DEVELOPING A KENAF PULP MILL PROJECT

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Introduction

KP Products Inc. doing business as Vision Paper has been producing and selling kenaf based papers since 1992. The production of the products has been accomplished through relationships with existing pulping and papermaking mills. This arrangement has allowed the company to gain valuable raw material acquisition, processing and marketing experience as it regards the use of kenaf fibers in commercial types of printing and writing papers. However, the relatively small scale and sporadic frequency at which we have been producing our papers has inherent economic disadvantages. Intermittent non-dedicated production cannot compete with continual dedicated processing efficiencies. To alleviate the economic disadvantages, the company is developing a U.S. based kenaf pulp mill project. This paper will describe the conceptual approach applied to the mill design process.

Key Conceptual Considerations

Our approach identified that the key issue to launching a kenaf pulp mill is that it must be able to secure financing. In order to secure financing the final pulp product must be technically and economically competitive in a large market segment. The raw material supply and price must be fully secured. The mill design must meet all applicable environmental regulations, both now and in the foreseeable future. And finally, the project must be acceptable to the citizens, businesses, and governmental entities associated with the site chosen for the mill.

Financing Issues

First and foremost, any kenaf pulp mill project must appear attractive to the financing community. As such, the cost of producing a ton of pulp must be lower than the cost of producing a comparable ton of tree based pulp. Because of kenaf's lower lignin content, the energy and chemical levels required to pulp it may be lower, but this potential savings may be offset by the need to purchase energy, as opposed to self-generation as commonly practiced in the wood pulping industry.

The main economic advantage of kenaf, as we see it, is the trend in raw material costs over time. Wood fiber will become more costly, and kenaf fiber will become less costly. The raw material costs can account for up to thirty percent of the finished pulp cost. For wood costs, a look at historic timber prices for one particular grade gives an indication of the long-term prospects for the price of wood delivered to a mill.

Table 1: U.S. Woodchip Prices

Source: Pulp and Paper 1996 North American Factbook

Year	South Pine chips (green) $/ton	Bone Dry Unit Equivalent

1995	28	59.36
1994	27	57.24
1993	24	50.88
1992	22	46.64
1991	23	48.76
1990	21	44.52
1989	21	44.52
1988	21	44.52

While wood chip prices and timber prices vary by species and region, and are subjected to periodic fluctuations due to complex supply and demand dynamics, the overall trend for the cost of wood fiber delivered to a mill is clearly upward. Short-term events may cause prices to move in either an upward or downward direction. There is no known technological development that will significantly change this trend over the long term

Kenaf Potential

In comparison, the productivity of kenaf can be expected to increase as years of agricultural experience accrue. Various entities have reported kenaf yields and prices in the range of four to seven tons per acre and a field side price of fifty to seventy dollars per ton. Whatever current values apply to a given area, a historic review of other crop's performance over time provides an indication of what might reasonably be expected with kenaf.

Crop Improvement History
Table 2

Units/acre						% Yield Increase
	1961	1971	1981	1991	1998	
Pop Corn	22	29	35			59%
Oil Crops	25	30	35	40	45	80%
Sugar Beets	37	45	50	46	50	35%
Rice	38	52	54	64	64	68%

Source: USDA/ARS

A conservative analysis of this and other new crop data indicates that current kenaf yields will improve significantly over time. This increased productivity may be at some cost regarding crop inputs, and some of the increased productivity will revert to the benefit of the producer. When considering the added input costs and increased return to the producer, the raw material costs are likely to either go down, or remain constant.

The raw material supply and price must be guaranteed

In order to perform financial projections related to the mills long term profitability, raw material availability must be guaranteed, and the price must be predictable. Price predictability can be difficult to project considering the unknowns of fuel and chemical costs increases, and the competitive prices paid for other crops.

The end product must be widely marketable

The end product application must be identified in order to determine the appropriate pulping and bleaching process. Narrow high value markets may appear to be lucrative on the surface, but intense examination is needed to insure the projects ability to achieve a

presence in those markets. If the project can achieve a fifty percent share of a specialty market, it may not be enough to entice the necessary financial backing.

We have chosen to produce a pulp product that will be suitable for commercial and commodity paper grades, as well as other nonpaper applications. The U.S. market alone, for this type of pulp exceeds 90 million tons per year. Our initial mill project would produce approximately 30,000 tons of pulp, which is less than one tenth of one percent of the total market segment. The goal of capturing a very small portion of a very large market segment is probably more realistic than trying to capture a very large share of a very small market segment.

The technology is proven

In conceptualizing the mill we have had to strike a technology balance between the new and the old. Using kenaf as the sole raw material for a pulp mill has never been done in the history of the world. And while we are confident that it is an excellent feedstock, the investment community assigns a certain degree of risk to any unproven concept.

Certain new technologies have come to our attention, which while very interesting, are currently unproven on a commercial scale. Such technologies include biopulping, wherein certain fungi and molds are used to delignify the raw material in advance of any cooking and refining, or thermal depolymerization, which can treat the black liquor from pulping in an elegant manner. While these technologies are quite intriguing, and the possibilities quite promising, it is our opinion that incorporating any of these unproven technologies will increase the perception of risk in the investment to an unacceptable level. We do not plan to turn our backs on this type of potential advancement, however. Rather we are designing the mill in a way that will allow, after a successful start-up, a certain amount of flexibility to examine some of these technologies on a step-by-step basis.

Patentable or proprietary processing technologies

Kenaf is a unique raw material for pulp and papermaking. Processes for raw material handling, dust control, chemical processing, pulping chemical recovery, and waste water treatment all offer the opportunity to establish new, patentable methods that can contribute substantially to the projects long-term profitability.

Raw Material Issues

We have identified that 12-14,000 acres of kenaf must be grown each year for twenty to thirty years within 30-40 miles of the mill location. A simple analysis shows that this amount of acreage is potentially available in a number of locations in the southeastern U.S. Securing access to the acreage for the time period required is a bit more complex.

In order to achieve financing, the availability of raw material must be guaranteed for a twenty to thirty year period. One approach is to enlist as partners a major agricultural producer that has the financial strength to issue hard contracts to supply the raw material. If they fail to supply the required material, they suffer sever financial consequences. This proposition, while understandably desirable from the financing viewpoint, is nearly impossible to secure short of giving over the entire benefit of the project to the agricultural partner.

Another approach is to enlist private farmers in the form of a cooperative, wherein the farmers pledge some percentage of their productive acreage on a multi-year basis in exchange for firm purchasing agreements and a portion of equity in the mill. This approach may work some of the time in some areas, but the financing community views it very skeptically. The skepticism is due in part to prior examples of failed cooperatives, and the unpredictability of the future value of markets for other crops. Attempting to lock farmers into a long-term arrangement producing a crop that does not return as well as other crops is perceived as a high-risk proposition.

Another approach is when the project management leases land and arranges for either a management entity to produce kenaf on that land, or the company enters into the farm production business themselves. The advantage of this approach is that the security of the fiber supply lies in the hands of the project managers. The disadvantage is that it requires the company to diversify into business areas that would be considered non-core.

Another approach is where the project purchases land for the purpose of producing kenaf. Again, this approach provides some hard assurance of land availability, but requires the management to diversify to other businesses since it is not practical to envision growing the same crop on the same land year after year. Soil nutrient depletion will require increasing amounts of soil supplements, which will increase the cost of production, thereby affecting the raw material costs. Arrangements for multiple year land swapping can be made, wherein acreage is traded with a producer growing another crop that has different soil requirements.

Another approach is where the project enters into an agreement with a governmental entity, wherein access to suitable land is granted to the project in exchange for certain values which might include job creation, tax base contributions, or other benefits of interest to the governmental entity.

Each of these approaches has certain merits, and in different regions of the country, certain approaches will work better than others. Our thinking is that a combination of some or all of the approaches would offer a level of production assurance and price protection necessary to assure raw material availability.

An important factor to consider is that crop loan programs and crop insurance programs for kenaf do not exist. While it may be possible to initiate such programs in a given area, it can only be done if the project is funded to the degree necessary to satisfy the bankers or insurance issuers of the projects ability to purchase the crop. The notion of spreading the risk and then sharing the benefit is logical to a project developer, but not necessarily logical to a banker or insurer.

Environmental Considerations
Site selection

The basic decision is to design for a greenfield verses brownfield location. A greenfield design assumes that the mill will be built on an open piece of land. An empty, green field. A brownfield location is one where previously, another manufacturing facility was located. Brownfield locations often involve some negative environmental condition such as contaminated soil. In general, governmental entities will offer incentives to projects that revitalize brownfield locations, particularly when they are located in or near large population centers, where job creation is weighted heavily as a benefit.

Any new pulp mill project planned to be located in the United States can expect a significant amount of public inspection and opposition. The anticipated public opposition is based upon concerns originating from the perception that pulp mills are "stinky" (due to the use of sulphur based chemicals and the resulting rotten egg smell that occurs) and pollute the water (based upon concerns of dioxins and other persistent endocrine disruptors well documented by environmental groups such as Greenpeace). Based upon the past performance of some existing mills, these concerns are valid, and they must be proactively addressed.

In our design approach, we have stressed the need to not only comply with existing regulations regarding air and water emissions, but to exceed the current standards in

anticipation of continually tightening regulations. We have selected a soda (sodium hydroxide) based pulping chemistry, which does not have the odor problem, and we have committed to a chlorine-free bleaching process that does not have any dioxin association.

Nonetheless, we expect some level of public opposition. To mitigate the concerns we are forming a partnership with a nationally known and science based environmental protection group, which will review all processes and ultimately endorse the project as "environmentally sound." We also plan to introduce the mill to the targeted community in advance, and conduct a series of educational sessions on the environmental impact of the mill, allowing concerned local residents the opportunity to express all concerns.

Site selection

Local government support is essential, and seems to be one of the positive aspects of site selection. We have identified a number of potential locations where local, state and even federal incentives and support resources exist for projects that are clean, safe, and create jobs. Industrial revenue bonds, job training credits, and tax deferrals are all commonly offered. Site improvements such as road or rail upgrades are also considered.

Local business support is also required. Small businesses such as restaurants, gas stations, and grocers all stand to gain if jobs are created in the community. An effort must be made to engage other types of businesses that may not directly benefit from the mill, and could be in competition for a limited labor pool.

Local citizen support can be enlisted early in the projects development to insure a limited amount of citizen opposition.

And finally, an appropriate site must be within reasonable proximity to the growing area to minimize transportation costs, and there must be an adequate supply of water into the mill, as well as receiving water for the treated process water. A cost effective power supply must also be present.

Conclusion

In summary, there are many more issues related to initiating a kenaf pulp mill project in the U.S. than I can cover here today. The bottom line is the bottom line. The project has got to be attractive to financers, and the risks must be minimized.