

Biomass in Food and Energy Production

USEID Networking Event

Devens, MA

September 12-14, 2012

How it Began:

In October 2008, an inter-disciplinary Project Team of local stakeholders and regional renewable energy experts began discussing the possibility of transforming the Silver Bay

Business Park into an Eco-Industrial Business Park

Sustainable Industrial Development

- A Minnesota Pollution Control Agency grant for "Sustainable Industrial Development" was applied for and received in June 2009. The MPCA Grant assesses two elements. First, the ability to use wind, biomass and biodiesel to generate heat and power to make the park self-sustainable using renewable energy. Second, using industrial ecology and industrial clustering to achieve the ideology of "zero waste - zero emissions".

2 Concepts

- . Industrial ecology is achieved by designing clusters of businesses and industries to network with each so that one industry's waste becomes another nearby industry's feedstock.
- The goal of the park is to be self sustainable, i.e., off the grid and powered by renewable energy production systems that are locally owned. It is strongly believed that the park is an ideal location for integrating three types of renewable energy (wind, biomass, biodiesel).

Cluster Based Economic Development

- Cluster based economic development refers to similar manufacturing processes or infrastructure needs, related feedstocks or resources that are typically positioned in a defined geographical area.
 - Reduces waste and pollution
 - Provides for resource conservation
 - Reduces transportation costs
 - Greater efficiency within related manufacturing processes.

Clusters Identified and Placed

- Energy Cluster
- Office Cluster
- Education Cluster
- Retail Cluster
- Tourism Cluster
- Biofuel – Food Cluster

PLAT OF SILVER BAY BUSINESS PARK

COPI

- ENERGY CLUSTER
- BIOFUEL-FOOD CLUSTER
- OFFICE CLUSTER
- RETAIL CLUSTER
- EDUCATIONAL CLUSTER
- TOURISM CLUSTER



VOYAGEUR
AS SHOWN

LEGEND

- 50' 500' x 1000' ROAD - R.S. No. 1224
- FOUND SURVEYOR'S LAND MARKS

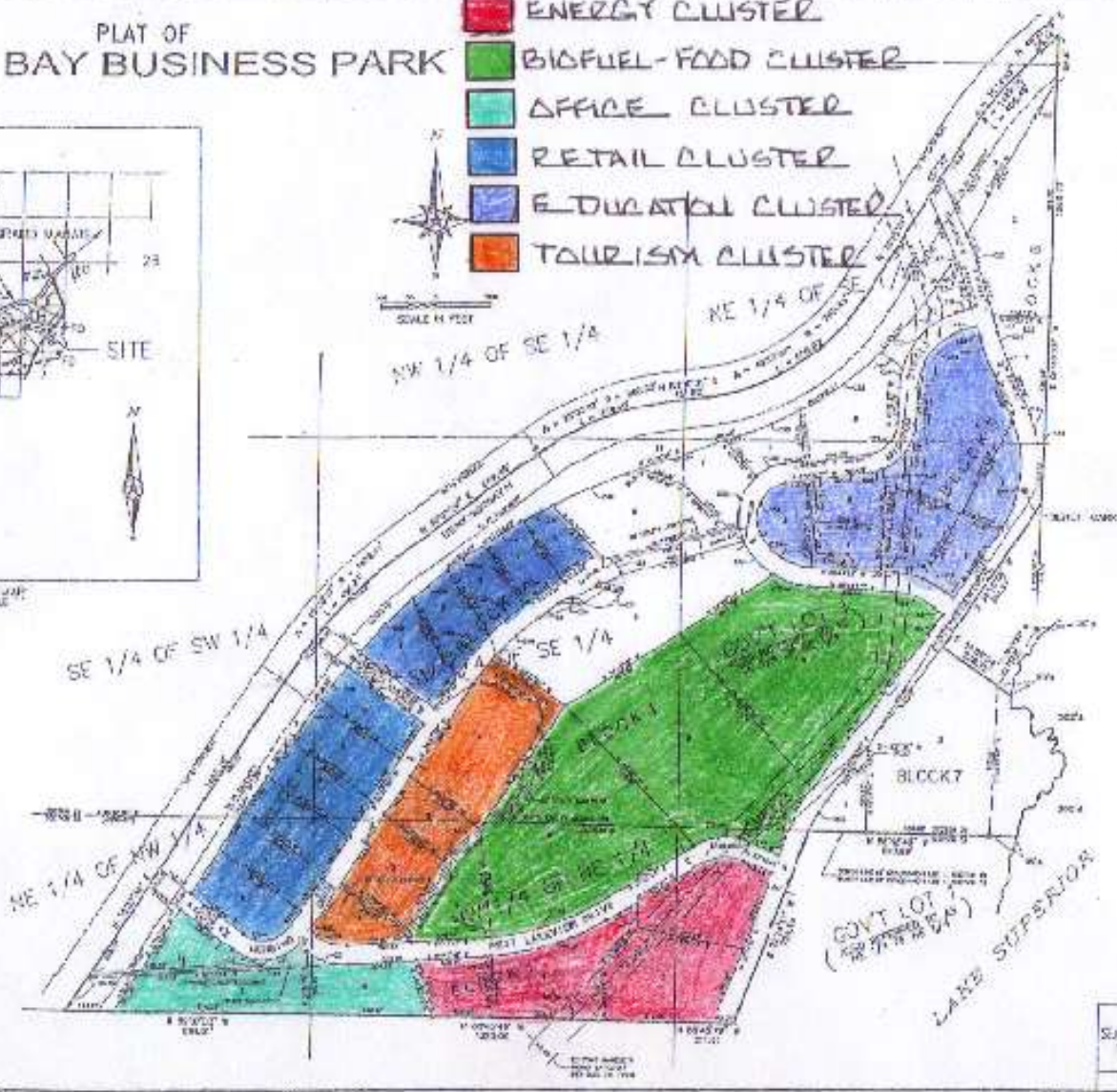
- PLAT BOUNDARY
- 10' LINE
- 50' LINE
- SECTION LINE

BENCH MARK

20' 500' x 1000' ROAD
5' 100' x 100' x 100' ROAD
AT 0.500' (200' LAKEVIEW DRIVE)
DIRECTION: S22°W

BASES OF BEARING

BEARINGS ARE BASED ON INFORMATION
PROVIDED BY SURVEYOR. THE BEARING &
SCALE OF 500' = 1" IS USED ALONG
THE SOUTH END OF SOUTHWEST QUARTER
SECTION 25, TOWNSHIP 54, RANGE 7 WEST



DESIGNED BY
SAVY BONES
314 174 0047
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1 OF 1

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Economic Development Tool

Businesses will be attracted to locate within the park as they will benefit from predictable renewable, sustainable energy costs. In addition, the need for fossil fuel consumption will be eliminated, which ultimately results in reductions in greenhouse gas emission, reductions in carbon footprint and reductions in waste.





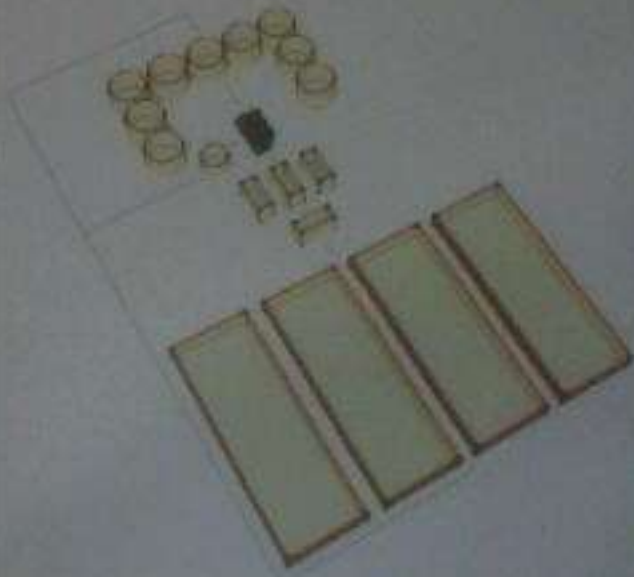
Victus Farm Conceptual Diagram

2021-2022 | 2023-2024 | 2025-2026 | 2027-2028 | 2029-2030 | 2031-2032 | 2033-2034 | 2035-2036 | 2037-2038 | 2039-2040 | 2041-2042 | 2043-2044 | 2045-2046 | 2047-2048 | 2049-2050 | 2051-2052 | 2053-2054 | 2055-2056 | 2057-2058 | 2059-2060 | 2061-2062 | 2063-2064 | 2065-2066 | 2067-2068 | 2069-2070 | 2071-2072 | 2073-2074 | 2075-2076 | 2077-2078 | 2079-2080 | 2081-2082 | 2083-2084 | 2085-2086 | 2087-2088 | 2089-2090 | 2091-2092 | 2093-2094 | 2095-2096 | 2097-2098 | 2099-2100

The Victus System

1. Water starts in one 2000 gallon fish tank. From a central bottom drain, water flows to the main filter. The ultra filter removes suspended solids that accumulate in the fish tanks.
2. Once the suspended solids are removed, the water flows to three line tanks. The line tanks control pH and act as a biological incubator.
3. From the line tanks the flow converges into the mixing tank. The mixing tank ensures the nutrients are evenly mixed before heading to the plants.
4. Once mixed, the water flows to the four growth troughs where the plants and algae absorb the nutrients and re-oxygenate the water for the return to the fish.
5. The water is continuously recirculated. It will take each drop of water approximately three hours to make the full loop.

- Water Tanks**
 - Mixing
 - 3 Line
 - Feed
 - Return
 - 2000 Gal
- Victus Displays**
 - 100
 - 100
 - 100
 - 100











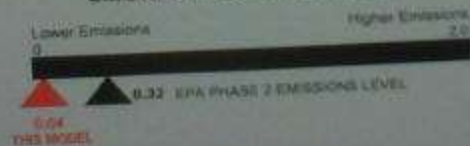
PHASE 2 QUALIFIED

U.S. Environmental Protection Agency Hydronic Heater Program

Phase 2 Qualified models are cleaner and pollute less than those models that have not met this emission level. Exposure to smoke has been associated with respiratory illness and other health problems. Models that have lower smoke emissions may reduce your risk.

For more information go to www.epa.gov/burnwise

HYDRONIC HEATERS SMOKE EMISSIONS RANGE



Heaters with lower emissions produce less smoke when installed and operated properly.

MANUFACTURER:
MODEL NUMBER:
8-HOUR OUTPUT RATING:
8-HOUR AVERAGE EFFICIENCY:
PARTICLE EMISSIONS:

Northwest Manufacturing, Inc. (Woodstock)
Fire-Fuel 60W Indoor (Solid)
219,833 BTU/Hr (Soft Wood)
99% (using higher heating value)
95% (using lower heating value)
2.6 GRAMS/Hr (average)
5.8 GRAMS/Hr (maximum test run)
0.04 LBS./MILLION BTU OUTPUT
0.04 LBS./MILLION BTU OUTPUT
0.04 GRAMS/Hr/10,000 BTU OUTPUT

EPA has determined, based on testing by an accredited independent laboratory, that this model qualifies as the Phase 2 emissions level for U.S. EPA's voluntary program.



Greenhouse Production System

