



The Appropriate Technology Collaborative

Humanitarian Carbon Credits



Avoiding Carbon Through Humanitarian Solar Power Installations

Part 1, Program Description



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Humanitarian Carbon Credits

- A Win-Win-Win Program -

Offset your carbon footprint for \$10.00 per ton by helping rural Guatemalan families purchase solar home lighting systems to replace toxic and highly polluting kerosene lamps and paraffin candles. Avoid greenhouse gas emissions, help families get solar power and help local Mayan women earn a living so they can provide for their families.



Guatemalan Man With Kerosene Lamp

The Appropriate Technology Collaborative's Humanitarian Carbon Credit (HCC) program will help you avoid the equivalent of one ton of carbon dioxide* (notated CO₂e) for \$10.00 per ton.

Here's How It Works:

Your \$10 donation to The Appropriate Technology Collaborative's Humanitarian Carbon Credits program helps a family buy a solar home energy system and LED lights to replace kerosene lamps and paraffin candles. Right now homes without electricity burn candles and kerosene to see at night. The combined gasses released into the atmosphere have a "Global Warming

* CO₂e is carbon dioxide equivalent. It counts all the emissions from burning candles or kerosene and converts to the equivalent carbon dioxide in terms of global warming potential.

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Potential” equal to over 3 tons of CO₂ per year. (see ATC Carbon Credit Worksheet) Our solar power systems last at least 3 years in the field so each household converted to solar power saves over 9 tons of CO₂e. To be conservative ATC counts only 5 tons per household.

Every \$50 we receive will offset five tons of CO₂e and help one family purchase a home solar power system. But \$50 is not the total cost of a lighting system. Each family will contribute to the price of their solar power system with \$12.50. We take this measure in order to ensure that people value these solar power solutions, use them well and maintain them. We find that nonprofit handouts reduce the value of a product in the eyes of the recipient. Handouts are less likely to be properly maintained by recipients and more likely to be re-sold to others in exchange for cash



Family With First Solar Light

Transparency:

Each head of each household that purchases one of our solar kits will sign and affirm that they have received a solar home power system and that they will maintain the system as instructed.

These signed documents will be stored by ATC with redacted copies available online so people who donate can verify that their donations are being used as stated by the Humanitarian Carbon Credit program.

The Environment:

In addition to releasing huge amounts of CO₂e, replacing fuel based lighting with solar power and LEDs has an immediate impact on indoor air quality. Kerosene lamps and candles give off

carbon monoxide, volatile organic compounds and Black Carbon or soot. Carbon monoxide and most volatile organic compounds are toxic. Soot particles are small and hard for our lungs to expel thus soot accumulates in people's lungs, especially in the lungs of very young children and their mothers. Pulmonary disease from breathing indoor smoke is the #1 cause of death in children between the ages of 6 months to 5 years. [1]



With Solar Lights Kids Study At Night For The First Time

Family Benefits:

Families that you help purchase solar lighting systems take their first steps up the ladder out of poverty. LEDs are much brighter than kerosene lamps and candles. Children study at night for the first time. Women weave or work on needle point and have more handicrafts to sell in the market. Fathers and older children have extra time to help around the house or repair tools.

On a recent visit to check in on over 2 dozen solar homes I discovered several families had set up ad-hoc stores. Families with houses close to a road or pathway sell staples, snack foods, soap and women's hygiene products out of a window illuminated by a solar LED. When you have one of the only lights in a community you attract attention and families are quick to take advantage.

[1] Aiden, Aviva Presser. 2014. Clean Lighting Leads to Improved Health in Rural Africa, <http://nrs.harvard.edu/urn-3:HUL.InstRepos:12407604> , 04/02/2019



10 Watt Home Solar Power System



Solar Power Lesson

Community Benefits:

The families we serve live in rural communities and work as day laborers on nearby farms. They work long hours from early morning to after sunset. When the work day is done there is no place bright place to congregate and organize as a community. With just a few LED lights people gather at night and organize to advocate for themselves, their schools and their communities. With solar lights we have seen communities organize to petition for their rights.

Mayan Power and Light:

A portion of the cost of our Humanitarian Carbon Credit LED lighting systems is paid for by the families that receive the lights. The sales force selling and distributing the lights are from our Mayan Power and Light program. Your support helps MPL saleswomen earn a living and provide for their families. When women in less developed countries earn extra income most of their gains are spent on their families.

In western Guatemala over half of the children are so chronically malnourished that they grow up stunted. The extra income MPL women earn supports their families. Their children get better nutrition and there is enough left over for school books, soap to clean hands, shoes and the essentials for a healthy start in life.

Timing:

In order to get the best prices on solar home energy systems we need to wait till we have at least 50% of the funds required to purchase 200 solar home energy systems wholesale. We will update all donors with information from our Mayan Power and Light program in the interim.

Regardless, at the end of 18 months we will purchase as many solar home energy systems as are paid for by the HCC program and distribute them to families to ensure all donations offset the required greenhouse gasses.

Part 2, Program Assumptions
And Calculations



The Appropriate Technology Collaborative

RE: ATC Humanitarian Carbon Credit Assumptions and Calculations

Program Outline:

The ATC Humanitarian Carbon Credit program provides rural families that don't have electricity in the Western Highlands of Guatemala with solar LED lights. To offset part of the cost of these systems we sell every ton of carbon dioxide (or equivalent greenhouse gasses) for \$10.00/ton. Your purchase of a ton of carbon dioxide will help a family take their first steps out of poverty.

When a household in rural Guatemala switches from burning candles and kerosene lamps to solar power they avoid carbon dioxide and other emissions equal to over 1 ton (2,000 pounds) of CO₂e (shorthand for "carbon dioxide equivalent") per year.



One of the ATC Solar LED Light Study Participants

Our Humanitarian Carbon Credit program will avoid a minimum of 1 ton of CO₂e* emissions for every \$10.00 we receive. We calculate each solar replacement for candles and kerosene lamps avoids a minimum of 1 ton of CO₂e every year. Based on our decade of experience we estimate each solar power system will last 5 years thus each home we convert from candles and kerosene lamps to solar LED lighting will avoid 5 tons of CO₂e.

With each household we convert from candles and kerosene lamps to solar we require a signed document from the household affirming that they have received an 8 - 10 watt solar kit from The

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Appropriate Technology Collaborative Mayan Power and Light program. Signed documents will be scanned and saved for future reference in our Google Drive folder along with the names of each donor who contributed to the solar power system.

Please note: The household/family that receives a solar power system will pay a portion of the cost of their system. We believe the people we serve should contribute to improve their quality of life.



Kerosene Lamps Emit a Lot of Black Carbon Soot

Assumptions:

- We only count households that have no electricity before they receive a solar LED power system.
- Each household burns candles or kerosene for an average of 4.625 hours per day.[1]
- Each week a rural household burns 1 liter of fuel, either kerosene or paraffin.[2]
- Paraffin candles are equivalent to kerosene lamps (some studies use kerosene and paraffin interchangeably)
- The carbon dioxide emissions from a burning a liter of kerosene is 2.6391 kgs of CO₂ thus 2.6391kg/week x 52 weeks is 137 kg per year or 302 lbs.
- One lamp consumes 0.04 to 0.06 litres of kerosene per hour, and the daily usage at three to four hours. 1 litre of kerosene per week x \$1.00 USD= \$52.00USD/year. (Mills, 2002)
- Kerosene weighs .82 kg per liter. Thus each household burns .82 kg kerosene or paraffin per week.
- 7–9% of kerosene consumed by simple wick lamps is converted to carbonaceous particulate matter that is nearly pure Black Carbon [3] Black Carbon has a global warming potential (GWP) of 900. [4]
- Thus 7% of .82 kg is .057 kg Black Carbon per week or 2.96 kg Black Carbon per per year x 900 = 2,668 kg for 100 years. 2,668 kg = 5,881 lbs = 2.94 tons from Black Carbon alone!
- Total CO₂e from candles and kerosene lamps = 5,881lbs. from Black Carbon + 302 lbs. from carbon dioxide = 6,183 lbs total CO₂e.

Total CO₂e From Burning Kerosene and Candles = 6,183 lbs Per Year!

Each household converted from candles and kerosene lamps to solar LED lights avoids the equivalent of 2,237 kg carbon dioxide every year. We use the shorthand CO₂e to represent carbon dioxide equivalent.

Our calculations show over 2 tons of CO₂e per year per household. We are using 1 ton per year per household to be conservative.

* CO₂e is carbon dioxide equivalent. It counts all the emissions from burning candles or kerosene and converts to the equivalent carbon dioxide in terms of global warming potential.

[1] ATC survey of households in the Western Highlands of Guatemala show people use candles and kerosene for 4.625 hours per day.

[2] The \$230-billion Global Lighting Energy Bill, Evan Mills, Ph.D. Lawrence Berkeley National Laboratory

[3] Atmos Chem Phys. 2011; 11:1505– 1525.

[4] JOURNAL OF GEOPHYSICAL RESEARCH: ATMOSPHERES, VOL. 118, 5380–5552, doi:10.1002/jgrd.50171, 2013

Part 3, Sample Receipt
From Family



CARTA DE COMPROMISO

ATC-AEIDS Y BENEFICIARIOS DEL PROYECTO "EMERGENCIA VOLCAN DE FUEGO"

ATC-AEIDS y la familia _____, ante la situación de emergencia por lo ocurrido el tres de junio del año en curso, hacen un compromiso para hacer la entrega oficial de la donación de Tecnología apropiada que consta de lo siguiente:

1 Filtro de agua marca Sawyer y/o 1 lámpara solar

En virtud de lo anterior, ambas partes suscriben y firman la presente carta de entendimiento de conformidad con las siguientes cláusulas:

Primero: Compromisos de ATC -AEIDS

1. Informar acerca de la organización
2. Dar a conocer el funcionamiento del filtro de agua y/o lámpara donados a la familia
3. Dar orientación y formación a acerca de los cuidados que deben darse a los beneficiarios
4. Cubrir los gastos totales que conlleva la entrega del filtro de agua y/o lámpara solar.

Segundo: Compromisos de la familia beneficiada

Asistir y participar durante la capacitación organizada por ATC-AEIDS realizada el día de la entrega de la donación.

1. Participar activamente durante la capacitación.
2. Brindar información clara, precisa y real acerca de la familia y situación económica.
3. Dar el uso adecuado a la tecnología apropiada recibida.
4. Cuidar y dar mantenimiento constante de la tecnología apropiada para que tenga mayor durabilidad.
5. Informar si no es de su utilidad la tecnología, para apoyar a otra familia que si lo necesite.
6. En caso de movilización o cambio de casa, mantener la tecnología en buen estado para continuar con su uso.

Tercero: Cese de convenio

El presente convenio podrá darse por terminada o verse suspendida por cualquiera de las partes involucradas, mediante el envío de una notificación detallada y por escrito por parte del técnico de Insivumeh del lugar. La suspensión o terminación puede darse por las siguientes circunstancias.

- Por rescisión de mutuo acuerdo entre ambas partes
- Por incumplimiento de alguna de las partes en cualquiera de sus compromisos
- Por venta o mal uso de la tecnología apropiada por parte de la familia, esto debe informarse con evidencias

Quinto: Las familias autorizan al personal de ATC-AEID, donantes, padrinos y voluntarios, para la toma y uso de fotografías, grabación de videos, historias de éxito y el impacto del proyecto en la vida de las familias cualquier otro material que se requiera.

Estamos enterados de su contenido.

Fecha:

X _____
Representante de la familia
DPI:




Monika Goforth

Directora ATC