Air Emissions Recycling Flow Chart

Captured mixed emissions: CO_2, HAP, Particulate

fractional condensation, sedimentation

CO_2 & Traces <----------Liquid HAP<----------Metals & Particulates

$CO \sim 0.007\%$

$NO_x \sim 400$ ppm

formaldehyde, benzene

trace metals

corrosive

non-corrosive

Stored CO_2 (> 300K TPY)

land fill & civil projects

fuel > 30 TPY

chemical scavengers

other scavengers

Recycled public waste water aseptics

Purification and distribution to:

* Compressed CO_2 markets
* Year-round hydroponic agriculture
* Bio-tech innovations

AER's strategic components

A. Establishing market demands: Determine recurring market demand for AER and product derivatives

1) CO_2 source for compressed air distributers
2) CO_2 source for hydroponic agriculture systems
3) CO_2 source for glucose-derivative products

B. Marshaling feasible technology:

1) Stack channeling & burner efficiencies, storage, fractionation, purification, distribution
2) Regulating CO_2 concentrations in growth systems
3) Linkage & draw-down of public waste water systems
4) Biotech reactor synthesis & combination

4.1 Pharmaceuticals
4.2 Complex polysaccharides--fibers.
4.3 Algae fibers & derivatives

C. Promoting commerce: Engage local public and private capital interests

D. Basic research:

1) AER's 2012 benefits analysis has determined 120 Kw are required to energize 1 mole glucose (44 gm).

2) Current grid costs are $0.14 / Kw Hr. The grid cost for one mole--44 gm--glucose = $ 4.66. The grid cost for one pound glucose (~ 10 mole) = $ 48.00.

3) AER's theory predicts a 2W solar device (1 Red LED + 1 Blue LED, i.e. 120 Kw / hr) energizes 0.14 mole glucose / hr (~ one pound glucose / day).

4) Solar panels costing < $ 2.40 / Watt = $ 0.66 / Kw during the 1st Kwh, $ 0.066 / Kw by the 10th Kwh and < $ 0.0066 / Kw after the 100th Kw hr. The solar energy cost to energize a pound of glucose is inconsequential.

5) Feasible CO_2 end products include pharmaceutical grade 5% glucose drip bags which wholesale for < $ 0.45 / bag. One pound glucose makes about eighteen 500 ml 5% glucose drip bags.

6) Hydroponic CO_2 concentrations must range from 400 - 1200 ppm (0.03% - 0.09 %.)

6.i) 1.5 m^3 CO_2 / sec fixation / turnover in an 1,800 m^3 grow box defines a hydroponic system with a 0.09% CO_2 concentration.

6.ii) 1.5 m^3 CO_2 / sec = 5,560 m^3 CO_2 / hr = 10 TPH, (an emission source ~ 250 TPD CO_2).

7) Waupaca's emission sources include a 250 TPD facility and another 375 TPD facility.

8) These sources' CO_2 emission could be reduced 80% by installation of TKEnergizer™ burners.

E. Benefits:

Implementing AER would be cost-effective for operators and Waupaca County's public health (APPENDIX B Tables 1 - 5.2).