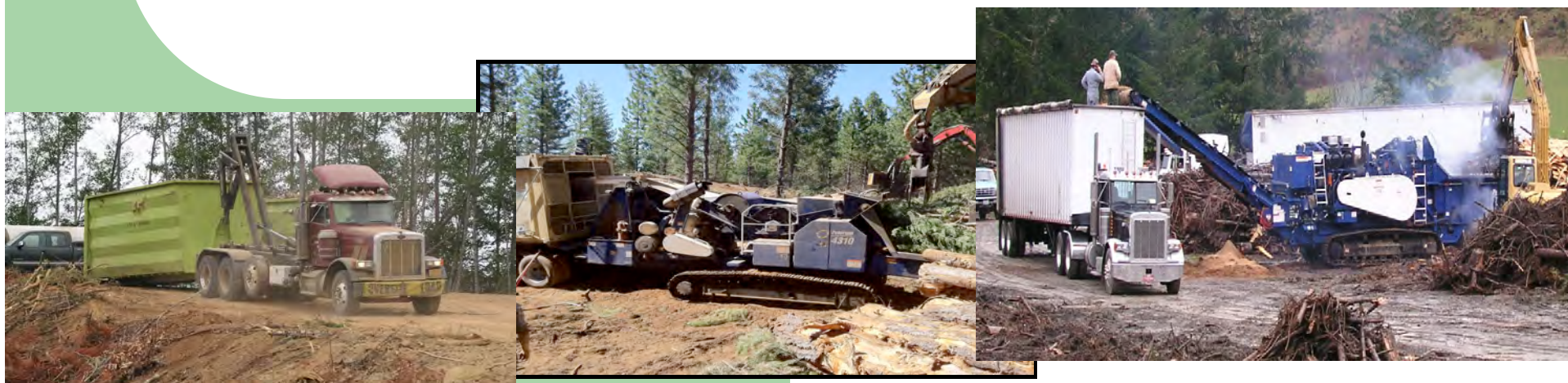


BIOMASS ENERGY TRENDS AND LESSONS LEARNED IN THE WEST



Utah Biomass Summit

September 18, 2012

Tad Mason, TSS

Presentation Overview

- Introduction
- California Biomass Sector
- Objectives of Forest Restoration
- Example: Wilseyville Product Yard Study
- Observations
- Lessons Learned



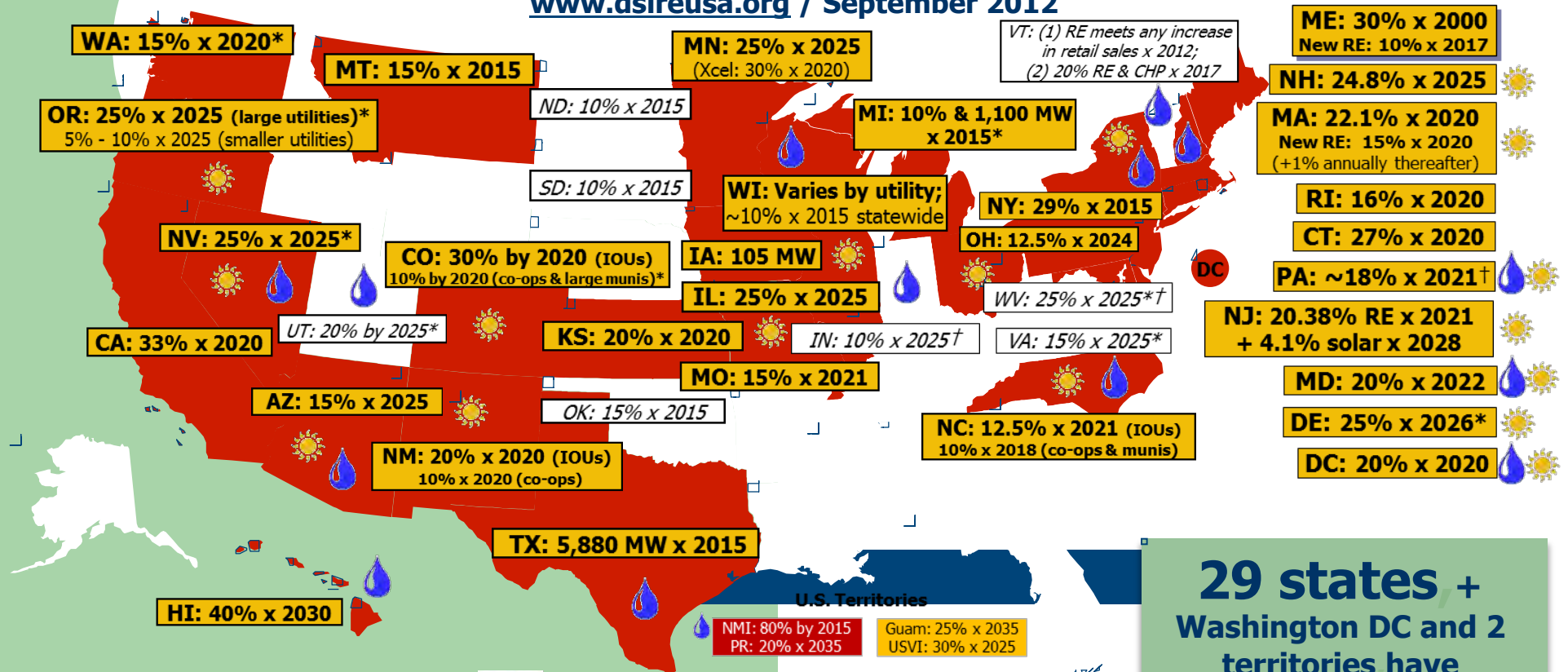
Abbreviated History of the California Biomass Power Sector

- PURPA 1978
- Market response – 60 new biopower plants.
- Power contract buyouts.
- Currently 33 biopower plants, 28 operating.
- RPS – 33% renewable by 2020.
- Feed in tariff program.



Renewable Portfolio Standard Policies

www.dsireusa.org / September 2012



- Renewable portfolio standard
- Renewable portfolio goal
- Solar water heating eligible



Minimum solar or customer-sited requirement



* Extra credit for solar or customer-sited renewables



† Includes non-renewable alternative resources

**29 states +
Washington DC and 2
territories have
Renewable Portfolio
Standards**

*(8 states and 2 territories have
renewable portfolio goals)*

Current Trends in California

- Convert coal fired power plants to biomass.
 - Three plants recently converted
 - Two others targeted
- High interest in community-scale bioenergy projects.
- Legislative mandates regarding feed in tariffs.
 - FiT ReMAT
 - SB 1122
- Create and maintain strategic defensible space near communities and infrastructure at risk.



Forest Restoration Objectives

- Address the significant risk of catastrophic wildfire.
- Restore forest/range ecosystems to robust conditions.
- Reintroduce fire to fire dependent landscapes.
- Create and maintain strategic defensible space near communities and infrastructure at risk.
 - Rural communities.
 - Upland watersheds.
 - Power lines – transmission and distribution systems.
 - Aqueducts or other water delivery systems.
- Train and employ local residents.

Forest Restoration Byproducts

- Small logs
 - 6" to 14" diameter
- Micro logs
 - 2" to 5" diameter
- Limbs/tops
- Brush

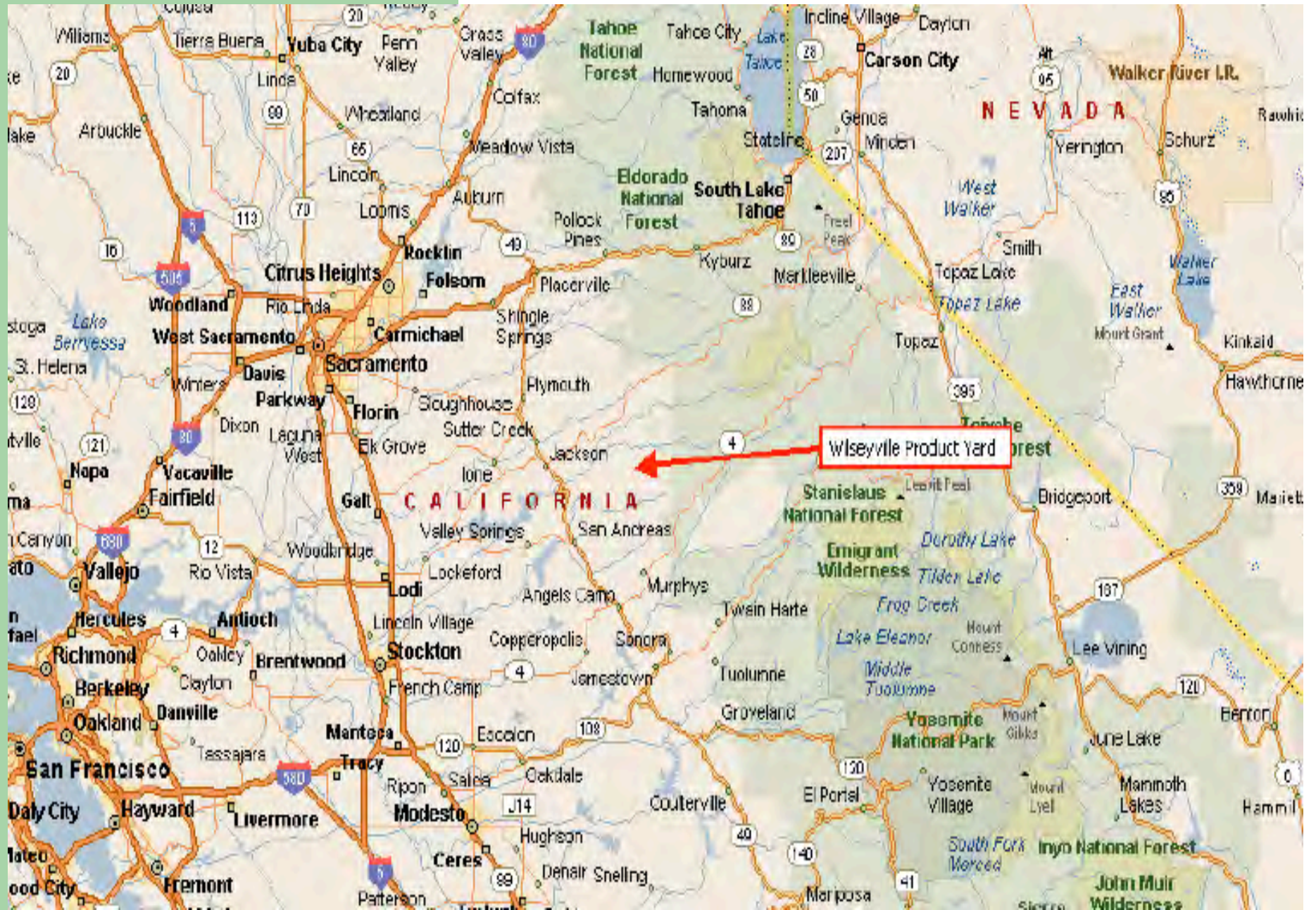


Examples of Value-Added Uses

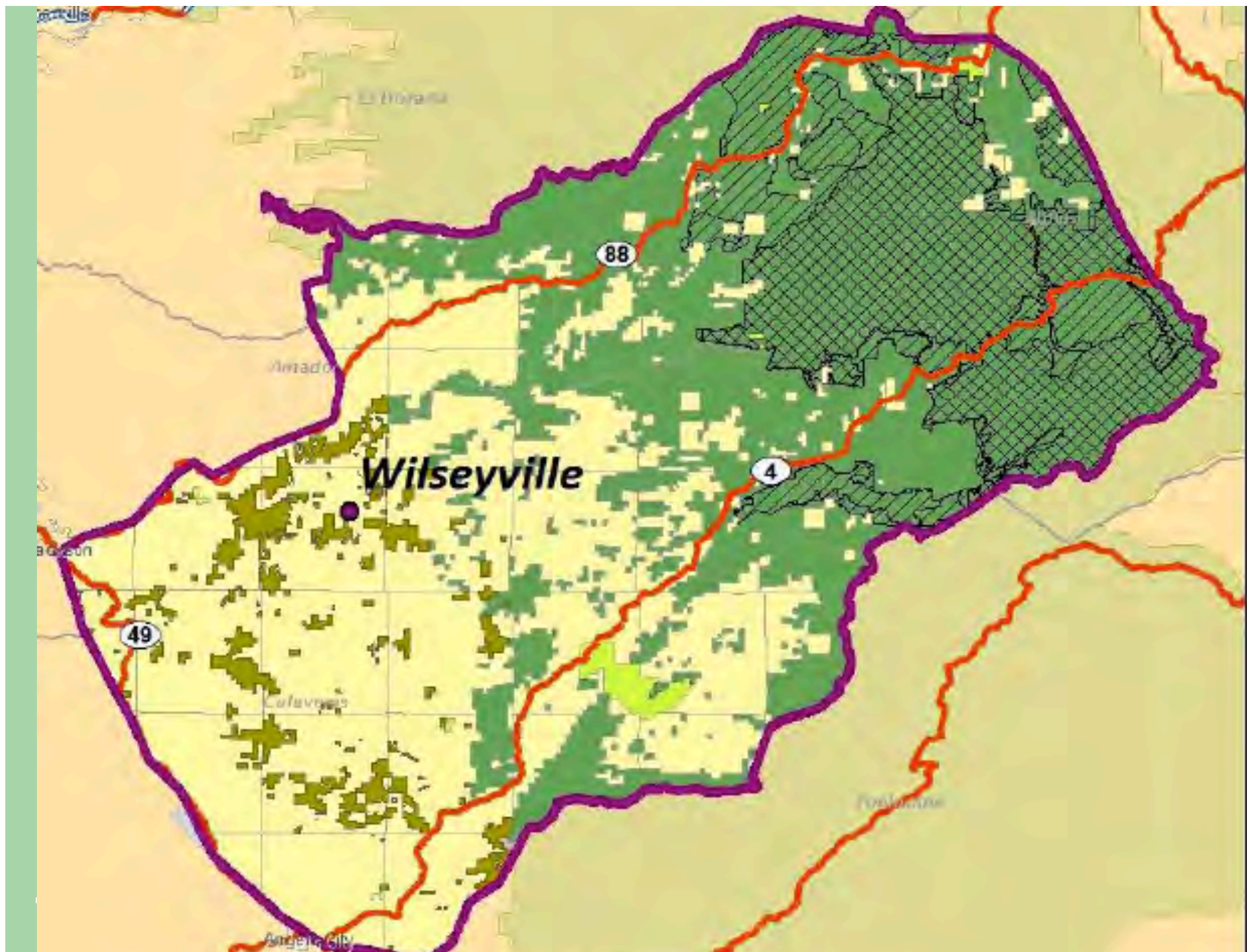
- Lumber
- Power Generation/Thermal Heat Recovery
- Firewood
- Posts and Poles
- Landscape Cover/Soil Amendment
- Animal Bedding
- Fuel Pellets
- Other Stuff

Wilseyville Product Yard Study











Forest Biomass Availability

BIOMASS SOURCE	LOW RANGE (BDT/YEAR)	HIGH RANGE (BDT/YEAR)
Timber Harvest Residuals	21,000	42,000
Fuels Treatment Activities – USFS/BLM	8,250	13,750
Fuels Treatment Activities – FSC/NRCS/CHIPS	5,625	13,125
Urban Wood Waste – Wilseyville Transfer Stations	160	175
TOTAL	35,035	69,050

Small Log and Biomass Costs

BIOMASS MATERIAL SOURCE	DELIVERED MATERIAL	LOW RANGE	HIGH RANGE
Timber Harvest Residuals	Chips	\$45/BDT	\$60/BDT
Pre-Commercial Thinning Activities and Timber Harvest	Small Logs	\$32/GT	\$42/GT
Fuels Treatment Activities – USFS/BLM	Chips	\$45/BDT	\$60/BDT
Fuels Treatment Activities – Fire Safe Councils/NRCS/CHIPS	Chips	\$50/BDT	\$70/BDT
Urban Wood Waste –Received in raw form	Limbs, Construction Debris, Misc. Wood	\$5/BDT	\$15/BDT

Targeted Value-Added Opportunities Selected by Project Steering Committee

- Small Scale Combined Heat and Power
- Small Scale Mobile Dimension Sawmill
- Firewood Processing
- Biomass Fiber to Local Markets

2MW Combined Heat and Power Facility

- Annual fuel usage of 16,000 BDT/year at \$40 - \$50/BDT.
- Primary revenue generated through power sales. Biochar also generates revenue.
- Assume 75% debt/25% equity in year one. 5% interest on debt.
- Federal production tax credit of \$.011/kWh.
- Capital costs are \$10.4M.



Commercial Scale Firewood Operation

- Annual resource needs of 400 truckloads of logs (about 2 loads per day).
- Procure logs at \$575 to \$800 per load.
- Firewood sales of \$125 to \$225 per cord (FOB Wilseyville).
- Targeted sales of 3,200 cord per year.
- Capital costs are \$163,850.



Small Scale Sawmill Operation

- Annual sawlog resource needs of 640 MBF per year (about 1 load/day).
- Procure logs at \$375 to \$500 per MBF (\$1,500 to \$2,000 per load).
- Lumber sales of \$375 to \$800 per MBF (FOB Wilseyville).
- Targeted sales of 8,000 MBF per year.
- Secondary manufacturing is an opportunity.
- Capital costs are \$114,602.



Biomass Fiber Markets

- As additional forest biomass is generated (Cornerstone CFLR, etc), 40,000 plus BDT per year will be generated from TSA.
- Forest biomass demand is driven primarily by power generation.
- Additional markets should be considered (compost, landscape cover).



Product Yard – Observations Part I

- Site integrated enterprises that can share infrastructure, equipment, overhead, labor and resources.
- Create a business model that will operate year round.
- Utilize a full range of resources from small logs to biomass.
- Incorporate secondary manufacturing whenever possible.



Product Yard – Observations Part II

- Locate product yard in strategic location. Retired sawmill sites can work well.
 - Adjacent to major highways.
 - Appropriate land use zoning is helpful. .
 - Infrastructure on site:
 - Water
 - Power



Restoration Lessons Learned Part I

- Operate transparently within the community:
 - Openness
 - Communication
 - Accountability
- Hire and train local talent.



Restoration Lessons Learned Part II

- Develop communication plan that uses a variety of outreach tools:
 - Website
 - Handouts/Project overview/FAQ
 - Workshops/Community meetings
 - Media relations



Restoration Lessons Learned - Part III

- Participate in community forums/collaborative groups.
- Conduct demonstration projects with high visibility.
 - Install signage explaining project objectives/desired future conditions.
 - Document before and after conditions, volume removed, and acres treated.



Restoration Lessons Learned - Part IV

- Team with land management agencies to hold workshops or public meetings to discuss land management plans, project status, and accomplishments.
- Work with state policy makers on an RPS/FiT program.





Positive Effects of Fuel Treatments

Wallow Wildfire, Apache National Forest, Arizona, May 2011, 500,000 acres, largest wildfire in Arizona history



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QUESTIONS, HECKLING REMARKS?



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