

# YAVAPAI APACHE NATION BIOMASS FEASIBILITY STUDY



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DOE Tribal Energy Program Review  
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# Yavapai-Apache Nation Energy Program History:

## Introduction:

The Yavapai-Apache Nation Economic Development Authority (EDA) began working on energy related economic development programs in 1997. The basic function of the Energy Program was to manage the Nation's energy resources

The Energy Program has primarily been funded through grants. The EDA has assumed the salaries and operational expenses of the program over the past 2.5 years.

The Energy Program will assist in the development of a Utility Authority and become self-sustaining through revenue created by management of the Nation's resources that remain to be identified

# YAN Energy Office Projects:

- U.S. Department of Energy (DOE) Municipal Energy Management Program, Urban Consortium Energy Task Force: Objective: Power reliability study - completed
- Administration for Native Americans (ANA) SEDS Grant: Objectives: 1) Study financial & infrastructure arrangements to receive WAPA – Post 2004 Allocation 2) Develop a framework for a Tribal Energy Action Plan - completed
- U.S. Department of Housing and Urban Development (HUD) Indian Community Development Block Grant (ICDBG): Objective: Build a solar covered parking lot structure at the Medical/Dental Building - completed

# YAN Energy Office Projects con't:

- U.S. Department of Housing and Urban Development (HUD) Rural Housing and Economic Development (RHED) Innovative Economic Development: Objectives: 1) To develop electrical generation resources on the Reservation 2) Energy Efficiency Program - completed
- U.S. Department of Housing and Urban Development (HUD) Rural Housing and Economic Development (RHED) Capacity Building: Objective: To enhance and develop the capacity of the Energy Program, to manage the WAPA Hydropower Allocation, develop Reservation energy resources and to establish Energy Efficiency programs for Tribal facilities and homes - completed

# YAN Energy Office Projects con't:

- U.S. Department of Energy (DOE) Renewable Energy Development on Tribal Lands: Objective: Yavapai-Apache Forest Biomass Feasibility Study ie; Resource availability assessment, power utilization assessment, technology review, system design, manpower development assessment, economic assessment, project business planning and implementation strategy – ongoing
- Inter-Tribal Council of Arizona (ITCA) Weatherization Program: Objective: To increase the energy efficiency of dwellings owned or occupied by low-income persons, reduce their total residential expenditures and improve their health and safety – completed year 1, transferred program to YAN Housing Authority

# YAN Energy Office Projects con't:

- Western Area Power Administration (WAPA) Hydropower Allocations/Navajo Tribal Utility Authority (NTUA) Benefit Crediting: \$8,100.00 (monthly avg.) Objective: Utilize the benefits of federal hydropower allocations through monthly benefit checks paid by NTUA who will use the power allocation - ongoing
- APS Negotiations/Yavapai-Apache Nation Utility Authority Development: Negotiations have been terminated and will resume once the Nation has a defined plan for energy development
- Miscellaneous Projects: Water well pump replacement in Middle Verde, retrofit of Casino lighting, and solar street lighting

# Project Overview

The Yavapai-Apache Nation Energy Program proposed a study of the feasibility of siting a renewable energy generation facility on the Nation's land, the Nation decided to go with biomass. The study is to determine whether such a facility can be economically sustainable, as well as be consistent with the cultural, social and economic goals of the Nation.

YAN Demographics

Biomass Study Team

YAN Biomass Study Background

Tribal Objectives

Results to Date

Summary

Questions

# YAN DEMOGRAPHICS

- YAN Population = 1800 Enrolled Members
- YAN Geography = 650 Acres in 5 Locations – Camp Verde, Middle Verde, Clarkdale, Rimrock and Tunlii (increased to approximately 1850 Acres in 2006, 1200 purchased acres turned to trust)
- Projected location of a Biomass Facility
  - Located in Verde Valley of Central Arizona
  - Middle Verde (On reservation)
  - Drake (30 Miles from M.V.)



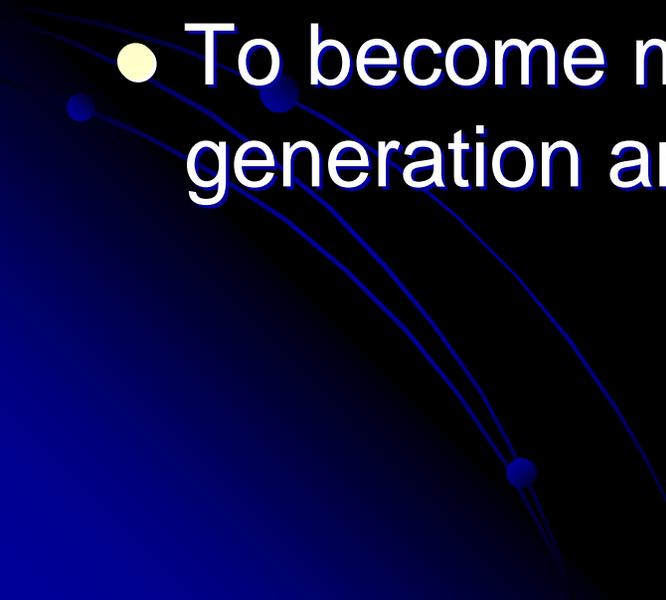
# YAN Biomass Study Team

- Jamie B. Navenma, Yavapai-Apache Nation – Energy Manager
- Mark Randall, Daystar Consulting, LLC – Program Consultant
- Leonard Gold, L.S. Gold & Associates, Utility Consultant
- Al Dozier, Global Concepts, LLC – Technology Consultant

# YAN Biomass Study Background

- YAN Energy Program drafted a Resource Assessment (1999)
- YAN has installed 41 kW of PV Solar Generation through 3 facilities (Medical Center, Food Bank & Daycare Center)
- YAN held negotiations with local utility for possible acquisition of Reservation electric utilities
- YAN views Biomass as an opportunity for economic development
- 2001 DOE FEMP Pre-feasibility Study indicated biomass could be economic

# Tribal Objectives

- Creation of technology based jobs
  - Generation of revenue for the Nation
  - Diversity of tribal economy
  - Environmental awareness
  - To become more self-sufficient in energy generation and development
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# Biomass Resource Availability

- Forest products wood waste –limited locally & expensive/low value: available on a long term basis for supplying a 5MW biomass power plant, estimated capital cost of \$15.6 million,
- Sewage sludge biosolids –low quantity available but can be included
- Energy Farm Biomass – better approach & value, can make better use of Nation farm lands

# Biomass Energy Farm



# Power Utilization Assessment

- Under current market conditions in Northern Arizona a 5 MW Biomass plant WOULD NOT attract the equity and debt financing required. The Capital Costs, Operating Costs and delivered Fuel Costs are too high in relation to Projected Revenues and Return on Investment
- The Arizona Environmental Portfolio Standard (EPS) is not structured to support new biomass combustion systems
- Projected water use is from 1.2 – 11 acre feet per year depending on technology
- Negotiations with Arizona Public Service (APS) to acquire the local electric distribution system are on hold indefinitely

# Technology Review

## ● Pyrolytic Steam Reforming Gasification



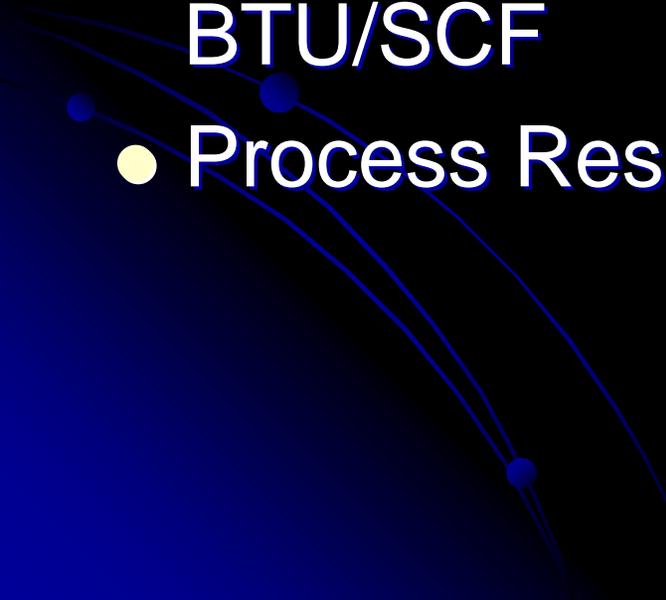
### *Gasification vs. Incineration*

#### **Gasification**

#### **Incineration**

➤ Oxygen free gasification; converts feedstock to Syn Gas and benign ash	➤ Thermal destruction with direct flame & excess oxygen, Heat & CO <sub>2</sub>
➤ No air flow (extremely low NOX)	➤ High air flow (high NOX)
➤ <i>No toxic emissions (no Furans or Dioxins)</i>	➤ Generates <u>Furans and Dioxins</u>
➤ 94-98% reduction in volume and weight of carbon in Feedstock	➤ Maximum 85% to 90% reduction
➤ Creates high quality Syn Gas (450 to 900 BTU/SCF) that is storable	➤ Heat is only usable form of Energy and can not be stored
➤ Secondary air pollution control devices rarely required	➤ Secondary air pollution control device <u>always required</u>

# Gasifier Technology

- Can process any carbonaceous material
  - Supplies its own purified process water
  - Produces “Syn-gas”
  - BTU Energy can be from 350-900 BTU/SCF
  - Process Residue is a benign Ash
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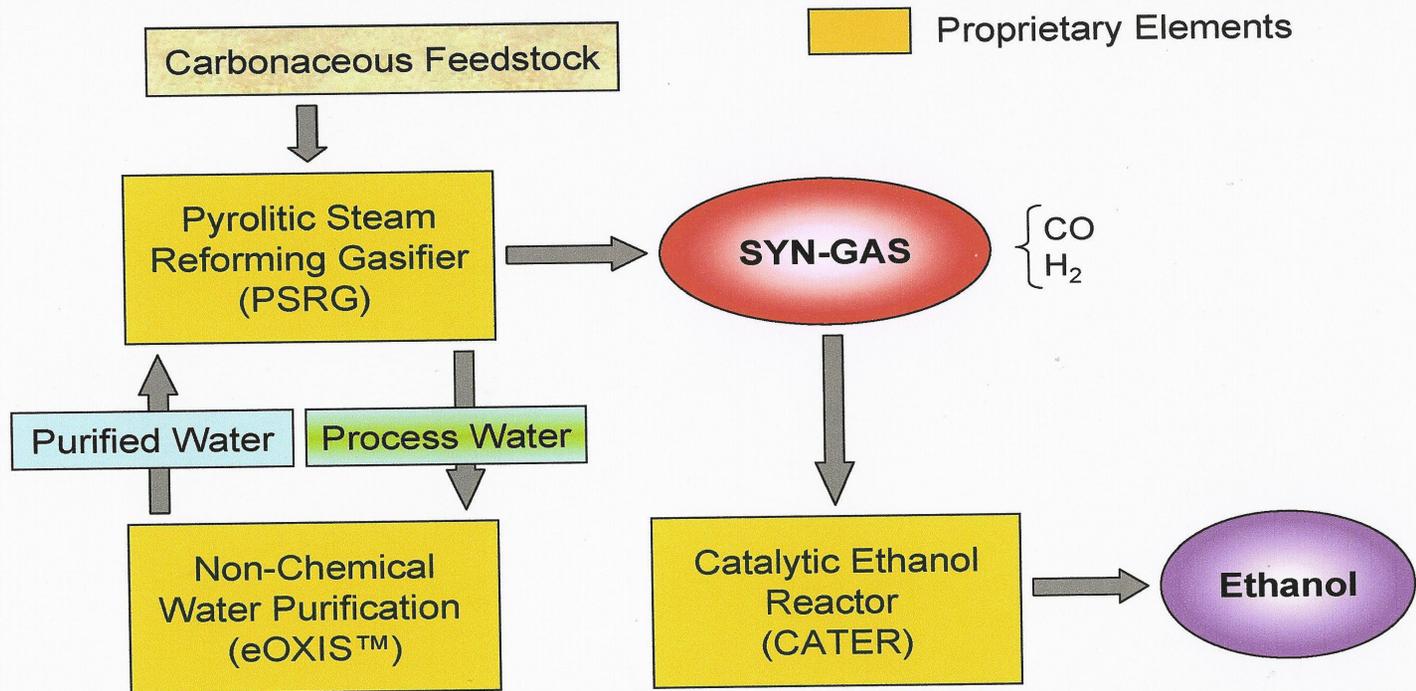
# Wide Range of Gasifiable Materials

- Forest Trimmings - Wood
  - Agricultural Residues
  - Animal Manures
  - Human Biosolids
  - Municipal Solid Wastes
  - Carbonaceous Fossil Fuels
- 

# Gasfier Process



*Proprietary Technology*



# Results to Date

- The Resource Availability Assessment has been completed
- Power Utilization Assessment has been completed, reviewed and the Nation will look at developing a Utility Service Code to help in this area
- Technology Review and System Design have been completed
- Manpower Development Assessment is on-going, the Nation realizes it needs to develop and build capacity to meet the Nation's future energy goals
- Economic Assessment is also on-going, they realize that energy development, especially renewable energy is in the best interest of the Nation and it's community members
- The Nation is looking into developing a comprehensive strategic energy plan for the future development of tribal lands and programs

# Summary

- The Nation has determined a biomass facility IS NOT currently viable
- Future site selection criteria for the Nation to consider 1) Proximity to fuel supply 2) Transportation infrastructure 3) Proximity to transmission and distribution systems 4) Existing and future land uses and zoning issues and 5) Probable acceptance by the YA Nation communities
- These critical elements would be needed by the Nation to support the installation of a new biomass facility in Northern Arizona 1) 20 year power sales contract @ \$0.22/kwh with a reputable utility company 2) A grant of at least 50% to offset capital costs 3) The Nation, Federal and/or State would have to absorb from \$10 - \$30 dollars per BDT of forest fuel and 4) Possible partnership with another tribe or entity
- Arizona RPS will be a factor in economics
- The YAN Energy Program has funds remaining and will work with the DOE TEP to determine what is the best use of the funds

# Questions?

Thank you...

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