INTEGRATION OF THE WOOD PRODUCTS INDUSTRY

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EXECUTIVE SUMMARY

Integration of the wood products industry, or better integration of the wood products industry, will be a strategic method to improve the ability to successfully accomplish landscape scale forest and woodland restoration. Understanding the foundations of business risk and creating professionalism from the industry view of the supply side and utilization side of the wood products industry is paramount to targeting projects and encouraging industries through policy and budgetary allocations. The presence of appropriate agreements, such as long-term supply agreements, within the wood products industries and the success these investments provide to forest restoration projects can be the difference between creation of sustainable projects/businesses and the formation of monsters or Wood Czars that can reduce our ability to treat our natural resources. Integral to accomplishing landscape scale forest restoration treatments is the formation of markets which can use the biomass that no other product can either utilize or can’t utilize at the scale necessary. This low-value biomass makes up at least a third and often the majority of material that comes from forest restoration of primarily small diameter trees. Analysis of the structure of current wood products industries and clusters, as well as suggested structures to guide industries toward, are presented with examples of specific areas in New Mexico.
INTRODUCTION

The Chief of the Forest Service, Tom Tidwell, offered an objective during a presentation to the National Association of State Foresters to have an “integrated wood products industry” that would help achieve the natural resource goals. Stemming from this idea, the Southwest Sustainable Forest Partnership has asked me, Brent Racher of Restoration Solutions, LLC, to help define this concept and stimulate the discussion of this concept at a strategic level.

Integration of the wood products industry is required to meet numerous objectives. First, utilizing wood products is necessary to reduce the cost for treatment of forests and woodlands (including grassland restoration where appropriate).

Second, utilization of wood products from forests and woodlands reduces the phytomass through removal in those ecosystems that normally would have been consumed by periodic fire. Currently, most forests and woodlands have become overstocked with woody plants due to many factors, the greatest of which is the removal of natural periodic fire that would normally have volatilized material on a more frequent basis. Due to this removal of natural fire from these systems, the accumulation of plant material, especially woody plants and material, when fires do occur in these ecosystems, the fire often burn too hot. These hot fires change the forested ecosystem, which normally was sustained at a disturbance climax, into a different type of ecosystem at a lower seral stage.
Third, utilization of wood products provides jobs and more economic activity in areas which are often rural. Versus only treatment of forests, utilization of the wood products from forest restoration treatments provides greater economic activity and greater local multipliers (turnover of dollars within a community) for the same dollar spent on treatment alone (w/out wood utilization).

**PRODUCTS FROM FOREST RESIDUES**

There are numerous products that can be produced for forest residue. The cost to produce and value of these products vary widely. The source material, forest residue, for wood products also vary widely in what can be create from them. For example, compost or mulch, which holds a profit margin if the material is subsidized somewhere in its processing chain, can be created from 5” dbh trees at approximately the same cost as 20” dbh trees. However, vigas, which have a value that can sustain the harvesting/processing costs and still provide a positive margin, cannot be created from 5” dbh trees, but rather requires larger diameter trees for a marketable product. Relatively, there are very few 20” dbh trees which will need to be removed for forest restoration compared to trees less than 9” dbh. The value of high value products, like vigas, can not support the value of harvesting and not utilizing the lower value products. Likewise, the value of low value products, like mulch or compost cannot alone carry the cost of restoration treatments of forests and woodlands with the resultant residue they produce. The solution to this situation most likely lies within the integration of wood products industry or industries to provide the economic conditions we need to restore our forests and woodlands.
BUSINESS INTEGRATION

There are various levels and types of business integration that should be considered.

VERTICAL INTEGRATION

The term vertical integration, as defined by Wikipedia, describes a style of management control. Vertically integrated companies are united through a hierarchy with a common owner. Usually each member of the hierarchy produces a different product or (market-specific) service, and the products combine to satisfy a common need. It is contrasted with horizontal integration. Vertical integration is one method of avoiding the hold-up problem. Vertical integration concepts have been used to promote better financial growth and efficiency in their companies and businesses.

Vertical integration is the degree to which a firm owns its upstream suppliers and its downstream buyers. Contrary to horizontal integration, which is a consolidation of many firms that handle the same part of the production process, vertical integration is typified by one firm engaged in different parts of production (e.g. harvesting raw materials, manufacturing, transporting, marketing, and/or retailing).

There are three varieties: backward (upstream) vertical integration, forward (downstream) vertical integration, and balanced (both upstream and downstream) vertical integration.

- A company exhibits backward vertical integration when it controls subsidiaries that produce some of the inputs used in the production of its products. For example, an automobile company may own a tire company, a glass company, and a metal company. Control of these three subsidiaries is intended to create a stable
supply of inputs and ensure a consistent quality in their final product. It was the main business approach of Ford and other car companies in the 1920s, who sought to minimize costs by centralizing the production of cars and car parts.

- A company tends toward **forward vertical integration** when it controls distribution centers and retailers where its products are sold.

- **Balanced vertical integration** means a firm controls all of these components, from raw materials to final delivery.

The three varieties noted are only abstractions; actual firms employ a wide variety of subtle variations. Suppliers are often contractors, not legally owned subsidiaries. Still, a client may effectively control a supplier if their contract solely assures the supplier's profitability. Distribution and retail partnerships exhibit similarly wide ranges of complexity and interdependence. In relatively open capitalist contexts, pure vertical integration by explicit ownership is uncommon—and distributing ownership is commonly a strategy for distributing risk.

**Problems & benefits**

There are internal and external (e.g. society-wide) gains and losses due to vertical integration. They will differ according to the state of technology in the industries involved, roughly corresponding to the stages of the industry lifecycle.

**Static technology**

This is the simplest case, where the gains and losses have been studied extensively.

Internal gains:
• Lower transaction costs
• Synchronization of supply and demand along the chain of products
• Lower uncertainty and higher investment
• Ability to monopolize market throughout the chain by market foreclosure

Internal losses:

• Higher monetary and organizational costs of switching to other suppliers/buyers

Benefits to society:

• Better opportunities for investment growth through reduced uncertainty

Losses to society:

• Monopolization of markets
• Rigid organizational structure, having much the same shortcomings as the socialist economy
• Monopoly on intermediate components (with opportunity for price gouging) leads to a throwaway society

**Dynamic technology**

Some argue that vertical integration will eventually hurt a company because when new technologies are available, the company is forced to reinvest in its infrastructures in order to keep up with competition. Some say that today, when technologies evolve very quickly, this can cause a company to invest into new technologies, only to reinvest in
even newer technologies later, thus costing a company financially. However, a benefit of vertical integration is that all the components that are in a company product will work harmoniously, which will lower downtime and repair costs.

**Vertical expansion**

Vertical expansion, in economics, is the growth of a business enterprise through the acquisition of companies that produce the intermediate goods needed by the business or help market and distribute its final goods. Such expansion is desired because it secures the supplies needed by the firm to produce its product and the market needed to sell the product. The result is a more efficient business with lower costs and more profits. Related is lateral expansion, which is the growth of a business enterprise through the acquisition of similar firms, in the hope of achieving economies of scale.

Vertical expansion is also known as a vertical acquisition. Vertical expansion or acquisitions can also be used to increase scales and to gain market power.

**Alternatives to Vertical Integration**

There are alternatives to vertical integration that may provide some of the same benefits with less of the downsides. Vertically-related organizations can develop relationships through:

- Long-term explicit contracts
- Franchise agreements
- Joint ventures
- Co-location of facilities
Implicit contracts (relying on a firm’s reputation)

HORIZONTAL INTEGRATION

The term horizontal integration, as defined by Wikipedia, describes a type of ownership and control. It is a strategy used by a business or corporation that seeks to sell a type of product in numerous markets. Horizontal integration in marketing is much more common than vertical integration is in production. Horizontal integration occurs when a firm is being taken over by, or merged with, another firm which is in the same industry and in the same stage of production as the merged firm, e.g. a car manufacturer merging with another car manufacturer. In this case both the companies are in the same stage of production and also in the same industry.

A term that is closely related with horizontal integration is horizontal expansion. This is the expansion of a firm within an industry in which it is already active for the purpose of increasing its share of the market for a particular product or service.

RESTORATION BI-PRODUCTS & APPROPRIATE USES

Within every conceivable long-term forest restoration region in the Southwest, a majority of the trees that need treatment will be small diameter. Therefore, the wood products industries that utilize this material will necessarily have to be able to handle an abundance of small diameter woody material. Hogg (2009) estimates the residue from 5-8.9” DBH trees to be 52%, and from 9-11.9” DBH trees to be 44%. The tops of these
trees ranging from 4-6” diameter and less also account for 14% of the total trees, this quantity would be even greater in the smaller diameter class. For all of this size of material, traditional utilization for lumber does not utilize well over half of the material harvested when treating small diameter timber for forest restoration. The use of this timber must be considered because the cost of harvesting and much of the processing is already being spent in the restoration costs.

This timber, that is not economically suited for lumber production, has limitations on its use. Some of the material, which can be delimbed and debarked economically, can be used to create standard and premium grade pellets. It appears that tree in the range of 7-11.9” DBH hold the best promise for this type of market. Pellet markets appear to be staying strong and even expanding. Pellet facilities can be easily sized to meet the wood
supply and are, therefore, very capable of being included in most landscape scale forest restoration efforts. Without delimming/debarking, the material would also be suited for commercial grade pellets. However, there are not currently markets for commercial grade pellets, and these markets probably won’t develop in significant quantities. Commercial grade pellets simply have too much processing cost involved when compared to utilizing the same material as a biomass chip. The only advantage to producing a commercial grade pellet would be to consolidate the material more than a chip for transportation over long distances.

The material can also be utilized as biomass. Biomass markets vary widely in what is required in terms of specifications. Size and quality specifications can demand either a medium quality, cheap material or a high priced, clean material. What is needed for landscape scale restoration project utilization is a biomass market which will utilize wood products containing bark, needles, and woody material, i.e. a “dirty” chip. The market will be the center of utilization for a forest restoration project since the majority of material from small diameter utilization will be of only biomass quality. Additionally, biomass markets can utilize the species which are traditionally considered non-traditional such as pinon and juniper species. These types of feedstocks can not only be used when performing restoration of woodlands, savannahs, and grasslands, but also as a means to provide the quantity of biomass needed to for large supplies and provide a harvesting area for biomass during times when higher elevations may be inaccessible due to winter weather conditions.
Biomass markets MUST be the focal point for utilization for forest restoration within the Southwest region. Wood products from forest restoration need to become more economical. In order to accomplish this, all forest products need to be utilized. Biomass for energy production is the only market which can utilize the quantity and quality of woody material that needs to come out of Southwestern forests and woodlands. In order for us to create and integrate wood products industries, sizeable biomass utilization markets must be invested in to provide the opportunity for other wood products industries to be economical and sustainable.

**LAND STATUS AS RELATED TO FEEDSTOCK SUPPLY**

When establishing an integrated wood products industry around, consideration must be given to not only the quantity and quality of the wood supply, but also to the reliability of the supply over time. The best way to reduce the risk to investments associated with feedstock supply is to have a variety of land ownerships.

For example, only having federal lands as a wood supply is very risky because that supply will be subject to the politics and bureaucracy associated with federal agencies. Situations where federal land is the majority of supply being relied upon will have to be very economically advantageous to attract the capital investment in a significant wood products industry. The longest authority federal agencies have at this time to provide supply is currently ten years. This is a minimum amount of time needed to service the capital costs associated with large scale projects. So, large projects which are relying
primarily on federal lands will have to be subsidized substantially in some manner to reduce the amount of time in which the capital costs can be retired.

Conversely, wood supplies from private lands can reliably be contracted and accessed for long-term debt service. However, the economics of wood supplies on private lands are often not as attractive. Private lands are less likely to receive funds to “subsidize” treatment or harvesting costs. However, the costs associated with treatments or harvesting are almost always less than other land ownerships.

Likewise, the size and number of private landowners is important in order to minimize the risk on private lands. Land parcels need to be large enough to treat/harvest economically with mechanized operations. However, a small number of very large landowners can have the negotiating position with a wood supply on an industry which can be harmful if those landowners choose. Large private land parcels can lead to either investments in wood products industries not being made or those industries having the wood supply compromised by pricing.

Tribal lands vary in their relative risk depending on tribal leadership/consistency and their involvement in the utilization industry. If a tribal economy is based upon the utilization of wood products, tribal lands can often be counted on to supply a consistent flow of material. If investment capital or utilization project ownership from other than tribal sources is needed to provide for large-scale wood products utilization industries, though, reliance on tribal lands often falters because contracts for residues from forest
restoration from tribal lands on a long-term basis are often unable to be successfully negotiated. So, tribal lands are often considered to be a risk to wood product utilization industries that are not tribally owned. However, tribal lands can serve as significant sources of forest residues because tribal ownership of forests and woodlands is sizeable in some areas.

Land ownerships such as State lands fall somewhere in the middle. Although they can often be contract upon for treatments or harvesting to provide a wood supply, they are not as cheap to operate on as private lands. They also do not enjoy the budgets of federal agencies, and therefore funding is more difficult to find for the cost of treatments/harvesting.

The consideration of land status must be taken into account in Colorado, New Mexico, and Arizona because most of the forests are in federal ownership. This includes the majority of ponderosa pine and mixed conifer forests and a large quantity of the pinon/juniper type. Also, there are many programs associated with federal lands or work around federal lands which are not available to non-federal lands or large parcels not adjacent to federal lands.

Overall, wood products industries that integrate land status considerations into planning and strategy will have a diversity of land ownerships. This diversity can provide both the reliability of supply to the industries which is needed for sustainability while leveraging outside funding to increase profitability.
WOOD PRODUCTS & TECHNOLOGIES

Forest and woodland restoration in the Southwest is driving many old and new utilization technologies. The wood products that are residues of forest restoration are largely not usable for traditional creation of lumber. Although some of these forest residues are used for lumber, the majority of material will need to be utilized in other ways.

BIOMASS UTILIZATION

Biomass markets for energy production hold the largest potential to utilize the forest residues from forest restoration. Energy production also has the ability to provide the economics suitable to provide for the landscape-scale restoration efforts that are envisioned for our forests across the West. A comprehensive overview of biomass utilization technologies can be found presented by Innovative Natural Resource Solutions LLC (2008).
Electrical energy generation from biomass has been a long-standing use for wood residue. Almost all electrical generation facilities, new and old, are based upon combustion of biomass for steam driven turbines. This technology allows a wide range of fuel characteristics to be utilized. The typical biomass fuel is a medium quality “dirty” chip (Biomass Energy Resource Center, 2006). Most new facilities that have been built recently or are being built require 100,000 to 600,000+ green tons of biomass per year. Due to the scale of material needed for these facilities, there are often ample opportunities for other smaller-scale, higher-value utilization facilities within the same vicinity. The economics of providing biomass to electrical generation facilities is often marginal due to the need for these facilities to be competitive with their energy costs. Therefore, the harvesting biomass for electrical generation often must have subsidization, higher value product utilization integrated, or low transportation costs to make projects viable. Additionally, for new facilities, projects can have high complexity as issues range from securing adequate biomass feedstocks to approval of project, pricing, and electrical transmission into regulated electrical markets.

Thermal applications using biomass are largely based upon combustion technology. Thermal projects can vary widely in scale from hundreds of green tons per year up to hundreds of thousands green tons per year. With these varying scales and the boiler and feedstock handling technologies used with them, comes varying qualities of biomass that are desirable. Normally, smaller scale thermal applications will require high quality, consistently sized biomass material, while larger scale projects can utilize medium
quality feedstock. One of the advantages of thermal projects is the ability to size the project to the biomass feedstock available. Another advantage is the economics of thermal applications. Because thermal uses of biomass have high efficiencies and the costs of competing energy sources, the economics of providing biomass to thermal projects is more attractive. Higher value products and keeping transportation costs low are important for long-term sustainability of these projects, though, and subsidies that offset the cost of the biomass in early years of project will help pay for the capital costs of thermal systems and encourage these types of applications. The complexity of thermal projects largely depends on the source utilizing the heat energy. If it is a process heat or commercial heating operation, the system can be simple, but thermal applications like district heating projects can requires some significant infrastructure development.

Combined heat and power (CHP) projects are often highly variable and fit to specific situation where significant needs of both heat and power are required. These types of projects have the advantage of gaining higher efficiency than just electrical generation, but have increased complexity than most thermal applications.

Biofuel conversion facilities that utilize woody biomass hold significant promise for forest and woodland restoration. Technologies such as gasification and pyrolysis are approaching commercial scale and have the ability to compete with more valuable products such as fossil fuels. Biofuel conversion projects being discussed vary in scale from portable, in-the-woods projects to regional projects which could take woody biomass from many states along with other biomass feedstocks such as agricultural
Almost all biofuel conversion technologies possess the ability to be adjusted to utilize numerous feedstocks. Another advantage of biofuel conversion project is these projects, although trying to achieve a low cost for biomass, are taking a realistic view of biomass costs in their proformas. These realistic proformas may give these projects better long-term sustainability. Biofuel conversion projects have the advantage and disadvantage of having to compete with fossil fuels. The last few years of volatility in fossil fuels markets has likely slowed the advancement of biofuel conversion technologies and projects. Policy mandates, though, are helping move biofuels projects forward.

PELLET MANUFACTURING

The pellet industry is a considerable utilizer of small diameter timber and has been considered for years to be one of the solutions to increasing forest restoration. Pellet manufacturing requires the use of relatively clean wood (usually boles) for premium and standard grade pellets. There has always been a desire to produce commercial or industrial grade pellets made of whole-tree chips, but the markets for these types of pellets have not materialized. The economics of providing forest products to the pellet facilities varies widely across the Southwest. Some facilities have grown accustomed to receiving woody material that is heavily subsidized or below the full cost of harvesting/transportation. The competition in the pellet market has driven many facilities to attempt to receive low cost feedstock to keep the retail cost low for the finished product. The expansion of pellet production throughout North America has been tremendous in recent years. The question for forest restoration, though, is whether pellet
production is or has outgrown the market for pellets; whether supply has increased beyond demand. The near future will demonstrate whether additional uses for forest material can be found in the pellet industry.

OTHER KNOWN MARKETS

There are other markets which are capable of using forest and woodland restoration residues outside of traditional timber markets. Markets such as end-block flooring, wood shavings, mulch/compost operations, post/pole, firewood and other operations collectively utilize a large amount of material and employ numerous people in our communities. These markets vary by area, and the size and scale of these are significant on the local scale. These types of markets greatly diversify and can stabilize the utilization of wood residues. The economics of restoration needs as a whole can also be improved by these utilization markets. However, the ability of these markets to increase in size and scale to meet the needs of the landscape-scale which forest and woodland restoration need to meet it unlikely.

LANDSCAPE RESTORATION PROJECTS

The desire and need in forest and woodland restoration is to move to landscape scale treatment projects. These projects must cover larger areas than are currently being done and they must cross land ownership boundaries to achieve forest health, fire, and watershed goals. This concept is relatively simple, but in order to accomplish this goal, the number of things that need to be coordinated is tremendous. For example, funding, planning, social outreach, collaboration, harvesting/treatment capacity, and utilization
capacity have to be timed and coordinated across land ownership boundaries to make this effort successful.

One of the first things that needs to occur for landscape scale projects to get off the ground is to gain a social license for support of the project. The best way we in this field have found to get this social license is to collaborate, collaborate, collaborate…

**PROGRAMMITIC OPPORTUNITIES**

There are currently some programs which are specifically trying to move landscape scale projects forward. The first of these is the Forest Landscape Restoration Act which has blossomed the Collaborative Forest Landscape Restoration Program (CFLRP). The CFLRP will choose its first projects during 2010. One of the key components of this program is the need to show a sustainable utilization component within its application. The capacity building of harvesting and utilization industries around CFLRP projects will establish industries which will have a lasting impact on the natural resource in those areas. The focus of the funding from CFLRP is for non-private lands, therefore, project development is primarily where contiguous tracts of federal and tribal lands occur. State foresters and other entities which deal with private lands will need to ensure that private lands surrounding these areas receive treatment to create true landscape restoration efforts. The private lands within areas of these projects will also help ensure the long-term sustainability of harvesting and utilization industries which are expanded around CFLRP projects beyond the 10-year funding horizon. As always with funding, there is not enough to go around to assist with all the landscape scale project which need to be
performed. The selection of these projects, therefore, is very important to provide a head
start toward landscape scale restoration.

Other federal authorities such as stewardship contracting and the Wyden amendment
need to be used to greater potential. Soon, by 2013, stewardship authority will have to be
renewed or another mechanism will need to be created to accomplish good-for-services
contracting. In order to make landscape scale projects work everywhere, the way
contracts and agreements are entered into needs to be re-evaluated to improve results and
increase efficiency.

INDUSTRY INTEGRATION & COLLABORATION

Above is discussed some academic definitions and problems/benefits of differing types of
integration with the wood products industry. This discussion was not just for academic
purposes, though. The need to better integrate the wood products industry has been
remarked on by Chief of the Forest Service Tom Tidwell during the National Association
of State Foresters convention in Albuquerque. In order to accomplish more with stagnant
or decreasing budgets, agencies and industry need to work together to provide integration
of projects to industries and to provide better integration within harvesting and utilization
industries. The current economic downturn is going to make this even more difficult,
though, as we see a decrease in the number of businesses surviving. Wood products
businesses that are surviving are generally increasing their diversity to accomplish this,
and many have lost the capital resources needed to rise to the occasion for increasing
capacity with the changes in the financial system.
Currently, there is little integration within the wood products industries. Most areas lack the capacity in treatment/harvesting and utilization industries to meet the goals of landscape scale forest restoration. To meet these goals, these industries will need to be ramped up while also allowing for greater diversity and efficiency of industry. For example, some areas where the wood products industry is small and fragmented, much of the treatments and harvesting performed in the woods is hand harvested and moved on a micro-scale (Figure 1). Utilization industries in these instances are often very low tech such as firewood production, latillas, and posts.

Where substantial forest and woodland restoration are occurring, there is still the need to increase the capacities for greater accomplishments in the landscape. These areas generally have sizeable contracts with the US Forest Service, sizeable utilization
industries (e.g. sawmills, pellet plants, biomass powerplants, etc.), or both (Figure 2). However, the diversity of the industries in these areas is relatively lacking. The current scenarios present approach monopolies in either the supply side or the utilization side of raw materials.

**Figure 2.** Representation of wood products industry with only one supplier.

**SCENARIOS FOR GROWING THE WOOD PRODUCTS INDUSTRY**

To meet the needs to accomplish landscape scale restoration, the wood products industry needs to be matured to handle the task. Through policy decisions and actions, the status of the wood products industry can easily create businesses that approach monopolies and border upon socialism. If the right business owners can be found who are benevolent, honest, fair, and near saints, this scenario will be good for our natural resources. Past
experience in this scenario has often led to the creation of “Wood Czars.” In reality, though, this growth of the forest industry needs to be based upon the premise that competition is good. Having a diversity of suppliers who harvest/treat the woods while providing raw material to a diversity of businesses that utilize the material will be, in the long-term, the most sustainable system (Figure 3).

Figure 3. Representation of balanced wood products industry.

The wood products industries need to be integrated, but not strictly in the sense of vertical or horizontal integration management systems. Using some of the alternatives to vertical integration mentioned above such as long-term explicit contracts, joint ventures, and co-location of facilities as found in wood clusters are sound business practices that will result in successfully implementing landscape scale forest restoration. Although
letters of support and commitment are great to see in proposals for projects, business-to-
business transactions are more likely to succeed if explicit contracts are put into place. If
businesses don’t have the financial depth to rise to an opportunity but do have the know-
how, joint ventures or similar arrangements are mechanisms which can provide the
needed capital to expand. Co-location of facilities into wood clusters is a strategy which
has long been recognized as a means to improve efficiency and decrease transportation
costs when numerous operations utilize different parts of the same tree. These wood
clusters location also needs to be approached from the economic standpoint of where the
economically optimal location may be, rather than the location that is convenient in the
short term.

One example of the need to integrate the wood products industry is presented in the
development of landscape scale projects in central and north-central New Mexico.
Currently, the Jemez Mountains Landscape Restoration Project (Jemez Project) is being
prepared for submittal to the CFLRP. Meanwhile, less publicized restoration projects are
being prepared based upon other surrounding National Forest System lands, tribal lands,
land grants, state lands, and private lands. The industry needed to perform all of these
projects and utilize the residues from treatments is being staged. As seen in other
restoration projects throughout the Southwest which predominantly deal with small
diameter ponderosa pine, a significant proportion of the material that will be produced
will have very low value and the best use will be biomass for energy production. This
biomass utilization will be the core product to keep raw material costs low for other
value-added utilization businesses. Other utilization businesses that will likely be
involved in wood products processing will be pellet production, appropriately-scaled lumber and/or flooring production, mulch/compost facilities, landscaping materials (bark), and viga/latilla makers. Some of these industries will be scaled to only deal with the residues produced from the Jemez Project (Figure 4). Likewise, the Jemez Project

![Figure 4. Single supply from Jemez Project.](image1)

![Figure 5. Diverse supply for wood products industry.](image2)

will probably only materialize with one to a few businesses implementing the treatments and harvesting the wood products. Beyond the possible funding through the CFLRP of the Jemez Project for ten years, the sustainability of businesses built around just that project is questionable. So, businesses which are larger scale or capital intensive are already looking for diversity of supply to create longer sustainability and profitability (Figure 5). Supplies also coming from other parts of the Santa Fe National Forest such as the Las Vegas/Pecos RD, the Cibola National Forest around the Mt. Taylor, Sandia, and Mountainair RDs, as well as the numerous tribal, land grant, state, and private land parcels. Through this diversity of supply resources, the utilization industries will attain
greater reliability in supply while achieving a fair price for raw materials from a larger number of suppliers.

Another example of the need for greater integration of the wood products industry is provided in the need to re-establish New Mexico’s last large sawmill. Mescalero Forest Products is focused on the harvesting and processing of timber for lumber. They have a number of suppliers who work as subcontractors to harvest the material in the woods, but otherwise receive very little timber from outside suppliers which they do not already have ownership. The lands where timber is harvested is consistently tribal lands and often National Forest System lands. Very little timber has been harvested from private lands for some time. Other wood products from forest residues are not of primary concern or are not utilized at all due to the lack of industries in the area which could successfully and appropriately make use of that material. Further integration in this area would improve the economics for the sawmill and the industries within the area. The biomass left from timber harvesting needs to be utilized within the area while also harvesting material unsuitable for timber to form a stable biomass supply. The residue left following timber harvest are already being partially processed, and the additional processing needed to create a biomass feedstock can only yield greater profit to the industries involved. Other utilization industries in the area include wood shavings, mulch/compost, and firewood operations. In order to accomplish this integration, the Mescalero Apache Tribe will either have to become a stand-alone monopoly or have to build firm, explicit contracts with surrounding and proposed industries to improve their own supply and profitability while allowing entities such as a biomass conversion facility to attain a reliable supply of
forest residues. Additionally, the Lincoln National Forest will need to increase the availability of residues from forest restoration to meet the needs of the wood products industries. This includes working with a greater diversity of suppliers to present a good investment in biomass conversion facilities.

RECOMMENDATIONS

In conclusion, the need to integrate the wood products industry while increasing collaboration among agency and industry partners is apparent. In order for all to rise to perform landscape scale forest and woodland restoration in the shadow of the current recession, we have to be organized and efficient to prevent failure. Although none of us can force particular industries to come into existence and be sustainable, we can all help set the stage for the needs we recognize. This includes the need to have a viable, sustainable biomass utilization facilities which can take advantage of the low-value material that must come out of our forest and woodlands to meet the natural resource objectives. When our target is forest and woodland restoration, low-value biomass may be the only use for a significant portion (if not the majority) of wood residues that are removed. However, biomass utilization alone cannot sustain the economics needed to perform treatments in stagnant or shrinking agency budgets.

With the lack of funding to perform the necessary treatments for forest restoration, State Foresters find themselves in the unique position to be a major player in the selection of projects and targeting of funding toward the areas where success can be achieved. Therefore, the recognition of wood products industries which act and perform
professionally and with sounds business practices is important to focusing funding and time.
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