Air Emissions Recycling Flow Chart

Captured mixed emissions: CO₂, HAP, Particulate

· fractional condensation, sedimentation

CO₂ & Traces <-------- Liquid HAP <-------- Metals & Particulates

· CO ~ 0.007%
· NOₓ ~ 400 ppm

formaldehyde, benzene
trace metals
corrosive non-corrosive

Stored CO₂ (> 300K TPY)

fuel > 30 TPY

chemical scavengers

other scavengers

Recycled public waste water aseptics

Purification and distribution to:

* Compressed CO₂ 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) CO₂ source for compressed air distributors
2) CO₂ source for hydroponic agriculture systems
3) CO₂ source for glucose-derivative products

B. Marshaling feasible technology:

1) Stack channeling & burner efficiencies, storage, fractionation, purification, distribution
2) Regulating CO₂ 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 (\(\sim\) 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 (\(\sim\) 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 \(\sim\) 250 TPD CO\(_2\)).

7) Waupaca's emission sources include a 250 TPD facility and another 375 TPD facility.
8) These sources' CO₂ 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).

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