

# Understanding WER Carbon Offsets

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Available at [woodgas.org/resources](http://woodgas.org/resources)

## Part One

### Introduction to Juntos NFP, Woodgas TLUD Stoves and WER Carbon Offsets

#### 1.1 Introduction to Juntos NFP and TLUD Micro-gasifier Stoves

Juntos Energy Solutions NFP is an Illinois-registered not-for-profit corporation created for charitable purposes, especially those “to assist in the creation, design, development, marketing, and distribution of inexpensive clean burning cookstoves and fuel, particularly to enhance the environment and quality of life in poor and undeveloped parts of the world...” (Articles of Incorporation, 2013). Juntos NFP conducts business ventures that combine activities with public, private, for-profit, not-for-profit, government, and non-governmental-organization (NGO) entities, plus financial and service contributions of individuals and groups. Its goal is the worldwide resolution of numerous undesirable impacts of inferior cooking stoves. Its methods involve gasifier stoves and carbon offsets to assist 250 million impoverished households attain better lives.

Juntos NFP was created in 2013 by Paul S. Anderson, PhD, who serves as the Executive Director. Since 2001, Dr. Anderson has nurtured, named, refined, and promoted the innovative cookstove technology of Top-Lit UpDraft micro-gasification, widely known as TLUD (pronounced tee-lud); and he is known internationally as “Dr TLUD”. Using common, dry biomass (wood, corn cobs, dung, pellets, etc.), a TLUD stove creates its own gas-fuel (“woodgas”) for cooking while leaving behind charcoal valued for many purposes. TLUDs are internationally recognized as the cleanest burning of all stoves that use dry biomass fuels (ESMAP, Tech Rpt 007, 2015). And properly made TLUD stoves consume less than half of the fuel needed by smoky traditional stoves that are used in approximately half-a-billion impoverished households in Africa, Asia and Latin America.

The fuel savings and charcoal production from the use of woodgas TLUD stoves are ideal for earning carbon offsets. Note that it is not the stove itself, but the USE of the stove that yields the reduction of CO<sub>2</sub> into the atmosphere. For one model, known as Champion, a project that began in 2013 around Deganga, India has already established that one Champion TLUD stove in regular usage for one year generates four (4) Emission Reduction (ER) credits. The sales of carbon offsets are poised to potentially finance TLUD stoves in great numbers.

#### 1.2 Basics of Carbon Offsets

The prevention of one metric ton (tonne) of carbon dioxide (CO<sub>2</sub>) or its equivalent (CO<sub>2</sub>e) from entering the atmosphere can be a measured accomplishment with a marketable value and is called a “carbon offset.” Written as 1t CO<sub>2</sub>e, a carbon offset is recognized and documented by organizations and systems under two main management systems.

1. Certified Emission Reduction (CER) units are carefully verified by the UNFCCC, the only organization with a global mandate on the overall effectiveness of atmospheric emission control systems, established under the Kyoto Agreement.

2. Voluntary Emission Reduction (VER) units are managed with less rigidity. Several organizations have established their protocols and procedures.

CERs are the most regulated, most difficult to get approved, most numerous because they deal with large projects, and most expensive to get established (typically costing over \$100 K and a year or more of processing). To ease these costly pre-requisites, VERs have been created, but they are still annually verified and commonly involve over \$10 K and several months of processing before approval. Such procedures, including multiple reports, site visits and reviews, are expensive and commonly result in much (often most) of the carbon offset income being spent on administrative costs. Those costs can be appropriate when building and operating a hydro-electric dam with millions of CERs and VERs, but they are undesirably prohibitive when the reduced carbon emissions are accomplished by impoverished villagers when they are cooking on appropriate stoves.

Therefore, to financially favor the poor, to encourage carbon offsets for smaller projects, and to expedite the delivery of benefits to impoverished households, Juntos NFP has initiated a very specific set of carbon offsets called “Woodgas Emission Reduction” (or WER) units or offsets. WER units are not CER or VER emission reduction units.

### **1.3 Introducing Woodgas Emission Reduction (WER) Carbon Offsets**

The carbon offsets that are available from Juntos NFP are known as Woodgas Emission Reduction (WER) units or carbon offsets. Note that these terms are originated and introduced by Juntos NFP, a not-for-profit registered corporation dedicated to the advancement of TLUD micro-gasification for the benefit of impoverished people. **Juntos NFP and the Woodgas Institute (Woodgas.org) are working to promote WER and related nomenclature for climate benefits generated by woodgas projects because they distinctly use pyrolysis to create woodgas and charcoal.**

Each WER unit represents a one-ton reduction of CO<sub>2</sub> emissions (or equivalent), exactly the same amount of reduced emissions as the well-known CER and VER units. **The vigilance of Juntos, under the direction of Paul “Dr TLUD” Anderson, is the basis for confidence that WER carbon offsets are real and valid emission reductions, with optional third-party verifications to be arranged, welcomed, and announced at the Juntos NFP and Woogas Institute websites.**

WER units are based on emission reductions accomplished by the use of TLUD (pronounced tee-lud) micro-gasifier cookstoves and related char-producing technologies. TLUD stoves are already in use in projects that issue and sell CER and VER units of carbon offset credit. A report about one such project around Deganga, India, is found at: <http://drtlud.com/deganga-tlud-project-2016> . The initial Juntos NFP project and WER offsets are from the use of the exact same TLUD stove in a different area of the same state in India, and with the same methodologies and activities for project implementation.

### **1.4 Characteristics of WER Carbon Offset Units**

1. Each WER unit is created by standard and sustained use (cooking) with a TLUD stove that is specifically included in a designated WER Project for which Juntos NFP provides leadership and information (eventually to be displayed on the [JuntosNFP.org](http://JuntosNFP.org) and the [woodgas.org](http://woodgas.org) websites).

2. Note that it is not the sale of the stove, but it is the USE of the stove that generates the carbon offset. Therefore, some sales of TLUD stoves may not result in creation of WER offsets.

3. One WER per year is the same as 1/12<sup>th</sup> WER per month. Therefore, each of these stoves that generate four WERs per year is generating one WER unit in each three months of use.

4. TLUD stoves are increasingly attractive to people who are further down on the poverty scale, and those people are the ones most likely to use TLUDs daily. WER-financed TLUD stoves are not trying to compete with LPG, electric, alcohol, biogas or solar cooking when marketing is on a level (non-subsidized) playing field to people with moderate financial means. TLUD stoves with WER credits are targeted to the BOP (Base of Pyramid) households that are LEAST ABLE TO AFFORD such clean-burning stoves and are currently and in the future dependent on dry biomass as their household fuel. And those households receive the most benefits from the Juntos NFP efforts and WER financing.

5. Woodgas TLUD stoves in WER projects approved by Juntos NFP and the Woodgas Institute are never given away, but are always earned eventually, such as by offering very favorable arrangements for the BOP and the use of WER carbon offsets.

6. In order to generate the carbon offsets, impoverished people who cannot afford the TLUD stoves need to have the stoves in their houses and in use. This is the proverbial “chicken or egg” dilemma that is made worse by the need to pay the stove manufacturers at the start of the stove usage. The solution devised for Juntos NFP activities is to offer WER carbon offsets for sale BEFORE the carbon reduction is actually generated. In some ways, this is like CER and VER units sold for hydro-electric projects and re-forestation efforts that have emission reductions many years later.

7. Unlike CERs and VERs that can be traded and can have changing values over time, WER units **cannot** be traded and are considered to have been “used” (consumed or “retired”) at the moment of purchase. This prevents speculative business practices.

8. WERs are sold at a set value and are associated with a specified carbon offset for the purchaser. This reduces speculation and price fluctuations. However, the WER purchaser who believes that the cost of purchasing carbon offsets in the future would increase can save money by making additional purchases now, but even advance-purchase WERs cannot be sold to a third party later because they have been recorded in the registry as “retired early”.

9. EXPLANATORY NOTE: The above items 6, 7, and 8 can also be expressed in different words. For example, consider that the purchaser pays a specified price in advance for four WERs and is to receive two WERs at the end of the first year of stove use and the second two WERs at the end of the second year. That would have been like an interest free loan for two years, with repayment in the form of WERs. If those WERs cost US\$20 (example of original price) but the value of the WERs one and two years later were double that value, the cost to the purchaser did not increase, and the purchaser is appropriately advantaged. And if the price dropped to half, the purchaser still receives the 4 WERs for the price that was originally paid. In either case, the purchaser helped one or more impoverished families obtain TLUD gasifier stoves and associated benefits that were beyond their reach without the advanced purchase of the WERs.

10. Through maintenance, repairs and replacements that are covered by a combination of the manufacturer’s guarantee plus sales-staff service plus some possible payments by the users, every stove will be functional for the entire duration of the WER project, typically seven or ten years. A stove that is not in use represents the loss of WER units that it could have provided; therefore, everyone is engaged in keeping all the stoves in use. This is a key to sustainability.

11. Because each stove has a unique serial number and is registered through Juntos NFP to a specific household, stoves cannot be sold by the user unless it is sold back to the Juntos NFP project. Because the stove price is initially subsidized to allow early placement in many more households, any

stove that is not being utilized can be reclaimed by the WER project for the price the user originally paid (perhaps discounted based on years of use). Stoves that are not being used appropriately are removed from the project listing of active stoves and do not earn WER offsets.

12. Because of the very explicit purpose of the WER carbon credits, and because the basic operational units are small (\$40 for one stove and \$20 for one carbon offset), and because WER-project stoves are individually identified with a serial number, the procedure for individual persons or entities to sponsor specific stoves and purchase project-specific carbon credits can be arranged if merited, such as sponsorships of specific communities by specific donors/sponsors/WER purchasers.

## 1.5 Only TLUD Stoves are Funded by WER Credits

The main reason only TLUD stove can receive WER credits is that TLUD stoves are better than alternative stoves.

1. An authoritative categorization of cookstove types jointly published by the Global Alliance for Clean Cookstoves (GACC) and the World Bank's ESMAP (Tech Rpt 007, Fig. 1, 2015) identifies the gasifier stoves (TLUD, TChar, and Fan-jet stoves) as being ***the only wood-burning stoves*** in the category of modern "Advanced Cooking Solutions." [See: <http://www.drtilud.com/wp-content/uploads/2017/04/Stove-Classification-2017-04-10.pdf> ] These gasifier stoves are cleaner burning than any other stoves burning solid fuels. They are not perfect, but gasifiers are undoubtedly the best biomass-burning stoves for reduced Household Air Pollution (HAP) and greater health benefits.

2. TLUDs are quite efficient, using less fuel than traditional (Tier 1) stoves. Some other biomass-burning stoves (mainly Rocket stoves) also have high fuel efficiency, but they do not create recoverable charcoal and are not as clean-burning.

3. TLUD stoves are the only stoves that produce plentiful charcoal that can be easily recovered. Charcoal collection is crucial in the WER carbon offset system for two reasons:

- a) Collection of the char is one major way to confirm that the stoves have been in use.
- b) Charcoal is the avenue for the generation of half of the WER credits.

4. The Champion TLUD stoves (and probably many other TLUD stoves) have already been researched and documented by field work in India to generate four (4) carbon offsets per year of use. Four is a higher number than the carbon offsets given for rocket stoves, improved charcoal-burning stoves, and other types.

Note: TLUD stoves have other favorable attributes, including simple construction, relative low cost, ability to use many types of dry biomass as fuel (less deforestation), significantly reduced HAP, and consistent flames with reduced fire tending. Although these characteristics are of secondary or no importance when determining the validity to issue carbon offsets, these reasons could be the primary reasons why some supporters of TLUD advanced cookstoves choose to purchase WER carbon credits.

## 1.6 Pricing of WER units

"Beauty is in the eye of the beholder." The value of any carbon offset, whether CER or VER or WER, is subject to the perceptions and emotions of the buyers. The prices of CERs and VERs are whatever is negotiated between the buyer and seller. Historically, carbon offsets have higher market prices if the offset-generating activities have socially and morally higher collateral rewards for each tCO<sub>2e</sub> (such as water wells and cookstoves for impoverished people) than if they are for less-personal

activities such as hydro-electric dams and massive reforestation projects. That favors higher prices for the WERs that are for cookstoves for BOP (Base of the Pyramid) households.

Prices as high as US\$50 per carbon offset have been suggested for cookstove projects by the US EPA. Sweden has some carbon offsets that cost over US\$150 each. In California, carbon offset projects are found with prices of \$12. On the other hand, some CERs and VES have been traded several times and have values less than \$3.

Because Juntos NFP wants to maximize the number of TLUD stoves put into use by households, a reasonable, low price has been set. As an informed but still arbitrary decision, Juntos NFP has set the price of each of the initial 100,000 WER credits at US\$20, which is a total value of two million dollars. This amount will fund the purchase of 50,000 Champion TLUD stoves that cost \$40 each, which will then generate the WER carbon offsets that will pay off loans and provide funds for project expansion.

## 1.7 Initial Woodgas (WER) Projects by Juntos NFP

Actions speak louder than words, so Juntos NFP has already (October 2018) started a WER project in the community of Hingalganj, West Bengal, India. See project information at the Projects page at [JuntosNFP.org](http://JuntosNFP.org).

# Part Two: Financial Issues of Juntos NFP and WER Offsets

## 2.1 Financial operations of a WER project.

Every Juntos NFP cookstove project with WER financial assistance involves several financial operations, including:

- A. stove acquisition,
- B. initial-year costs,
- C. stove sales,
- D. annual continuation costs (support for second and later years),
- E. macro-administration costs,
- F. return-on-investment (ROI),
- H. externalities, and
- I. sources of funding.

**A. Stove acquisition:** The stoves are not free. Somebody must make them and be paid for the materials, labor, overhead and production profit. If manufacturing has been already established within geographic range to supply the needed stoves, the start-up costs are substantially lower than in areas just starting to introduce woodgas TLUD cookstoves. Stove supply issues can be highly variable and must be resolved for each project location.

With production capacity organized, there is a known price for each stove. For the Champion TLUD in India in 2018-19, that price is around US\$36, at the factory door. To include transportation and initial project costs, the price per stove for WER projects is set at \$40. One hundred stoves cost \$4000 and must be funded up front before a convincing pilot project can start. Similarly, a 10,000-stove

project needs \$400,000 just to have the stoves available to be in use in the first year. If the TLUD is equipped with fan assistance, the factory price might be \$50 to \$70 per stove.

A successful WER project starts with having available and in use a sufficient concentration (critical mass) of TLUD stoves into a small area. This is not a trivial matter. And when the stove-user population is readily accepting the stoves and even forming waiting lists, the stoves are needed very soon, not years later. In the Hingalganj area, where there are 50,000 candidate households and expectations of over 50% adoption, the up-front funding requirement for 25,000 stoves would be one million dollars to have the stoves available. Even a 5-year project would need US\$ 250,000 per year for this one district in one state in one country. Fortunately, the results merit the expenses. But the importance of having the necessary capital must not be underestimated. Cash flow is an issue even when future repayment is assured.

**B. Initial-year costs:** The project has marketing and sales-commission costs to reach the household. Also, new users of TLUD stoves need support while learning stove usage, fuel preparation, guaranteed stove maintenance and some administration necessities. Local persons (often the same as the salespeople) are employed to accomplish those three services, plus the charcoal buy-back business (“earn-while-you-cook”). The expense for the stove-sale-and-support services and activities in the first year of operation is approximately US\$19.

**C. Stove sales:** This is an income item. Each household that receives the subsidized (\$40) TLUD stove (item A above) pays directly (\$19) for the sales and first-year support services (item B above) in the Deganga and the Hingalganj projects. This is the only payment by the household, and it will be fully refunded if requested (which virtually never happens). The household adult signs a contract to use the micro-gasifier stove instead of its traditional cookstove.

**D. Annual continuation costs** (support for second and later years): The sales/support personnel (B and C above) need to be active in the area throughout each year. They reach every stove owner every month for charcoal purchasing, record keeping, minor maintenance, supplemental sales, instruction, and motivation for the continual usage of the stoves. This requires \$10 per stove (or 80 cents per month), which is to be covered from the sale each year of the carbon credits. At the October 2019 price of US\$20 each for WER carbon offset, that is equal to one half WER offset unit per stove per year. Without this expenditure, there soon would not be any carbon offsets in future years. For a project with 10,000 stoves, that would be \$100,000 used for job creation and services in the local area each year. Using actual results from Deganga, that becomes about 70 jobs averaging \$3 to \$4 per day, with many people wanting to have those jobs

**E. Macro-administration costs:** Juntos Energy Solutions NFP has responsibility for the overall administrative duties and expenditures. This includes managing agreements, licenses, legal fees, necessary verifications of the reductions of CO2 emissions, expansion planning beyond the active local areas, and promotional efforts about WERs. In the initial years of operations, Juntos NFP will utilize the equivalent of one-half carbon offset (WER) per stove per year. Any surplus of funds, especially as the project becomes larger, will be redirected into the Juntos NFP efforts. Because Juntos NFP is a registered Not-For-Profit entity in the State of Illinois, USA, its efforts and expenditures must be utilized for the advancement of woodgas stoves.

**F. Return on investment (ROI):** The issue of ROI raises the questions of “what investment”, “what risk”, and “who gets the money.” The major investment is if there are loans to acquire the \$40 stoves to be provided for the households. Juntos NFP can pay reasonable interest rates, and the sales of the carbon offsets should cover the repayment within two to four years. Clearly, it is the people who

use the stoves who are the ones creating the woodgas carbon emission reductions (the carbon offsets) that are being sold. ROI is an open topic for discussion.

**G. Externalities:** Some unanticipated expenses are likely in any new project, especially one with potential for worldwide applications. The broad scope covers uncharted territory, both figuratively for administrative issues and literally for geographic territory and for reaching the “last mile.” There is no specific budget for contingencies and externalities. Awareness is the best preparation at present.

**H. Sources of Funding:** (Discussed in later sections.)

## **2.2 Example of the cash flow for 500 TLUD stoves financed with WER carbon offsets**

The specific, ongoing activities discussed are in Hingaljanj, West Bengal, India. Five hundred stoves are sold in August – September of 2018. They are used regularly, generating four TERs per stove in each year of operation. The issues of manufacturing and local project implementation (personnel, facilities, etc.) are resolved. [Totally new projects in new areas require these preparations, and others discussed later.]

To initiate a project with 500 TLUD stoves, the sum of \$20,000 was gathered from several sources as private loans requiring repayment. Alternatively, the advanced purchase of 1000 WERs @\$20 each (\$20,000) would also be appropriate. The Indian rupee equivalent of about \$18,000 is paid to the manufacturer, and \$2000 is available for the WER Project account for mainly assisting this and other new projects.

[Note: Under similar conditions, an additional 250 stoves were put into the project in June 2019, but they are not included in this example because they are just beginning their first year of use.]

The 500 stoves are trucked to the Hingaljanj project area and sold to 500 households for \$19 each, generating \$9500 to cover stove transport, marketing, sales commission, user training, record keeping regarding each household, and the operation of support facilities (including maintenance) for the first year of operation.

By the end of that first year of operation, 2000 WERs were created and are entered into the WER registry of emissions reductions, sometimes called the WER Exchange. They became available to be acquired as of late October 2019, at US\$20 each, or a total of \$40,000.

There is a four-way (A-B-C-D) split of those incoming funds:

A. Loan repayment: Because the stoves were purchased from the factory with \$20,000 borrowed funds, \$10,000, (50% of the borrowed money) is used for partial repayment. This corresponds to 500 WER x \$20.

B. Continuation of services: The sum of \$10,000 (500 WER x \$20) is split in half for the second year of service and project maintenance by the Implementation Partner in India (500 stoves x \$10), and half into a Juntos NFP reserve account for verification and certification actions as conducted as the project progresses.

C. and D. The remaining 1000 WERs generate additional funds to purchase additional stoves for project expansion, directed by Juntos NFP. When the projects are more established, some of the funds could be for the community where the stoves are in use, eventually to include additional benefits (such as water wells, health services, and education).

The above cost and revenue breakdown is feasible when the value of each TER remains at US\$20. If the price goes down or if the WERs are not sold, there can be difficult times (discussed in

section 2.5). This is a risk undertaken by Juntos NFP and any creditors. But if the WER values increase, the net increase goes for purposes of project expansion, handled by Juntos NFP (the parent and not-for-profit entity).

### **2.3 Scaling the WER financial methods of Juntos NFP to reach larger numbers and more areas**

This section is based on the assumption that legitimate (sufficiently verifiable) WER offsets will attract sufficient buyers, and that the WER carbon offset price will remain at US\$20.

The WER carbon offset financing plan of Juntos NFP calls for up-front money to purchase appropriate TLUD stoves to get them into use in WER-backed projects of various sizes. Projects are the keys. The Hingalganj Project is a good example. It is better to have focus points for growth. To reach all of the Hingalganj area, the project started in the east after favorable results from introductory demonstrations. 500 stoves were sold in the first six weeks. An immediate goal is to reach 10,000 households during 2020. With sufficient funding (donations or loans) the project could initiate 10 other such zones, with total targets of 100,000 households, reaching about 50% of the households within 4 years.

100,000 household @ \$40 per stove requires \$4 million to be paid for manufactured stoves, but it is expected that repayment could be covered by surplus income that starts one or two years after the stove purchases. But by year four, 100,000 stoves are generating 400,000 WERs that are expected to be selling for \$8 million PER YEAR. Everyone reaps benefits: stove makers, local sales and support persons, families with better stoves that save them money and improve their health and comfort, and the overall Juntos organization that is dedicated to expanding TLUD access to reach 250 million households. And of course, there would be 400,000 fewer tons PER YEAR of CO<sub>2</sub> in the atmosphere.

Success breeds success. Not everywhere, but wherever the conditions are appropriate and adequate regarding fuels and households and support structures (manufacturers, area organizers, local labor, record-keeping administration, and initial capital). Every project location starts small, with pilot studies, but that can be quickly accomplished with Juntos NFP guidance. Whether in India, Nepal, Bangladesh, Uganda, Kenya, Ghana, Haiti, Guatemala, Peru or other countries, if the pre-requisites are in place and the families are receptive, WER projects similar to the West Bengal experiences can begin.

- a. Some areas will have different designs of TLUDs that have been accepted by Juntos NFP.
- b. All areas will have local people in the implementation teams.
- c. Most areas will have start-up funding that is targeted to the specific country, bringing in the national and district governments, the NGOs and churches that are already working in the areas, businesses and investors inside the country, and of course, the local people in their households with adaptations to make TLUD cooking appropriate for their local culture and conditions.

Right now, (November 2019), the WER project focus is on Hingalganj. By March 2020, much more will be known, including lessons from the anticipated next-round of pilot projects. Soon after, there could be training sessions on all aspects of WER project implementations for interested locations. Each location needs to find financial backing only for itself. As the world community awakens to the issues of climate change and the Paris Agreement (2016), literally hundreds of millions of carbon emission reductions need to be registered. [Note: If this is not the case, then climate change will progress unchallenged with escalating consequences, and eventually the need for these carbon offsets will be realized.]



## 2.4 Funding Options in Addition to Selling WER Carbon Offsets

The TLUD stove projects such as in Deganga and Hingaljanj and eventually elsewhere in the world need not be solely dependent on WER carbon credit funding. Beyond carbon offsets, options include donations, government funding, corporate sponsorships, loans, and local community self-funding. Financial security of investments and loans into Juntos NFP projects with WERs relate to the following:

1. The advancement of the woodgas TLUD stoves is dependent upon sufficient funding to purchase the stoves from the manufacturer(s). In general, the amount of US\$40 per stove is appropriate. Therefore, 25,000 stoves need an up-front grant, investment, or loan of \$1 million. In fact, the goal of 250 million TLUD stoves would require 10,000 loans of one million dollars each. There are easily 10,000 multi-multi-millionaires across the globe who could each handle one or a few million-dollar loans.

2. Grants and donations are wonderful. But they are unlikely to be sufficient, even if national governments generously helped each family at the base of the pyramid (BOP). Consider the Polio eradication efforts initiated by the Rotary Foundation in 1985 that have raised a few billion dollars from Rotarians, Gates Foundation, WHO, UNECEF, in-kind participation by CDC and other nation-based entities, and local participation. That has been a thirty+ year effort. Cookstoves should not take that long, but are unlikely to get similar grants. But one multi-billionaire could step forward and dramatically improve the well-being of millions of people.

3. Investments and investors would need to be analyzed. It is one thing to help alleviate smoky stoves and energy poverty; but it is something different when the “help” is only on terms of financial gains for those who already have control of so much money. Junto NFP will not be “selling out” to venture/vulture investors. Investors seeking equity might consider TLUD stove manufacturing enterprises.

4. Loans of a million dollars at zero or low interest can be repaid during a period of three years if the lender accepts to be repaid by the proceeds from sales of carbon credits. And if the lender needs carbon credits for business or personal reasons, the investment is virtually guaranteed by the lender’s own purchase of WERs. For example, a corporation such as a major airline could sponsor (guarantee) the production and placement of one million woodgas stoves in its home country or countries of its choice (and possible major destination). Within a few years of diligent appropriate implementation, that would represent the following:

- a. Investment of US\$40 million,
- b. Generation of 4 million Woodgas Emission Reductions per year, to offset the emissions of jet airline travel by that airline. That would be 28 million WER t CO<sub>2</sub>e in 7 years, with multiple possible renewals as a continuing 7-year project,
- c. Possible recovery of the funding by selling the WERs to travelers using that airline.
- d. And all of the additional benefits (beyond carbon offsets) for family health, income improvement for impoverished families, woman enablement, and woodland and wildlife preservation.

[Note: Annual airline CO<sub>2</sub> emissions are almost 900 million tons, or the equivalent of what 225 million woodgas stoves could offset every year. Certainly, a worthy goal to consider.]

And if the lender wants back his or her money, the only risks to the lender is if the market value of carbon offsets drops below US\$10 or if nobody wants to buy any (in which case, climate change alters the world, and everyone loses).

As structured for the TLUD stove projects, basically a quarter (1 of 4 WERs) of the cash value of Woodgas Emission Reduction (WER) carbon offsets at \$20 each are designated to repay the lender for a period of 24 months (8 fiscal quarters) within a 3-year period. That becomes two WERs, and with the nominal value of each WER set at US\$20, the full loan of \$40 per stove can be covered. The question of Juntos NFP offering to pay interest on that money (at 1% to 10% per year) has not been resolved and is open for discussion with potential lenders.

## **2.5 Notes on assurances, “profits” and risks:**

### **A. The WER units are created** (by stove-user activity):

1. Each WER unit has a declared value of \$20 when sold (as of October 2019), resulting in the loan being repaid in two years, without interest, or shortly thereafter if some interest is to be paid.

2. If the value of each WER drops to only \$10, and \$2.50 is subtracted for assure the project support is continued, then the net funds for loan repayment is \$7.50. 4 WER per stove x \$7.50 equals \$30 in two years. But in the third year two additional WERs (\$15) could be allocated for loan repayment (becoming \$45), closing the loan with \$5 extra payment per stove (12.5% of \$40 over 3 years, or 4.16% interest per year).

3. If the value of WERs is less than \$7.50 each, the lender will receive back the value of half of the WERs sold per year for up to seven years or for the life of the project, whichever is shorter, up to the total value of \$45 per stove.

4. If the value of WERs is greater than \$10 each when sold, the lender receives the value of four (4) WERs during two years, but not to exceed the amount of \$50 per stove (which would be a profit of 25% if within a period of one year.)

Note: WERs are intended to be equally as safe as CER and VER carbon offset financing, but WERs are only available in ways that avoid speculation and profiteering from carbon markets.

**B. If the WER units are not created**, or those created are insufficient in number. Something has gone wrong with the project for which the loan was made.

1. The lender will receive back the value of half of the WERs created each year for the life of the project, up to the total value of \$45 per stove.

2. If B.1. above is not sufficient, and IF (this would be a requirement) the project has been approved by Juntos Energy Systems NFP (which is the authorizer of all WER credits), loan repayment funds could (subject to review and authorization by the Juntos NFP administration) be provided from the Juntos NFP part of the funds that have been derived from other WER projects by Juntos NFP. The maximum repayment would be \$5 per stove in excess of the amount lent to the WER project.

## **2.6 Self-funded WER projects.**

Recommended approval: Juntos NFP or Woodgas Institute written approval in advance is recommended for any project that uses the WER (and Woodgas Emission Reduction) designation and/or Juntos NFP consulting, endorsement, materials, or possible project management. Please note that Juntos NFP is a not-for-profit corporation dedicated to the well-being of impoverished people, not to the wealth accumulation of those who are already financially sound.

Scenario 1: A sponsor for an area: An identifiable geographic area that is a candidate to have a TLUD stove project is selected by a sponsor (such as a large church group that is active in the area) who will cover the stove acquisition and placement costs and is not expecting direct recovery of the funds. The stoves may be sold (with the funds returning into that project's account) or distributed for a nominal fee in an appropriate way (such as to church members or to the entire community equally). For multi-year continuity with service and maintenance, a payment of \$10 per stove is required at the start of each subsequent year. This continuity money can be obtained via the sales of WER carbon offsets because Juntos NFP has a role in the proper verification, registration and retirement of all WER carbon offsets.

Scenario 2: Corporate sponsor seeking WER offsets: A business with many employees who could benefit from TLUD cookstoves in their homes can discuss with Juntos NFP ways the company could provide the stoves and obtain the WER offsets for its own carbon reduction objectives. In this case, all the WERs are pre-purchased by the company. All options are open regarding how Juntos NFP could assist with methodology, records, WER verifications, and services to the employees who, because they are using the TLUD stoves in their homes, should have more financial benefits than merely being presented with a stove and told to use it. As stated earlier, WER offsets are earned by USE of a TLUD stove, not by purchasing the stove. If properly done, corporate sponsorship for WER offsets could be quite beneficial to the company and to all concerned.

Scenario 3: Community self-help: Juntos NFP can assist a community of sufficient size that organizes its own funding (such as bank loans) for the stove purchases and then contracts Juntos NFP for WER-related services.

Scenario 4: Individual and small-group purchases of TLUD stoves: Essentially independent and/or isolated TLUD stove usage cannot be adequately supervised and documented, so WER credits would not be available unless and until a critical mass (minimum number) of stoves has been reached and appropriately organized. With proper record-keeping, the users of non-affiliated appropriate TLUD stoves could join an existing WER-approved group. These cases will be considered at later dates by the Juntos NFP and Woodgas Institute leadership.

## **2.7 Joining into Existing Concentrations of TLUD stoves**

This will be considered by the Juntos NFP leadership when appropriate.

# **Part Three: Additional Topics about Juntos NFP and WER Carbon Offsets**

## **3.1 Establishing Four WER Carbon Credits per Champion TLUD Stove**

Using the well-documented data from the Deganga project, each Champion TLUD stove in use for one year generates four (4) WER units, the equivalent of four tCO<sub>2</sub>e. Two of the WERs are from the greater-than-50% reduction of fuel (wood) for cooking, compared to traditional stoves that are of mud or are three-stone fires.

WERs (and CERs and VERs) are **not** associated with the reduction of household air pollution (HAP, commonly called smoke) and any resulting health benefits, which themselves are important reasons to have the TLUD stoves in each household. [Recommended reading about health and clean stoves: “Cooking Should Nurture, Not Kill.”

<https://www.fhi360.org/sites/default/files/media/documents/resource-washplus-cooking-nurture.pdf> ]

The other two WERs are created by the TLUD production of significant amounts of charcoal (or char), a stove operation byproduct which is over 85% carbon. A typical household using a TLUD stove for cooking produces approximately 800 g (1.8 pounds) of char per day (from about 4 to 5 kg of wood fuel). In the cited Deganga project, this char is purchased every four weeks (approximately 20 – 25 kg) from each household. The Deganga project earns two carbon credits by selling the char to replace the inefficiently made traditional-style charcoal that is burned by restaurants and small industries such as makers of incense sticks. Selling to that market is a requirement of the CER – VER Deganga project, but not a requirement (but is the current practice) in the WER Hingaljanj project.

The values of char being placed into soil for improvement of soil texture, better water retention, saving of nutrients, hospitality to micro-biota, reduction of methane release, and other benefits have *not* been mentioned, but are additional to the value of carbon emission reduction.

### 3.2 WER Carbon Offsets for Biochar into Soils

Charcoal has many potential uses which may or may not directly relate to reductions of CO<sub>2</sub> emissions. On a strictly chemical basis, the daily TLUD cooking yield of 800 grams of char (that is about 80% fixed carbon) approximately equals 0.65 kg of fixed carbon per day, or 2.4 kg CO<sub>2</sub> per day, or 870 kg/yr. This is the same as saying that nearly 300 kg per year of char approximately equals almost one ton CO<sub>2</sub> sequestration/yr, which is nearly one carbon credit if the char is not burned. To declare it to be equivalent to two credits (as in the Deganga activities described above) requires understanding of the CER/VER concept of “additionality.”

“The concept of additionality addresses the question of whether the project would have happened in the absence of an intervention in the form of the price signal of carbon credits. Only projects with emissions below their baseline level, defined as emissions under a scenario without this price signal (holding all other factors constant), represent a net environmental benefit.” [Wikipedia: [https://en.wikipedia.org/wiki/carbon\\_offset](https://en.wikipedia.org/wiki/carbon_offset) .]

What is “additional” for the Woodgas TLUD-created char is more than merely replacing of the inefficiently-made traditional-style charcoal that is burned by restaurants and small industries. TLUD char is about 80% to 85% “stable carbon” that will not reenter the atmosphere for hundreds (or perhaps thousands) of years unless it is burned. With the exclusion of scientific laboratory processes or millions of years of geologic compression to create fossil fuels, the production of stable carbon (char) is **only possible** via the thermo-chemical process of pyrolytic carbonization of biomass (carbohydrates). Fortunately for the welfare of our planet, char creation can be easy and economical, as shown by the Woodgas TLUD “char-maker” cookstoves.

Said in different terms that relate to climate issues, TLUD charcoal production is “carbon negative” and makes carbon sequestration economically possible by simply making the char “unburnable” by mixing it with soil or compost, a **carbon negative** action. This results in virtually permanent **drawdown** of atmospheric CO<sub>2</sub>. That is, it is not simply a reduction or avoidance of emissions of CO<sub>2</sub> associated with CER and VER offsets for making a replacement of traditional charcoal.

To recognize the value of carbon drawdown, Juntos NFP unilaterally declares either:

- a. Two WER units are created by the char production of TLUD cookstoves, or
- b. The dollar value for the 300 kg of charcoal is double the dollar value of CO<sub>2</sub> gases, if rendered unburnable, such as being used as biochar.

Either way, the financial value of the created char is equal to two carbon offsets. Alternatively stated, one “Biochar Offset” that has twice the value of a carbon offset. Both carbon offset and biochar offset can NOT be claimed for the same carbon atoms.

Note that additional biochar benefits (some still being studied and debated) of water-retention/drought-resistance, securing soil nutrients, etc., are not factored into the Juntos NFP decision to give higher value to char to be used as biochar.

Furthermore, the sequestration takes place once but has climate benefits for every year that it stays in the soil. It is the opposite of burning an equivalent amount of fossil coal or oil which puts its CO<sub>2</sub> into the atmosphere where it causes warming year after year after decade after century. The “atmospheric value” of biochar should be 10 or 40 or 100 years, with appropriate payments for the sequestration.

Someday the world might increase that value of carbon sequestration. Because CERs and VERs currently (2019) give no credit for carbon sequestration by making unburnable the charcoal that has been produced in TLUD devices, WER units are truly carbon removals (not just carbon offsets) that recognize monetarily this valuable addition of biochar to the ways to combat climate issues. They are in line with “CORC”, the “Carbon diOxide Removal Certificates” being auctioned by [www.puro.earth](http://www.puro.earth).

### 3.3 About WER Certificates

Similar to what is done with the sales of registered CER and VER carbon offsets, documentation will be provided for registered WER carbon offsets, known as “WER Certificates”.

1. On each legitimate WER certificate appears the logos of the Woodgas Institute, CharTrac, and Juntos NFP. These are proprietary designations and cannot be used by anyone without written permission.

2. Creation: Each Woodgas Emission Reduction (WER) unit has a value of one carbon offset (1 tCO<sub>2</sub>eq) that is specifically created and entered in the CharTrac Registry in cooperation with Juntos NFP.

3. Retirement: Each WER that is purchased is eventually reconciled to a specifically-designated stove-use as an Emission Reduction or carbon sink (properly buried char). The registered WER unit is marked “retired” in the CharTrac Registry. WER certificates **cannot** be traded. Having been issued as the offset of a specific emission by the original purchaser of the WER, the issued WER has no monetary value once it is reconciled and retired.

4. Any WER unit that is sold in advance of its actual creation will be properly noted for “early retirement”.

5. WER Certificates will be issued by Juntos NFP and any properly registered project owner who provides data for its CharTrac Registry.

## 4.1 Conclusion

This document provides an introduction to Woodgas Emission Reduction (WER) offset units. WER units are possible only because of the relatively new TLUD technology and TLUD stoves. There is still much to learn. Your participation and support are greatly appreciated!!!

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About any of this, please send comments and suggestions to Paul Anderson [psanders@ilstu.edu](mailto:psanders@ilstu.edu).  
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THANK YOU!!!