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ENGINEERING AND GINNING

Multi Scenario Pellet Fuel Manufacturing Operation Utilizing Cotton Waste

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ABSTRACT

Prior work demonstrated the economic feasibility of gin waste-based pellet fuel manufacturing. The goal of this project was to expand the economic analysis model to include a multi-scenario manufacturing approach to analyze the economics of the expanded scenarios. The objectives required a complete and comprehensive analysis of three different machine configurations for manufacturing of pellet fuel from cotton byproducts. The results concluded, within the parameters of the analysis, that a scenario which excluded the use of extruders in the manufacturing process was the most economically feasible for producing pellet fuels from cotton byproducts. At the pre-set production limitation of 9,072 Mg per year, the Net Present Worth (NPW) was 30.25% with a 2.35 year payback period. If the annual production was increased to 13,608 Mg per year, the project pay back period was reduced to 1.09 years with and NPW of 79.74%.

INTRODUCTION

Pellet fuel consumption (wood based) has risen significantly over the past decade. The Pellet Fuel Institute (PFI) estimated shipments of pellets to reach 1,093,158 Mg in 2006 (PFI, 2006). This is up 50% from 553,383 Mg in 1995. This increase is supported by the increase in residential pellet stoves. In 2003 approximately 700,000 new pellet stoves were sold within the United States. This number increased to 875,000 in 2005 (PFI, 2006). PFI estimated the average cost for premium wood pellet fuel to be $149.70 per Mg (PFI, 2006). This would bring the value of an 18.2 kg (40 lb) bag of pellet fuel to $3.30. For this research, due to high ash content and a slightly lower BTU value, the proposed cotton gin waste pellet fuel will be valued as standard or economy grade to be sold at a lower price per megagram or bag.

Pellet fuel extruded from cotton byproducts (i.e., gin waste or gin trash) has properties that are comparable to pellets made from traditional sources such as wood chips (Holt et al. 2000, 2003a and 2003b). It is estimated that enough gin waste is generated each year to support multiple cotton gin waste pellet fuel manufacturing operations. In 2006, Texas alone harvested over eight million bales of upland cotton (USDA, 2006a), which is estimated to have produced 1.3 million Mg of waste from the ginning process.

A single South Plains of Texas gin processing 50,000 bales of cotton, with an average of 236.8 kg (525 lbs) of waste per bale, can produce approximately 10,210 Mg (11,250 tons) of waste byproducts. Past research has explored other ways to utilize gin byproducts such as livestock feed, gardening compost, and raw materials for building products. In spite of these efforts, most of the waste generated by the gins is discarded back onto the fields where it becomes a soil additive, at a cost to the gin (Holt et al., 2003a).

Prior work has demonstrated the economic feasibility of a pellet fuel operation with a standardized processing machinery layout (Holt et al. 2004). The purpose of this research was to perform a comparison of three different manufacturing configurations for making pellet fuel from cotton byproducts. The project analysis focused on a single pellet manufacturing operation in a location (Morton, Texas) that is in close proximity to several cotton gins. Morton lies within Cochran County and in 2004 produced 331,000 bales of cotton followed by 312,000 in 2005, (USDA, 2006b). The cotton production within the county alone can provide an adequate supply of raw material even in very poor crop years.

The following are among the activities included in Holt et al.'s (2004) original model:

1. Possible distribution areas for finished product
2. Selling price
3. Transportation for raw materials and finished product

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4. Physical description and layout of the facility
5. Comprehensive cost system and economic analysis

MATERIALS AND METHODS

The research presented here was conducted by separating the research into the following categories: Materials, Equipment & Manufacturing, Transportation, Economic Model, Simulation, and Analysis. The methods used to complete the economic analysis within each task category are described in the following sections.

Materials. Thirty-four gins were identified within a 40 km (24.9 mile) driving distance from the location of the proposed pellet fuel operation. Production capacities for each gin were calculated based on the average production of cotton bales for the years 2000 to 2006.

Three different pellet fuel target production rates were considered in this study: 4,535 (5000 tons), 9,072 (10,000 tons), and 13,608 (15,000 tons) Mg/year. The three levels represented a range of production that was used to test the economic models developed. The raw material required to meet these target rates was calculated with the assumption that 80% of the raw material is usable for pellet production. This assumption was based on prior pellet fuel research with stripper-harvested cotton (Holt et al. 2003a). Based on this estimate it was determined that the amount of material needed for each production rate could be supplied from cotton gins within a 16 kilometer (9.9 mile) radius from the proposed facility in Morton, Texas.

Equipment & Manufacturing. Based on the prior work of Holt et al. (2003), three different manufacturing scenarios were used for the analysis. Though many differences are present in the asset configuration of each, the three scenarios can be characterized by the size and quantity of extruders found in each. The inclusion of extruders was designed to provide increased process flexibility and versatility. Flexibility would only be an issue if another product line, such as high grade livestock feed was added at a later time, or if production quantities were varied to match demand. Scenario 1 used two high capacity Insta Pro 9400 extruders (Insta Pro, Des Moines, Iowa), Scenario 2, six low capacity Insta Pro 2500 extruders, and Scenario 3 utilized additional shredding/grinding operations in lieu of extruders. All three scenarios were designed to meet the hourly production capacities outlined in the model. Machinery layouts for each of the three scenarios are contained in Figures 1, 2, and 3 respectively.

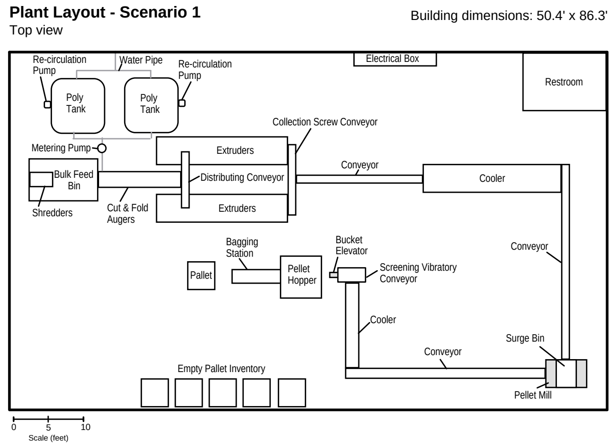

Figure 1 Machinery layout for scenario one with two extruders

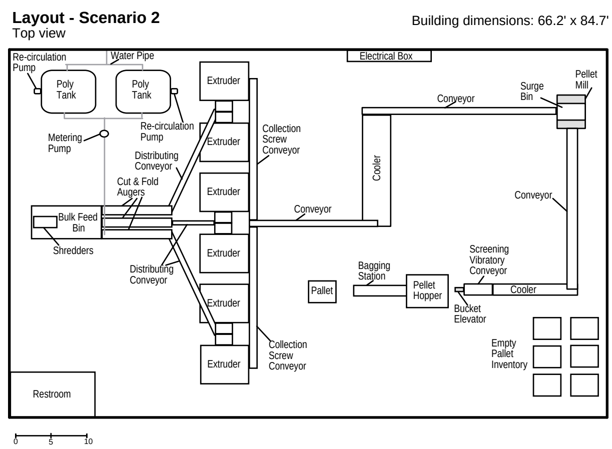

Figure 2 Machinery layout for scenario two with six extruders

Each scenario had similar operations. Each proposed process begins with the transportation of raw material, as modules to the centralized storage area at the pellet fuel manufacturing facility. The raw material is moved through a feeder that breaks down the material for ease of handling through an air conveying system. The air conveyor transfers the material to shredders, where it is further broken down and then gravity fed to a “live bottom” bulk feed bin. Then material is gravity fed to cut and fold augers where it is mixed with a binding agent (corn starch). The distributing conveyors then move the mixture to extruders (Scenarios 1 and 2) to be further processed. The mixture is then conveyed to a cooler and then transported by another conveyor to a Landers Model 150-144 pellet mill (Landers Machine Co., Ft Worth, Texas) where it is formed into pellets. The pellets are conveyed through a cooler on their way to a bucket elevator that gravity feeds pellets into a pellet hopper. Once in the hopper, pellets are gravity fed to the bagging station where they are bagged into 18 kg (40 lb) bags. The bags are then stacked on shipping pallets and then moved to storage with a forklift.

Identification of required equipment and equipment parameters. A comprehensive list of the equipment needed for each operation was created. The list identified specific equipment and parameters that were necessary for determining equipment compatibility, electrical consumption, purchase costs, and facility dimensions. The equipment list was developed based on the machinery needed to physically operate the proposed manufacturing scenarios. In doing so, a separate equipment list was created for each scenario.

Three different equipment scenarios were compared in this research. All three scenarios were equipped to meet the same production requirements. The equipment list for Scenario 1 was structured around the use of two high production capacity extruders, Scenario 2 was structured around the use of six low capacity extruders, and Scenario 3 was structured with additional shredding/grinding operations with no extruders. Scenario 3 represented the process with the lowest degree of flexibility and versatility while Scenario 2 had the greatest. Equipment quotes and bids from vendors were requested and analyzed to establish equipment cost and capacity parameters. Equipment costs and published costs from previous projects were also considered in the analysis. The final equipment lists were generated based on the following criteria: electrical consumption, equipment costs, compatibility with other equipment, and ability to meet target production capacities. For this particular location, electrical consumption was a concern due to local electrical distribution infrastructure capacity limitations.

Investigation of facility layout and costs. As previously mentioned, layouts for each scenario are contained in Figures 1, 2 and 3. The layouts were used to determine the required size and the costs of the facility. The equipment lists provided the dimensions of the machinery that were needed to design the layouts of the production process. An analysis was conducted to determine the optimal orientation of the manufacturing equipment to get the most advantageous utilization of space in the facility. Each layout was drawn to scale and designed such that the least possible amount of floor space was required by the operation to reduce facility construction costs. The compatible orientations of each piece of machinery, along with the necessary clearances between machinery were major considerations in the design.

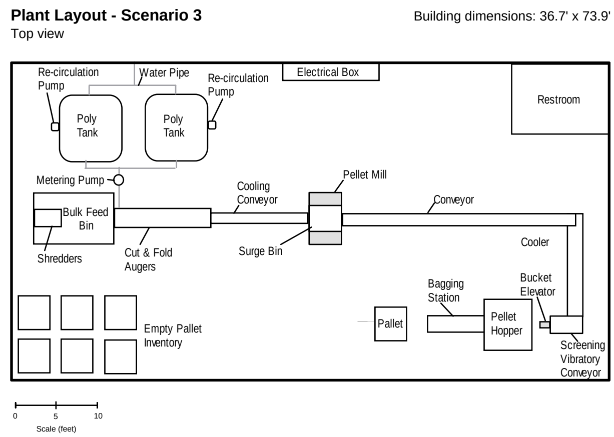

Figure 3 Machinery layout for scenario three with no extruders

Estimates of technical feasibility. The cost system for this project was complex with a large number of interdependent variables. The project was undertaken from the approach of determining whether any of the three proposed scenarios would be viable and worthy of the capital investment. A comprehensive economic model was developed to achieve the final objectives of the project. This section was separated into three parts:

1. Database and formula spreadsheets
2. Economic simulation
3. Financial analysis reports (sensitivity analyses)

Economic Model. As with any model, it is only a representation of a specific reality, which means that the model includes a set of assumptions and limitations. For this model the assumptions and limitations include the following:

1. A production efficiency of 83.33% was applied, which is in the standard efficiency range that is generally acceptable to this type of industry (Humphreys and Wellman, 1996).
2. Internal Rate of Return (IRR) and Net Present Worth (NPW) were utilized for comparing alternatives.
3. Project life was assumed to be 15 years when computing each IRR, with no salvage value.
4. Modified Accelerated Cost Recovery System (MACRS) was used for calculating depreciation.
5. All finished products were assumed to be sold during the season.

General explanations of the tools utilized to developed the model. Two basic software tools were utilized for developing the economic model, Microsoft Excel and Crystal Ball 2000 (Decisioneering, Denver, CO). The spreadsheet included linked organized data and formulas that were necessary to complete the economic model. Crystal Ball 2000 was used as the simulation software and it was applied to assign statistical distributions to the independent variables and prediction variables for decision analysis and forecasting. Listings of the distributions utilized are contained in Table 1.

Explanation of the structure of the model. The economic model was structured into several linked worksheets. These worksheets included Inputs, Production Process, Labor, Utilities, Transportation, Capital Recovery-Depreciation Analysis, Income Statement, and Metrics for each of the three different manufacturing scenarios. The worksheets contain data and information critical to the simulation analysis (Canada, Sullivan, and White, 1996).

It should be noted that the values of some independent variables were assigned distributions. In assigning distributions to these variables the economic

Table 1 Distributions and their associated parameter variables used in the forecast modeling.

Variable	Distribution	Units	Distribution Parameters	Range
Pellet mill production rate	Normal	kg/hr (lbs/hr)	Mean = 3402 (7500) Std. Dev. = 703 (1550)	2268 - 4536 (5000 – 10,000)
Waste per bale	Normal	kg/hr (lbs/hr)	Mean = 238 (525) Std. Dev. = 23.8 (52.5)	166.7 – 309.6 (367.5 – 682.5)
Usable waste	Normal	%	Mean = 80 Std. Dev. = 4	68 - 90
Raw Material Cost	Triangular	$/Mg	Min. = 0; Max. = 20; Likeliest = 10	
Number of bales ginned	Normal	#	Mean = 55,000 Std. Dev. = 10,000	25,000 – 66,000
Starch applied	Normal	%	Mean = 4.0; Std. Dev. = 0.4	2.8 – 5.2
Price per kWh	Normal	$	Mean = 0.10; Std. Dev. = 0.01	0.085 – 0.13
Cost of starch	Triangular	$/Mg ($/ton)	Min. = 163 (180); Max. = 200 (220); Likeliest = 180 (200)	
Bag cost	Normal	$	Mean = 0.25; Std. Dev. = 0.015	0.205 – 0.295
Pallet cost	Triangular	$	Min. = 10.8 Max. = 13.2; Likeliest = 12	
Maintenance and repair cost	Normal	% of Capital I	Mean = 10% Std. Dev. = 1.67	5.6 – 14.4
Natural gas cost	Triangular	$/Mcm ($/Mcf)	Min. = 0.119 (3.37); Max. = 0.145 (4.11); Likeliest = 0.132 (3.74)	
Diesel cost	Normal	$	Mean = 2.50; Std. Dev. = 0.50	1.24 – 3.70
Selling price per bag	Normal	$	Mean = 2.75 Std. Dev. = 0.28	2.10 – 3.35
Interest rate	Normal	%	Mean = 8.0; Std. Dev. = 1.0	5.0 – 11.0
Office operational cost/month	Triangular	$	Min. = 2100; Max. = 2566; Likeliest = 2333	
Disposal cost	Normal	$	Mean = 2.00; Std. Dev. = 0.67	0.01 – 4.00
Laborer wages	Pareto	$/hr	Location = 7.00; Shape = 2	
Mill leadman	Pareto	$/hr	Location = 9.00; Shape = 2	
Loader operator	Pareto	$/hr	Location = 8.00; Shape = 2	
Floor operator	Pareto	$/hr	Location = 7.00; Shape = 2	
Secretary	Pareto	$/hr	Location = 8.00; Shape = 2	

1Mega gram (Mg) = 1 Metric ton

model was able to simulate the risk and uncertainty of the market reality being modeled, which portrayed more realistic values of the prediction variables. The variables which were assigned distributions included starch %, usable raw material, cost of raw material, extruder capacity (Scenarios 1 and 2), pellet mill capacity (Scenario 3), electricity cost, maintenance cost, selling price, interest rates, labor cost, and fuel consumption (propane and diesel). Some of the distributions were based on historical data while others were gathered from expert recommendations. Table 2 contains an outline of the three main parameters for the project.

Table 2 Main project variables

Main Variables	Levels of Variables
Target production capacities	**4,535 metric tons**
	9,072 metric tons
	13,608 metric tons
Process scenarios	**Scenario 1 (2 extruders)**
	Scenario 2 (6 extruders)
	Scenario 3 (no extruders)
Work shift schedules (5 days/wk)	**1 shift 12 hours**
	2 shifts 12 hours
	2 shifts 8 hours
	3 shifts 8 hours

Raw material. The amount of usable raw materials required per year depends on the chosen target production per year. The raw material required to meet the chosen demand was calculated by estimating that 80% of the raw material obtained was usable. This estimate was a conservative value based on prior work in this area (Holt et al., 2004). Cost of raw material per Mg is based on a triangular distribution with a range of zero to twenty dollars per Mg and the most likely value of ten dollars per Mg. All cost associated with the purchase and handling of raw material are addressed in the model.

Corn starch was used as a binding agent on all of the processes. The amount of starch needed was based on the prior work of Holt et al. where it was found that 4% starch by weight was adequate to hold the pellet together (Holt et al., 2003a). In the model, starch consumption was described as having a normal distribution (Mean 4%, Std. Dev. 0.4%), and the cost was estimated to be $180 per Mg.

Land cost for raw material storage was established for each scenario based on the raw material requirements. The final design, 9,072 Mg, (10,000 tons) was based on a long term storage capacity of 540 modules of gin waste. It was calculated that 4.61 hectares (11.4 acres) are needed for raw material storage at an estimated cost of $6,000. Land costs were based on a rate of $1,302 per hectare ($527/acre) for 4.61 hectares (11.4 acres). Long term storage (approximately three months) was required due to the proposed pellet manufacturing operation which is designed to utilize the work force of a current cottonseed delinting operation after the delinting season is over. If the pellet operation was set up as a stand alone unit, storage requirements and land cost could be reduced.

Labor. The operation was designed to be a compliment to a seasonal cotton seed delinting operation currently in existence at the proposed location. For this reason, the number of days for the pellet fuel operation was limited to a maximum of 100 days per year. According to Saez, when labor supply is kept constant the density of wages is single peaked and follows the Pareto Distribution (Saez, 2001). For this reason, wages and salaries were described using a Pareto distribution with a shape equal two. To calculate labor related costs, the model considered different combinations of work shifts per day and work hours per day based on a 5 day a week work period. There were four work shift combinations incorporated into the model. These were as follows:

1. 1 shift per day, 12 working hours per shift.
2. 2 shifts per day, 12 working hours per shift.
3. 2 shifts per day, 8 working hours per shift.
4. 3 shifts per day, 8 working hours per shift.

Administrative and managerial overhead cost is contained within the salaries and benefits for two foreman, two secretaries, and one plant manager. These charges were annualized due to ongoing work beyond the actual manufacturing season. Workman's compensation insurance and payroll taxes, both federal and state, are also addressed.

Finished Product. The key data regarding finished product included production rates, cost per bag, and sale price. Production rate was limited by the output capacities of the machinery, which influenced the total manufacturing days required to fulfill the target production requirements (max 100). The selling price was established based on a survey of current pellet fuel prices. An evaluation of pellet prices for 11 companies was conducted. The analysis considered wholesale and retail prices, location of company, pellet grade, and bag weight. The wholesale selling price per bag for this project was described by a normal distribution and set at $2.75 with a standard deviation of $0.28.

Production Process. Since each scenario has different capital investment, electricity consumption, production capacity, annual operation and maintenance cost, etc., the production process worksheet incorporated these features for each scenario.

A machinery list summary table depicted detailed equipment information including the costs of equipment, horsepower required per hour and per day, and the kWh required per day. In addition to the machinery purchase costs, the installation costs were also included. Installation costs were calculated based on recommended percentages of capital investment for both material and labor costs of the following: instruments, electrical, piping, painting, and miscellaneous. The percentages adopted were obtained by recommendations from expert consultation and from Humphreys and Wellman (1996; p. 30). The total installation cost was calculated to be 21.5% of the capital investment. Table 3 contains a summary of machinery cost by scenario.

Utilities. Electricity costs were based on the electricity consumption for each manufacturing scenario. The electricity consumption was calculated for each piece of machinery that was provided by the machinery list. Table 3 displays the total electricity consumption required by machinery for each scenario. Scenario 2 has the greatest hourly demand (1002.90 kW) and Scenario 3 has the least demand (306.68 kW). Scenario 1 is in the mid range of demand (838.78 kW).

Electricity costs were based on a normally distributed mean rate of $0.10 per kilowatt hour with a standard deviation of $0.01. The electric rate was obtained from the utility company servicing the facility's proposed location. The electricity costs were calculated for each scenario, work shift, and target production rate. The calculation included unit electricity costs, kilowatts required per day, and the production days required per year.

Other Costs. Repair and maintenance costs were estimated as a percentage of the capital investment. The percentage was a variable that was based on a normal distribution (Mean 10%, Std. Dev. 1.67). Fuel consumption and costs were also based on a normal distribution for the forklift (propane) and module truck (diesel) which was expressed separately. The model included the cost associated with the module truck transporting raw materials from the storage site to the manufacturing facility. The forklift was to be used to move pallets of finished product from the manufacturing facility to storage with fuel consumption set at 1.9 liters per hour (0.5 gallons per hour). Fuel consumption for the module truck was set at 2.1 km per liter (5 miles per gallon).

An analysis was conducted to determine the fuel costs for propane and diesel. Weekly costs for each fuel were obtained from the Energy Information Administration (EIA, 2006). An analysis was performed to determine the growth rate of the fuel costs for the last two years for both diesel and propane. Based on these results, a normal distribution (Mean $0.66/liter or $2.50 per gallon) for diesel cost per gallon was applied in the model. For propane, a normal distribution with a range of $0.33 to $0.98 per liter ($1.24 to $3.70 per gallon) more closely represents the cost per liter of propane for this operation.

Transportation. Only transportation cost related to moving raw material from cotton gins to the manufacturing facility were considered. Raw material transportation cost was based on the driving distance per trip. After surveying local transportation companies, the rate was set at $150.00 for driving distances less then 80 km (50 miles) round trip from the storage site with an additional cost of $1.55 per km ($2.50 per mile) for each kilometer over 80 km (50 miles). The total cost of transporting the required raw material was based on the number of trips required to meet the target production capacity.

Table 3 Summary of electrical consumption and machinery costs.

		Scenario 1	Scenario 2	Scenario 3
Total HP and Annual Electricity Consumption	**Total Horse Power**	**1124.38**	**1344.38**	**413.63**
	Total Consumption (kW)	**838.78**	**1002.90**	**306.68**
Machinery Costs	**Used Equipment**	**$211,007**	**$211,007**	**$211,007**
	New Equipment	**$456,158**	**$588,436**	**$124,416**
	Total Machinery Cost	**$667,165**	**$799,443**	**$335,423**

ECONOMIC MODEL & SIMULATION ANALYSIS

Metrics. The economic model included initial investment, annual cash flow and net income, while providing information such as payback period analysis, return on investment, and internal rate of return. The initial investment consisted of machinery, installation, building, and land cost. The annual net cash flow came from earnings before interest, taxes, depreciation, and amortization (EBITDA). The formulas of payback period and return on investment are as follows:

Payback period = Initial Investment / Net Income (after taxes with capital expenses) (1)

Return on Investment (ROI) = Annual Cash Flow (EBITDA)/ Initial Investment (2)

To calculate the Internal Rate of Return (IRR):

PW = Initial Investment + Annual Cash Flow *UniformSeries PresentWorth (3)

Where: PW = present worth

In this equation, let PW = 0, and solve for i% to obtain the internal rate of return.

Cost System Economic Model. As mentioned before, the cost system was developed utilizing a Microsoft Excel Spreadsheet. The following formulas contain the bases for calculating each aspect of the cost system:

Annual Sales

AS = SPB * BPS (4)

Cost of Goods Sold (COGS)

COGS = Direct Labor + Raw Material + Starch + Royalty Fee + Bags Costs + Pallets Costs (5)

Gross Margin

Gross Margin = Sales Revenue – COGS (6)

Total Annual Operating Expense (TAOE)

Operating Expense = General Selling and Administration + Electricity + Freight / Shipping + Repair & Maintenance + Office Supplies + Vehicle Costs + Insurance (7)

Capital Depreciation Amount (CDA)

CDA = TDV * Depreciation Schedule for each year (8)

Total Utility Cost (TUC)

E = (CKWH * Shifts per day * Hours per Shift) * DO (9)

Total Bag Cost (TBC)

BC = BPS * BC (10)

Total Pallet Cost (TPC)

TPC = (BPS/50) * PC (11)

Total Repair and Maintenance (TRM)

TRM = Annual Sales Revenue * % of Maintenance Cost per Sales Dollar (12)

Earnings

Earning Before Interest Tax and Depreciation (EBITDA)

EBITDA = Gross Margin – Operating Expense (13)

Earning Before Interest and Taxes (EBIT)

EBIT = EBITDA – Depreciation - Amortization (14)

Net Income (NI)

NI = EBIT – Interest - Taxes (15)

Return on Invested Capital (ROIC)

ROIC = EBIT / ICI (16)

Where:

AS – Annual Sales

SPB – Selling Price per Bag

EBITDA – Earning Before Income Taxes, Depreciation and Amortization

ICI – Initial Capital Investment

BPS - Bags Produced per Season

CDA – Capital Depreciation Amount

TBC – Total Bag Cost

TPC – Total Packing Cost

TRM – Total Repair and Maintenance

TDV – Total Depreciated Value

E - Electricity

DO – Days of Operation

RESULTS

The model provided the bases for performing sensitivity analyses for the independent variables. The sensitivity analyses were used to observe how altering values for independent variables would affect the financial performance of the different manufacturing scenarios. These variables include shifts per day, working hours per shift, and the amount of final product produced.

The economic model was used to analyze more than seventy possible combinations. To measure the performance of each scenario, payback period and internal rate of return as the primary financial ratios were employed in this study. A quantity break-even analysis was also conducted to identify the amount of final product needed to be produced before any profit is made.

The results were obtained for a 3 shift 8 hour work day and a 2 shift 12 hour work day. The 2 shift 12 hour work schedule was selected as the preferred option because it required a lower number of total employees. This decision was based on minimizing the number of days required to meet the production targets within the production limitations of the three scenarios.

Production requirements for break even points were different for each scenario. Scenario one broke even at 11,884 Mg of finished product, scenario two did not break even within the established production parameters, and scenario three at 6,232 Mg. Table 4 contains a summary of these results.

In table 4 it can be clearly noted that it would be very difficult to justify capital expenditures within the specified 100 day operational window with any equipment other than that contained in Scenario 3. Scenario 1 would give a modest return if the days of operation were extended to 300. It would also make this scenario very sensitive to raw material and finished product cost. If the risk of being inflexible was not an issue, the extended production schedule for Scenario 3 would be the most obvious choice.

CONCLUSIONS

The low capital investment of scenario 3, as compared to scenarios 1 and 2, coupled with 2-12 hour work shifts was the option chosen to be most profitable. The target production of 13,608 Mg a year produced the best overall results but did not fall within the mandated 100 days of operation requirement. At 9,072 Mg per year scenario three required 100 days of operation with a 30.25% return, and 2.35 years to payback. Scenario three, at 13,608 Mg of production per year, produced a return on investment of 79.74% with a payback period of 1.09 years. It can be easily surmised that with larger raw material quantities being available it would be more cost effective to treat the pellet fuel operation as a separate entity and process a larger production volume. The analysis revealed that each scenario was sensitive to raw material cost and the transportation cost related to getting the material from the gin to the manufacturing facility. This highlights the importance of locating the manufacturing facility in an area where ample amounts of raw material will be available in close proximity even in poor harvest years.

Table 4 Summary of project results

Process Scenario	Finished Product (metric tons/yr)	Days Required	Net Income - without land costs	EBITDA - without land costs	Pay Back Period (years)	Return on Investment (Annualized)	NPW with 15 Year Useful Life
1	4,535	49.0	($289,960)	($179,280)	N/A	N/A	N/A
	9,072	97.0	$(110,281)	$398	N/A	N/A	N/A
	13,608	146.0	$175,561	$64,881	4.92	7.52%	1.54%
2	4,535	61.0	$(414,786)	$(282,351)	N/A	N/A	N/A
	9,072	122.0	($307,639)	($175,204)	N/A	N/A	N/A
	13,608	182.0	$(195,750)	($63,315)	N/A	N/A	N/A
3	4,535	50.0	$(87,079)	$(30,898)	N/A	N/A	N/A
	9,072	100.0	$204,735	$148,554	2.35	30.84%	30.25%
	13,608	150.0	$440,369	$384,188	1.09	79.75%	79.74%

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