Woodard & Curran
Success Story:
Maine Liquid Methane Fuels

Maggie Connolly, PE, LEED AP
Key Team Members

- CHI Engineering
- Pierce Atwood
- Haley & Aldrich

Woodard & Curran

MLMF
WOODARD & CURRAN’S ROLE

- Environmental & Local Permitting
- Site Design
- Support CHI Engineering
PROJECT GOAL

Introduce Alternative Energy & Fuels to the Interior of Maine
PROJECT GOALS

• Leverage existing transit infrastructure
  o Maritime Northeast Pipeline
  o State and Interstate highway network
• Deliver a cleaner & currently unavailable fuel source to Maine
• Diversity Maine’s existing fuel supply pool
• Reduce Maine’s dependency on Petroleum
• Provide a less expensive fuel source
PROJECT LOCATION

- Brewer, Maine -- Greater Bangor area
- Brewer Business & Commerce Park
- Adjacent to the Maritime Northeast Pipeline
- 10-acre site with a purchase option from the City
- Easy access to I-395 and I-95
WHAT IS LMF?

- Liquid Methane Fuel
- Natural Gas
  - Purified, Fractionated and Stored/Transported as a liquid
  - 97% Methane
  - <1% Ethane
  - Balance = Nitrogen & Other Hydrocarbons
1. RECEIVE GAS FROM MARITIMES NORTHEAST PIPELINE

2. PURIFY GAS
   A. REMOVE CO2, SULFUR COMPOUNDS AND OTHER HEAVY HYDROCARBONS
   B. REMOVE MOISTURE

3. COOL TO -265 F

4. FRACTIONATE TO PRODUCE A CONSISTENT ENERGY VALUE

5. STORE TWO FUEL GRADES
   A. HEATING FUEL
   B. MOTOR FUEL (97% C1, <1% C2)

6. TRANSPORT TO CUSTOMERS
PROCESS WASTES

- Purification Process
  - ENVIROSCRUB Solvent

- Spent solvent & removed sulfur = Byproducts
  - Sold to Farmers as Fertilizer

- Non LMF gases from Fractionation
  - Fuel Production
WHY LMF?

- NG has varying Methane contents: 78% to 94%
  - Conversion process provides consistently graded LMF
- Produces fewer emissions than burning Diesel
- Occupies 1/600\(^{TH}\) of the equivalent volume of gas
- Can be derived from many sources:
  - Natural Gas
  - Landfill Gas
  - Biogas
SITE DESCRIPTION

- 10 Acre Site

- NFPA 59A
  - Standard for the Production, Storage, and Handling of Liquefied Natural Gas

- Meets Homeland Security Standards

- ~ $50M in Construction Costs
WAREHOUSE/Maintenance/Self-Generation Building
Truck Loading
Hyd. Tank Array
Cooling Fan Room
Fire Water Tower & Pump
Compressor & Process Buildings
SITE PLAN
PERMITTING

- ACOE – MAINE GENERAL PERMIT
- MDEP – SITE LOCATION OF DEVELOPMENT PERMIT
- MDEP – NATURAL RESOURCES PROTECTION ACT PERMIT
- MDEP – MAINE CONSTRUCTION GENERAL PERMIT
- CITY OF BREWER SITE PLAN APPROVAL
- MDEP – AIR EMISSION LICENSE
- DWP – WATER SUPPLY WELL APPROVAL
COMMUNITY IMPACT

ACCESS TO LESS EXPENSIVE FUEL SOURCE

- Increase cost competitiveness of Maine businesses
- Preserves Maine jobs in the interior
- Increases State’s fuel mix – reduce petroleum dependency

JOB CREATION

- 12-20 Plant Production jobs created
- 6-10 transportation related jobs created
- Will multiply as additional phases come online
- Average Annual Wage ~142% above average for Greater Bangor area
POTENTIAL MAINE CUSTOMERS

- PULP AND PAPER MILLS
- UNIVERSITY SYSTEM
- TRUCKING/TRANSPORT FLEETS
- RAILROADS
- AGRICULTURE
- SKI AREAS
- ASPHALT PLANTS
- MUNICIPALITIES
- MARINE FLEET – FERRIES AND FISHING VESSELS
KEY FACTORS TO SUCCESS

- MUNICIPAL PARTNERSHIPS
- ECONOMICALLY FOCUSED COMMUNITY
- WELL – INFORMED CLIENT
- REGULATORY PARTNERSHIPS
- PERMITTING EXPERTS
OTHER W&C PROJECTS

- LNG
- SOLAR
- WIND
- BIOMASS
THANK YOU

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