Protected Agriculture

Adapting Climate Resilient Technologies to the Caribbean Region

ALQUIMI RENEWABLES
MAY 2018 – GRENADA
Introduction

➢ Project Development & Investment Company
➢ US and Caribbean based
➢ Utility Scale Renewable Energy Conversion
➢ Solar, WTE, CCHP, & Geothermal Infrastructure

WTE: Caribbean Projects

Geothermal: Nevis (9MW), Montserrat (3+20MW), India (2000MW)

➢ Off Grid Commercial Greenhouse Projects – Micro Grids

Caribbean, Latam, US, Pacific Islands
What is Protected Agriculture?

“modification of the natural environment to achieve optimal growth”

(Jansen and Malter 1995)
Focus on Greenhouse Technology

- **Greenhouses**
- **Grow Lighting**
- **Hydroponic Systems**
- **Solar Energy**
Recent Regional Climate Events Affecting Agriculture

- Hurricanes Irma and Maria - Anguilla (Cuisinart)
- Jamaica – GK Pepper Farm Flooding
- Dominica, Puerto Rico
Case Study – The Power of Technology

The Netherlands is a TINY country....

But it now produces more food than Russia, Canada, or China!

<table>
<thead>
<tr>
<th>Year</th>
<th>AG Imports</th>
<th>AG Exports</th>
<th>Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017* [€]</td>
<td>411,665,633,000</td>
<td>468,241,589,000</td>
<td>56,575,956,000</td>
</tr>
</tbody>
</table>

Hongerwinter 1944-45
22,000 deaths
Case Study – The Power of Technology
The Netherlands is a TINY country....

Agri-Food export figures 2017

Total export from the Netherlands
€ 101 billion

Top 5 export products
- Materials and technology € 9.1 billion
- Flowers € 9.1 billion
- Dairy and eggs € 8.9 billion
- Meat € 8.3 billion
- Vegetables € 6.7 billion

Top 3 destinations
- Germany 24.7%
- Belgium 11.2%
- United Kingdom 9.2%

- The Netherlands is the EU’s biggest agri-food exporter
- And the second biggest in the world

Source: Nov & Dec 2017 estimates, Wageningen University & Research/Statistics Netherlands

Source: Cointrade
Case Study – The Power of Technology

The Netherlands is a TINY country…but growing.

17% of total land area is reclaimed from the sea;

26% of its area is located below sea level.

21% of its population lives in areas below sea level.

Only 50% of its area is more than 1 meter above sea level.

Lowest point: Zuidplaspolder −7 m (−23 ft), below sea level.
Global Greenhouse Production

Netherlands

• World leader in protected agriculture;

• 9,000 hectares under glass (1/4 area of Grenada);

• Many powered by geothermal energy;

• 2nd largest agricultural exporter in the world.
Global Greenhouse Production - NL
USA – The Largest Agricultural Producer

- 1.35 billion square feet of greenhouse production in the US in 2017;
- Equates to over 31,000 acres;
- Produces a market value of almost US$15 billion annually;
- Estimated to increase dramatically with the advent of urban farms.

| Aquatic Plants          | 277 | 1,642,080 | $20,756,332 |
| Bulbs                   | 193 | 1,306,346 | $72,766,990 |
| Cuttings, seedlings, liners, and plugs | 1,114 | 35,627,552 | $585,066,367 |
| Floriculture            | 18,724 | 873,290,590 | $5,888,527,346 |
| Flower Seeds            | 212 | 368,593    | $32,378,251  |
| Greenhouse fruits and berries | 673 | 7,950,774 | $28,976,671 |
| Greenhouse Tomatoes     | 6,323 | 55,180,582 | $400,286,262 |
| Other greenhouse vegetables | 5,268 | 42,816,149 | $234,199,741 |
| Sod Harvested           |      |           | $1,011,490,194 |
| Mushrooms               | 740 | 37,416,059 | $1,127,007,448 |
| Nursery stock crops    | 4,883 | 258,498,855 | $5,104,694,108 |
| Tobacco transplants     | 447 | 4,487,277 | $11,442,846 |
| Vegetable seeds        | 555 | 1,001,257 | $155,216,724 |
| Vegetable transplants   | 1,942 | 21,527,367 | $165,845,577 |
|                         | 41,351 | 1,344,913,481 | $14,838,654,867 |

Shipping and Logistics
Reducing the Carbon Footprint

80% of all fresh produce shipments to the Caribbean are from US through Port of Miami. The region currently imports US$1.3B of fresh produce and growing.
Climate Threat to Horticulture in the Caribbean

Hurricanes and Typhoons
Drought and Flooding
High Risk Climate Solutions

Greenhouses

Water Recycling

Alternative Energy
Adapting Greenhouses to High Risk Climates - Caribbean

- Simpler ‘Frame & Film’ greenhouses are cheaper to build, but are not designed to withstand weather threats like tropical storms or hurricanes;
- They cannot be fully sealed so are also subject to flooding and pestilence;
- Difficult to insure, so commercial scale production is high risk to the investor/owner.
Adapting Greenhouses to High Risk Climates - Caribbean


Over $3MM investment lost, not including hydroponic system and crop value.
Adapting Greenhouses to High Risk Climates - Caribbean

Alquimi Renewables has engineered and patented the first hurricane resistant commercial greenhouse system. Tested to withstand 150mph sustained winds. (CAT4+)

Constructed from marine coated galvanized steel, polycarbonate panels, and proprietary ground pinning system.
Off-Grid Energy and Water Supply

- Solar energy and battery storage system saves on operating costs;
- Rooftop solar arrays save on valuable land area;
- Water collection, storage, and recycling system (6 in/month = 1000 gl/month)
  - Does not require arable land – flat and accessible;
  - Each unit 202' x 204' or about 41,000 square feet. Produces over 400,000 pounds of produce annually.
Production – Packaging & Freezer

Sprung Pre-Engineered Structures

- Rapid Deployment;
- Cost Effective;
- Energy Efficient (R25);
- High volume;
- Expandable.
Alquimi Commercial Production
Hydroponic Systems

Sub-Tropical NFT and Vine Crop Hydroponic Systems
Greenhouse Environment Automated Control Systems

Digitally Climate Controlled Greenhouse Environments

Digital Temperature Controls

Grow Light Controls

Able to control internal temperatures within 0.5 degrees C

pH Water Controls

CO2 Metering
Alquimi Commercial Production

- Standard project site of 15 greenhouse units;
- Total of 620,000 square feet of greenhouse space;
- Able to produce over **6 million pounds** of fresh produce annually;
- At average wholesale crop price of $1.80/lb. will generate almost US$11MM in gross revenue per annum.
- Total project cost approx. US$35mm
Grenada Market Demand

Grenada fresh produce IMPORTS 2013: 4.34 million pounds

Grenada fresh produce IMPORTS 2017: 8.44 million pounds

5 year increase almost 100%

Demand is growing – let’s grow local!

(Source: Grenada Statistics Department)
Alquimi Projects in Development Caribbean Region

➢ Tortola, BVI: 9 acres + 2MW utility off take
➢ Grand Cayman: 10 acres + 2MW private off take
➢ St. Croix, USVI: 15 acres + 3MW utility off take
➢ St. Lucia: 15 acres + 3MW utility off take
➢ Jamaica: 5 acre private client production
➢ Jamaica: 1 acre hybrid project
➢ Barbados: 8 acres (off take TBN)
➢ Grenada: 8 acres (off take TBN)
Market Demand

Alquimi will supply customized fresh produce needs to the following companies:

Supermarket Chains:
- COST U LESS
- Rite Way
- Hi LO
- Masse Motors

Resort Chains:
- Westin Hotels & Resorts
- Hilton Hotels & Resorts
- Sandals
- Ritz Carlton

Online Market:
- Farmed Today
  - Eat Local, Sustain Global
Investor Criteria – Project Delivery

✓ NEED? Value Proposition

✓ Return on Investment: what’s the IRR? Looking for minimum 15% over 25 year term.


✓ Insurance: Project underwriting

✓ Market: Customers under contract

✓ Tax Implications: Government concessions or MOU?

✓ Growth Opportunity: Expansion and downstream opportunities

✓ Local support and social mandate.
## Investor Criteria

### Project Delivery

<table>
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<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>Total Equipment, Construction and Development Cost</td>
<td>$26,897,006.90</td>
</tr>
<tr>
<td>Hardware</td>
<td>$22,796,027.01 (85%)</td>
</tr>
<tr>
<td>Labor</td>
<td>$4,212,063.59 (15%)</td>
</tr>
<tr>
<td>Down Payment</td>
<td>0%</td>
</tr>
<tr>
<td>Total Financing</td>
<td>$26,897,006.90</td>
</tr>
</tbody>
</table>

Insurance (Approximate) | $120,000.00

Operations & Maintenance Including Auto Software | 6.0%

Prime Rate | 1.0%

Spread | 3.5%

Cost of financing | 4.0%

(Year) | 20

### System Details

| PV Solar rooftop System Size in Watts | 3,020,406 |
| Degradation Allowance                | 0.50%     |
| Sale Price per KWH to Green House    | $9.20     |
| Annual Excavator on Solar sale price to GHI and Grid | $370,872.00 |
| Cost of Green House including construction | $32,348.00 |
| Total Initial Energy Output / Watt (KWH) | 1.756 |
| Solar installation Cost per Watt     | $12.00    |
| Cost of energy system                | $7,122,030.00 |
| Cost of 25,000 Sq ft of auxiliary Buildings ($49/Sq Ft) | $1,225,000.00 |
| Fee to Utopia for PV Solar (Per Watt) | $0.14 |
| Cost of Hydroponic system ($115/Sq Ft) | $0.14 |
| Freight handling                    | $507,000.00 |
| Sales per KWH to Grid               | $0.14     |

Notes 1. PV Solar plant capacity of 3020.4 KW DC planned on 370,872 Sq Ft of Green House roofs
Grant Funding or Private Investment?

A solid business model and detailed plan can attract private investment;

The Grenada Development Bank was established as an agricultural development bank;

Now only 4% of loans are AG based;

Can be a faster way to grow your business.
Benefit Summary: Why Growing Locally Matters

- Reduces the US$1.3B annual fresh food import bill to the Caribbean;
- Improving food quality and nutritional value to local consumers;
- Lowering price of fresh food to local consumers;
- Eliminating dependency of offshore food supply = national food security;
- Improving food quality in restaurants = better tourism product;
- Adding renewable energy to the local grid to reduce energy cost;
- Creating high skilled permanent jobs in every island;
- Foreign Exchange savings;
- Provides access to new skills development and technology transfer (FEP).
For further technical information, due diligence requirements, or investor inquiries, please contact:

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