Niagara Falls Ammonia Project Genesis

- Dave Bradley and Neal Rauhauser introduced via Energize America 2020
- First presentation of the HB ammonia/greenhouse plan given in Graettinger, Iowa
- Dave approached Wilson Greatbatch, inventor of the pacemaker and biodiesel producer

Project Timeline

- Dave wrote initial report to bring Wilson Energy staff up to speed on ammonia market.
- First report well received, funding given to expand to team of three for one month
- Working with Kathy Showalter/Enerjyn to offset six months project cost via USDA VAPG or other grants

First Report

- Finance and operations audience
- Basic ammonia production information
- Market trends for natural gas
- Many exciting possibilities in the Niagara Falls area

Second Report Objectives

- Renewable ammonia plant design
- Competitive Analysis
- Income and Costs
- Business Aspects

Second Report Team

- Dave Bradley – chemist, plant conception and preliminary engineering
- Larry Bruce – Marketing and organizational development
- Neal Rauhauser – Energy market and follow on business analysis

Plant Inputs and Outputs

- 45mw continuous – 24 tons H2/day
- 216 tons of water required
- 112 tons of nitrogen
- 136 tons ammonia produced
- 192 tons of oxygen
- 64 tons natural gas NOT used
- 26MBTUs/hour heat

Historic Example

- Norsk Hydro production using electrolysis running until 1991
- Not competitive after North Sea gas became available
- 750k tons/year
- Conservative approach – off the shelf technology

Ammonia Plant Design Status

- Capital equipment estimate $75 million
- Primarily hydrolysis units
- Not complete, expected to double when construction included
- No economies of scale – linear relationship between hydrolysis units and plant volume

Competitive Analysis

- Natural gas depletion, EROI declines
- Banking crash, dollar weakness, loss of supplies
- Coal is cheaper, but carbon tax very likely
- Petroleum coke gasifiers with CO2 capture are situational
- National expectation of renewable boom
- Pickens Plan wildcard

Ammonia Operation

- 50,000 tons/year, $1,000/ton wholesale, $50M in revenue
- Debt service on $150M investment
- $8.75M - $25M electric cost – NYPA dependent
- ROI? Very dependent on electric cost

New York Power Authority

- New York Power Authority – as low as $0.02/kwh
- Must be within 30 miles of dam
- Must create jobs
- Very political

Green House Operations

- 26 MBTUs waste/heat hour
- Almost 20 acres of greenhouse operations
- Full hydroponic/no herbicide
- 1,500ppm CO2 atmosphere/no insecticide
- Organic output on brownfield land
- 200+ jobs and access to NYPA power

Wood Pellet Manufacturing

- 26 MBTUs summer waste heat for drying
- Nearby cottonwood stands planted/never harvested
- Consumer wood pellet boilers pay off in two years
- Prices as high as $350/ton
- Green wood 40% moisture, seasoned 20%
- Spring harvest & drying
- Summer & fall pellet production
- Not many jobs – five to ten on site

South Buffalo Site

- Existing air separation
- Existing nitrogen pipeline
- Abandoned 115kv transmission tower
- Lightly used industrial cooling water tower
- Rail siding
- 5,000 ton/year ammonia customer

Core Business

- Produce and market NH3 at a predictable cost utilizing a carbon neutral technology, while delivering high value byproducts to local chemical concerns, home heating and grocery/restaurant distributors.

Business Structure

- Phase I: LLC for research and business planning
- Phase II: Corporation for financing, construction and contracting with customer base
- Phase III: Phase II Corp contracts with operating entities for chemical operations, greenhouse, pellet production

Financing

- Angel/VC for development funding
- Simultaneous State and Federal grants for development process--Six NY state grant programs cover elements of project
- VC/Bank financing for construction
- Establish Long Term customer contracts

Summary

- Unique opportunity with local champion in Greatbatch
- Unique opportunity with NY Power preferred energy pricing for jobs
- Take advantage of local circumstances to establish carbon neutral NH3 production facility
- Use experience as a template

Buffalo Air Separation

Buffalo Nitrogen Pipeline

Buffalo Abandoned Power

Buffalo Cooling Water

Buffalo Rail Yard

Contact Info & Web Sites

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