

Next Generation

BioWastes-to-Renewable Energy

Kyoto Protocol Compliant

Global Cooling

Technologies

Business Model 1

- 💧 Cities become electricity, natural gas, and diesel fuel independent. No more expensive imports from the power grid, natural gas pipeline, and oil companies.
- 💧 City residents and businesses will be able to purchase electricity, natural gas, and diesel fuel at a 20% discount from existing marketplace prices on a sustainable basis.
- 💧 City residents and businesses will be able to purchase compressed natural gas (CNG) which burns cleaner than gasoline and will be priced to sell for 20% less on an equivalent miles per gallon basis.
- 💧 Municipalities automatically become zero-waste-to-landfill communities.

Business Model 1

- 💧 The generated electricity is always **green** and 100% renewable.
- 💧 City residents and businesses will be able to purchase electricity, natural gas, and diesel fuel at a 20% discount from existing marketplace prices.
- 💧 City residents and businesses will be able to purchase compressed natural gas (CNG) which burns cleaner than gasoline. This fuel will be priced to sell for 20% less than gasoline on an equivalent miles per gallon basis.
- 💧 Municipalities automatically become instant zero-waste-to-landfill communities.

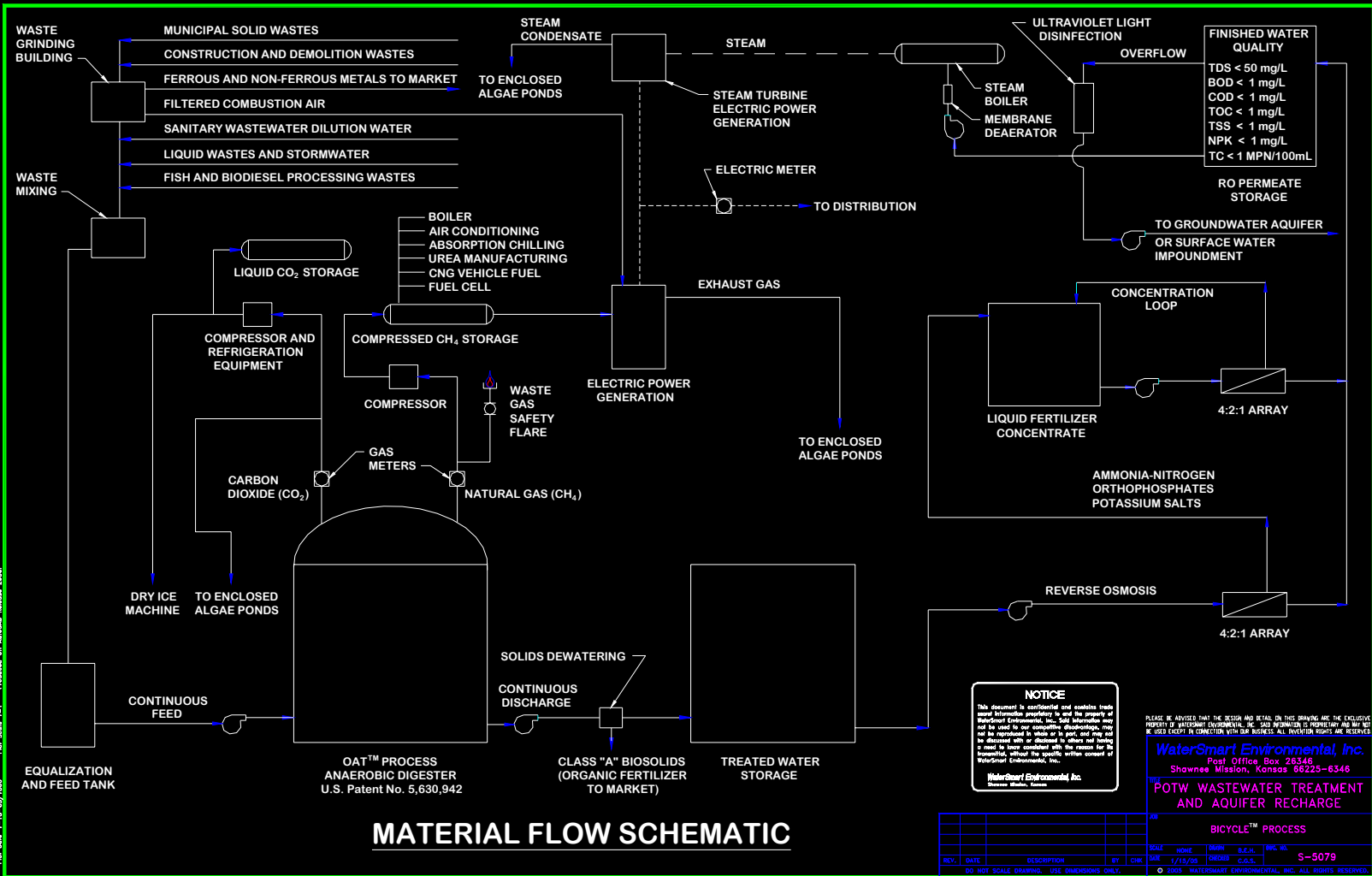
Business Model 1

Is marketed and developed as

BioWaste Energy Regional Industrial Parks

- ◆ **Each park always treats sanitary wastewater, municipal solid wastes, fish processing wastes, and biodiesel refining wastes.**
- ◆ **Many other wastes will also be accepted.**
- ◆ **Each Park is operated by BioWasteEnergy, A Division of WaterSmart Environmental, Inc.**

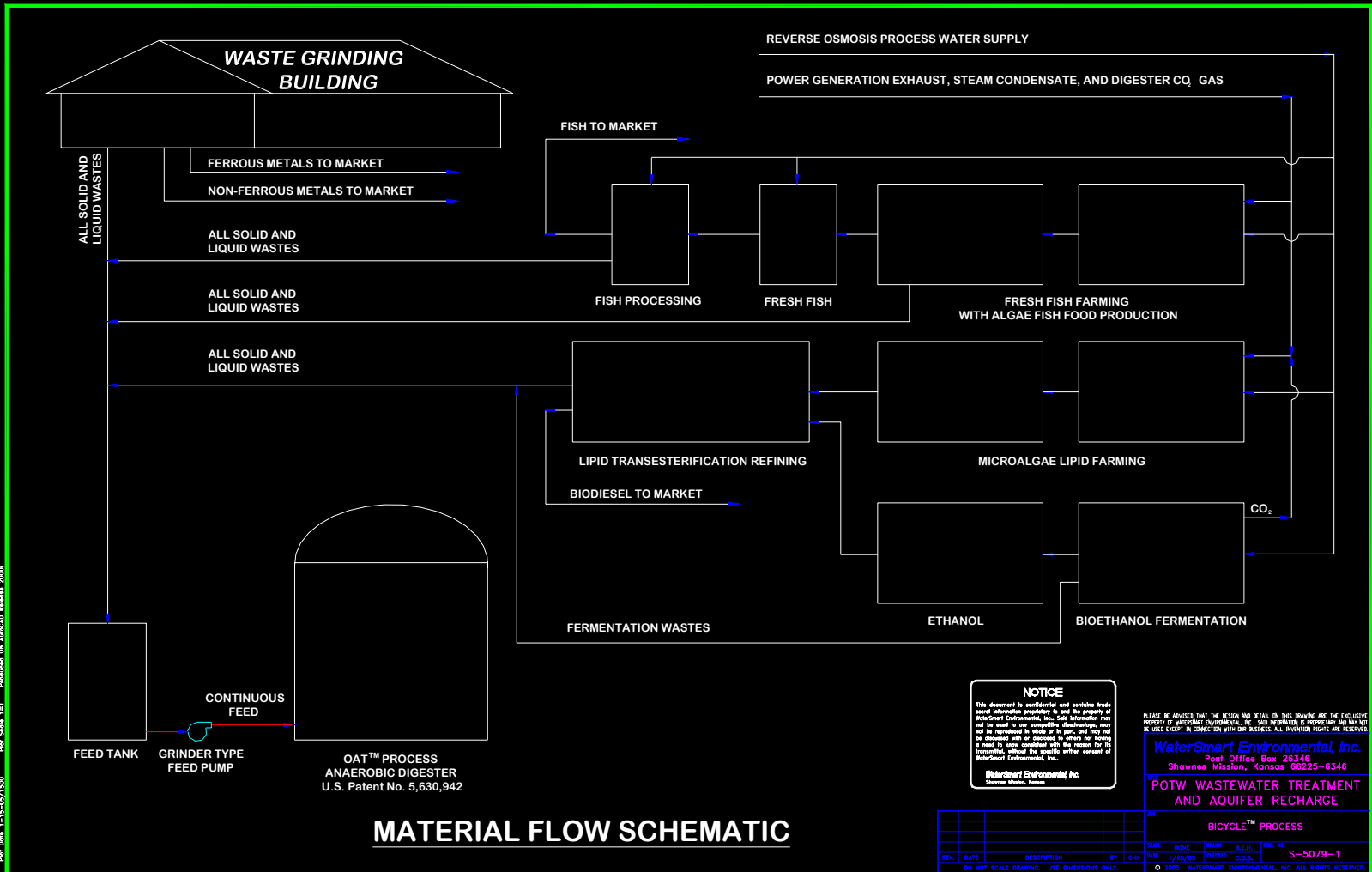
Material Flow Schematics



MATERIAL FLOW SCHEMATIC

Ref: 04th_1-15-05/1500 Produced On: AutoCAD Release: 2005

Material Flow Schematics



MATERIAL FLOW SCHEMATIC

Plot Date: 1-13-07/100
 Plot Scale: 1:1
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Regional Industrial Parks

- 💧 Never require tax money for their construction. Project financing is raised from financial markets. Sales and property taxes will never increase due to park construction.
- 💧 Always generate significant renewable energy credits because they have a positive impact on global warming. These credits are used in part to secure project financing.
- 💧 Always increase farming property worth by creating greater value per acre than existing use.
- 💧 Have zero emissions to the environment.
- 💧 Have zero wastes that require landfill disposal.
- 💧 Always create temporary and permanent jobs.

Regional Industrial Parks

- ◆ Generate 100% of a community's electricity demand thereby permitting a city to eventually disconnect from the grid.
- ◆ Generate 100% of a community's diesel fuel demand since biodiesel is a perfect replacement for petroleum diesel.
- ◆ Generate 100% of a community's demand for natural gas since digester methane gas is a perfect replacement for pipeline supplied natural gas.
- ◆ Enable the use of compressed natural gas (CNG) fuel for gasoline powered engines. CNG is cleaner burning than gasoline and significantly extends engine life.
- ◆ Have the ability to generate 100% of the local demand for fresh fish through fish farming activities. All fish raised will be Mercury free since they are grown under cover. Additional Mercury-free fish will be exported to the marketplace. Fish farming will be practiced 365 days/year as excess energy from the park will permit effective heating of pond water during winter months.
- ◆ Microalgae farming and associated biodiesel production will also be practiced around the clock 365 days/year.
- ◆ Fish and microalgae farming generate far greater value/acre than all other food production products. Processing fish and biodiesel refining are "value added" activities.

Regional Industrial Parks

- ◆ Require the full privatization of a community's wastewater treatment plant.
- ◆ Require the conversion of the community's potable water plant to membrane treatment. Membrane treatment is far more secure from terrorist attack than all lesser forms of water treatment. The cost of membrane conversion is included within total project financing. If the water plant is fully privatized the cost of potable water to citizens and businesses decreases by 20%.
- ◆ Permit the continuance or elimination of community trash recycling programs. Each park will recycle ferrous and non-ferrous metals (beer and pop cans) and nothing else.
- ◆ Will accomplish stormwater treatment by beneficially using it as municipal solid waste dilution water.
- ◆ Will be organized as for-profit corporations. Each park will share its annual profits with the city on a 50:50 donation basis to enhance municipal payroll compensation and to help fund routine municipal projects.

There Are Over 50 Existing North American MSW-To-Energy Plants That Use Incineration To Generate Electricity

- 💧 Other than scrap metals no other valuable co-products are produced.
- 💧 Associated air pollution is always a concern.
- 💧 The resulting ash must be landfill disposed.
- 💧 The plant's owner/operator makes very little profit.
- 💧 Consequently, existing MSW-to-energy technology is held in low esteem by both investors and environmentalists.

One Major Reason For Low Profits--

The High Moisture Content Of MSW

- 💧 The efficiency of incineration technology is **Greatly Diminished** by the ever present high moisture content of MSW.
- 💧 Incineration Technology is a **Dry Process**.
- 💧 Anaerobic Digestion is a **Wet Process**.

Anaerobic Digestion

- 💧 Is already being used by municipalities to generate methane gas to fuel electricity power generators.
- 💧 Is already being used by dairies and swine producers to generate electricity.
- 💧 Is already being used by the food and beverage industry to generate electricity.
- 💧 Can be beneficially used to produce methane gas from municipal solid wastes.

WaterSmart's MSW-To-Energy Anaerobic Treatment Process

- 💧 Has been carefully designed to recycle 100% of its residuals.
- 💧 Therefore, no material left over requires landfill or other disposal.

System Design

- ◆ MSW is mechanically sorted to remove ferrous and non-ferrous metals (beer and pop cans) which are sold to ferrous and non-ferrous metal buyers.
- ◆ Everything else is mechanically reduced in size to about 2.5 mm (approximately 1/10th inch) by mechanical grinding.
- ◆ The ground material is then mixed with sanitary wastewater and added to the anaerobic digester.
- ◆ Represents **next generation** technology in the marketplace.

Each System Component Is Established Technology

- 💧 MSW sorting to remove beer and pop cans.
- 💧 Size reduction (grinding).
- 💧 Slurry mixing.
- 💧 Anaerobic digestion of MSW.
- 💧 Carbon dioxide compression.
- 💧 Methane compression.
- 💧 CNG fuel for gas generators.
- 💧 Reverse osmosis membrane treatment.

Digester Co-Products

- 💧 Methane gas
- 💧 Carbon dioxide gas
- 💧 Organic fertilizer (digestate)
- 💧 Liquid fertilizer concentrate
- 💧 Reverse osmosis permeate water

Methane Gas

- Is dried, compressed, and beneficially used as a fuel to power internal combustion engines or *gas turbines* to generate electricity.
- Waste heat from power generation equipment is beneficially used to make steam. The steam is used to make additional electricity. When two methods are simultaneously used to make electricity its power generation is referred to as **combined cycle**. The efficiency of combined cycle generation is about 15% greater than simple cycle electricity generation.
- The compressed methane gas (called CNG) can also be used to fuel transportation equipment.
- The compressed methane gas can also be used to manufacture anhydrous ammonia and urea fertilizers.
- No methane gas from the anaerobic treatment process is released to the environment.

Carbon Dioxide Gas

- 💧 Some is liquefied for use in manufacturing dry ice.
- 💧 The balance is beneficially used in the photosynthesis of carbohydrates during fish farming and lipids during microalgae farming.
- 💧 No carbon dioxide will be released to the environment.

Digestate Solids Composition (From Anaerobic Digester)

- ◆ Ground glass, ground sand, ground rubber, ground leather, and ground plastics.
- ◆ Highly insoluble sulfides of Cadmium, Calcium, Copper, Iron, Lead, Manganese, and zinc, Chromium Oxides, and Calcium salts. These metals and salts are beneficial, necessary, and valuable micronutrients in soil.
- ◆ Approximately 1-1-1 N-P-K (Nitrogen, Phosphorus, and Potassium).
- ◆ Qualifies as Class “A” Biosolids in compliance with 40 CFR Part 503.
- ◆ Also qualifies as an organic fertilizer.

Solids Management.

- 💧 May be sold to the marketplace as an organic fertilizer at 30% moisture content.
- 💧 May be sold to the marketplace as a soil conditioner or soil amendment at 30% moisture content.

Liquid Streams (From Digester)

- 💧 Liquid fertilizer concentrate.
- 💧 Reverse osmosis permeate water.

Liquid Fertilizer Concentrate.

- 💧 Contains about 20-10-10 N-P-K in a concentrated 10% dissolved solids water solution.
- 💧 Will also contain soluble aluminum, magnesium, and sodium salts.
- 💧 Is sold to the marketplace.

Reverse Osmosis Permeate Water.

- 💧 Is used as boiler water make-up in making steam for the steam turbines.
- 💧 May be added to MSW to prepare a 5% slurry.
- 💧 May also be used for aquifer recharge to repair and replace contaminated groundwater.
- 💧 May be used for irrigation.
- 💧 Excess may be discharged under an NPDES permit.

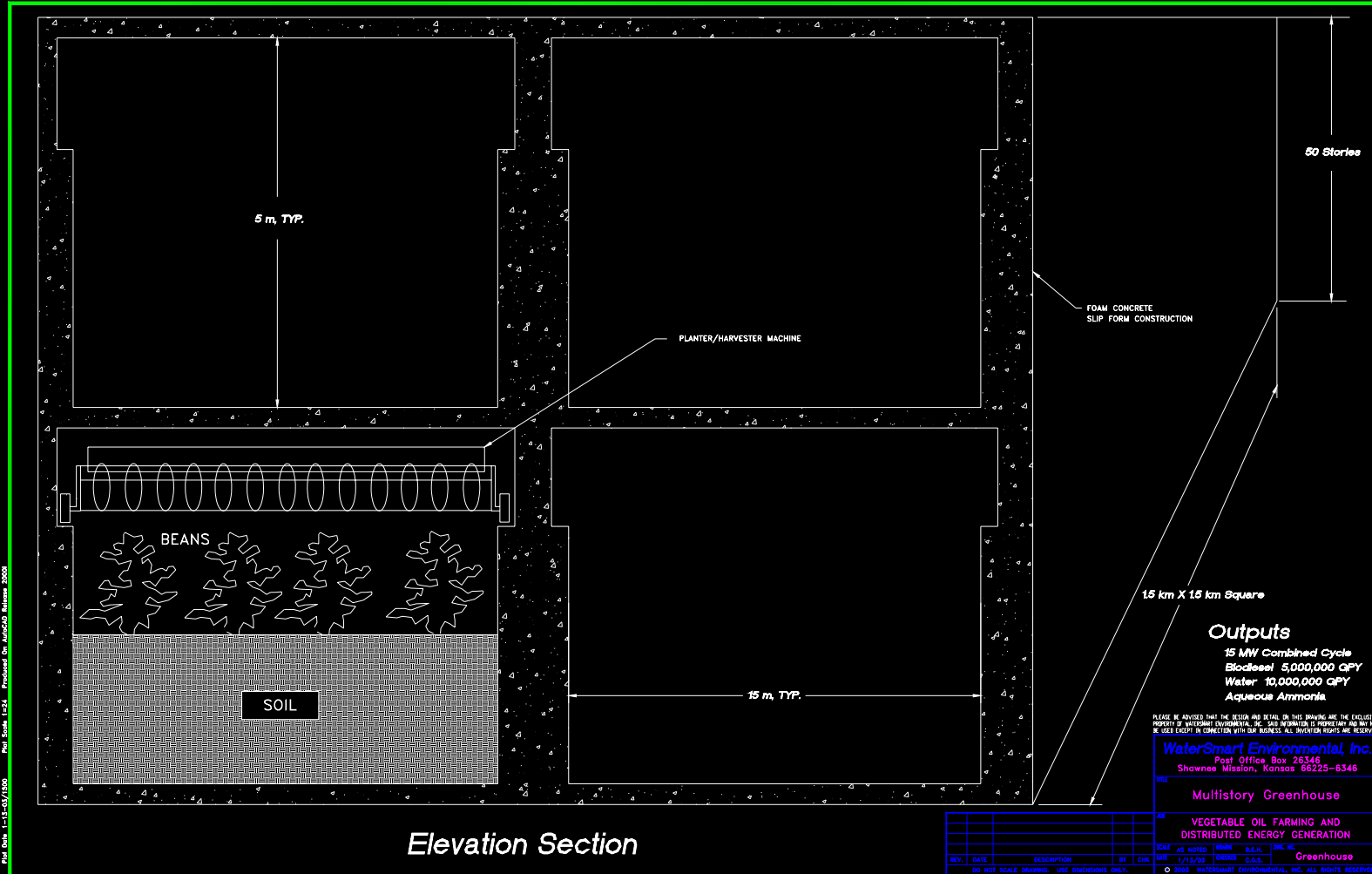
Gas Management.

- ◆ No digester release of methane gas to the environment.
- ◆ No digester release of carbon dioxide gas to the environment.
- ◆ Eliminating digester gas releases to the environment accomplishes a 500%+ reduction in greenhouse gas emissions.
- ◆ At the same time significant carbon dioxide credits are generated, on the order of 85 grams/kWh of electricity generated.

Business Model 2

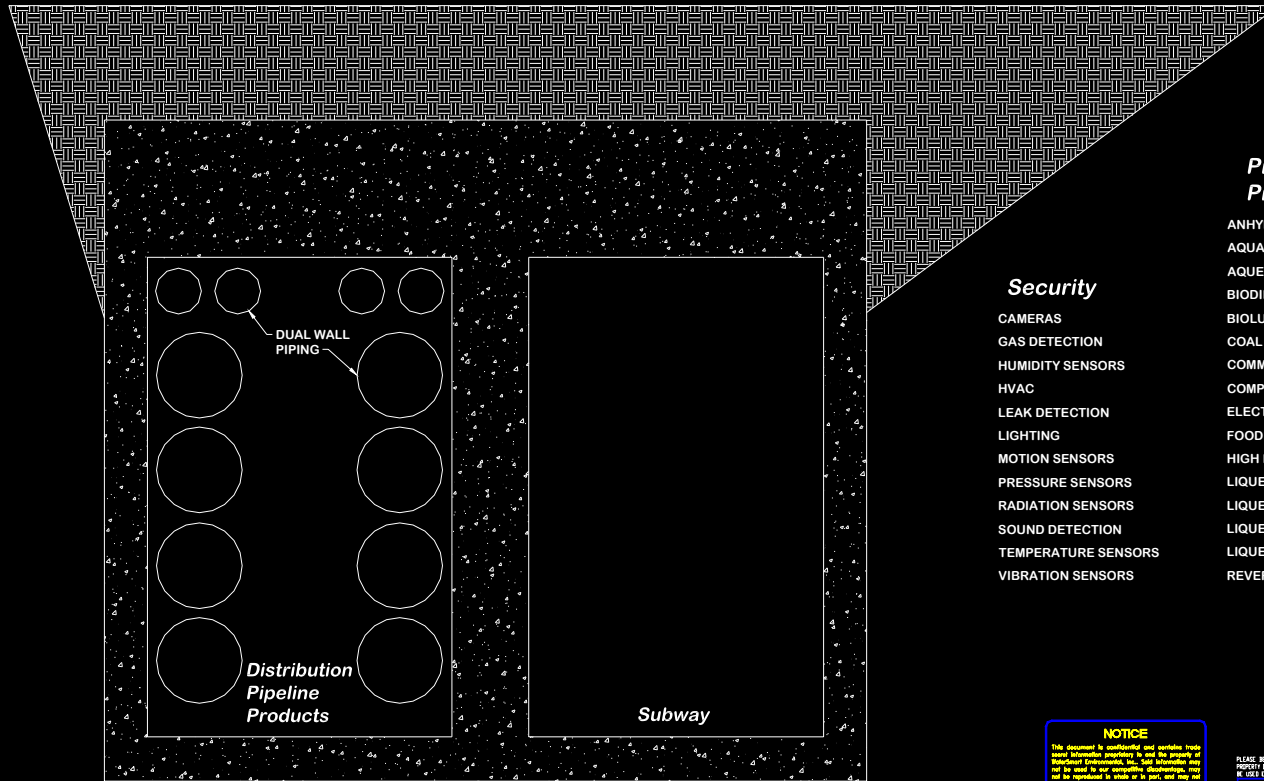
- ◆ Entire Nations become energy, food, fuels, and water independence through massive greenhouse farming. By massive is 1 mile square (1.5 km square) by 50 stories high.
- ◆ North America requires some 5,000 massive greenhouses to achieve energy, food, fuels, and water independence.
- ◆ By connecting each of the several greenhouses together to form a SuperGrid, energy, food, fuels, and water can be economically delivered to the marketplace under secure conditions.
- ◆ Greenhouse farming results in several harvests per year. By controlling moisture, humidity, carbon dioxide concentration, temperature, nutrient addition, lighting, and other variables, successful intercropping can be practiced. All foods grown and processed result in organic and natural food production. The use of pesticides and weed killers can be totally eliminated. Massive greenhouse farming represents highly efficient land management. Upwards of 500 times as much food can be grown/horizontal acre with this technology.
- ◆ Pipeline products consist of electricity, biodiesel fuel, anhydrous ammonia, urea, compressed natural gas, liquefied nitrogen, and water. Foods may consist of anything that can be grown as well as concentrated animal feeding operations. All food products will be processed to achieve value added. All wastes associated with farming, food production, and food processing will be anaerobically digested to produce the same five co-products referenced in Business Model 1.

Business Model 2



Prof. Suite L-1-10/1000
 Prof. Suite L-1-1
 Rev. Suite L-1-1
 Produced On AutoCAD Release 2000

SuperGrid™



Pipeline Products

- ANHYDROUS AMMONIA
- AQUA AMMONIA
- AQUEOUS UREA
- BIODIESEL FUEL
- BIOLUBRICANTS
- COAL SLURRY
- COMMUNICATIONS
- COMPRESSED NATURAL GAS
- ELECTRIC POWER
- FOOD PRODUCTS
- HIGH PRESSURE STEAM
- LIQUEFIED ARGON GAS
- LIQUEFIED CARBON DIOXIDE GAS
- LIQUEFIED NITROGEN GAS
- LIQUEFIED OXYGEN GAS
- REVERSE OSMOSIS WATER

Security

- CAMERAS
- GAS DETECTION
- HUMIDITY SENSORS
- HVAC
- LEAK DETECTION
- LIGHTING
- MOTION SENSORS
- PRESSURE SENSORS
- RADIATION SENSORS
- SOUND DETECTION
- TEMPERATURE SENSORS
- VIBRATION SENSORS

Buried SuperGrid™ Elevation Section

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SuperGrid™

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DATE: 1/19/03
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