AK-CHIN INDIAN COMMUNITY
BIOMASS FEASIBILITY STUDY

Department of Energy
Office of Energy Efficiency and Renewable Energy
TRIBAL ENERGY PROGRAM
FY2004 Program Review Meeting
Feasibility Study for
Renewable Energy Development on Community Lands
Solicitation # DE-PS36-02GO92006

October 20, 2004
AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY

Topics

• Ak-Chin Indian Community
• Project Background and Objectives
• Project Description and Diagram
• Project Team
• Proposed Project Schedule
• Items To Be Reviewed
• Resource Assessment
• Digester Technology
• Decision Factors
• Next Steps
• Contact Information
AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY

Ak-Chin Indian Community

- Federally recognized Indian Tribe
- Founded in 1912
- Reservation comprised of approximately 22,000 acres of which about 16,000 acres are cultivated by the Ak-Chin Farms
- Community has approximately 670 enrolled members of which about 75% live on the Reservation
- Employs almost 1,000 people in 3 Community-owned businesses and government
- Located approximately 30 miles southeast of Phoenix, Arizona

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Ak-Chin Indian Community (Continued)

- There is a 100-acre industrial park
- Hickman’s Egg Ranch is located in the industrial park
- Committed to long-term self sufficiency
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Project Background & Objectives

• Background
  – The Ak-Chin Electric Utility Authority (AKEUA), an enterprise of the Ak-Chin Indian Community, has a need for additional electrical power.
  – The Ak-Chin Farm, an enterprise of the Ak-Chin Indian Community, uses chicken litter from the Hickman’s Egg Ranch as fertilizer for its agricultural crops.
  – The Ak-Chin Indian Community supports the use and/or development of cost-effective renewable energy.

• Objective
  – Use the chicken litter and other biomass materials to either produce bio-gas or burn and generate electricity.
  – Ensure that the Ak-Chin Farm experiences no adverse economic or nutrient dispersement impact.
  – Eliminate possible odor and fly problems.
  – Meet all environmental requirements.
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Project Description

- Study use of chicken litter to produce energy either through digestion or combustion
- Determine chemical content of chicken litter
- Identify nutrients needed by Ak-Chin Farm from raw chicken litter
- Identify nutrients remaining after digestion or combustion
- Determine economics of power produced from digestion or burning and fit with AKEUA operational plans.
- Identify resultant fertilizer distribution system
- Benefit / Cost analysis
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Project Diagram

Existing Process

- Chicken Litter
- Other Organics

Proposed Process

- Chicken Litter
- Digestion or Combustion
- Power Production

Ak-Chin Farm
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Project Team

- Leonard S. Gold of L. S. Gold & Associates, Inc. will be responsible for power related issues.
- Mark R. Randall of Daystar LLC will be responsible for renewable energy incentives, environmental issue identification, and reporting tasks.
- Mark Moser of RCM, Inc. will be responsible for developing digester and power production systems, layout, costs, and benefits.
- NREL will provide peer review and technical assistance as required.
- Support from Ak-Chin Farm and Hickman Egg Ranch.
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Proposed Project Schedule

- June 25\textsuperscript{th} - Kick-off
- September 04 - Samples submitted to Lab
- October 04 - Attendance at DOE Conference to present status
- July/November 04 - Meet with Ak-Chin Farm to discuss nutrient content analysis and system distribution methods
- September 04/January 05 - Draft Benefit / Cost Analysis
- January/February 05 - Presentation to Ak-Chin
- March 05 - Final Study Submitted to Ak-Chin Indian Community Council for acceptance
- April 05 - Study submitted to DOE
- October 05 - Attendance at DOE Conference to present study
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Items To Be Reviewed

• Test Chicken Litter
  – Dry BTU Content
  – Wet Digestibility
  – Nutrient Value
• Technology review
• Power production strategy and economics
• Nutrient distribution
• Community compatibility
• Project construction costs and financing
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Resource Assessment

• Potential digester or combustion materials
  – Chicken Litter
  – Flush Dairy Manure
  – Potato Processing Wastes
  – Food Waste
  – Other potential sources nearby?
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Resource Assessment

- Material locations
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Resource Assessment

• Material quantity
  – Chicken Litter: 1.9 Million Birds
  – Dairy Manure: 7,000 Cows
  – Potato Processing Wastes: TBD
  – Food Waste: TBD
  – Other Sites: TBD
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Resource Assessment

• Digestion potential of chicken litter

  1.9 Million Birds =

  475,000 # manure/day

  + 80,000 gallons dilution water

  – Yield: about 300,000 gpd liquid effluent

  And >1MW of electricity
PROSSIBLE DIGESTER TYPE

Heated Complete Mix
Tank or Covered Lagoon
300ft x 300ft x 16ft
Effluent storage pond
About 2 acres total area
Decision Considerations

• Digestion or combustion
• Reduction of Odors, Pathogens & Flies
• Ability to distribute and apply liquid fertilizer
• Nutrient content from digestion or combustion
• Power production potential
• Proximity of Biomass Sources
• Existing land uses & terrain
• Cultural resources & environment
• Ak-Chin Farm cropping patterns
• Existing utilities & road access
Next Steps

• Review results from material sampling/analysis
• Identify availability of other potential sources of organic materials
• Evaluate nutrient distribution options
• Review findings with Farm & Hickman
• Evaluation of digestion or combustion
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Contact Information

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