

# THE GRENADA PROJECT: PROTEIN FROM WASTE & LOCAL CROPS

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## **The Protein From Waste Project's Vision Statement:**

**To enhance Grenada's food security, workplace opportunity and it's environment by converting it's waste into useful products that will reduce the need for imported food and energy while creating employment opportunities that did not previously exist.**

## Protein from Waste & Local Crops ~ Project Concept

**Protein From Waste and Local Crops (PFW)** is a model project that addresses three aspects of importance for small countries struggling to: reduce imports [specifically food and fuel], create employment in sustainable livestock agriculture and recycle noxious waste products heretofore not utilized or neutralized. In May of 2012 the project produced it's first product, a fish meal based high protein supplement that has been lab tested and proven to be very valuable (protein is by far the most expensive component in animal feed). This was achieved using all free inputs including fuel.

This site will explain the process and will attempt to show in pictures and in words what has been done to date. The purpose of this is to attract a final round of funding to put the PFW plant into production. The Grenada Project, a small NGO has spent \$300,000 accomplishing PFW's 'proof of concept' status. Production will require trucks, tanks, pumps, bins, elevators, condensers and spares. All the major unknowns are behind us and what remains is quite conventional and with proper funding, easily acquired and assembled.



“Equipment pre-assembled”

In 2008 the machinery of the PFW plant was pre-assembled in a factory in North Carolina (first 2 Photos) so that when actual assembly took place in Grenada there would be no snags created by a lack of preparation. All the pieces were then carefully labeled and disassembled and packed into sea going containers for the trip to Grenada. The equipment shown includes a boiler (dark green) that makes steam which provides cooking heat to a 5000 liter “cooker” (bright aluminum) that will process waste into Protein Supplement. The last photo shows the disassembled cooker being loaded into the container for shipment overseas.

**Impacts of the Protein From Waste and Local Crops Project:** 1. Utilization of the [unfortunately renewable] waste oil as a fuel to do process work. 2. Recycling of much of Grenada's organic waste products that are currently 'landfilled.' 3. Creation of employment for 6 on site. Creation of profitable livelihoods for 100's of farmers. 4. Improving Grenada's food security. 5. Reducing Grenada's imports [95% of poultry, the most popular meat is imported]. 6. Reducing fuel imports. 7. Reduced feed imports 8. reduced carbon footprint. 9. Reduced land and sea and air pollution.



This is the new PFW plant. The building was assembled with a U.S. made prefab roof and the original containers used to ship the machinery overseas. The plant is designed to provide flow through ventilation so that the elevated temperatures created in the manufacturing process can quickly escape protecting the workers from unnecessary heat stress.

Here is the boiler installed in the actual plant. This unit is specifically engineered to cleanly burn used lubricating oil (like you would have in the crankcase of your car) as a fuel. Grenada has no way (besides overseas export) to safely dispose of these products. We currently source our used oil from the island's electric utility company who provides this at no cost to the project. One of the project's goals is to create an island wide infrastructure that will reclaim all of Grenada's used oil before it is cast into the sea or spilled on the land (as it is today). This will substitute for imported diesel fuel needed for various thermal chores such as hot water for hotels, hospitals, laundries and hot air for agro processing.



**The burning of used lubricating oils for a fuel in the United States is covered in The Code of Regulations, Protection of the Environment PARTS 260–299**, promulgated by the Environmental Protection Agency. In the US there are thousands of facilities [primarily "oil change shops"] that heat by burning used oil. Some are actually larger than the PFW plant and many are located in high density suburban communities. In Pennsylvania, we recorded the operation of a huge car wash/oil change/mega service facility that had [9] separate boilers that burn more used oil than PFW. They advertise "Being a good neighbor to the community and the environment" in a brochure that explains their choice of used oil. The facility is situated across the street from a large apartment building and surrounded by a suburban one and two family housing development. No more oil on the ground or in the sea is one of our long term goals.



The cooker fully installed in the new plant. This is basically a giant horizontal cooking pot with continuous internal paddle wheels and a jacket into which the boiler's steam is injected. It is here the various waste streams will be processed. They include: brewer's spent grains, fish offal, distressed fruits and vegetables from the island markets, farmers and food outlets as well as plate scrapings from hotels and restaurants. All of these things were previously an odor causing burden on the island's solid waste management facilities. In addition, the plant anticipates a flow of high protein agro forestry products produced by farmers specifically for inclusion in the process.



In this photo you can see the boiler and the cooker arranged in the plant. Walls are provided to segregate different functions such as the boiler room and the processing room. Especially important is the wall between the incoming feedstock and the final product. Industry standards provide that workers in one section do not cross into the other section thereby preventing contamination.

This is a pile of brewer's spent grain from Grenada Breweries, the island's own brewery. This is high in protein and water and would normally spoil in short order. We will take delivery of this everyday and immediately process it down to about 8% moisture to allow it to be bagged and later mixed into feed. Our agreement with the brewery allows us to pick up this grain which is provided at no cost.

## About the team:

**Robert Davenport** is a rendering specialist. He was Maintenance Superintendent of one of the 3 biggest plants in the world and the biggest falling film plant for Perdue Farms. He is a trouble shooter and problem solver for the rendering industry.

**Jeff Mattocks**, President of The Fertrell Company, comes with 16 years experience in natural, organic and outdoor access poultry diet formulations and management techniques. He develops poultry feed formulas with many local, renewable and sustainable feed resources. His duties will include evaluating feed ingredients, analysis; investigate negative side effects and feeding limitations.

**Byron Townsend** is the Service Manager for Webster Engineering, the manufacturer of our used oil burner which is critical to our operation. As the Combustion Specialist for PFW his task will be to advise the group for burner tuning and repair. He will answer questions that have to do with firing of the Webster burner and its related support apparatus.

**Dr. Santosh Lall** is a Group Leader of the Marine Bioactive program at the National Research Council of Halifax, Canada and an adjunct professor at Dalhousie University. He has undertaken and directed research on animal nutrition since 1974, with more than 150 publications in the field of nutrition and feed development.

**Jim Aronson**, Team Leader, is an engineer whose work has included high speed vehicles, low speed aerodynamics [gliders], synthetic solid fuels from peat/wood, and land development. He founded TGP and designed PFW with the goal of doing something to help the planet and its inhabitants.

**Agro-Forestry experiments:** While not a waste product, it is worth noting that the project has been active in encouraging new local crops for forage ingredients like Gliricidia and other high protein crops. These trees are high in protein and when properly combined with other vegetable matter [in the supplement] they can constitute an additional source of livelihood through agro-forestry.



This is our first delivery of fish waste from Grenada's Ministry of Agriculture Fisheries Division. Our agreement with them allows us access to this waste stream provided we pick it up on a regular basis. This represents our most valuable feedstock and will convert to fishmeal at around 60% protein when processed. Animal feed costs are by far dominated by the cost of protein. Feed costs are the biggest impediment to Grenada's livestock industry. 95% of the poultry on the island comes from abroad. Because the feed represents 80% of the cost of a marketable bird, Grenada's farmers are cut off from their own market based on the local cost of feed. That's why PFW is critical in this equation.

**Replicability:** There are dozens of locations right here in the Caribbean basin that could, on a cost effective basis, utilize this particular combined technology. Grenada's neighbors [the West Indies] all share some common problems, they are: waste streams that if properly cooked would be useful for animal feed such as fish and other offals, food, produce crop wastage, brewery and other agro processors wastage, hotel, restaurant and surplus crops waste and finally used motor oil with no proper means of disposal. Additionally, island businesses with thermal energy usage and costs will want to investigate the used oil combustion process to save money and reduce the load on the environment.



Here is the first product coming off the PFW line. This is a product made directly from the fish waste in the previous photo. You can see some white flecks of bone that will require grinding, [a grinder is one of the pieces of equipment to be financed in the final round]. Created at very little cost with free fuel [fuel usually represents 80% the cost of this process], this protein can substitute for extremely expensive soy beans thereby reducing the costs of raising poultry and allowing Grenada's farmers a bigger share of the \$30 million local market. As more farmers take advantage of the opportunity created by PFW the island's unemployment will decrease.

**Our workforce:** The PFW project will include 6-8 employees. The plant is located in the Perseverance Landfill. Our workers are disadvantaged landfill workers who perform a rightful service to the community by scavenging anything of value and recycling it. These people built the PFW facility. They have learned building trades and techniques and they will be schooled in the technologies involved. While their situation is critical, they have proven themselves capable and hopefully they will go on to raise families in a productive environment that they can be proud of. TGP has purposely targeted the most disadvantaged to be direct beneficiaries.

The first runs were conducted by loading the cooker one bucket at a time. This of course is not a cost effective method but this is typical of the kind of sacrifice that was required to reach the proof of concept plateau. There is a piece of equipment missing here that was not yet purchased because of scarce funds. The bucket lift was devised only for purpose of the initial testing. An appropriate elevator will be purchased in the final round along with the other items previously mentioned.



Here you can see the plastic temporary fuel tank used in the proof of concept test phase. This type of tank will be used in the final design only for the weekly conversion of the company truck into a fuel truck. Because hot oil is recirculated back to the main tank, this tank is really not suitable in the final embodiment. A much larger steel tank to be located in the upper container with a proper pump to fill it will be another item for the final round of financing which we truly hope you will participate in as a partner.



**Our community of beneficiaries:** By far the largest group of direct beneficiaries will be the farmers themselves. Numbering in the hundreds they will reenter poultry production when the profitability returns via the savings on feed that PFW will provide. Chicken is by far the most popular meat in Grenada. At one time every bird served in Grenada was raised on island. Now only 5% of the market is covered by local farmers, the rest are cheap imports, in Grenada this is a \$30 million/year market. The cost of feed in Grenada is 50% higher than it is in the US [as sold by the same company]. Recent world trade rules have decimated Grenadian agriculture. They have literally lost their right to feed their own people. It is anticipated that the protein supplement can save farmers 20% of their feed costs. Feed is 80% of the cost to raise a bird. That provides a significant profit to households that were previously in the red. Hundreds of mostly disadvantaged households can be raising birds with protein supplement. Half of the poultry farmers in Grenada are women. It has been estimated that unemployment in Grenada is as high as 35%.