FEASIBILITY EVALUATION OF BIOMASS BUSINESS SORTING AND PROCESSING OPERATIONS AT THE NORTH FORK MILL SITE

January 12, 2012 Final Report Update

Prepared for:

Yosemite-Sequoia Resource Conservation and Development Council
North Fork, California

Prepared by:

TSS Consultants
Rancho Cordova, California

Funding for this evaluation was provided by the US Department of Agriculture, Rural Business Enterprises Grant

INTRODUCTION

The Yosemite-Sequoia Resource Conservation and Development Council (the Council) has retained TSS Consultants (TSS) to provide technical assistance in evaluating the feasibility for developing biomass accumulation, sorting and processing activities at the North Fork mill site in eastern Madera County.

The 135 acre North Fork site is strategically located tributary to cost effective and sustainably available forest biomass feedstocks. The site is managed by the North Fork Community Development Corporation (CDC) and currently has 10 acres leased to an existing biomass processing operation (Alpine Sierra Greencycling) and 10 acres leased to a recycled lumber recovery enterprise (Crossroad Recycled Lumber). In addition, the Mono Tribe plans to improve 15 acres of the North Fork site for a fire station.

The mission and stated goal of the CDC are as follows:

Mission: *To promote the social, economic and environmental welfare of North Fork, CA.*

Primary Goal: *To redevelop the North Fork Mill Site, helping to create jobs, green space and community serving facilities for the town of North Fork.*

Approximately 20 to 40 acres are available for an additional forest biomass value-added utilization enterprise, one that is complementary to the existing businesses.

Exhibit 1. North Fork Mill Site

FEASIBILITY EVALUATION OBJECTIVES

The community of North Fork and surrounding environs includes about 3,600 residents. Historically the region has been devoted to ranching, logging and lumber manufacturing. In 1994, the largest employer in the area, South Fork Timber Industries, closed its sawmill at North Fork, laying off 120 employees and effectively eliminating ancillary jobs such as logging and trucking. Unemployment in the region continues to be high, with the July, 2011 unemployment rate for Madera County at 15.4%,[1] but the jobless rate in the North Fork area is likely closer to 20%.[2] See Appendix A for detailed employment report provided by the California Employment Development Department.

Unfortunately, the local Native American Tribe has been severely impacted as a result of the mill closure. Members of the North Fork Rancheria of Mono Indians made up a significant portion of the sawmill's workforce. The Tribe also had numerous members employed in the harvest and transport of sawlogs to the mill. Data provided by the North Fork Rancheria Indian Housing Authority indicate an inordinately high rate (57%) of low-income Indian families in the service area of Fresno and Madera Counties.[3]

There is a very high level of interest in the community for new, sustainable, family wage employment opportunities. Due to concerns regarding wildfire and the need to restore forest landscapes in the area, many residents believe that enterprises focused on forest restoration, hazardous fuels treatment and value-added utilization of small stems and logs removed as a byproduct of restoration/fuels treatment activities show much promise. This evaluation is focused on development of strategies to support value-added utilization of forest biomass in concert with a forest restoration economy for the North Fork region.

The CDC manages the North Fork mill site, and while hosting two existing business enterprises on the site, has issues and questions regarding biomass feedstock supply, existing value-added product markets and potential diversification to take advantage of local/regional markets.

The primary goal of this feasibility evaluation is to provide impetus for local entrepreneurs and other firms to consider sustainable woody biomass processing enterprises co-located at the North Fork site. By diversifying value-added product lines using robust business models and ramping up processing capacity, additional biomass material sourced sustainably from local fuels treatment and restoration activities can be utilized creating jobs and other economic benefits for local communities.

---

[1] As reported by the US Department of Labor, Bureau of Labor Statistics and the California Employment Development Department.
[2] Per discussions with Elissa Brown, Grant Writer, Sierra Nevada Conservancy.
[3] Ibid.

Additional goals for this preliminary feasibility analysis include:

- Review current operations and site conditions at the North Fork site.
- Evaluate current information/resources to analyze potential biomass processing business models that optimize utilization and value-added markets from locally available biomass feedstocks.
- Seek out stakeholder input to assure that local knowledge is a key component of any outcomes or suggestions/recommendations addressing next steps.
- Seek out highest value markets offering a diversified range of opportunities that provide revenue streams which facilitate procurement of locally available biomass feedstocks. This procurement strategy will (likely) result in an opportunity to contribute at least a portion of the costs to treat/remove hazardous fuels.
- Facilitate new and sustainable family wage jobs in rural communities.
- Generate findings that result in a summary of resources, potential opportunities, suggestions for optimized business models and detailed next steps to consider.

Exhibit 2. North Fork Community Development Council Office (located at the mill site)

SCOPE OF WORK

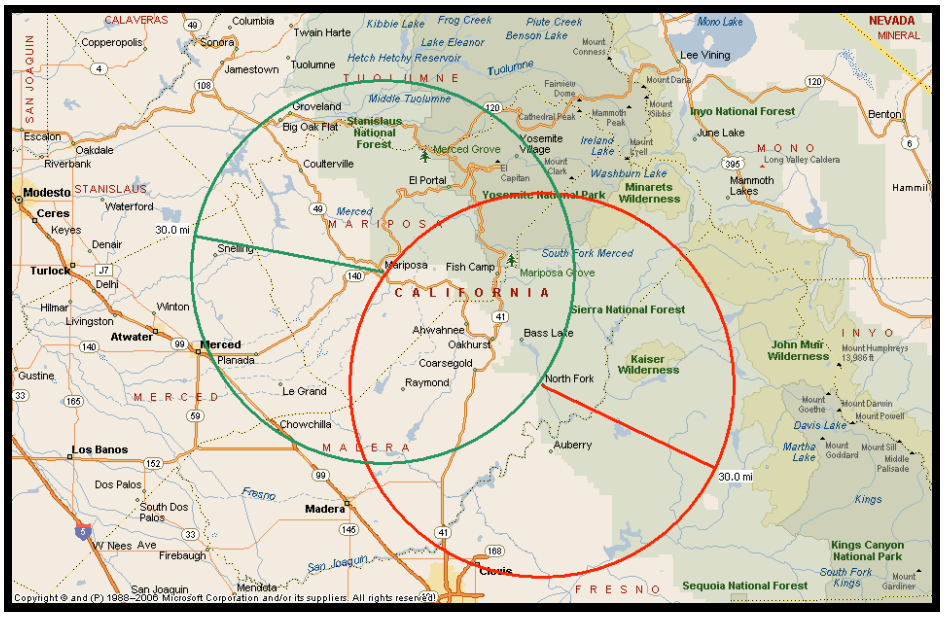
The scope of work tasks utilized to provide guidance in the implementation of the North Fork feasibility evaluation are listed below.

Task 1. Pre-Work Conference

Convene a meeting with the Council program managers. Review approach and implementation schedule/work plan for the feasibility study. Confirm primary Council contacts and project management team members. Review availability of existing studies and data. Confirm target study area for sourcing of potential biomass feedstock resources.

The map below highlights draft target feedstock sourcing areas for the North Fork/Mariposa and surrounding region. Analysis will be focused on the North Fork feedstock sourcing area.

Draft Target Study Areas



Task 2. Site Reviews and Initial Stakeholder Meetings

A. Arrange for site visits to review current operations and business models. Conduct pre-site visit conference calls with key staff to prepare for visits and to arrange for initial stakeholder meetings.

B. Secure stakeholder lists from Sierra Nevada Conservancy and the Council. Working with program managers, confirm final stakeholder list for outreach and invitation to initial stakeholder meeting at the North Fork site. Generate one page

project overview document and meeting agenda for dissemination prior to meeting. Send out invitations with RSVP request.

C. Conduct site visits with operations staff. Review:
    i. Current business model
    ii. Challenges/opportunities/lessons learned
    iii. Local community support/concerns
    iv. Site constraints (e.g., zoning, dust/fugitive emissions, odor, infrastructure, current capacity, etc.)

D. Conduct initial stakeholder meeting (preferably on site). Facilitate active discussions regarding current operations (e.g., presentation by operations management staff). Structure discussions so that stakeholders are encouraged to actively participate in a problem-solving exercise that pinpoints the heart of the matter addressing opportunities/challenges/issues regarding sourcing of appropriate feedstocks and processing operations that optimize value-added outcomes.

E. Summarize initial North Fork site stakeholder meeting outcomes and disseminate to meeting participants.

Task 3. Conduct Research Based on Outcomes from Site Visit and Initial Stakeholder Meeting

A. Utilizing outcomes from the site visit and stakeholder meetings, conduct research on key topics that are most likely to move site-based projects forward. Examples of key research areas that are potential outcomes from the meetings:
    i. Most economically feasible value-added products based on biomass feedstock supply and local/regional markets.
    ii. Value-added markets that show promise in the short term and long term.
    iii. Minimum volume required for economic processing and marketing of select value-added options.
    iv. Capacity of local/regional markets for these value-added products.
    v. Sustainable biomass feedstock supply availability within economic haul distance of the North Fork site.
    vi. Costs of collection, processing and transport.
    vii. Overview of processing equipment required to address key value-added market opportunities.
    viii. Limiting factors that if not corrected, could become fatal flaws to business models considered.
    ix. Site constraints based on:
        1. Available acreage
        2. Current zoning/environmental regulations
        3. Available infrastructure (e.g., water, power)

Key topics considered for research and analysis will be selected and prioritized by the program managers and confirmed using outreach to key stakeholders.

Task 4. Convene Follow-up Meeting with Key Stakeholders

A. Convene second meeting with key stakeholders utilizing key outcomes from Task 3 as the basis for a meeting agenda. It is anticipated that discussion items will be focused on:
    i. What are the volumes of woody biomass feedstocks available on a long-term, sustainable basis?
    ii. What are the costs of collection, processing and transport?
    iii. What are the site improvements necessary to support new business models?
    iv. What are the capital costs of key processing equipment?
    v. What is the site capacity available for expanded operations?
    vi. What are the potential community concerns if expanded operations are initiated?

B. Critical business model related issues will be addressed so that key stakeholders have a set of recommendations and suggestions for next steps to consider, including:
    i. Are there key partnering opportunities that support a sustainable business model based on local/regional value-added products?
    ii. What are the next steps for securing sustainable feedstocks and attracting key partners?
    iii. What are the capital financing options available?
    iv. What grant funding may be available?
    v. What are the potential fatal flaws that may hamper new business model deployment?

Task 5. Draft Feasibility Evaluation Report

Based upon information, research findings and stakeholder input assimilated in Tasks 2 through 4, generate a draft planning document in the form of a feasibility evaluation report. The draft document will present a clear plan addressing specific steps to consider in moving forward with optimized business models at the North Fork site.

Task 6. Final Feasibility Evaluation Report

Based on input from key stakeholders and program managers, a final planning document and feasibility evaluation report will be issued. The final report will be generated within two weeks of receiving input from key stakeholders and program managers. Findings will be presented to key stakeholders (via conference call).

Task 7. Project Management

During the course of this feasibility evaluation, it will be very important that TSS and program managers communicate regularly. TSS has been conducting feasibility studies for over 25 years, and a key lesson learned is that client/contractor communication and coordination is paramount to assure successful analysis and delivery of work product that meets the goals of the project. TSS will provide project management services including:

- Monthly progress reports that highlight activities undertaken, results achieved, and challenges experienced.

- Regular communication and coordination via meetings (including conference calls) with program managers.

FINDINGS

Summarized below are findings generated as a result of this feasibility evaluation analysis.

Forest Biomass Availability and Cost

Woody biomass material from forest operations, forest restoration and fuels treatment activities, and local landfills/transfer stations are sustainably available in volumes that could support commercial-scale, value-added utilization enterprises located at the North Fork mill site. Table 1 provides an overview of currently available wood waste volumes by biomass fuel type. Biomass volume is traditionally presented as bone dry tons,[4] as this is the unit of measure commonly employed by value-added utilization markets (pulp, paper, biomass power) when procuring woody biomass material.

Table 1. Biomass Material Potential Availability

BIOMASS MATERIAL SOURCE	BDT PER YEAR
Timber Harvest Residuals – USFS (Bass Lake RD)	4,500
Timber Harvest Residuals – Private	1,170
Pre-Commercial Thinning Activities – USFS (Bass Lake RD)	1,000
Fuels Treatment Activities – USFS (Bass Lake RD)	3,000
Fuels Treatment Activities – Eastern Madera County Fire Safe Council	2,500
Fuels Treatment Activities – Coarsegold Resource Conservation District	0
Urban Wood Waste – Local landfills and transfer stations	500
TOTAL	**12,670**

Table 2 summarizes the estimated costs of collection, processing and transport of biomass material to the North Fork site.

[4] One bone dry ton represents 2,000 pounds of dry woody material (zero moisture content).

Table 2. Biomass Material Collection, Processing and Transport Costs with North Fork Mill Site as Delivery Point

BIOMASS MATERIAL SOURCE	DELIVERED MATERIAL	LOW RANGE	HIGH RANGE
Timber Harvest Residuals – USFS (Bass Lake RD)	Chips	$45/BDT	$60/BDT
Timber Harvest Residuals – Private land	Chips	$45/BDT	$60/BDT
Pre-Commercial Thinning Activities – USFS (Bass Lake RD)	Small Logs	$34/GT[5]	$40/GT
Fuels Treatment Activities – USFS (Bass Lake RD)	Chips	$45/BDT	$60/BDT
Fuels Treatment Activities – Eastern Madera County Fire Safe Council	Chips	$50/BDT	$70/BDT
Fuels Treatment Activities – Coarsegold Resource Conservation District	Chips	$50/BDT	$70/BDT
Urban Wood Waste – Local landfills and transfer stations	Chips	$40/BDT	$50/BDT

Site Review

The North Fork mill site is zoned Heavy Industry and currently qualifies for a wide variety of biomass-related processing and utilization activities. Environmental constraints do exist but can be addressed. Should a biomass power generation facility be pursued, a modified Condition Use Permit may apply. The North Fork site formerly hosted a 10 MW biomass power generation facility, and much of the infrastructure (water wells, power transmission and distribution) appears to still be in place.

Stakeholder Meetings

Local and regional stakeholders are very supportive of new enterprises located on the North Fork mill site. There is a very strong interest in the value-added utilization of sustainably available forest biomass resources generated as a byproduct of forest restoration and forest fuels reduction activities. New family wage jobs and reduction of wildfire threats are high priority issues.

Value-Added Utilization

The preferred value-added utilization option for the North Fork site is addition of a small-scale (1 MW) biomass power generation facility. Initial financial analysis indicates that due to the relatively high cost of biomass material delivered to the North Fork site (see Table 2 above), the levelized cost of power generated will need to be at least $146/MWh[6] to attract private sector investment. There may be an opportunity to extract heat from the biomass power facility to support lumber drying and/or a greenhouse operation.

[5]GT is one green ton or 2,000 pounds.
[6]MWh is a megawatt hour and represents 1,000 kilowatts per hour. This is enough power to sustain approximately 1,000 homes.

Conclusions

In order to attract private sector participation in the development of a small-scale biomass power generation facility at North Fork, it will be imperative that power sales rates be aligned with the cost of generation. At this time, the California Public Utilities Commission Section 399.20 rulemaking process for feed-in tariff rates shows promise and may result in favorable power sales rates. In addition, the Commission may be willing to facilitate discussions with investor-owned utilities (such as Pacific Gas and Electric) to consider pilot project status for a biomass power generation facility at North Fork. This could result in a favorable power sales rate.

Potential Grant Funding

In order to drive down the capital expenses associated with a 1 MW biomass power generation facility, the CDC should consider grant funding options.

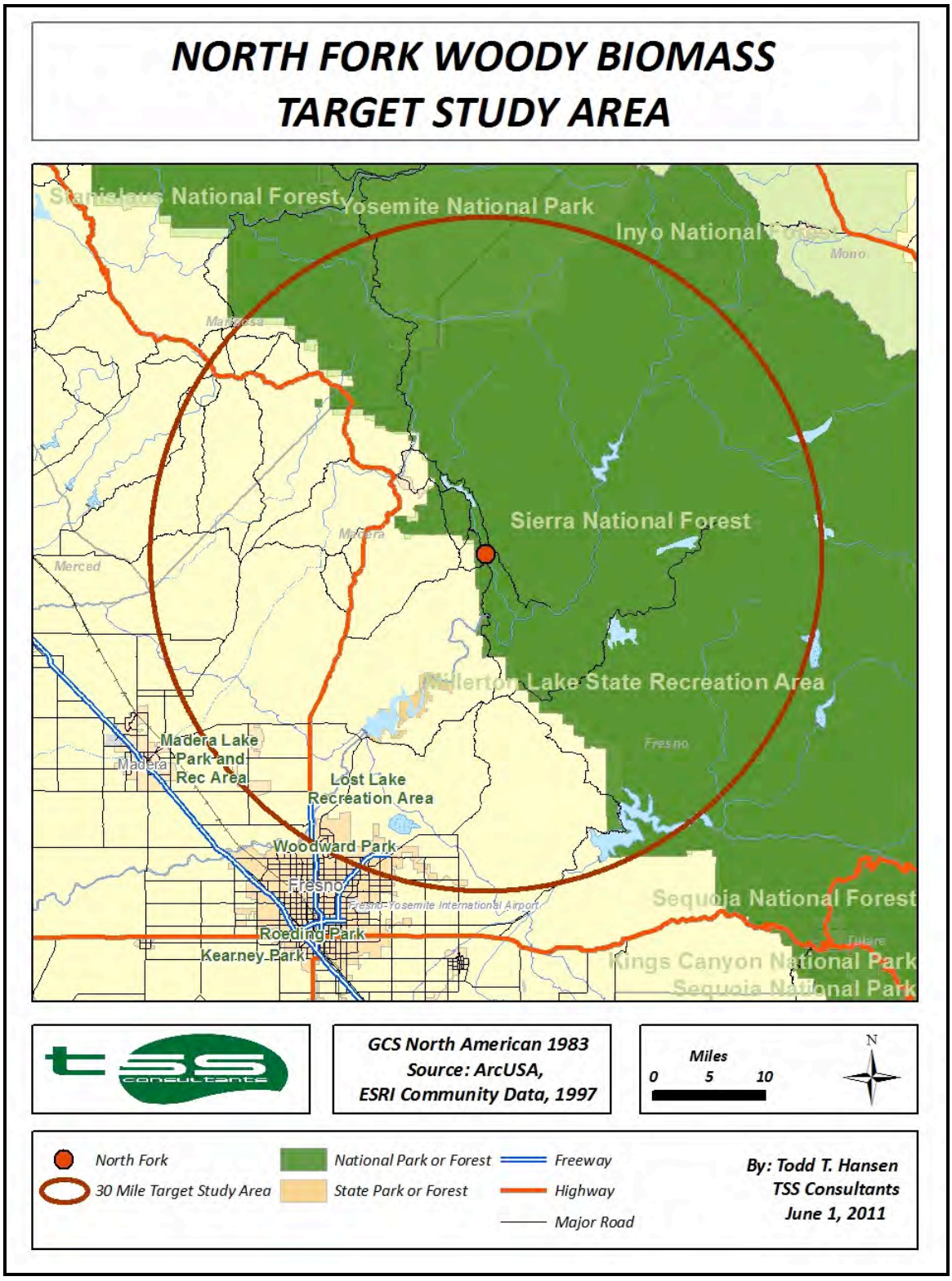
BIOMASS FEEDSTOCK AVAILABILITY REVIEW

In order to fully understand natural resource recovery and utilization opportunities from forest restoration and fuels treatment activities, it is imperative that a review of the current vegetation cover types in the region be analyzed. In addition, forest ownership patterns need to be assessed to understand current land management objectives in the region. The greater North Fork region includes heavily forested landscapes that are predominantly managed by public land management agencies.

Target Study Area

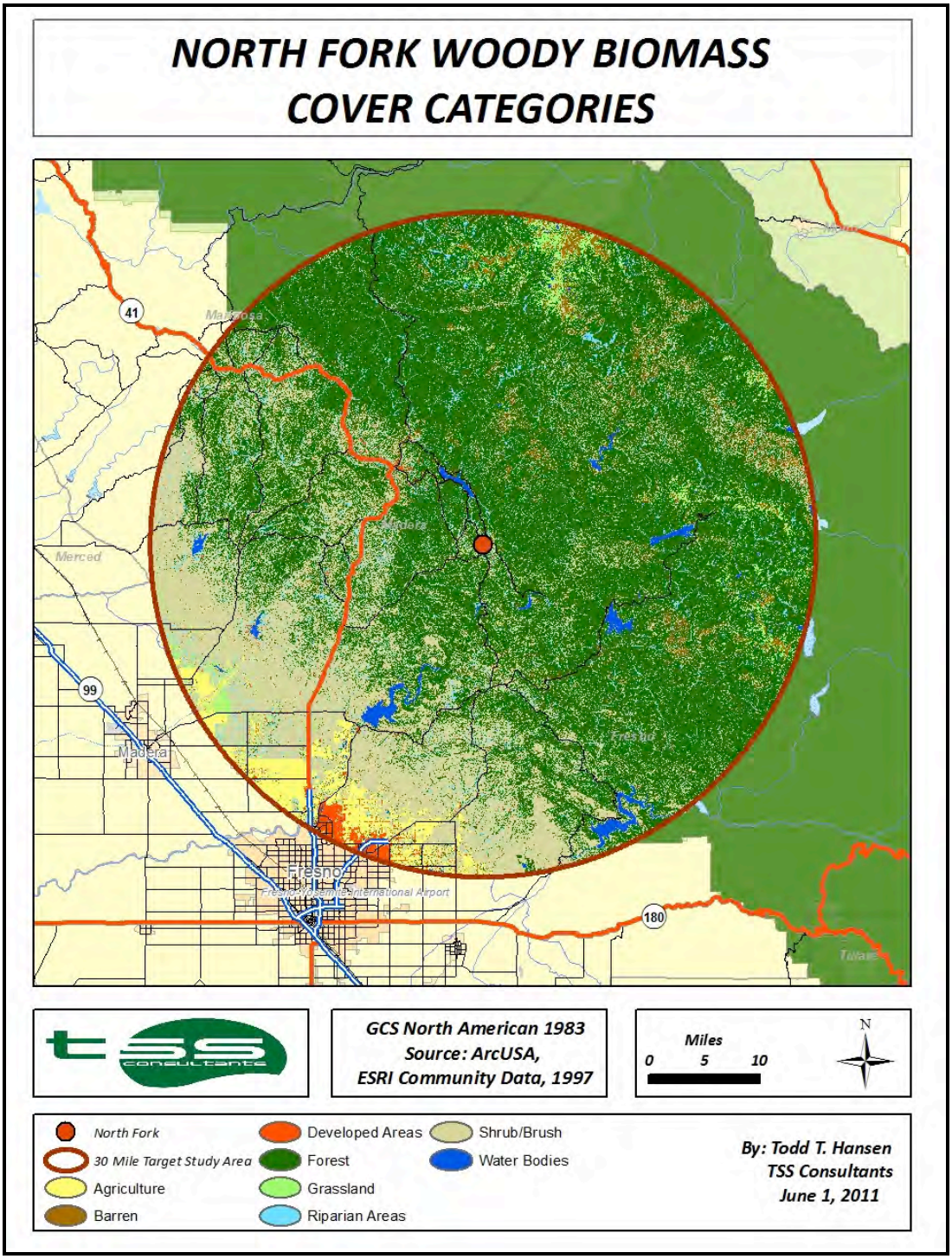
Consistent with the objectives of this biomass feedstock availability review, the forested landscapes and watersheds located within a 30-mile radius were included in the Target Study Area (TSA). Due to relatively high transportation costs associated with movement of forest biomass, TSAs are typically 25 to 50-mile radius in scale. Figure 1 highlights the North Fork TSA.

Figure 1. Target Study Area



As stated previously, woody biomass availability for any given region is heavily dependent on vegetation cover, land ownership and management. Figure 2 shows vegetation cover types within the TSA.

Figure 2. Vegetation Cover Within the Target Study Area



Vegetation cover dictates what vegetation types are predominant within a region and therefore influence woody biomass availability. Depending on management objectives, certain cover types could generate sustainable volumes of woody biomass material for use as feedstock for value-added enterprises. Table 3 summarizes vegetation cover by category within the TSA.

Table 3. Vegetation Cover Within the North Fork TSA

COVER CATEGORIES	ACRES	PERCENT OF TOTAL
Agriculture	49,319	3%
Barren	35,882	2%
Developed Areas	22,233	1%
Forest	1,065,337	59%
Grassland	32,405	2%
Riparian Areas	104,754	6%
Shrub/Brush	463,505	26%
Water Bodies	18,505	1%
TOTALS	**1,791,940**	**100%**

Land ownership drives vegetation management objectives and within the TSA, the USDA Forest Service is the most significant land manager with responsibility for approximately 60% of the forested landscape within the TSA. Private land makes up about 32%. Federal land management agencies (USFS, National Park Service and the Bureau of Land Management) manage approximately 68% of the forested land within the TSA. Table 4 summarizes land ownership and jurisdiction within the TSA.

Table 4. Land Ownership/Jurisdiction Forest Vegetation Cover Within the TSA

LAND OWNER/MANAGER	FORESTED ACRES	PERCENT OF TOTAL
Bureau of Land Management	5,520	1%
Bureau of Reclamation	3,313	< 1%
Department of Defense	914	< 1%
National Park Service	75,007	7%
Private	343,497	32%
State of CA	242	< 1%
USFS	636,845	60%
TOTALS	**1,065,337**	**100%**

GIS analysis confirmed that 34% of the USFS managed lands with forest vegetation within the TSA include wilderness or roadless areas which will not provide opportunities

for recovery of woody biomass material. Table 5 summarizes USFS jurisdiction and land classification within the TSA.

Table 5. USFS Jurisdiction/Land Classification Within the TSA

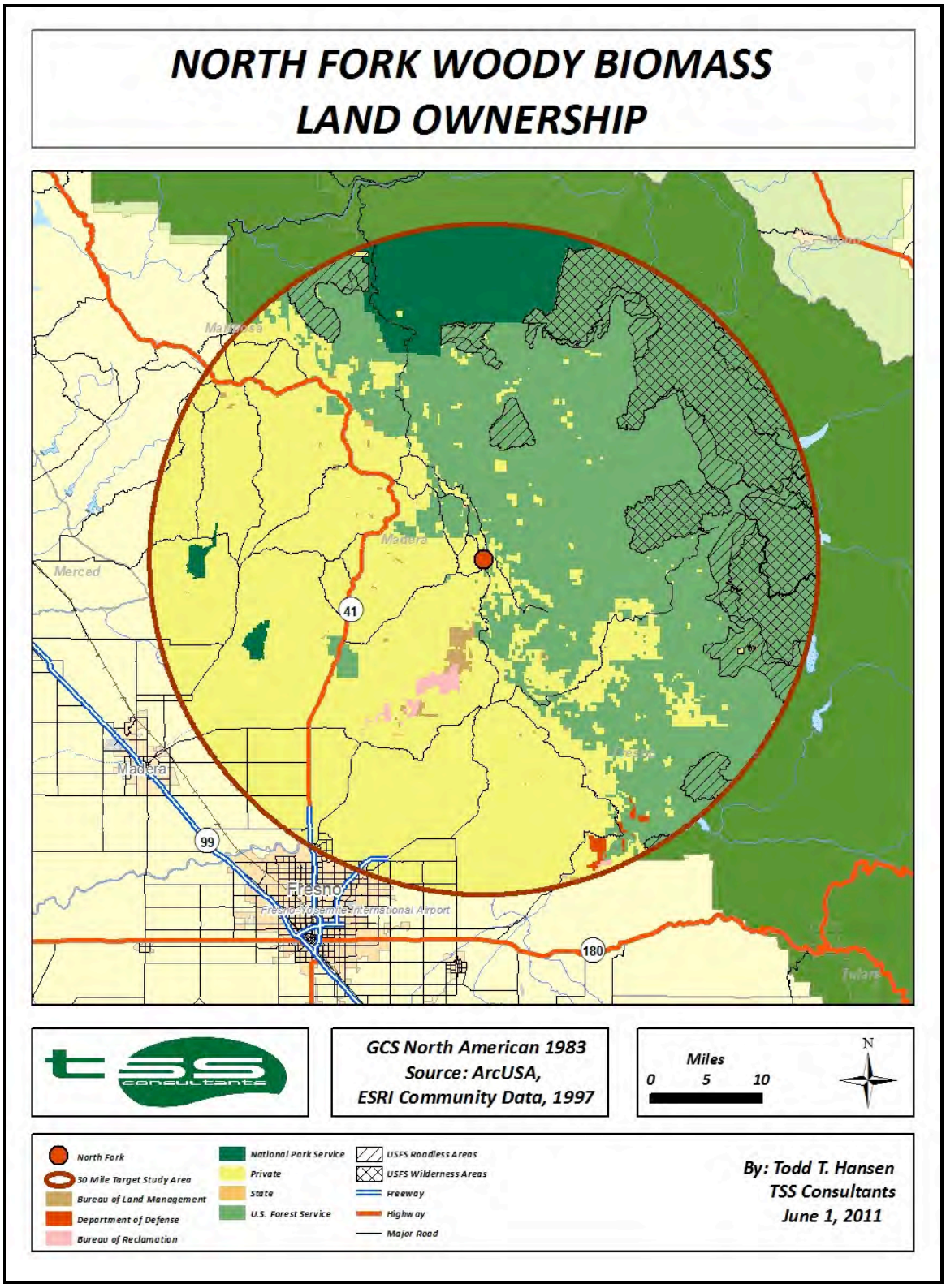
LAND OWNER/MANAGER	FORESTED ACRES	PERCENT OF TOTAL
USFS Wilderness	138,407	22%
USFS Roadless	75,269	12%
USFS Net Available	423,169	66%
TOTALS	**636,845**	**100%**

Additionally, very little forest biomass material is available from the National Park Service managed lands[7] (Yosemite Park) on a consistent basis. Forest biomass material is occasionally recovered within the park due to snow breakage or hazard fuel removal activities along roads or near structures.

Figure 3 highlights the locations of the various ownerships and jurisdictions.

[7]Per discussions with Brian Mattos, Park Forester, Yosemite National Park.

Figure 3. Land Ownership/Jurisdiction Within the TSA



Forest Biomass Material Availability

Woody biomass material from forest operations, fuels treatment activities and local landfills/transfer stations are sustainably available in volumes that could support commercial-scale, value-added utilization enterprises located at the North Fork mill site. Table 6 provides an overview of currently available wood waste volumes by biomass fuel type.

Table 6. Biomass Material Potential Availability

BIOMASS MATERIAL SOURCE	BDT PER YEAR
Timber Harvest Residuals – USFS (Bass Lake RD)	4,500
Timber Harvest Residuals – Private	1,170
Pre-Commercial Thinning Activities – USFS (Bass Lake RD)	1,000
Fuels Treatment Activities – USFS (Bass Lake RD)	3,000
Fuels Treatment Activities – Eastern Madera County Fire Safe Council	2,500
Fuels Treatment Activities – Coarsegold Resource Conservation District	0
Urban Wood Waste – Local landfills and transfer stations	500
TOTAL	**12,670**

Assumptions used to calculate potential biomass availability:

Bass Lake Ranger District:

- Annual sawlog harvest is 5 MMBF[8]/year.
- Fuels treatment activities on 300 acres/year.
- Timber stand improvement activities on 100 acres/year.

Private forest land:

- Annual sawlog harvest is 1.3 MMBF/year.

Eastern Madera County Fire Safe Council:

- Fuels treatment on 500 acres/year of which one-half may generate biomass material that can be recovered, processed and transported.

Coarsegold Resource Conservation District:

- Due to current funding challenges, no fuels treatment likely in the near term.

Mariposa landfill and North Fork Transfer Station:

- Minor volumes of recoverable construction debris and tree trimmings.

Table 7 summarizes the estimated costs to collect, process and transport biomass material to the North Fork site.

[8]MMBF is one million board feet. One board foot is a board that measures 12" by 12" and 1" thick.

Table 7. Biomass Material Collection, Processing and Transport Costs with North Fork Mill Site as Delivery Point

BIOMASS MATERIAL SOURCE	DELIVERED MATERIAL	LOW RANGE	HIGH RANGE
Timber Harvest Residuals – USFS (Bass Lake RD)	Chips	$45/BDT	$60/BDT
Timber Harvest Residuals – Private land	Chips	$45/BDT	$60/BDT
Pre-Commercial Thinning Activities – USFS (Bass Lake RD)	Small Logs	$34/GT	$40/GT
Fuels Treatment Activities – USFS (Bass Lake RD)	Chips	$45/BDT	$60/BDT
Fuels Treatment Activities – Eastern Madera County Fire Safe Council	Chips	$50/BDT	$70/BDT
Fuels Treatment Activities – Coarsegold Resource Conservation District	Chips	$50/BDT	$70/BDT
Urban Wood Waste – Local landfills and transfer stations	Chips	$40/BDT	$50/BDT

Assumptions used to calculate range of costs:

- No service fees collected or cost share arrangement (e.g., goods for services).
- One-way transport averages 20 miles for biomass and sawlogs.
- Biomass is collected and processed into truck for $30/BDT at roadside landing.
- Small logs are harvested, collected and loaded onto log truck for $25/GT (about $150/MBF)[9] at roadside landing.
- Haul costs are $85/hour for standard chip truck/trailer.
- Haul costs are $100/hour for walking floor chip truck trailer.
- Haul costs are $85/hour for standard log truck.
- Biomass chips average 14 BDT/load.
- Small logs average 24 GT/load.

[9]MBF is one thousand board feet. One board foot is a board that measures 12" by 12" and 1" thick.

SITE REVIEW

The North Fork mill property was the former site of a large sawmill. Of the 135 acres comprising the sawmill site, about 80 acres are usable, with approximately 35 acres already in other uses (or planned for uses such as a fire station). Of these 35 acres, approximately 10 acres are used for biomass processing activities, such as stockpiling, chipping and mulching, landscaping materials, and firewood sales (Alpine Sierra Greencycling). There is also a recycled lumber operation (Crossroads Recycled Lumber) on site. Additional biomass businesses could also be located at the site, plus there also exists the potential for a small biomass-fueled electric generation system (1 to 3 MW)[10] to be sited at the North Fork mill site.

Figure 4 is an aerial photo of the North Fork mill property site. As can be seen from that photo, much of the property was highly disturbed and remains so in the present (the sawmill was operational at the site in excess of 50 years until its closure in 1994).

Figure 4. Aerial View of North Fork Mill Site

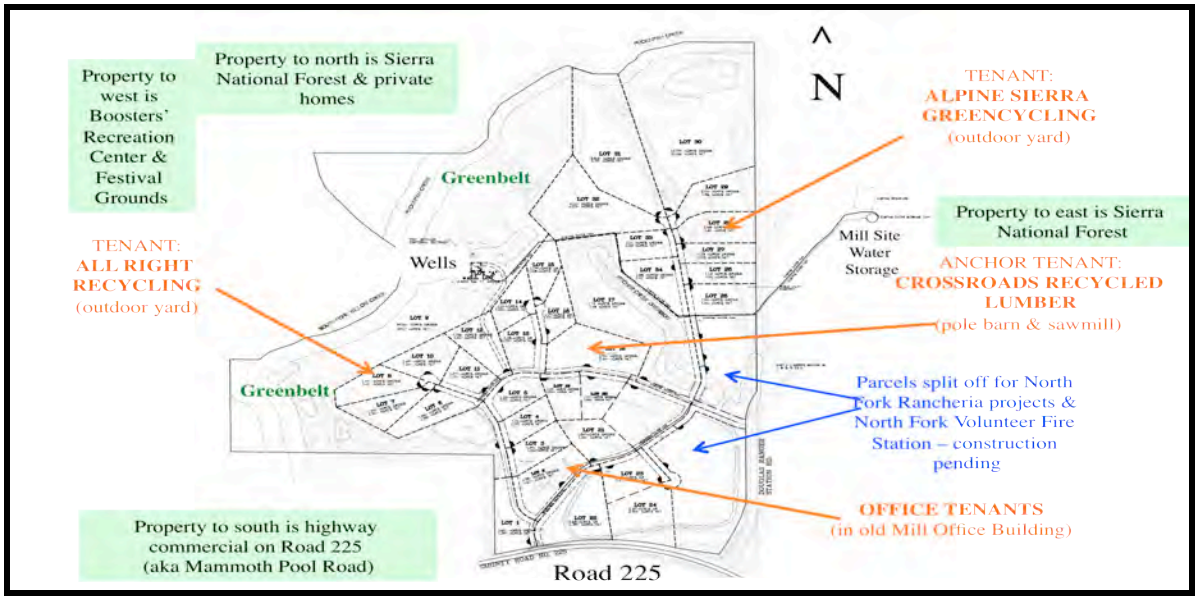
Figure 5 is a representative photo of the site, which still demonstrates the former industrial nature of the subject property.

[10]MW is a common unit of measure for power production and represents 1,000 kilowatts (about enough power for 1,000 homes).

Figure 5. Representative Photo Image of the North Fork Mill Site

Figure 6 is a subdivision map which shows the current biomass recycling tenants at the subject site.

Figure 6. Proposed 2009 Subdivision Map of North Fork Mill Site (not reviewed or approved by Madera County)



Land Use and Zoning

The land use and zoning designation of the mill property site is Heavy Industry, as indicated on Figure 3-3 of the North Fork/South Fork Community Central Area Plan.[11] Table 1 of the Central Area Plan describes the permitted uses within the Heavy Industry zone (as allowed by Chapter 18.44, Madera County Code of Ordinances). Further, Section 18.04.245 of the Madera County Code defines heavy industrial uses as:

> "All those industrial and manufacturing uses not otherwise prohibited by law except the following: Manufacture of cement, lime, gypsum, or plaster of Paris, acid, explosives, fertilizer, glue, fat and bone products, or the storage of explosives, or the reduction of offal or dead animals, or the operation of stockyards or commercial slaughter houses. Other similar heavy industrial uses may be included in this definition by the interpretation of the zoning administrator."

Thus, it appears that nearly all-ongoing and planned biomass processing activities are, or could be, allowed by Heavy Industry property zoning. Even a small-scale, biomass-fueled electric generation system could be permitted in the zone, as it is not specifically prohibited. It is possible that such a use might require a Conditional Use Permit, based upon the interpretation of the Madera County Zoning Administrator (who is also the County Planning Director). Utility lines to transmit generated electric power from the project site are permitted in all zoning districts (with certain conditions - Section 18.88.040 of the Madera County Zoning Ordinance).

Environmental Regulations and Constraints

As all of the proposed uses appear to be allowable on the subject site (due in large part to the favorable zoning), many potential environmental constraints are potentially eliminated. However, there remain the following potential constraints to be considered. These include:[12]

- Air quality
- Hazardous Waste Site Contamination
- Storm Water Drainage
- Endangered Species
- Wetlands Delineation and Preservation

Air Quality

Air quality would most likely only be a potential constraint if a biomass-fueled electric generation system were proposed. The site is within the jurisdiction of the San Joaquin

[11] Prepared by QUAD Knopf and North Fork Community Development Council, November 2003.
[12] Identified in part within the North Fork/South Fork Community Central Area Plan.

Valley Air Pollution Control District (SJVAPCD), which has some of the most stringent air pollutant emissions limitations in California. However, a state-of-the-art small-scale electric generation system would have very low emissions, and additional add-on emissions controls are available. Recently, two small-scale electric systems were permitted by the SJVAPCD in Merced and in Stanislaus County.[13]

Hazardous Waste Site Contamination
The subject property has reported soil contamination from asbestos, fuel hydrocarbons, and wood preservatives, all used by the former sawmill and its operations.[14] However, it is also reported that the all known site contamination has been remediated.[15]

Storm Water Drainage
The former sawmill had significantly modified creeks located on the property (Peckinpah and Pitcher) for the construction and operation of the sawmill. However, since the closure of the sawmill in 1994, the modified drainage system has not been maintained, nor does it meet current standards. It will need to repaired and modified as the site is further developed.

Endangered Species
There is the possibility that species of concern (e.g., California red-legged frog) may use the riparian corridor of the subject property's creeks and the riparian areas associated with them. However, if development of biomass processing activities avoids these areas, any threats should be eliminated.

Wetland Delineation and Preservation
The riparian zones of the creeks that border and traverse the subject property, as well as the water diversion areas for storm water, now meet the definition of wetlands. As such, these areas must be addressed (and protected) from additional biomass-related development that may encroach or border such areas. The project site appears to be large enough that impacts to federally-defined wetlands can be avoided.

It appears that the North Fork mill site is zoned for a very wide variety of biomass-related processing and utilization activities. Environmental constraints do exist but can be addressed successfully.

[13]Per discussions with Paul Elisas, VP Development, Phoenix Energy.
[14]North Fork/South Fork Community Central Area Plan 2003.
[15]Discussions with Elissa Brown, grant writer and North Fork resident.

STAKEHOLDER MEETINGS

Any consideration of value-added utilization enterprises at the North Fork mill site must include input from local and regional stakeholders. Local knowledge and experience (lessons learned) can provide invaluable information to guide decisions impacting communities and regions that seek economic development. In addition, it is important that local stakeholders have an active role in deciding which value-added utilization enterprises are most appropriate for possible development at the North Fork mill site.

Initial Stakeholder Meeting

TSS worked with the CDC and Sierra Nevada Conservancy representatives to generate a stakeholder invitation list and meeting agenda. In addition, a project overview document was crafted and distributed to provide stakeholders with background information and feasibility evaluation study objectives.

The initial stakeholder meeting was held on April 26, 2011 at the CDC office conference room and included 10 stakeholders. See Appendix B for meeting notes. Key stakeholder input included:

- Very high interest in the successful development of new sustainable enterprises that are complementary to existing businesses on the mill site (Crossroads Recycled Lumber and Alpine Sierra Greencycle).
- Concern regarding loss of local talent due to relatively little new employment opportunities.
- Job creation should be a priority.
- Opportunities exist to treat high levels of hazardous forest fuels to mitigate catastrophic wildfire in the area.

Meeting notes and outcomes were disseminated to meeting participants.

In addition to meeting with stakeholders, TSS and a Sierra Nevada Conservancy representative[16] met with Marc Mandel, owner of Crossroads Recycled Lumber, to review current operations and discuss possible interest in co-locating expanded or additional value-added processes. Mr. Mandel expressed a high level of interest in possible expansion but only if sustainable feedstocks are available and expansion plans are consistent with community interests.

TSS attempted unsuccessfully to contact and meet on site with Alpine Sierra Greencycling representatives.

[16] Mark Stanley, forester and biomass advisor for the Sierra Nevada Conservancy.

Follow-Up Stakeholder Meeting

On June 2, 2011, a follow-up meeting was held (again at the CDC office conference room) with a similar stakeholder invitation list. The follow-up meeting was focused on presenting results of TSS findings regarding woody biomass material availability within the TSA and presentation of promising, value-added utilization processes/enterprises that should be considered for the North Fork mill site. See Appendix C for meeting notes. Discussions during the meeting included:

- TSS presentation addressed:
    - Sustainable availability of woody biomass resources within a 30-mile radius of North Fork mill site. Cost estimates to collect, process and transport woody biomass material to North Fork.
    - Current biomass markets and uses in the region.
    - Mill site review and environmental permitting required if additional value-added enterprises were developed on site.
    - Matrix of value-added uses for woody biomass material. See Appendix D for the value-added utilization matrix created by TSS and University of California Cooperative Extension.[17]
    - Recommendations regarding steps forward including consideration for the following value-added technologies:
        - Addition of a small sawmill at the Crossroads Recycled Lumber operation.
        - Post and pole operation.
        - Expanded firewood operation (Alpine Sierra Greencycling already markets firewood).
        - 1 MW biomass power generation facility.
- Other discussion items included:
    - Any added enterprise at the mill site must be structured to utilize biomass material that is available in sustainable volumes and specifications.
    - Collaborative processes (like the effort to evaluate and restore the Willow Creek watershed) may facilitate availability of sustainable, long-term volumes of biomass material generated as a byproduct of forest restoration and fuels treatment activities.
    - County staff noted that an amended Conditional Use Permit might be the best option if considering a biomass power plant.
    - There may be an opportunity to utilize bug-killed pine trees removed from USFS lands. Blue stain lumber from milling these pine trees has character and may be valued in the marketplace.
    - Need to decide what entity or entities (e.g., CDC or Yosemite-Sequoia RC+D) will take the lead to manage or shepherd the addition of value-added enterprises on the mill site.

[17] Gareth Mayhead, UC Cooperative Extension staff.

VALUE-ADDED UTILIZATION

A wide variety of value-added utilization technologies were considered in the process of conducting this feasibility evaluation. The utilization matrix developed by TSS and UC Cooperative Extension (see Appendix D) summarizes the technology findings. This matrix served as an outline for discussion during the follow-up meeting with stakeholders.

Priority Technologies Considered

Four technologies reviewed with stakeholders during the June 2, 2011 meeting in North Fork, showed promise and were considered. One technology, biomass power generation, was selected for consideration as the best technology for the site. Outlined below are findings and outcomes from the technology evaluation process.

Small Sawmill
Sustainable feedstock (sawlog) supply is a major challenge, especially considering that the USFS manages the majority of the forested landscape in the TSA. In addition, there are already five small mobile sawmills operating in the area.[18]

Post and Pole Operation
Like the small sawmill, sustainable volumes of feedstock (small logs) available long term are a concern. Other post and pole operations in California have recently closed[19] due to poor market conditions for posts and poles.

Firewood Operation
There may be an opportunity to expand the existing firewood operation (Alpine Sierra Greencycling). Unfortunately, Alpine Sierra was not responsive to TSS inquiries, and it is assumed that they are not interested in participating in this evaluation.

Small Biomass Power Generation Facility
A small biomass power generation facility scaled at 1 MW could be developed at the mill site. At this scale, the facility would require between 8,000 and 10,000 BDT per year of biomass feedstock. TSS review of available biomass material found that just over 12,600 BDT/year are sustainably available.

Preferred Technology

Of the priority technologies considered, the small biomass power generation facility was identified by TSS and stakeholders as the preferred candidate. Listed below are important findings that drove this decision.

- TSS biomass availability review confirmed sustainable feedstock availability.

[18] As noted by Walt Ellis during April 26, 2011 stakeholder meeting.
[19] Watershed Research and Training Center at Hayfork and Lance Forest Products at Bieber.

- North Fork site previously supported a 10 MW biomass plant[20] and there should be more than enough transmission and distribution capacity to support a 1 MW biomass plant.
- Market demand for renewable power generated in California is ramping up with recent legislation (SB2 1X) signed into law by Governor Brown.[21] Investor owned utilities and publicly owned utilities are required to include 33% renewables in their generation mix by 2020.
- There is a significant and compelling need to restore forest landscapes and treat hazardous forest fuels in the North Fork region (like much of the Sierra Nevada). A ready market (e.g., biomass fuel for power generation) for biomass removed will help to offset some of the costs of restoration/fuels treatment.
- Restoration of forest landscapes and treatment of hazardous forest fuels could employ local contractors. In addition, the power generation facility will require staff to operate and maintain the plant.[22]
- A small biomass power generation facility at North Fork could serve as a pilot or demonstration facility that may be replicated at other locations in the Sierra Nevada.

Phoenix Energy

Following the selection of a small biomass power generation facility as the preferred technology for evaluation, TSS conducted an informal technology search to find a technology vendor that showed promise and had already deployed the technology within California. A full technology assessment is outside the parameter of the current scope of work for this feasibility evaluation.

While there are other vendors (e.g., EnergyFlex, Inc.)[23] that have promising technologies, TSS chose Phoenix Energy as an example of a small biomass power generation technology. Phoenix has a pilot project now operating at Merced, California. Scaled at 0.5 MW, the Merced installation utilizes urban wood waste as a primary feedstock and is currently under contract to sell renewable power to Pacific Gas and Electric (PG&E). In addition, the plant is permitted by the same air district that has jurisdiction over the North Fork mill site, the San Joaquin Valley Air Pollution Control District.

TSS arranged for an August 29, 2011 tour of the Phoenix Energy, Merced facility. Posted below (Figures 7 through 10) are images of the facility. In addition, Appendix E includes background information and a diagram showing process flow and layout of the technology.

[20] Per discussions with Patrick Emmert, formerly with Sequoia Forest Industries and South Fork Timber.
[21] SBX 1-2 signed into law on April 12, 2011.
[22] Per discussions with Paul Elias, VP Development, Phoenix Energy.
[23] Data and contact information provided by Bernard Berrier, consultant for EnergyFlex, Inc.

Figure 7. Phoenix Energy Fuel Receiving System

Figure 8. Phoenix Energy Gasification Equipment

Figure 9. Phoenix Energy Gas Cleanup Equipment

Figure 10. Phoenix Energy Electrical Generator

The Phoenix Energy power generation technology is basically a four-step process.

- Step 1 - receive and store biomass fuel. Prefer fuel with 10% moisture content and sized between 4" and ¼". See Figure 7.
- Step 2 - convey biomass fuel to gasification unit for conversion to a synthetic gas (similar to natural gas or propane). See Figure 8.
- Step 3 - cool and clean up the synthetic gas. Remove impurities such as tars and particulates. See Figure 9.

- Step 4 - deliver synthetic gas to caterpillar generator set (internal combustion engine coupled to a generator. See Figure 10.

Other important data is outlined below.

- Thermal energy can be recovered and utilized to dry biomass fuel (forest biomass can have 50% moisture content) or to custom dry other products (e.g., lumber, firewood). Waste heat can be extracted at three locations in the process:
    - Heat exchanger at the gas-cooling step.
    - Water jacket around the Caterpillar engine.
    - Radiator at the Caterpillar engine.
- Biomass fuel usage is approximately 1 BDT per MWh or about 8,000 BDT per year for a 1 MW facility.
- Capital and construction costs for the Phoenix Energy system, with fuel receiving system and thermal energy extraction, is approximately $5 million.
- Footprint of the fuel receiving and power generation equipment is less than one acre. Fuel storage for stockpiling fuel through winter months (when forest operations are not active due to wet soil conditions and inclement weather) may take up an additional two acres.

Phoenix Energy has expressed an interest in moving forward with discussions regarding the possible siting of a small-scale biomass power generation facility at the North Fork site. A Letter of Interest was provided by Phoenix Energy confirming their commitment to continue discussions if results of this feasibility evaluation are favorable. See Appendix F for the signed Letter of Interest.

Financial Analysis

Using an excel-based proforma workbook, TSS conducted a financial feasibility analysis to determine what the sale price of power produced would have to be to make the project financially viable. Assumptions built into this analysis included an industry standard return on equity (17%) and currently available federal tax incentives, such as the Renewable Energy Production Tax Credit (PTC) and the Business Energy Investment Tax Credit (ITC).

Summarized below are assumptions used when conducting the financial analysis:

- 17% return on equity (after taxes)
- $5 million capital expense
- $220,000/year labor cost (approximately five employees)
- $90,000/year maintenance cost
- $12,000/year land lease cost
- $38,000/year administration and other operating costs
- 5-year depreciation schedule
- 15-year debt service (amortization period)

- 5% interest rate on debt
- Thermal energy recovery (required to qualify for the ITC)
- 75% debt/25% equity in year one
- 1%/year escalation of fuel prices
- 1%/year escalation of power sales price

Other variables, such as the cost of biomass fuel and the availability of grant funding (to underwrite capital expenses), were included and ramped both up and down to confirm the financial impacts.

Tables 8 and 9 summarize findings of the financial analysis comparing use of the PTC and the ITC.

Table 8. Financial Proforma Results Using the Production Tax Credit

CASH GRANT FOR CAPITAL EXPENSES ($)	BIOMASS FUEL PRICE ($/BDT)	POWER SALES PRICE ($/MWh)
$0	$40.00	$141.65
$0	$45.00	$146.96
$0	$52.50	$154.92
$1,250,000	$45.00	$118.48
$2,500,000	$45.00	$90.00

Table 9. Financial Proforma Results Using the Investment Tax Credit

CASH GRANT FOR CAPITAL EXPENSES ($)	BIOMASS FUEL PRICE ($/BDT)	POWER SALES PRICE ($/MWh)
$0	$40.00	$145.70
$0	$45.00	$151.00
$0	$52.50	$159.00
$1,250,000	$45.00	$122.55
$2,500,000	$45.00	$94.00

The PTC provides a more optimized outcome (lower power sales price required to meet Return on Equity assumption) and is the preferred tax credit option when compared to the ITC. In order to qualify for the PTC, the project must be operational by December 31, 2013. Additional research (outside the scope of this evaluation) regarding PTC and ITC should be conducted when selecting the optimized tax credit as the preferred alternative.

Power Sales

Assuming no cash grant and use of the PTC, power sales from a 1 MW biomass power generation facility at North Fork must be at least $142/MWh ($.142/kWh) to meet the 17% Return on Equity. Currently PG&E is not offering biomass power generation

facilities power sales contracts at this rate.[24] Either a cash grant must be arranged to drive down the power sales price requirement or North Fork power project proponents will be required to seek other power sales options.

Pilot Project Status

UC Cooperative Extension and the USFS have been meeting with the California Public Utilities Commission (CPUC) to discuss the current status of biomass power generation facilities in California. There have been some discussions with CPUC staff regarding potential biomass power projects in the form of "pilot projects" that might qualify for enhanced power sales agreements at favorable rates. This may present an alternative strategy to secure a favorable power sales rate that will attract private investment for a small-scale biomass project at North Fork.

Feed-in Tariff Rulemaking Process

Recent California legislative actions (SB 32 and SBX 1-2) have made amendments to the Public Utility Code (Section 399.20) to direct investor owned utilities to develop feed-in tariffs for small renewable generation facilities scaled at 3 MW or less. The CPUC is currently considering comments on this process. It is expected that this rulemaking procedure may take two years to complete[25] however, the CPUC is currently scheduling workshops commencing in late September 2011.

If the Section 399.20 rulemaking process results in attractive feed-in tariff rates for 10, 15 or 20-year power sales contracts, projects like the 1 MW facility at North Fork will be considered financially viable and should attract private sector capital investment. It will be imperative that stakeholders interested in a positive outcome for new, small-scale forest biomass power generation projects be engaged in the CPUC process. It is clear that the solar and wind lobbies have been very active in the CPUC rulemaking process. It will be imperative that an organized and focused approach be formulated to address the CPUC and suggest a "carve out" for a separate feed-in tariff rate schedule specific to small-scale forest biomass power projects.

[24]Current feed-in tariff pricing for small renewable generators ranges from $88 to $110/MWh depending on length of contract, and is adjusted for time of day delivery.

[25]Per discussions with Steve Larson, former Executive Director of the CPUC.

POTENTIAL GRANT FUNDING RESOURCES

TSS and The Grant Farm staff [26] conducted a literature search for grant and loan support targeting small-scale bioenergy projects. Outlined below are the results.

The Grant Farm is currently under contract with the Sierra Nevada Conservancy to provide advice and support, including grant-writing services.

Rural Energy for America Program (REAP)
Administered by the USDA Rural Business-Cooperative Service, this program replaced the Renewable Energy Systems and Energy Efficiency Improvements program in the 2002 farm bill. The program provides grants and loans for a variety of rural energy projects, including efficiency improvements and renewable energy projects. Assistance is limited to small businesses, farmers and ranchers with projects located in a rural community. REAP grants and guarantees can be used individually or in combination. Together the grants and loan guarantees can finance up to 75% of a project's cost. Grants alone can finance up to 25% of the project cost, not to exceed $500,000 for renewables and $250,000 for efficiency.

Woody Biomass Utilization Grants
Administered by the USFS, the Woody Biomass Utilization Grant program (WBU) is a nationally competitive grant program that supports wood energy projects requiring engineering services. The projects use woody biomass material removed from forest restoration activities, such as wildfire hazardous fuel treatments, insect and disease mitigation, forest management due to catastrophic weather events, and/or thinning overstocked stands. The woody biomass must be consumed in a bioenergy facility that uses commercially proven technologies to produce thermal, electrical or liquid/gaseous bioenergy. Maximum grant is $250,000.

Biomass Research and Development Initiative
Administered by the US Department of Agriculture and the US Department of Energy. Both agencies produce joint solicitations each year to provide financial assistance in addressing research and development of biomass based products, bioenergy, biofuels and related processes. Approximate funding per project is $7,500,000.

Business and Energy Guaranteed Loans
Administered through the US Department of Agriculture. To improve, develop, or finance business, industry, and employment and improve the economic and environmental climate in rural communities.

[26] Shawn Garvey, CEO, The Grant Farm.

OBSERVATIONS

The results of this feasibility evaluation indicate that the optimized outcome for development of a new value-added enterprise at the North Fork mill site is the siting of a small-scale, 1 MW biomass power generation facility.

Opportunities

Stakeholder meetings confirm a high level of support for development of a small-scale biomass power generation facility. Community support appears positive.

The CPUC is currently convening a feed-in tariff rulemaking process that may result in favorable power sales rates. In the short term, CPUC may be interested in facilitating pilot project status for selected projects that may result in favorable power sales rates.

The Governor is very supportive of small renewable power generation systems.

There may be an opportunity to include the participation of the Central Valley Business Incubator and the Water, Energy and Technology Center when considering next steps. Members of both organizations attended the August 29 tour of the Phoenix Energy facility.

Obstacles to Success

Power Sales
Favorable power sales rates are key to attracting private sector financing. If favorable power sales or a combination of grant funding and favorable power sales rates can be achieved, then project success should follow.

Feedstock Supply
Sustainable forest biomass availability is critical to the successful development of a new biomass power generation facility at North Fork. It is imperative that the Willow Creek collaborative process continue so that forest restoration and fuels treatment activities can be considered long term. Ultimately, long-term stewardship contracts (10-year duration) will be a key outcome.

NEXT STEPS

This feasibility evaluation found that a small-scale biomass power generation facility sited at North Fork is an optimized arrangement utilizing locally available feedstocks and local talent (forest restoration and fuels treatment contractors) in support of a sustainable forest restoration economy.

Outlined below are next steps for the Council and the CDC to consider (in order of implementation).

- Convene third stakeholders meeting to present findings of this evaluation analysis and outline plans for next steps.
- Develop and implement a communications plan to educate CPUC staff, elected officials (including Governor's staff), agencies and other target audiences on the societal benefits of siting sustainable, small-scale biomass power generation facilities at strategic forest landscape locations in California.
- Develop and implement a strategic plan to source federal and state grants/loan guarantees.
- Seek out potential private/public sector partnerships.
- Confirm strategic partnership arrangement with a term sheet and memorandum of understanding.
- Review options for use of thermal energy (e.g., lumber kiln, firewood kiln, greenhouse).
- Conduct preliminary discussions with electrical utilities (target PG&E first) regarding potential for a power sales agreement.
- Update detailed financial analysis based on discussions with utilities.
- Secure state/federal grant support to offset a portion of capital expenses.
- Prepare environmental permitting plan for siting of a small-scale biomass facility at the North Fork site.
- Prepare a fuel procurement plan.
- Conduct technology assessment/selection and preliminary design.
- Update detailed financial analysis based on latest data.
- Issue Request for Quotes from select technology vendors.
- Issue Request for Quotes from select engineering and construction firms.
- Update detailed financial analysis based on latest data.
- Select and contract with technology/engineering and construction firm.
- Engineer, construct and start up.

APPENDIX A - MADERA COUNTY UNEMPLOYMENT STATISTICS

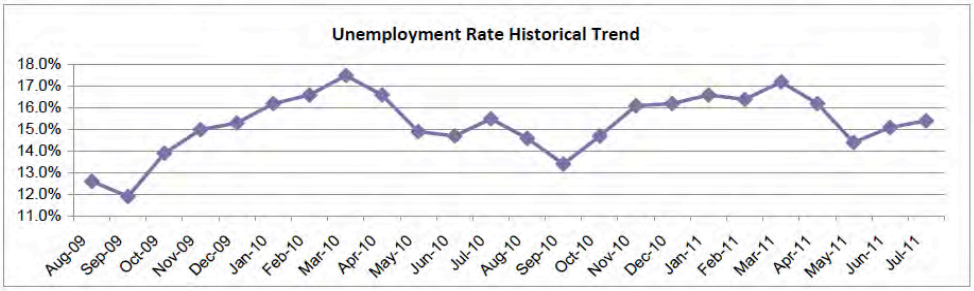
State of California
EMPLOYMENT DEVELOPMENT DEPARTMENT
Labor Market Information Division
2555 S. Elm Ave.
Fresno, CA 93706

August 19, 2011

Steven Gutierrez
559/445-6580

IMMEDIATE RELEASE
MADERA-CHOWCHILLA METROPOLITAN STATISTICAL AREA (MSA)
(Madera County)

The unemployment rate in the Madera County was 15.4 percent in July 2011, up from a revised 15.1 percent in June 2011, and below the year-ago estimate of 15.5 percent. This compares with an unadjusted unemployment rate of 12.4 percent for California and 9.3 percent for the nation during the same period.



Industry	Jun-2011 Revised	Jul-2011 Prelim	Change		Jul-2010	Jul-2011 Prelim	Change
Total, All Industries	44,400	42,900	(1,500)		42,300	42,900	600
Total Farm	12,200	11,000	(1,200)		9,900	11,000	1,100
Total Nonfarm	32,200	31,900	(300)		32,400	31,900	(500)
Mining, Logging, and Construction	1,100	1,100	0		1,100	1,100	0
Manufacturing	2,700	2,700	0		2,800	2,700	(100)
Trade, Transportation & Utilities	4,800	4,900	100		4,900	4,900	0
Information	400	400	0		400	400	0
Financial Activities	700	700	0		700	700	0
Professional & Business Services	2,700	2,700	0		2,700	2,700	0
Educational & Health Services	5,800	5,800	0		5,800	5,800	0
Leisure & Hospitality	2,700	2,700	0		2,900	2,700	(200)
Other Services	800	800	0		900	800	(100)
Government	10,500	10,100	(400)		10,200	10,100	(100)

Notes: Data not adjusted for seasonality. Data may not add due to rounding
Labor force data are revised month to month
Additional data are available on line at www.labormarketinfo.edd.ca.gov

APPENDIX B - INITIAL STAKEHOLDER MEETING NOTES

April 26, 2011 Initial Community Stakeholders Meeting
Concerns and Vision Meeting
TSS Consultants – Rural Business Enterprise Grant Feasibility Evaluation Study
Meeting Notes

Attendees:

Tad Mason, CEO - TSS Consultants
(916) 266-0546 — tmason@tssconsultants.com
Mark Stanley, Forestry/Fire Specialist — Sierra Nevada Conservancy
(530) 644-1631 — mstandley@sierranevada.ca.gov
Dan Rosenberg, President - North Fork Community Development Council
(559) 877-6444 — lldanj@gmail.com
Steve Haze, First Vice President - Yosemite-Sequoia Resource Conservation & Development Council
(559) 970-6320 — stevehaze007@gmail.com
Elissa Brown, Grantwriter
(559) 877-6585 — elissa.j.brown@gmail.com
Steve Mitchell – NFCDC Board Member & North Fork Chamber
(559) 877-8708 — stevemitchell@netptc.net
Sandy Chaille – NFCDC Board Member & North Fork Volunteer Fire Department Auxiliary
(559) 760-4950 — c.chaille@netptc.net
Diann Miller – NFCDC Board Member & Foundation for Resource Conservation
(559) 877-4620 — djmiller@netptc.net
Sarah Rah – NFCDC Board Member & Consultant
(559) 877-7272 — rah.sarah72@gmail.com
Bernard "Barney" Berrier – Community member
(559) 760-4100 — bernardberrier@gmail.com
Walt Ellis – Rancher
559-930-5820 — PO Box 1, North Fork CA 93643

Discussion:

- Steve Haze and Elissa Brown gave an overview of the Biomass Feasibility Study project.

- Tad Mason introduced his consulting firm, which focuses on value-added woody biomass and biomass-to-energy projects.

- Elissa Brown sought input from attendees on what they wanted to see happen on the Mill Site, what their concerns might be, and ideas for future projects.

Reviewed plans for development of a collaborative group in the area, one that can provided collective input to the USFS with regards to the Willow Creek Watershed Restoration Project.

- Steve Mitchell and Sandy Chaille emphasized the need for jobs, while expressing possible concerns over traffic and noise, depending on what types of projects might be proposed. Concerned about property values.

- Sarah Rah recapped prior community workshops, studies, land planning issues and Mill Site characteristics. One of the best options would be for a "master developer" or like firm that can take the lead to facilitate and attract sustainable businesses to the North Fork mill site. Lot's of local talent in the greater North Fork area. Region is located near a major recreational route (Hwy 41) and all weather road (Road 200).

- Steve Haze described YSRC&D's economic development initiatives for forest-related communities in Mariposa, Madera, Fresno and Tulare Counties, with nearly $800,000 in grants under contract or pending.

- Dan Rosenberg talked about objectives to develop the Mill Site and lot split opportunities. Looking for a suite of economically viable options. Need to attract enterprises that will add value to the community (jobs) and have sustainable business models. Reviewed some of the local population dynamics – median age of 49. Many retirees moving into the area due to attractive home prices and scenic beauty.

- Barney Berrier reflected on sustainability issues and how water + biomass + agriculture can all be inter-related. Concerned about losing local talent and skill sets. Provided overview of Energyflex, Inc. to Tad Mason. Briefly addressed the demographic mix in the immediate North Fork area – loggers/ranchers/retirees/Indians.

- Walt Ellis talked about the core expertise of local ranchers and loggers on rangeland and forest management. Stressed that the #1 issue facing the community is wildfire. Portable sawmill operators (maybe five in the area) are trying to salvage and utilize locally available timber. Trying to carve out a living but sustainable availability of sawlogs is challenging.

APPENDIX C – FOLLOW-UP STAKEHOLDER MEETING NOTES

June 2, 2011 Community Stakeholder Follow-up Meeting
TSS Consultants – Rural Business Enterprise Grant
Feasibility Evaluation Study
Meeting Notes

Attendees:

Tad Mason, CEO - TSS Consultants
916-266-0546 tmason@tssconsultants.com
Gareth Mayhead - Woody Biomass Technology Marketing, UC Berkeley
510-665-3662 gmayhead@berkeley.edu
David Martin - Ranger, Sierra Nevada Forest, Bass Lake Ranger District
559-877-2218 dmartin05@fs.fed.us
David Konno - Yosemite Sequoia Resource Development & Conservation
559-877-8663 konno95018@yahoo.com
Norman Allinder, Madera County Planning Director
559-675-7821 norman.allinder@madera-county.com
Larry Wright - Madera County Planning Commissioner
559-658-7201 wright2go@sti.net
Elissa Brown - Grantwriter
559-877-6585 elissa.j.brown@gmail.com
Jim McDougald - CalFire Battalion Chief, Pre-Fire Coordinator
559-243-4130 jim.mcdougald@fire.ca.gov
Clark Daley - CalFire Captain, Rancheria Forest Fire Station
559-877-2322 cdaley@fire.ca.gov
Christy Hansard - North Fork Mono Rancheria Environmental Department
559-877-2461 chansard@northforkrancheria-nsn.gov
Charles Sikora - Sikora Forest Consulting
559-658-5885 sikoraforestry@sti.net
Steve Mitchell - North Fork Chamber of Commerce
877-8708 stevemitchell@netptc.net
Bernard "Barney" Berrier - Community member
559-760-4100 bernardberrier@gmail.com
Marc Mandel - Crossroads Recycled Lumber
559-877-3645 marc@crossroadslumber.com
Diann Miller - North Fork Community Development Council & Foundation for Resource Conservation
559-877-4620 djmiller@netptc.net
Sarah Rah - North Fork Community Development Council
559-877-7272 rah.sarah72@gmail.com
Mike Gomez - Firefighter 1 - Rancheria Forest Fire Station
559-877-2322

Tad Mason, TSS Consultants introduced the preliminary draft report for the value-added biomass feasibility study his firm is preparing. The report will include a vegetation coverage map showing one million acres of forested lands and 460,000 acres of shrub and brushlands. Target Study Area includes region within 30 mile radius of North Fork. Major landowners/managers include Sierra National Forest (Bass Lake RD), Wilderness Preserves, National Park Service, State Recreation Areas, Bureau of Land Management and private owners. Areas within the 30 mile radius south of the San Joaquin River have been excluded for estimating biomass volumes, due to impractical access (transport issues). Within the 30 mile "practical" radius, historically 4-6 million board feet of sawtimber have been harvested per year on average over the past five years. Additionally, history shows 100 acres per years of pre-commercial thinning on USFS managed lands. Total woody biomass material considered practically available is approximately 12,670 bone-dry-ton of biomass available annually from the target Study Area. Existing markets for biomass material includes:

- Small pine logs to California Wood Shavings (animal bedding shavings facility near Sonora). Recent prices for small ponderosa pine logs - $32/GT.
- Biomass power – closest facilities are offering up to $48/BDT.
- Alpine Sierra Green Cycle

Other initial findings:

- There is enough woody biomass material available in the target study area to support a small biomass power generation facility scaled at 1MW. Small biomass gasification technologies like Phoenix Energy (currently operating .5 MW pilot plant at Merced, CA) show promise.
- Value added enterprises to consider at North Fork:
    - Mobile dimension sawmill
    - Post and pole operation
    - Firewood operation
- Long-term biomass feedstock availability is key. Business enterprises will not be able to secure capital needed to invest in new equipment unless raw material feedstocks are available long term. 10 year stewardship contracts would be very helpful.

Larry Wright, Planning Commission Chair suggested the County might offer fee mitigations for new projects sited at North Fork.

Norman Allinder, Planning Director recommended that a master conditional use permit or an amended conditional use permit could apply if a biomass power generation facility was sited at North Fork.

Elissa Brown, Grant Writer suggested there may be funding sources to address technical assistance and engineering to improve the Mill Site's development potential. She said it's important to identify what entities will implement the report's findings and recommendations — the County? North Fork CDC? Yosemite-Sequoia RC&D? Or

others? Collaborative stakeholder process may assist with facilitation of long term sustainable supply of sawtimber through the use of stewardship contracts on the Bass Lake RD.

Gareth Mayhead of UC Berkeley reported he and TSS are developing a matrix defining value added utilization alternatives and options. He reviewed the matrix and discussed value added options. Market opportunities will be defined by feedstock type and specifications.

Dave Martin, Bass Lake District Ranger explained special opportunities for North Fork's "blue stain" wood that is colored by beetle infestation to create a unique product with a niche market potential. He said the two primary bidders for USFS contracts are Sierra Forest Products and Sierra Pacific Industries. Of those, Sierra Forest Products is mostly like to be receptive to joint-venture opportunities. Currently planning timber sales scaled at 2 – 4 million board feet, due to cost effective scale (USFS staff time is more efficient when putting up large timber sales). Current timber sale contract term is three years.

Charles Sikora, Consulting Forester discussed handling slash piles and log trimming and other technologies. Mariposa and the Weaverville Community Forest concept may be models to consider.

Marc Mandel, Owner, Crossroads Recycled Lumber discussed possible interest in processing salvage logs (e.g., bluestain pine) at CRL. Currently have a small wood mizer sawmill on site. Might consider a mobile dimension mill, but would need consistent supply of 16" plus diameter sawlogs.

General discussion by all stakeholders covered other opportunities and ideas.
Next Steps:

- TSS will generate draft feasibility evaluation report by August 1, 2011.

APPENDIX D - VALUE-ADDED UTILIZATION MATRIX

Process or Product	Development Status	Feedstock Specifications	Jobs (FTE) Low	Jobs (FTE) High	Main Equipment	Market Potential	Comments
Wood fuel pellets	Commercially deployed	Clean, dry (<10% mc) chip, needs to be <1% ash.	15	85	Pellet mill, dryer, cooler, hammermill, packaging.	Domestic users now, animal bedding now, potential for boilers (including co-fire with coal), niche barbeque pellets? Large scale gives access to international markets for co-firing.	Use of biomass from forest possible (e.g., small logs or chips low in bark) - key issue and expense is drying system. Larger scale facility will face challenges in gaining market share for domestic stoves. Large scale export facility will have feedstock sourcing challenges and exposure to currency exchange rate risk.
Fuel bricks	Commercially deployed	Chip, dry (<15% mc), needles, bark okay.	3	6	Brick machine, dryer, cooler, hammermill, packaging.	Substitute for firewood is the primary market.	Potential to use field dried material as feedstock?
Fire logs	Commercially deployed	Clean, dry (<10% mc) chip, needs to be <1% ash.	3	9	Log machine, dryer, cooler, hammermill, packaging.	Substitute for firewood is the primary market.	Use of biomass from forest possible (e.g., small logs or chips low in bark) - key issue and expense is drying system.

Process or Product	Development Status	Feedstock Specifications	Jobs (FTE) Low	Jobs (FTE) High	Main Equipment	Market Potential	Comments
Wood plastic composites (WPC)	Commercially deployed	Clean, dry (2-12% mc) wood flour. Wood is ~55% of feedstock along with plastic and additives. Recycled wood use common.	0	0	Blender (compounder extruder), extrusion line, cooler, cut-off saw.	Landscape (bender board), decking, park furniture (picnic tables and seats).	Requires cost effective thermoplastic feedstock (HDPE, LDPE, PP, PVC). Utilize recycled plastics (milk jugs, plastic bags). Commercial facilities typically use pine, oak and maple. Blending (compounding) of wood and plastic may be 2 processes or single process depending upon equipment. Commercial molding processes typically continuous extrusion or batch injection molding. Other processes such as resin transfer molding (RTM) and others not commercially deployed. Could just make compounded wood-plastic pellets for WPC manufacturers.
Compound pellets for WPC production	Commercially deployed	Clean, dry (2-8% mc) wood flour. Wood is ~55% of feedstock along with plastic and additives. Recycled wood use common.	0	0	Compounder extruder.	Existing WPC mills (none in CA).	Cheaper way to get into WPC market place than making finished products.
Decorative bark	Commercially deployed	Small roundwood that is easily de-barked. Raw bark from sawmills is common feedstock source.	2	6	Debarker (flail, ring or rosser head), screen (trommel or flat).	High value up in urban areas (FOB $<100/ton)	As sawmill residuals become scarce, value of bark for landscape cover increases. Alternative use is hog fuel.

Process or Product	Development Status	Feedstock Specifications	Jobs (FTE) Low	High	Main Equipment	Market Potential	Comments
Decorative chip	Commercially deployed	Bark free and sized (no fines) wood chip.	2	6	Debarker (flail, ring or rosser head), screen (trommel or flat).	Colorized landscape cover sold in bulk and/or bagged.	Colored landscape cover requires additional equipment (colorizer). Feedstock (bark free chip) has alternative markets such as pulp/paper and furnish for composite products (particleboard/hardboard/decking).
Heating (buildings)	Commercially deployed	Woody biomass chipped to 3"minus, 50% mc, 3% ash.	1	2	Boiler system and hot water or steam delivery system.	Especially cost effective if replacing existing heating oil or propane heat. Can use for cooling also (using absorption chillers).	Fuel sizing has been an issue with recently installed thermal energy facilities. Typical installations include schools, hospitals, and community buildings.
Firewood	Commercially deployed	Roundwood (hardwood is preferred) logs that can be processed using automated firewood processor.	2	8	Log splitter or firewood processor.	Could be marketed to urban centers in boxes or bundles. Hardwood worth more. Higher prices for firewood near to affluent urban areas.	Numerous firewood contractors already in place. Some large contractors have significant market share.
Post and pole	Commercially deployed	Straight, low taper softwood (lodgepole, ponderosa, white fir) is preferred.	5	15	Rosser head peeler and/or doweller. Sorting line. Bucking saw.	Sold to treating facilities. Market treated posts for landscape timbers, vineyards (used to suspend vine wires) fences, furniture.	Need to treat - where is nearest facility? See map of treating facilities on website.

Process or Product	Development Status	Feedstock Specifications	Jobs (FTE) Low	High	Main Equipment	Market Potential	Comments
Small scale sawmill	Commercially deployed	Medium to large size roundwood.	2	10	Debarker, head rig, resaw, edger.	May need to target specialty markets to secure optimal value for products.	Tough to compete with large scale sawmills for logs and lumber sales. Niche markets for lumber is important. Most lumber is low value commodity product.
Lumber kiln	Commercially deployed	Lumber products or firewood	1	2	Kiln (steam or dehumidifier).	Kiln dried lumber has added value in the market place. Transport of dried lumber products is more cost effective (due to lower weight).	Could also dry firewood or heat treat lumber and packaging to meet ISPM15. Could use waste wood as a fuel source.
Gasification	Demonstration projects	Woody biomass chipped to 3"minus, 30% mc, 3% ash. Drier fuel preferred.	2	5	Gasifier, gas clean-up, IC engine or turbine-generator.	Technology is evolving quickly and is becoming more cost effective.	Only appropriate where electrical and thermal energy wholesale rates are high. Or in remote installations where power is not currently available.
Slow pyrolysis	Commercially deployed	Wood pieces (flexible spec).	1	2	Charcoal kiln	Charcoal for cooking, artists charcoal, filtration, soil amendment (biochar).	Very few slow pyrolysis units currently deployed.
Mild pyrolysis (torrefaction)	Pilot projects/R&D	Wood pieces (spec is vendor specific).	0	0	Reaction unit	Co-firing in coal power plants (no modifications required to coal handling systems). Or as fuel supplement for biomass power plants.	Torrefied fuel could be highly marketable due to BTU/pound and impervious to water. Coal is a key solid fuel in the marketplace and tends to set the price point.

Process or Product	Development Status	Feedstock Specifications	Jobs (FTE) Low	Jobs (FTE) High	Main Equipment	Market Potential	Comments
Fast pyrolysis	Pilot projects/R&D	Small (1/4" minus), dry, clean wood particles.	0	0	Reaction unit.	Char for filtration, cooking, soil improvement. No ready market for bio oil, except at oil refineries (upgrader).	Some significant investments made in R&D, including demonstration facilities (portable and fixed). Promising technology that may be commercially viable soon.
Solid fuel steam cycle (biopower)	Commercially deployed	Woody biomass chipped to 3"minus, 50% mc, 3% ash. Drier fuel preferred.	2	30	Fuel handling, boiler, turbine-generator, emissions control, water cooling and recovery.	Technology is evolving quickly and is becoming more cost effective.	Only appropriate where electrical and thermal energy wholesale rates are high. Typically found in states with attractive Renewable Portfolio Standards.
Air filtration media	Commercially deployed	Virgin material that will grind to large heterogeneous particles.	0	0	Grinder and screen.	Waste water treatment facilities etc.	Need other market for grinder material (e.g., hog fuel or landscaping) that does not meet specifications for filtration media.
Compost	Commercially deployed	Greenwaste (tree trimmings/grass clippings) is optimal.	2	6	Grinder, screen and windrow turner.	Soil amendment market is seasonal. Compost and mulch operations work best on same site. Typically sold in bulk or bagged.	There may be opportunities to install compost operation near existing landfills to divert greenwaste away from landfills.
Mulch	Commercially deployed	Greenwaste (tree trimmings/grass clippings) is optimal.	2	6	Grinder and screen.	Soil amendment market is seasonal. Compost and mulch operations work best on same site.	Very similar to compost operation. In fact compost/mulch operations typically share the same site.

Process or Product	Development Status	Feedstock Specifications	Jobs (FTE) Low	Jobs (FTE) High	Main Equipment	Market Potential	Comments
Chip for pulp/paper or composite panel furnish	Commercially deployed	Woody biomass chipped to 3"minus, 50% mc, bark free with few fines.	3	6	Debarking equipment (e.g., chain flail) chipper and screen.	No pulp/paper operations operating in CA. Two composite panel facilities in CA (Martel and Rocklin).	Very limited markets (no pulp mills and two composite panel operations) in CA. Chip export market may ramp up and demand in the Pacific Rim trends higher.
Anaerobic digestion	Commercially deployed	Wide range of feedstocks greenwaste, manure, and food waste.	1	2	Digester.	Compost market. Methane can be used for heat or electricity generation	Could complement agricultural or food waste streams. Typically collocated with ag operations (dairy).
Veneer	Commercially deployed	Straight logs with limited taper. 8"+ diameter.	40	80+	Steaming vats, veneer lathes, trimming, rolling stock.	Plywood and LVL mills are in Oregon, peeler cores (2"-4") sold into post and pole market.	Typically a large commercial scale facility (process 420 blocks per hour).
Animal bedding (shavings)	Commercially deployed	Small roundwood (ponderosa pine preferred)	2	6	Shaver, screens, drying, packaging.	Can be sold in bulk and/or in bags.	

APPENDIX E - PHOENIX ENERGY TECHNOLOGY DESCRIPTION AND LAYOUT

PHOENIX ENERGY™

Basic Process Description

The Phoenix Biomass Energy system converts wood and agricultural waste biomass into a natural gas substitute ("syngas") through the process of thermo-chemical conversion ("gasification"). This syngas is then used to fuel a specially modified natural gas genset that produces renewable electricity and heat. A byproduct of the gasification process, called "biochar", is a wood char that has sequestered carbon in solid form (~74% fixed carbon) and is used as a beneficial soil amendment.

The biomass conversion process is a thermo-chemical one that 'cooks' biomass in an oxygen starved environment. By depriving the fuel of sufficient oxygen, the wood biomass does not burn, but rather gives off a hydrogen rich syngas. As the biomass gives off the syngas, it is transformed into bio-char and ash of approximately 1-5% of the volume of biomass fuel. The syngas is then captured, cleaned and cooled before being sent as fuel to the genset. The gensets we utilize come from variety of nationally known vendors such as Cummins, Caterpillar, and GE. This ensures that there are readily available spare parts and maintenance technicians available locally. Further, we have incorporated an on-site water treatment as part of our core model, re-using much of the water for cooling and filtration process, to maintain a small footprint. Finally, our largest by-product, the biohcar, is sold to a variety of potential users.

One unique aspect of our system is that the footprint is very small – less than half an acre to generate 1 megawatt; versus wind systems that need 1-2 acres per MW, or solar which needs 8-10 acres per MW. Along with our module design, this small footprint allows our solution to be deployed close to the biomass feedstock.

Fuel Preparation

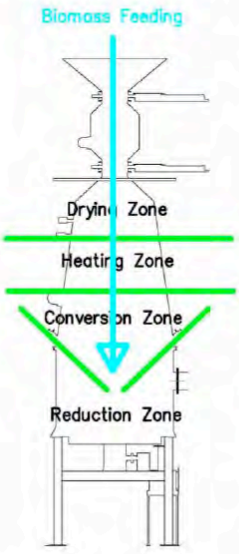


Figure 1

Fuel storage and handling is finalized with your company or host's personnel prior to site work being carried out. There are several design options to choose from, which complement a site's material flow. Currently, we believe a walking floor trailer and/or a combination conveyor fed hopper provide the most flexible solutions. Biomass fuel from your facility will be delivered via conveyer (or front-end loader,) to the fuel hopper. Once in the Phoenix Energy hopper, our automated system uses a robust transloading platform and fuel metering sensors to continuously feed the conversion unit in small batches as needed.

Biomass Conversion

The biomass conversion chamber (figure 1) is essentially a chamber where various complex thermo-chemical processes take place. As the material flows downward through the reactor, the biomass gets dried, heated, converted into gas and reduced into bio-char and ash.

Although there is a considerable overlap, each process can be considered to occupy a separate zone, where fundamentally different chemical and thermal reactions take place. The fuel must pass through all of these zones to be completely converted.

The downdraft conversion unit, employed by Phoenix Energy, is under negative air drawn by a high-pressure blower. The essential characteristic of the downdraft design is that the tars given off in the heating zone are drawn through the conversion zone, where they will be broken down or oxidized. When this happens, the energy they contain is usefully recovered with the mixture of gases in the exit stream being relatively clean, and ready for further processing. Expected total gas contaminant concentration prior to filtration is up to 100 times lower than what is often seen in updraft and fluid-bed systems.

Figure 2 – The P250 biomass conversion chamber (red) and filtering system (blue)

Gas Cleansing

After the syngas has been extracted from the conversion chamber it is cooled and cleaned by a series of scrubbers and filters. First, the gas passes through a venturi scrubber, which is known to remove particulate in the sub-micrometer range. The gas is then passed through a series of four filters. The first is a coarse filter to coalesce residual liquids. The second is a rejuvenating active sawdust filter, the third is a similar passive filter, and the fourth is a fabric bag filter. The filter media are sawdust and biomass chips so instead of using expensive synthetic filters that need to be thrown away, the used filter media can be simply placed back into the fuel hopper and consumed.

Power Generation

Phoenix Energy units are based on a spark-ignited engine genset. Depending on the size chosen, the engines are capable of providing 500 or 1,000KW operating on syngas. Phoenix Energy will customize the selected genset to allow syngas carburetion for this engine and provide standard paralleling switchgear for electrical output.

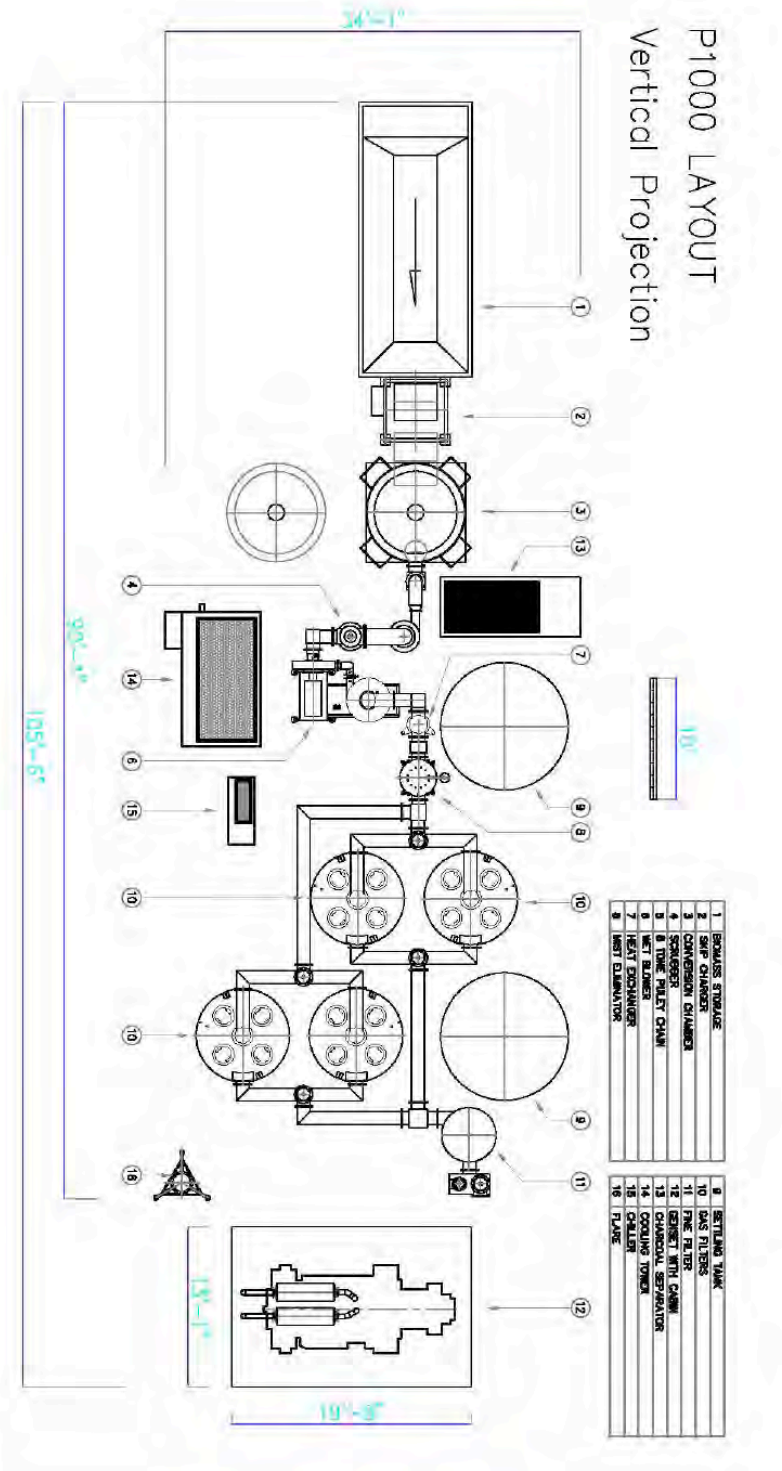
At present we believe the CAT 3516 or the Cummins 1710 offer the most attractive engine options for your firm, however we can work with *any* natural gas genset. First and foremost there is a large secondary market for CAT and Cummins engines and the service coverage in the US is very good. These engines also have unique features enabling good fuel economy, better emissions, high durability, and extended oil / filter change periods. They run on variety of gaseous fuels like natural gas, bio-gas, sewage gas, LPG etc. Engines are available in both types of aspirations, naturally aspirated and turbocharged, after-cooled

Figure 3 – A P500 installation in California

versions. Both CAT and Cummins engines have been designed to combine compact size, low emission levels and excellent performance characteristics of high-speed technology with the medium speed benefits of water-cooled exhaust valve seats, steel-crown pistons & combustion control.

Bio-char & ash handling, and Low Water usage

Bio-char & ash are removed from the conversion chamber using a dry extraction process designed around a water cooled auger at the base of the gasifier. Scrubbed particulate in the form of ash is extracted at the base of the cyclone. A closed water loop is used for both cooling and process water. On-site water treatment, utilizing biochar and sand filters allows for recirculation of both water loops reducing water usage to a minimum. In fact, at certain times of the year the system is actually water accretive as moisture is removed from the biomass and captured in the process water loop. Water levels are maintained in separate storage tanks for each loop and pumped through both the cooling and filtration process. The automated filter is typical for river sludge treatment and separates the solids from the re-circulated water. The biochar , is a "capture & store" byproduct that is separated out, using a special mechanical separator, for resale as a soil amendment or ADC, sequestering carbon in solid form while in the ground for up to 1,000 years! While we don't include these biochar sales in our conservative base financial forecast, we do believe that carbon credits related to biochar may become a valuable revenue source in the near future. Water leaving the filter is passed through a final stationary filter prior to heat exchange. The scrubbing water is absorbing heat from the syngas and must be cooled in a cooling tower prior to returning to the closed-loop scrubber.


P1000 LAYOUT
Vertical Projection
1 BIOMASS STORAGE
2 SKIP CHARGER
3 CONVERSION CHAMBER
4 SCRUBBER
5 TONE PULLEY CHAIN
6 WET BLOWER
7 HEAT EXCHANGER
8 MIST ELIMINATOR
9 SETTLING TANK
10 GAS FILTERS
11 FINE FILTER
12 REINJECT WITH CARBON
13 CHARCOAL SEPARATOR
14 COOLING TOWER
15 CHILLER
16 FLARE

APPENDIX F - PHOENIX ENERGY LETTER OF INTEREST

PHOENIX ENERGY™

September 6, 2011

North Fork Community Development Council
Dan Rosenberg, President
P.O. 1484
North Fork, California 93643

Dear Mr. Rosenberg;

Thank you for talking the time to visit our Merced, California site on August 29 and view firsthand our renewable energy generation facility. We at Phoenix Energy feel that our small-distributed generation business model can be replicated in communities (like North Fork) located near forested landscapes that are in need of restoration.

Phoenix Energy is interested in commencing discussions with the North Fork Community Development Council (NFCDC) regarding the siting of a 1 MW distributed generation facility at the North Fork mill site. We are impressed with work that the NFCDC has completed on the mill site, including environmental clean-up and infrastructure development, as well as its current efforts to attract new and innovative technologies to co-locate at the site. The feasibility evaluation that TSS Consultants is currently conducting will be informative and will help confirm whether there is potential for a viable biomass generation project.

Assuming that the TSS feasibility study shows the availability of biomass supply and other necessary pre-requisites for a viable project, we would like to pursue the possibilities of expanding our operations to the North Fork mill site. We feel that Phoenix Energy would be complementary to the enterprises that are currently operating on site. We also feel confident that we have the know-how, the right technology and capacity to implement a project at North Fork. It is anticipated that the project would generate between 6 and 10 jobs during the construction phase (not including vendors) and 5 to 6 full time jobs when the project enters commercial service.

Please consider this correspondence to constitute a letter of interest to initiate discussions for the possible siting of a 1 MW distributed generation facility at North Fork.

We look forward to continuing discussions with the NFCDC.

Regards,

Paul B. Elias
VP Development
San Francisco, CA 94115
415-671-9300
elias@phoenixenergy.net