

# **AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY**

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**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**

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# AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY

## Topics

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- **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**
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## AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY

# Ak-Chin Indian Community

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- 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 BIOMASS FEASIBILITY STUDY

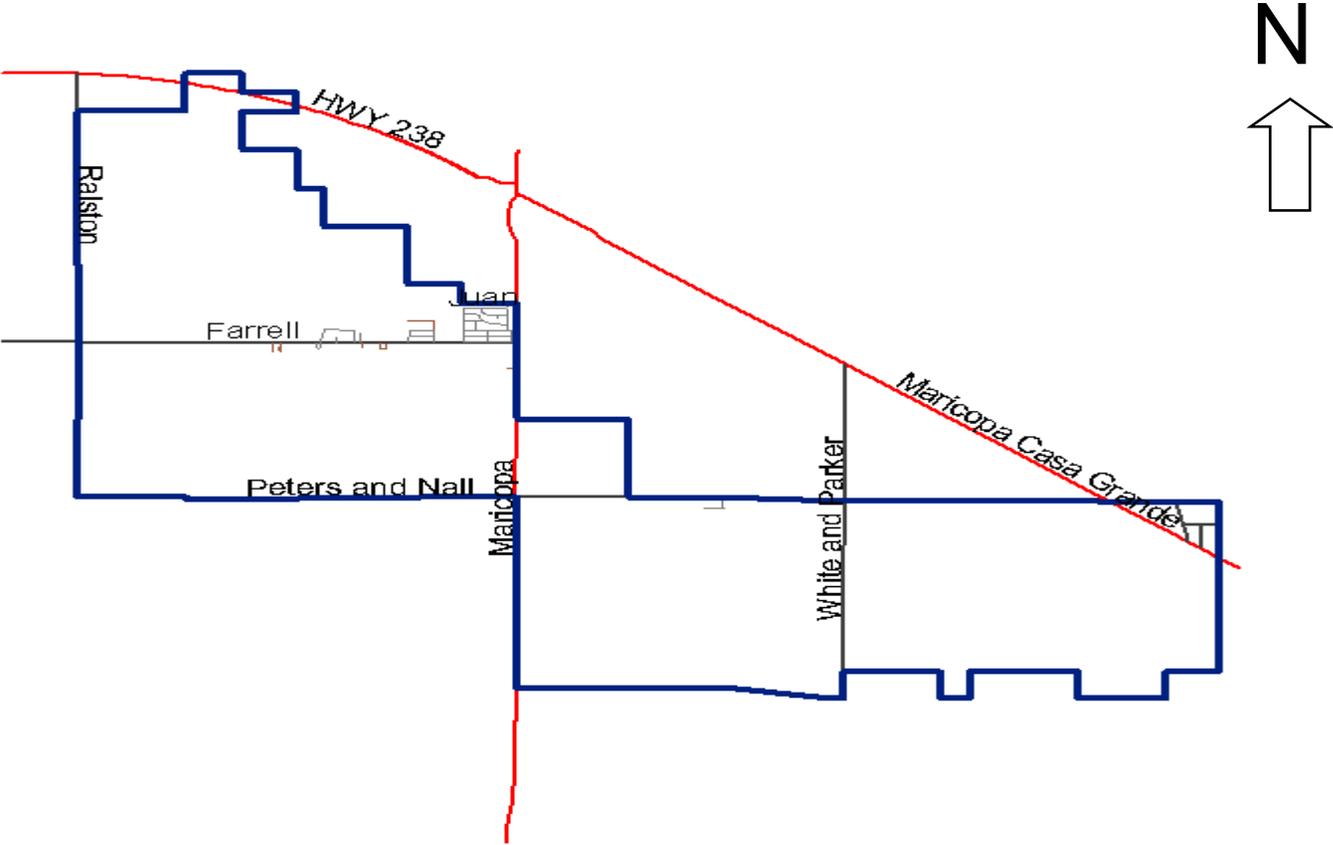
### **Ak-Chin Indian Community** (Continued)

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- There is a 100-acre industrial park
- Hickman's Egg Ranch is located in the industrial park
- Committed to long-term self sufficiency

AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY

Ak-Chin Indian Community



# AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY

## Project Background & Objectives

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- **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.

# AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY

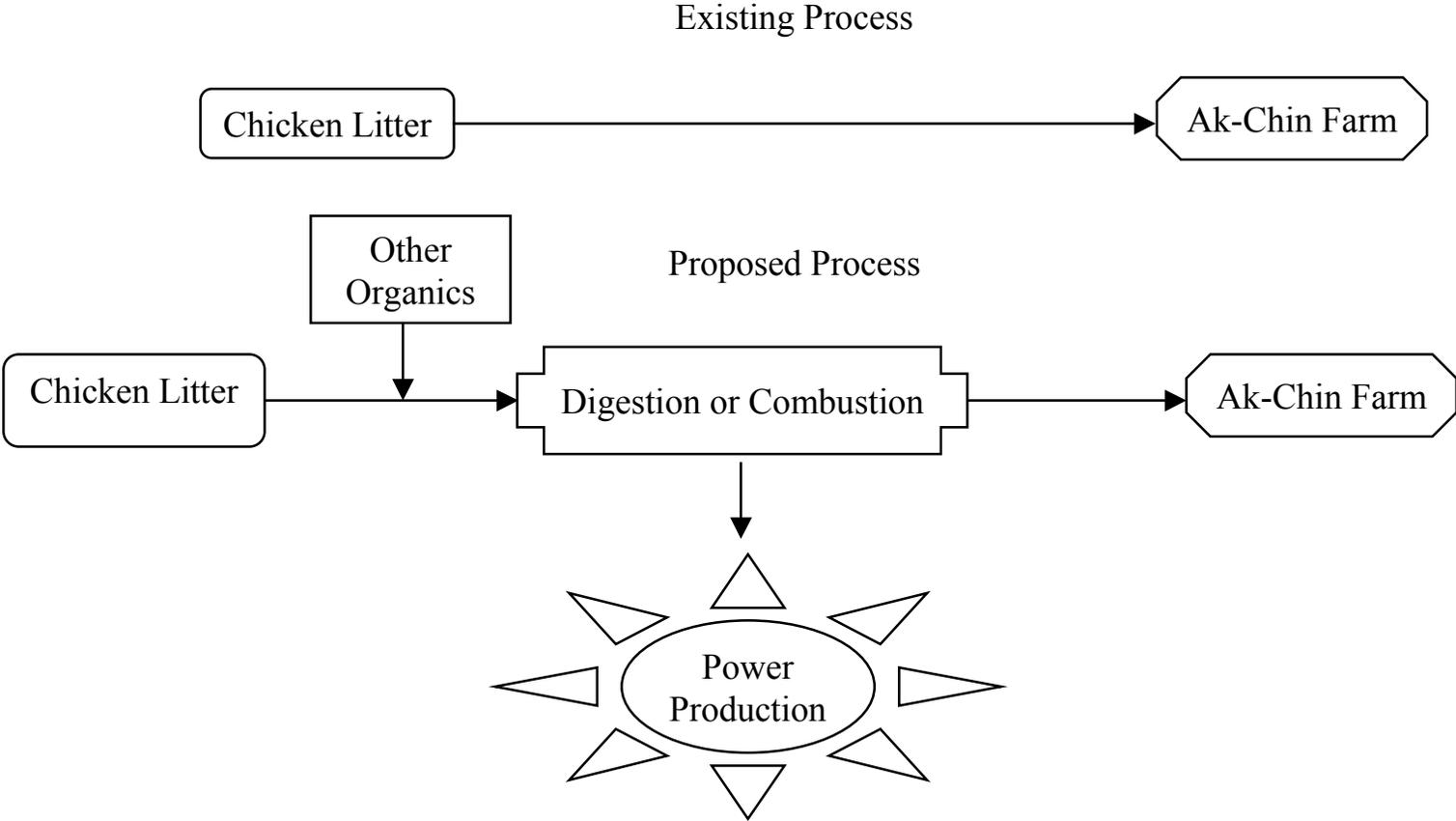
## Project Description

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- 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

# AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY

## Project Diagram



# AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY

## Project Team

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- 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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# AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY

## Proposed Project Schedule

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- June 25<sup>th</sup> - 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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# AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY

## Items To Be Reviewed

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- 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

## Resource Assessment

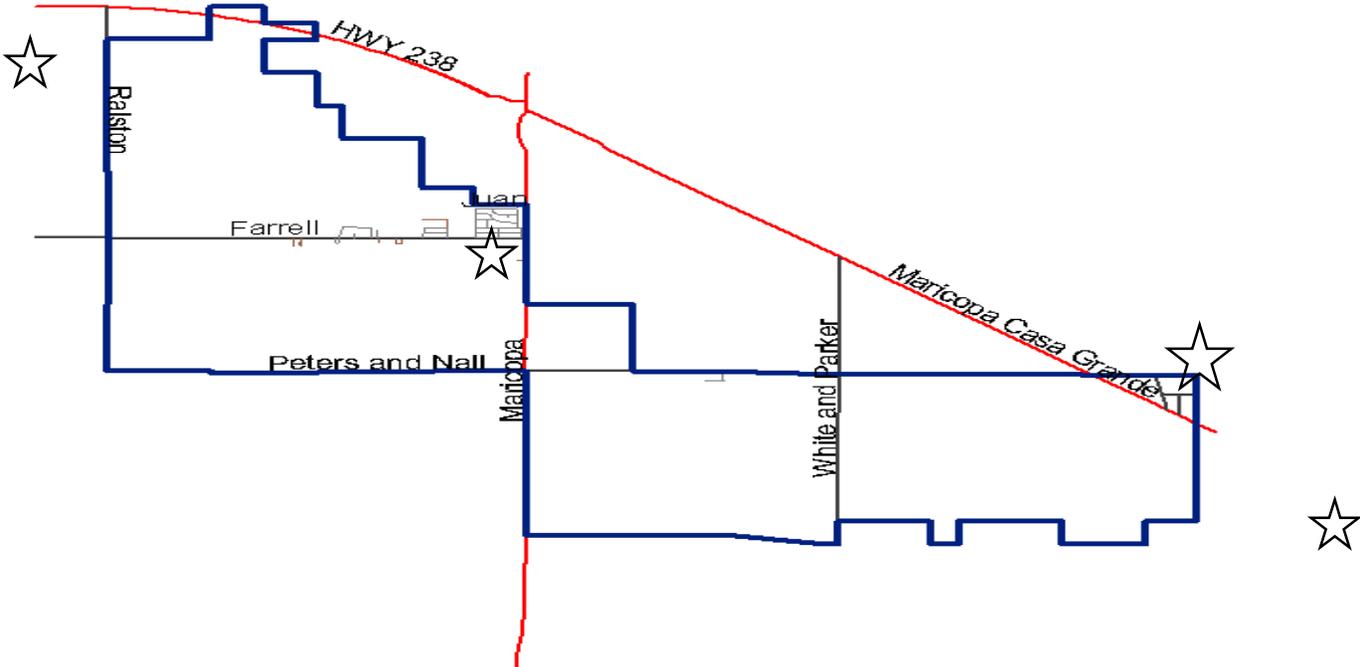
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- Potential digester or combustion materials
  - Chicken Litter
  - Flush Dairy Manure
  - Potato Processing Wastes
  - Food Waste
  - Other potential sources nearby ?

AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY

Resource Assessment

- Material locations



# AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY Resource Assessment

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

## AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY

### Resource Assessment

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- 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

## Digester Technology

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### PROSSIBLE DIGESTER TYPE

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

# AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY

## Decision Considerations

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- 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
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## Next Steps

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- 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

# AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY

## Contact Information

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- **Business Contact:**

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# APPENDIX

# AK-CHIN INDIAN COMMUNITY BIOMASS FEASIBILITY STUDY

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