# YAVAPAI APACHE NATION BIOMASS FEASIBILITY STUDY

# OVERVIEW

YAN Demographics

Biomass Study Team

YAN Biomass Study Background

Project Rationale & Outline

Project Progress

Future

Q&A

# YAN DEMOGRAPHICS

- YAN Population = 1800 Enrolled Members
- YAN Geography = 650 Acres in 5 Locations
- Projected location of a Biomass Facility
  - Located in Verde Valley of Central Arizona
  - Middle Verde (On reservation)
  - Drake (30 Miles from the Reservation)

# YAN BIOMASS STUDY TEAM

- YAN Energy Director– Tracy Tudor
- YAN Program Consultant – Mark Randall
- YAN Utility Consultant – Leonard Gold
- YAN Technology Consultant – Al Dozier

# YAN BIOMASS BACKGROUD

- YAN Energy Program 1999 resource assessment
- YAN has 41 kW of Solar Generation
- YAN is negotiating with local utility for procurement of Reservation electrical utilities
- YAN views Biomass as an opportunity for economic development
- 2001 DOE FEMP Pre-feasibility Study indicated biomass could be economic

# Project Rationale

- Pyrolytic Steam Reforming Gasification

ACT
Carbon Waste to Clean Energy

## *Gasification vs. Incineration*

| Gasification | Incineration |
|---|---|
| ➢ Oxygen free gasification; converts feedstock to Syn Gas and benign ash | ➢ Thermal destruction with direct flame & excess oxygen, Heat & $CO_2$ |
| ➢ No air flow (extremely low NOX) | ➢ High air flow (high NOX) |
| ➢ *No toxic emissions (no Furans or Dioxins)* | ➢ Generates Furans and Dioxins |
| ➢ 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 *always required* |

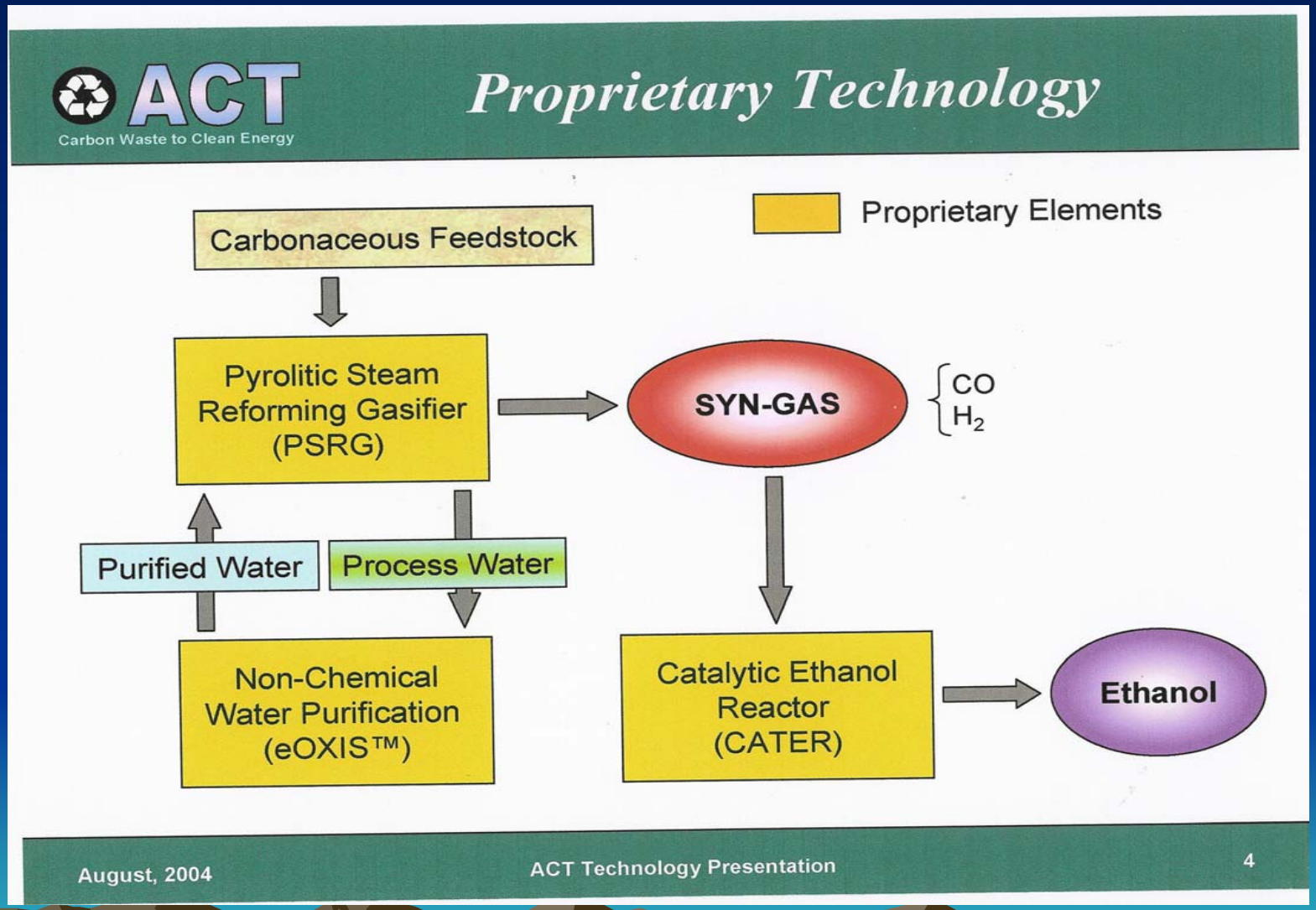
# Gasifier Technology

- 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

# Wide Range of Gasifiable Materials

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

# Gasifier Process



# Denver Test Facility

ACT
Carbon Waste to Clean Energy

## *Pilot Testing Facility*

Rice Straw

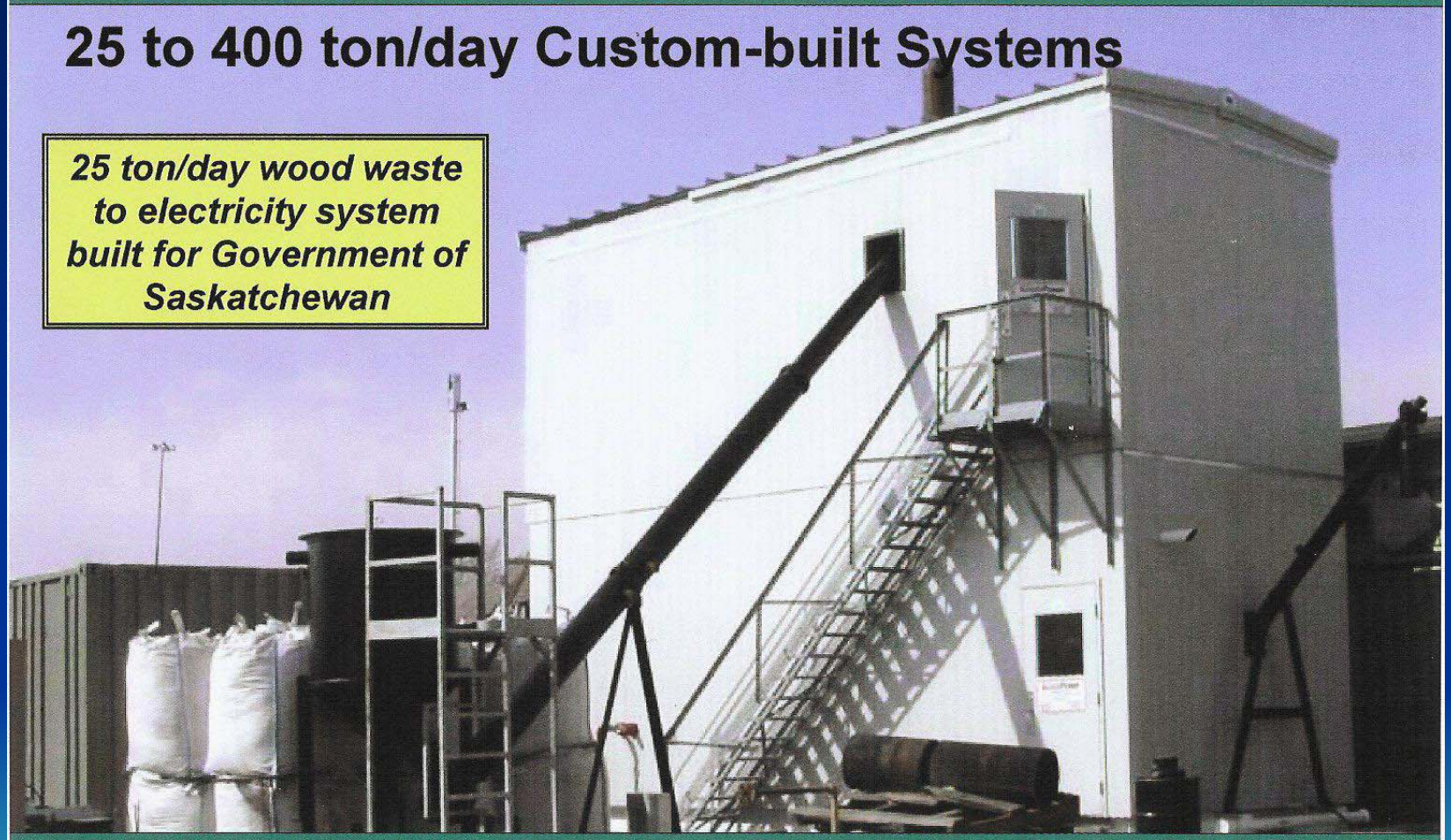
Pilot testing facility allows short-term design testing of feedstock to optimize process design

ACT
Carbon Waste to Clean Energy

# *Production Units*

## 25 to 400 ton/day Custom-built Systems

***25 ton/day wood waste to electricity system built for Government of Saskatchewan***



# Project Outline

- Resource Availability Assessment
- Technology Review and Best Fit Analysis
- Preliminary Design and Cost Analysis
- Financing and Incentives
- Utility Interface
- Manpower Availability
- Business Plan
- Tribal Council Approval

# BIOMASS STUDY PROGRESS

- Completed Fuel Availability Assessment
  - Forest Material
    - National Forests - 3 within 100 mile radius
    - USFS is preparing treatment plans
    - 300 Tons per day needed for economics of scale
    - 2006, Forest material will be available
    - Studying Transportation options
  - Sewage Sludge
    - Completed quantity and energy content study
  - Biofuel Crops
    - Studying suitability

# Results to Date

- Human biosolids could provide up to 40%
- Gasifier could be a solution to local biosolids disposal problems
- Forest material availability and processes not yet established.
- Transportation of forest material has marginal economics.
- Relocation of plant improves economics of gas production and diminishes economics of power production
- Local resources such as energy crops and MSW need study

# FUTURE

- Continue to explore other potential waste-streams

-- MSW

-- Human Waste Sludge

-- Horse/Cattle Manure

-- Local lumber mills

# SUMMARY

- Feasibility Study is On-track
- Technology Validation is On-track
- Arizona RPS will be a factor in economics
- Multiple feedstocks will be necessary
- Project has potential to address a variety of waste disposal issues for the Verde Valley

# Questions