The Nature Conservancy’s Perspective on Sustainable Woody Biomass Utilization and Project Development in the Interior West

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Why is a conservation organization interested in promoting sustainable woody biomass utilization?

- Conservation for people rather than conservation from people.

- Scale and magnitude of the wildfire and forest health issues in the interior west. It is predicted that 80% of federal forests may experience uncharacteristically high severity wildfire threatening the delivery of a wide variety of ecosystem goods and services.

- Retention of a forestry sector is important for restoration treatments at a meaningful scale.
## Advantages of Biomass Power

**Provides base-load renewable energy (24/7) on a cost effective basis.**

**Has numerous societal benefits:**
- Supports hazardous fuels reduction
- Reduces waste material destined for landfills
- Net improvement in air quality
- Provides employment (4.9 jobs/MW)
- Can be located near existing transportation/distribution system
Biomass Project Development -
Deal Killer Issues to Consider

- Community Support
- Fuel Supply
  - Sustainability
- Project Economics
  - Transportation
- Appropriate Technology
- Siting/Infrastructure
  - Existing infrastructure
  - New siting analysis
**Community Support**

- Best to have grass roots support.
- Poll key stakeholders:
  - Local peer groups
  - Board of Supervisors
  - Chamber of Commerce
  - Environmental organizations
  - Local, State and Federal agency representatives
  - Private sector resource managers, landowners
White Mountains Multi-Party Monitoring Board

Apache-Sitgreaves National Forests
Apache County
Apache County NRCD
Arizona Game and Fish Department
Arizona Wildlife Federation
Creative Green Homes, LLC
Eastern Arizona Counties
Ecological Restoration Institute
Life in the Forest, Inc.
Navajo County
The Nature Conservancy
Town of Eagar
U of A Cooperative Extension, Navajo County
White Mountain Conservation League
Required multi-party monitoring (*social, economic, ecological*)
- Monitoring Board provides input to USFS on priority monitoring objectives
- Board reviews data, provides input, may assist in monitoring
- Results incorporated in future planning efforts
Multi-Party Monitoring Board

- Convened when contract signed
- First year developing priorities; expert input; some protocols; initiated baseline studies
  - Social:
    - ASU Doctoral social study
  - Economic:
    - Cluster study on forest industries
  - Ecological:
    - Multiple studies
## Fuel Supply – Conventional wisdom

Typically considered sustainable long term supply located within close proximity (25 to 75 mile radius)

- **Economically available**
- **Environmentally available**
- **Meets quality specifications**
- **Available in quantities and from diverse sources that will support project financing:**
  - » Minimum 10 year supply, 70% under contract
Traditional Paradigm

Existing and Proposed Biomass Facilities in the Southeast

[Sourcing areas of existing and proposed biomass facilities in the Southeast would cover an estimated 46% of the historic range of the longleaf pine]
Existing Biomass Infrastructure Distance – Example Camino, CA
Camino Distance

Biomass Plants
- Planned
- Existing

Distance Miles To Camino
- 10
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90
- 100
- 110
- 120

Spatial Informatics Group, LLC
Integrating GIS, Science, Economics & Planning

Projection: Albers
Date: April, 2008

Miles
0 5 10 20 30 40
Example SE Alaska Biomass Sources
Young Growth PCT MMU = 50 acres
Project Economics

Markets for heat and power
  - Market support justifies capital investment

Return on investment
  - Minimum ROI of 19%

Economies of scale
  - Combustion efficiencies
  - Labor and overhead
Appropriate Technology

Search for most appropriate technology considering project location and fuel supply

- Ability to convert local fuel supply into heat/power
- Must meet local permitting specifications

Technology must be proven:

- Commercially available
- Operates efficiently on available fuel supply
- Operates cleanly on available fuel supply
- Appropriate for site and local resources
## Scale of the issue: Why work on fire?

### Wildland Fire Occurrence
- **Avg100,000 fires/year**
- **Annual acreage burned**: 3,300,000 acres
  - *(1,000,000 – 6,500,000 acres)*
- **Nationally about 50% or fires from people, 50% from lightning**
- **Approximately 52% of annual area burned by lightning fires**

### Climate Changing Fire
- **Climate change could effect fire regimes before changes in vegetation occurred**
- **In fire prone ecosystems, fire may be the main vehicle of vegetation change. Could occur over a few decades with higher frequency fires**
- **Extension of fire season, especially in areas with snow pack (2-3 weeks)**

### Fire Changing Climate
- **Wildland fire is major natural source of GhG emissions.**
- **Carbon emissions reduction credits could be given to fuels treatment projects...**
- **Carbon sequestration projects could be discounted, due to risk of loss to fire...**
Question...

How can natural resource management address wildland fire for mitigating the impacts of climate change?

Wildland Fire
- Fire Hazards
- Fire Risks

Forest Carbon
- C Sequestration
- GhG Emissions
- Forest Health

Natural Resource Management
- Rx Effects
- Ecosystem Service Valuation

Source: http://earthobservatory.nasa.gov/NaturalHazards/natural_hazards_v2.php?img_id=11799
Convergence with Climate Change Trends

- **Climate**
  - Conditions suitable for wildfires.

- **Resources**
  - Climate gives rise to suitable biomass.

- **FIRE**

- **GHG**
  - GHG Benefits

- **RENEWABLE ENERGY**
Convergence with Climate Change Trends

- The scope of the fire-climate change issue is beyond the capacity of national and state governments to handle alone.

- Trend towards community-based bioenergy development which can reduce GHG’s while improving public safety, stimulating economic activity and optimizing many other environmental benefits.
Some key questions to ponder

- What are the carbon benefits of promoting woody biomass utilization in the interior west? Is avoided wildfire emissions going to change the economics of biomass utilization?

- What are the resource assessments and monitoring systems needed to make sure that promoting biomass utilization does not lead to over-exploitation of forest resources?
The Life Cycle Approach

1. Model LIFE CYCLE environmental values of using forest biomass for energy and heat production

2. Test effects of different transportation modes, total emissions and other environmental factors.

3. Develop a decision-support framework to test biomass manufacturing locations and other assumptions and scenarios.
The Forest Health Conundrum

- Forest health and resilience are measured by a complex array of factors
- Major disagreements over what to measure and what matters
- Management objectives differ by landowner and place
- Data and science improving, but...
- Ecosystem services are poorly quantified, regulated, monetized and/or traded.
Some LCA findings from California

This Test Scenario -- modeling thinning, transporting, and converting biomass into electrical power -- yielded the following results when compared to the no-treatment.

• **$1.58 billion** in power revenues, assuming an 8.3-cent per kilowatt-hour price on the wholesale power market. A negligible amount of fossil fuels (approximately 1.3 percent of total energy consumed) is required to produce this power.

• Clear life cycle climate change benefits, including a **65 percent net reduction** in greenhouse gas emissions
  • from 17 million tons of CO2 equivalents to 5.9 million tons of CO2 equivalents

• **22 percent reduction** in the number of acres burned by wildfires.
What are some of our concerns?

Land Use
- PLoS One (McDonald et al 2009) - Energy sprawl or energy efficiency?
- Different energy production techniques will lead to severe impacts on habitat types, ecosystem services, and community needs.

Sustainability – Combating Energy Sprawl
- Need for energy conservation, appropriate siting, sustainable production practice, and compensatory mitigation offsets
- Scale: distributed generation at appropriate scale.... Trend towards community-based bioenergy development which can reduce GHGs.
Possible U.S. Locations for 300 ton per day Biomass to Clean Diesel and Renewable Electricity Plants

- 1 Billion Tons of Biomass Annually
- 10,000 PRF Biomass-to-Energy Plants Possible Based on PRF’s Technology
- Resulting in 50 Billion Gallons of Fuel
- Displacing 1.2 Billion Barrels of Imported Oil
- And Producing 575,000 Billion Watt-hrs of Electricity
- Creating over 1 Million Long Term Jobs
Any Questions?

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