**Centro alternativo rural El Limón**

**Atmospheric Carbon Extraction Through Regenerative Organic Agriculture:
A Pilot Project in the Dominican Republic**

**Preliminary Proposal as of November 11, 2016**

 **Summary**

The global community increasingly recognizes the urgency of reducing greenhouse gas emissions, but removing existing atmospheric CO2 has received relatively little attention. Regenerative organic agriculture can extract carbon dioxide from the atmosphere and sequester it in soils. While the amount of CO2 that can be sequestered per hectare is relatively modest, there are approximately one billion small and peasant farmers in the world. Research from the Rodale Institute, among others, indicates that, given a major reduction in fossil fuel use, these farmers could make a major contribution to rolling back atmospheric CO2 to climate-safe levels. This approach also opens a new and important role for the Less Developed Countries in addressing climate change. Despite multiple challenges associated with shifting farmers to a sustainable paradigm, accurately measuring soil carbon, and resolving payment issues, enabling small farmers to remove and sequester atmospheric carbon in the soil offers the only proven, affordable, immediately available approach to atmospheric carbon removal. This pilot project will develop, test and demonstrate the technical and social components of a broadly replicable approach to carbon sequestration by small farmers in the Dominican Republic.

**Key Points of the Project:**

* Regenerative organic agriculture could sequester large amounts of atmospheric carbon
* “Green revolution” high input market agriculture is increasingly creating existential economic, health, and environmental problems for small farmers, and developing countries in general
* Given effective technical and economic support, many small farmers would transition to regenerative organic agriculture
* This transition can best be accomplished through an integrated agricultural paradigm shift, rather than piecemeal changes in practices
* Soil carbon measurement provides an effective and accepted metric for both atmospheric carbon removal and agricultural sustainability

**Project Concept 1: Air-Soil Carbon Exchange**

The Earth’s soils, including tundra and peat bogs, are a major repository of organic carbon. Built up over the eons, they hold some xxx times more carbon than the atmosphere. This carbon has been released to the atmosphere at an accelerating rate since the invention of agriculture some 10,000 years ago, and that rate accelerated greatly after the massive introduction of industrial agriculture following World War II. Up until about 1970 more CO2 was released from soil destruction than from fossil fuels, after which fossil fuels became the larger contributor. This process of soil to air carbon transfer is reversible, and, , to safe pre-industrial levels. Converting mainstream industrial, high-input agriculture to a regenerative mode would be theoretically possible, but in reality the massive capital and psychological investment in heavy machinery, chemical infrastructure, and fossil energy sources make that transition a very difficult and slow process at best. The prospects for involving small and peasant farmers in carbon sequestration are much more favorable.

**Project Concept 2: Payment for Carbon Sequestered**

In anecdotal conversations with small farmers in the Ocoa region of the Dominican Republic, the farmers expressed an awareness that their high-input chemical farming was damaging the soil and causing health problems among them and their families. But they also felt that changing to more organic farming practices was not practical given their already marginal economic situation, and that attempting those changes would push them off their land and into the masses of displaced urban poor. This indicates the need to pay the farmers to sequester carbon. But the subsidies involved are quite modest, since even initially much of the cost of the farming operations will covered by the sale of produce. To make the project viable and attractive, the subsidy must only exceed the difference in net income between current and regenerative farming modes. Many agricultural economists feel that after a start-up period, the regenerative mode will provide more net income, and subsidy funds may be reduced or discontinued; this remains an open question. Payments will be tied to product: the amount of carbon actually sequestered. This introduces substantial challenges in selecting measuring technologies and protocols, due to difficulties in accurately determining the organic carbon content of a plot.

**Agricultural tTechniques and Sequestration Potential**

A variety of the agricultural techniques that build and maintain carbon-rich soil are identified and their sequestration potential quantified in the USDA-NRCS COMET computer model. These include, among others:

* + Crop selection
	+ Compost
	+ No till
	+ Cover crops vs. fallow
	+ Integration of animals
	+ Deep roots to transfer carbon downward
	+ Soil microorganism support
	+ Non-chemical pest management

**Introducing a Sustainable Paradigm**

Rather than introducing piecemeal changes of technique into the existing “Green Revolution” agricultural context, the project will provide an agricultural “reboot” by defining and planning sustainable parcels in each community. The key points are:

* **Community participation and ownership:** Each community will maintain ownership of its local project through its farmers’ association. While plot ownership will (generally) remain with individuals, the planning process will be based in the local farmers’ association, and will emphasize community aspects, including interdependence between the various parcels and common marketing of the produce.
* **Planning:** The project will incorporate the extensive planning techniques and experience available through the Permaculture Network. Using the Permaculture approach as a framework, each community will incorporate local knowledge in its design process, and be open to methods that may be outside general Permaculture practice.
* **Economic Sustainability:** Design will seek a balance between carbon sequestered and value generated through the sale of the agricultural products. Marketing of the products will be a project component.

**Other Societal Benefits**

The project will directly benefit the communities involved by reducing the health impacts of agricultural chemical exposure, and providing access to local organic produce. Additionally, the entire country will benefit through the national distribution of pesticide-free, more nutritious produce.

**Participating Communities:** Three farming communities in the Ocoa region are committed to participating in the startup (Phase 1) of the project. Several others have expressed interest. Up to three additional communities are expected to join the project in Phase 2.

* Los Martinez, population 250
* El Higuito, population 150
* El Limon, population 300

The region is characterized by semi-isolated mountain villages, between 1800 and 2500 ft. in elevation. Their economies are based on high-input chemical agriculture and piped irrigation, introduced by a populist Catholic priest in the 1980s. Before this time, the communities were roadless, extremely marginal, and survived on subsistence agriculture and the preparation and sale of charcoal, which led to massive deforestation. Most current production is of short-cycle vegetables, particularly tomatoes, peppers, and eggplant. There is an increasing trend toward avocados, and many farmers are aware of the potential organic export market.

Land ownership is a mix of small local farmers, communal lands, and larger outside owners. The project will initially focus on local farmer-owners who are active in their local farmers’ association.

**Payment Strategy**

Basing payments on demonstrated carbon sequestration is essential to the project’s conceptual model, but is complicated by uncertainties in measurement. Soil carbon distribution varies considerably within a plot, making it difficult to place an accurate and consistent value on the additional quantity of carbon sequestered. In a social context of long-standing farmer distrust of outside institutions, and a national culture that values finding and taking advantage of vulnerabilities in systems, this uncertainty requires a unique social contract between the project and the farmers. The project must make the measurements as accurate (and fraud-resistant) as possible, and ensure explicit agreements are in place for situations where the measurements seem unreasonable. , and also address that it typically takes two to three years of regenerative agricultural practices before a substantial increase in soil organic carbon is observed. The farmers must commit to the protocols, especially those prohibiting the use of agrochemicals, and accept the final decision of the project with regard to payments.

**Farmer Concerns: Safety Net for Participants**

Farmers have expressed concerns about the risk of dire economic consequences as a result of their participation in the project. The project must assure the farmers an adequate degree of financial security during the transition period. This will take the form of a modest reserve fund set aside as a type of crop insurance, providing a safety net for participating farmers.

**Measurement Methodology**

Measuring soil organic carbon presents methodological challenges, particularly the considerable variability of carbon content over short (centimeter) distances, by depth and location in a plot. A standardized protocol is now being finalized by a US working group based in the USDA. This protocol will be adapted to local conditions, including randomizing measures to avoid the temptation to “seed” known sampling points with additional organic matter. In the initial two or three years, before substantial carbon increase is observed, other indicators of progress, such as interventions quantified in the USDA-COMET computer model, may be employed as the basis for payment.

**Analysis**

To retain credibility with the farmers, and particularly since cash payments are involved, carbon measurements must be relatively accurate and reproducible. This calls for extensive sampling and reliable analysis. Given this situation, elemental analysis is the only appropriate currently available analytical technology. We have been unable to locate this capacity in the Dominican Republic, and sending the requisite number of samples outside the country creates major economic, logistic, and regulatory challenges. To address this issue, we will establish a small laboratory in CAREL’s base community of El Limon to measure Total Organic Carbon in soil samples. The laboratory may acquire the capacity for other soil measurements as the project develops.

**Recruitment and Orientation of Participants**

Participating farmers will be recruited and oriented through a series of local meetings organized through the villages’ farmers’ associations. The meetings will communicate the project concept and implementation, and emphasize the results-oriented nature of the effort. This will include an overview of plot selection, choice of crops, regenerative agricultural techniques that optimize carbon sequestration, and the measurement and payment protocols.

**Design Workshops**

Each community will participate in a three day design workshop. The workshop will be based on the Permaculture framework, and led by the Permaculture consultant. Each workshop will include:

1. Inventory of resources, including weather, experience, soils, land available, human resources, etc
2. Selection of participants and parcels
3. Design for each selected parcel
4. Design for integration and community components, including marketing

**Ongoing Technical Support**

A regional technical support team will be developed, led by a local agronomist with extensive practical experience in integrated and organic agriculture

**Ongoing Networking**

A network of participants will be developed, based on the WhatsAp cellular communications program. This tool has proved very successful with the REDSER national network of communities with village hydroelectric systems, which has the same demographic base as this project. The network will support mutual aid between the participating farmers and rapid access to the agricultural support group.

**Marketing of Transitional and Organic Produce**

The Permaculture Consultant will coordinate the development of a marketing plan for the transitional and organic produce grown by project participants.

Los Martinez is completing construction of a warehouse and packing facility on the main highway between Ocoa and Santo Domingo. This will greatly facilitate marketing, especially to supermarkets and for export.

**Phase 1: Startup, six months**

The Startup phase includes

1. purchasing equipment,
2. setting up the laboratory at CAREL in El Limon,
3. preparing initial sampling protocols and equipment
4. developing and testing the initial orientations and design workshops in the three initial communities
5. starting baseline soil carbon measurements in the identified plots
6. plots identified: 6 plots

**Phase 2: Operating Trial, six months**

The Operating Trial phase includes:

1. bringing two additional communities into the project, including orientations and design workshops
2. adding plots with design workshops as resources permit
3. developing baseline soil carbon data for the plots selected in each of the five communities
4. supporting the farmers in implementing the plot designs
5. securing funding for the project vehicle, laboratory photovoltaic electric system, and payment for carbon sequestered
6. plots in initial production: minimum 10 plots

**Phases 3 and 4, Project Operation, years 2 and 3**

The Project Operation Phase includes

1. Bringing additional communities into the project, as resources permit
2. Providing ongoing technical and marketing support for the participating farmers
3. Monitoring soil carbon buildup in the plot soils
4. Developing protocols and delivering payment for carbon sequestered
5. Developing outreach materials and disseminating project experience
6. Ongoing and final evaluation
7. Phase 3 plots in production: minimum 30
8. Phase 4 plots in production: minimum 50

**Integration of Additional Communities**

After the initial Phase 1 and Phase 2 startup period, the project will be opened to additional communities, depending on the availability of funding. Outreach will principally be through the REDSER renewable energy network. Criteria will include local organization, depth of community interest, and logistical concerns, such as distance and access.

**Dissemination of Experience**

The project will disseminate its experience through media outreach, a web site, and participation in meetings and conferences. Additionally, a series of on-site workshops will be offered for those interested in replicating the project.

**Funding Sources**

Potential funding sources include, among others, UNDP and the Dominican government. Beyond project startup, vehicle fuel taxes provide a logical funding source, since the revenue would be used to sequester carbon pollution equivalent to that released by the taxed fuels. Additionally, directing these funds to small farmers would generate considerable political support from the rural sector. International contributions through the UN climate initiatives also are a good prospect.

While the payment scheme is similar to those based on carbon credit markets, CAREL has serious concerns about the frequent use of carbon credits to de-localize responsibility for greenhouse gas emissions, and will seek sources of funding that do not contribute to ongoing fossil fuel use.

**Contact**

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**Appendix 1: Key Personnel (Tentative)**

Jon Katz, General Coordinator and Technology Specialist
Coordinator of CAREL, Board Director of the Dominican Renewable Energy Network (REDSER). Extensive experience in community based technology, including micro-hydroelectricity and wireless communications. MA in Physics.

Rodolfo Pierre, Agricultural Design and Marketing
Agronomist, Permaculture expert, organic farmer

Luis Cordero, Inter-Institutional Coordinator and Evaluator
Consultant in development project design and evaluation, graduate degree in Forestry

Esmelin Mateo Presinal, Agricultural Technical Support
Agronomist, organic farmer

**Appendix 2: Principal Institution**

**CAREL:**  Rural Alternatives Center of El Limon. A Dominican community-based non-profit. Innovator in village based technology since 1996, especially micro-hydroelectric mini-grids and wireless rural internet access. CAREL operates an educational and training center in the village of El Limon, population 250, near the provincial capital, San Jose de Ocoa.

**Appendix 3: Sampling Methodology**

**Custom core probes** will be fabricated. The probewill consist of concentric tapered tubes; the inner tube splitto cacilitate sample removal. Rapid soil penetration up to one meter will be facilitated by attaching the probe to a battery operated hammer drill

**Location of sampling** will be determined to centimeter accuracy (relative to a permanent fixed point in the plot) by a GPS with real time kinetic (RTK) correction

**Appendix 4: Analytic Laboratory**

**Sample processing rate** is set by elemental analyzer, approximately 5 minutes per sample

**Steps and Equipment**

1. Dry samples
Equipment: Microwave Oven,
capacity 20 samples,
drying time 20 minutes,
power consumption 1500W,
2. Confirm Dryness of selected samples

Equipment: Moisture analyzer

1. Grind samples

Equipment: Mill

Grinding time 30 seconds per sample

Power consumption : 400 W

1. Weigh samples

Equipment: Milligram balance (electronic interface with analyzer preferred)

Weighing time (two samples per measurement) 30 seconds total

1. Perform elemental analysis (TOC)

Equipment: TOC Analyzer for solids, Skalar SNC-100 or Skalar SLC

Power consumption: SLC:700W SNC-100: 2000W

**Electric Power Source**

El Limon is an off-grid village that relies on a community micro-hydroelectric mini-grid. Since the system is already operating at capacity, a hybrid photovoltaic component will be added, along with state-of-the-art lithium hydride battery storage with adequate capacity for the laboratory’s operation.

Photovoltaic System

Projected daily electricity consumption:

* Drying oven: 1500W x 1 min/sample x 100 samples daily = 2.5 kWh
* Moisture analyzer: 400W x 1 hr warmup +20 samples @ 10 min = 1.7 kWh
* Grinding mill 400W x 0.5min/sample x 100 samples = 0.33 kWh
* Analyzer Skalar SLC: 700W x 9 hr = 6.3 kWh
* Lighting etc: 1 kWh
* Daily projected total is about 12 kWh

Minimum System: PV capacity 6kW, 14kWh lithium hydride battery (Tesla Powerwall 2)

Recommended System: PV capacity 12kW, 2 x 14kWh lithium hydride batteries (Tesla Powerwall 2, includes built-in inverter)

Backup generator: EU7000is 7kW Honda Inverter with propane kit

**Appendix 5: Prediction of Carbon Sequestered and Setting Its Monetary Value**

Average plot area is one tarea = 629 m2

Regenerative farming systems trials show a typical sequestration of 4 Mg C ha-1 yr-1 (Rodale Institute White Paper)

Predicted sequestration is 250 kg C per 1-tarea plot per year (first several years, then gradually drops)

3.67 kg of CO2 contain 1 kg of C, so 250 kg C sequestered implies 918 kg of CO2 removed from the atmosphere

The current (November 2016) value of one carbon credit varies from 6€ in Europe to $US 13 in California. These values are determined by the market, and have been greatly reduced by the current low price of petroleum. Recent studies indicate that the real social cost is between $US 37 (US government) and $US 220 (Stanford University) per ton CO2e, which would put the societal value of one parcel’s sequestration at $US 34 to $US 202

**APPENDIX 6: COMPONENTS AND ACTIVITIES**

|  |  |  |
| --- | --- | --- |
| Component | Activity | Verifiable Product |
| Personnel Recruitment | 1. Coordinator
2. Design Consultant
3. Agricultural Support Team
4. Laboratory Technician
 | Personnel Selected |
| Community Orientations | 1. Develop community orientation framework
2. Coordinate with communities
 | Orientations Completed |
| Design Workshops | 1. Develop format with community participation
2. Present initial workshop
3. Evaluate and refine
4. Present additional workshops
 | Workshops |
| Farmer Support  | 1. Recruit and orient support team
2. Provide on-site support
 | Hours of Support Provided |
| Marketing | 1. Develop marketing plan
2. Evaluate results
 | Marketing Plan |
| Field Sampling  | 1. Coordinate with USDA group
2. Adapt USDA protocols as needed
3. Design sampling tools
4. Build sampling tools
5. Field test
 | Measurement Plan |
| Laboratory  | 1. Survey existing laboratories in US
2. Purchase minimum equipment
3. Install and test equipment using generator
4. Train local technicians
5. Fund and install solar power system
 | Laboratory Operational |
| Soil Carbon Baseline | 1. Develop data base
2. Collect and analyze samples from the plots
 | Carbon Baseline Data Base |
| Payment | 1. Analyze value of sequestered carbon
2. Develop short-term payment schedule based on practices
3. Develop long-term payment schedule
4. Initiate payments
 | Payments Delivered |
| Dissemination | 1. Prepare and maintain web site
2. Conduct outreach to national and international players
3. Implement visits to project sites
4. Provide educational workshops at CAREL (El Limon)
 | Visits and Workshops Completed |
| Evaluation | 1. Develop participant evaluation tools
2. Prepare intermediate progress reports
3. Prepare final report
 | Reports published |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Preliminary Budget in $US and$RD** |  |  |  |  |  |  |  |  |  |  |  |
|  | $US |  | $RD |
| Phase | 1 | 2 | 3 | 4 |  |  | 1 | 2 | 3 | 4 |  |
| Description | Startup | Test | Operation | Operation | TOTAL |  | Startup | Test | Operation | Operation | TOTAL |
| Months | 1-6 | 7-12 | 13-24 | 25-36 | 1-36 |  | 1-6 | 7-12 | 13-24 | 25-36 | 1-36 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **PERSONNEL** |  |  |  |  |  |  |  |  |  |  |  |
|  Coordinator (may be jobshare) | 5000 | 10000 | 20000 | 20000 | 55000 |  | 229500 | 459000 | 918000 | 918000 | 2524500 |
|  Permaculture Consultant @ $150/day | 1800 | 7500 | 15000 | 15000 | 39300 |  | 82620 | 344250 | 688500 | 688500 | 1803870 |
|  Agricultural Support Coordinator @ $100/day | 2000 | 5000 | 10000 | 10000 | 27000 |  | 91800 | 229500 | 459000 | 459000 | 1239300 |
|  Technical Support Associates |  | 5000 | 10000 | 10000 | 25000 |  | 0 | 229500 | 459000 | 459000 | 1147500 |
|  On-site Sampling Technician |  | 5000 | 10000 | 10000 | 25000 |  | 0 | 229500 | 459000 | 459000 | 1147500 |
|  Laboratory Technician |  | 5000 | 10000 | 10000 | 25000 |  | 0 | 229500 | 459000 | 459000 | 1147500 |
| **SUBTOTAL PERSONNEL** | 8800 | 37500 | 75000 | 75000 | 196300 |  | 403920 | 1721250 | 3442500 | 3442500 | 9010170 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **OPERATING EXPENSES** |  |  |  |  |  |  |  |  |  |  |  |
| Transportation |  |  |  |  |  |  |  |  |  |  |  |
|  Fuel  | 600 | 1200 | 2600 | 2800 | 7200 |  | 27540 | 55080 | 119340 | 128520 | 330480 |
|  Maintenance | 300 | 600 | 1400 | 1600 | 3900 |  | 13770 | 27540 | 64260 | 73440 | 179010 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Supplies |  |  |  |  |  |  |  |  |  |  |  |
|  Office | 300 | 300 | 600 | 600 | 1800 |  | 13770 | 13770 | 27540 | 27540 | 82620 |
|  Plastic ample bags (22,000 per year) | 1100 | 550 | 1100 | 1100 | 3850 |  | 50490 | 25245 | 50490 | 50490 | 176715 |
|  Analyzer crucibles | 500 | 100 | 100 | 100 | 800 |  | 22950 | 4590 | 4590 | 4590 | 36720 |
|  Oxygen | 250 | 500 | 1000 | 1000 | 2750 |  | 11475 | 22950 | 45900 | 45900 | 126225 |
|  Carbon diuoxide scrubber for oxygen | 500 |  | 500 | 500 | 1500 |  | 22950 | 0 | 22950 | 22950 | 68850 |
|  Acid | 100 | 150 | 300 | 300 | 850 |  | 4590 | 6885 | 13770 | 13770 | 39015 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Services |  |  |  |  |  |  |  |  |  |  |  |
| Rent for CAREL center | 600 | 600 | 600 | 600 | 2400 |  | 27540 | 27540 | 27540 | 27540 | 110160 |
| Communications | 500 | 500 | 1500 | 1500 | 4000 |  | 22950 | 22950 | 68850 | 68850 | 183600 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Electricity |  |  |  |  |  |  |  |  |  |  |  |
|  Fuel for generator lpg $0.60/kwh x 12kWh/day | 700 | 700 | 250 | 250 | 1900 |  | 32130 | 32130 | 11475 | 11475 | 87210 |
|  Generator maintenance | 100 | 100 | 150 | 150 | 500 |  | 4590 | 4590 | 6885 | 6885 | 22950 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **OPERATING EXPENSES SUBTOTAL** | 5550 | 5300 | 10100 | 10500 | 31450 |  | 254745 | 243270 | 463590 | 481950 | 1443555 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Administration 5%** | 717.5 | 2140 | 4255 | 4275 | 11387.5 |  | 32933.25 | 98226 | 195304.5 | 196222.5 | 522686.3 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Payment for farmers ($100 per parcel projected)** |  | 600 | 3000 | 5000 | 8600 |  | 0 | 27540 | 137700 | 229500 | 394740 |
| **Crop insurance** |  | 3000 | 5000 | 5000 | 13000 |  | 0 | 137700 | 229500 | 229500 | 596700 |
| **Marketing of produce** |  | 10000 | 5000 | 5000 | 20000 |  | 0 | 459000 | 229500 | 229500 | 918000 |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **CAPITAL EXPENSES** |  |  |  |  |  |  |  |  |  |  |  |
| Vehicle: used 4x4 crew cab pickup truck |  | 15000 |  |  | 15000 |  | 0 | 688500 | 0 | 0 | 688500 |
| Sampling equipment |  |  |  |  |  |  |  |  |  |  |  |
|  Differential GPS with radios (2) | 1000 |  |  |  | 1000 |  | 45900 | 0 | 0 | 0 | 45900 |
|  Soil probe farication | 2000 |  |  |  | 2000 |  | 91800 | 0 | 0 | 0 | 91800 |
|  Hammer drill and batteries | 250 |  |  |  | 250 |  | 11475 | 0 | 0 | 0 | 11475 |
| Laboratory |  |  |  |  |  |  |  |  |  |  |  |
|  Microwave oven | 200 |  |  |  | 200 |  | 9180 | 0 | 0 | 0 | 9180 |
|  Humidity analyzer | 1500 |  |  |  | 1500 |  | 68850 | 0 | 0 | 0 | 68850 |
|  Powder mill | 800 |  |  |  | 800 |  | 36720 | 0 | 0 | 0 | 36720 |
|  Milligram balance with interface (used) | 800 |  |  |  | 800 |  | 36720 | 0 | 0 | 0 | 36720 |
|  Skalar Primacs SLC elemental carbon analyzer (used) | 5500 |  |  |  | 5500 |  | 252450 | 0 | 0 | 0 | 252450 |
|  Rebuild and callibrate analyzer | 3000 |  |  |  | 3000 |  | 137700 | 0 | 0 | 0 | 137700 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Photovoltaic system for laboratory |  |  |  |  |  |  |  |  |  |  |  |
|  Panels 12 kW |  | 15000 |  |  | 15000 |  | 0 | 688500 | 0 | 0 | 688500 |
|  Battery Packs Tesla Powerwall 2 ( 2) |  | 12,000 |  |  | 12000 |  | 0 | 550800 | 0 | 0 | 550800 |
|  Materials to mount panels, miscellaneous |  | 5000 |  |  | 5000 |  | 0 | 229500 | 0 | 0 | 229500 |
|   |  |  |  |  |  |  |  |  |  |  |  |
| Honda EU7000i generator with propane kit | 5200 |  |  |  | 5200 |  | 238680 | 0 | 0 | 0 | 238680 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Transportation and customs 25% | 5062.5 |  |  |  | 5062.5 |  | 232368.8 | 0 | 0 | 0 | 232368.8 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **CAPITAL EXPENSE SUBTOTAL** | 25312.5 | 47000 | 0 | 0 | 72312.5 |  | 1161844 | 2157300 | 0 | 0 | 3319144 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **TOTAL** | **40380** | **105540** | **102355** | **104775** | **353050** |  | **1853442** | **4844286** | **4698095** | **4809173** | **16204995** |
|  |  |  |  |  |  |  |  |  |  |  |  |
| NOTES: |  |  |  |  |  |  |  |  |  |  |  |
| Exchange rate: | 45.9 |  |  |  |  |  |  |  |  |  |  |