

BioGreen Inc.

Business Plan

2005

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Executive Summary

BioGreen Inc. is a company dedicated towards generating green renewable energy sources while maintaining an environmental approach. This involves the building of a Biodigester plant to accompany a feedlot in the Rosetown, Saskatchewan area. A Biodigester is capable of taking raw manure and turning it into usable products that are friendly to the environment. Essentially it is worse for the environment no to produce these product.

Products that will be produced at BioGreen will include biogas, and fertilizer. Biogas or methane gas is what is emitted from the manure after it goes through the anaerobic digestion in this facility. The methane gas rises off the manure and into a series of pipe where is can potentially be burned to produce heat or electricity. BioGreen will mainly deal with producing electricity from this biogas, as this is where the most income will come from. Heat will only be produced to heat the facilities at BioGreen Inc. The other product that is generated from this process will be an organic fertilizer, which is in liquid form. This fertilizer is considered organic by some because of the processes that it goes through but some consider it not to be organic. Whichever way, BioGreen will be producing an end liquid fertilizer enriched in nitrogen, phosphorus and potassium. This will be the second major income for BioGreen. BioGreen will also offer manure-handling services to the adjoining feedlot. The feedlot will deliver the manure to the facility and BioGreen will take care of it from there. The feedlot will pay BioGreen to dispose of the manure in an envi ronmentally friendly manor, which is what is done in this facility.

This type of facility that BioGreen is proposing will require internal and external investment in order to cover the capital costs of the facilities. This will come in the form of a long-term debt through a loan, hopefully secured through Farm Credit Corporation and through equity financing from the founding partners as well as from another interested party. The financing required will be split up between a long-term loan and through the equity financing. Long-term debt will be \$892,783 and expected equity financing both internal and external will be \$892,783 for a total of \$1,785,567 of long term financing required. This is due to the high costs of equipment that is utilized in this facility. BioGreen has accounted for 10 years to pay of the long-term loan. The expected internal rate of return for equity financing is 22.9%. This is due to high amount of dividends paid out and low retained earnings as this is not needed in this business as there are very few operating costs.

Project Information

1.0 Project Information

1.1 Mission Statement

“BioGreen Inc is committed to disposal of manure in the most environmentally friendly way possible. BioGreen plans to take advantage of the move towards greener energy production and cheaper fertilizer sources.”

1.2 Proposed Project

The business that we are planning is a manure biodigester that would be incorporated with a 5,000 head feedlot. The name of the company will be BioGreen Corporation. We plan to have this business in the Rosetown area. There are many reasons for this, the main reason being the abundant feed source in that area that would sustain a feedlot of that size. Another reason for this location is the soil type in the area. The soil is composed of heavy black clay that would serve as a buffer to the groundwater thereby limiting any seepage of contaminants into the groundwater. With the large agricultural land base there is also great opportunity to sell the fertilizer to area farmers. The central location of the area relative to major centers would also be a benefit, as we would eventually like to sell the enriched fertilizer to nurseries and gardeners. There is also potential in this area to sell the wastewater to nearby farmers as irrigation water. Another advantage to placing the feedlot here is the relatively low concentration of rural residents, thereby limiting the number of people affected by air pollution caused by the manure in the feedlot.

The main reason for planning this venture is to help kick start the rural economy by taking an underutilized waste product and adding value to it by further processing it into different useable resources. The company will add jobs to the area with the processing and packaging of the enriched fertilizer that will be sold to small-scale producers such as nurseries. The construction of the associated buildings will also create short-term gain for the community. The company is also concerned with environmental issues that pertain to Intensive Livestock Operations (ILOs) and this venture would help to alleviate the majority of those concerns.

1.3 Project Background

The cattle industry is always trying to seek new ways for manure disposal. The trend of going to larger feeding operations has increased the need for such ventures as biodigesters. Historically beef cattle feeding has occurred in small feedlots on mixed farms that also produced feed grains. Concentrating cattle in feedlots has numerous advantages in terms of productivity, quality control and producing a uniform high quality beef carcass. Such concentrations however, increase the potential for both water and air pollution. Feedlot managers are now focusing more on manure and waste water management to control water and air pollution and to recover nutrients in the form of fertilizer. This is where the use of biodigesters comes in.

Biodigester technology for converting manure into methane for fuel is neither new nor uncommon. Biodigester use is widespread in many parts of Asia, Central America and Europe. They are a response to manure disposal problems in high population density areas and/or high-energy costs. The combination of large land area, relatively low energy costs and high initial investment in biodigesters has so far made the use an unattractive option in the prairies. However with the possibility of climate change and the cost of Greenhouse Gas (GHG) emitting activities, such as coal fired electrical generation; combined with the increasingly lower capital cost of biodigesters this technology use should increase on the prairies.

There are many economic benefits to biodigesters as all of the by-products can be used for economic profit. The first being the fertilizer that is obtained from the anaerobic digestion process. There are two types of fertilizer that can be produced. One type is slurry that can be spread or injected on agricultural land. This slurry is very high in nitrogen, phosphorus and

potassium (NPK). This is the rawest form of fertilizer that comes from a biodigester. The second type needs to be processed further by taking the water out of the slurry, which leaves a dry enriched NPK fertilizer. There are many advantages to this type as it can be packaged and sold greater distances and also at a higher profit as it is aimed more at gardeners and nurseries. The bonus to both of these fertilizers compared to raw manure is that the processed fertilizer is almost entirely odourless, free of disease, germs, weed seeds and is less prone to water contamination. Another by-product of the biodigester is the methane gas that is produced. This can be used to fire internal combustion engines that can generate electricity. This electricity can then be used on farm or put into the SaskPower energy grid. There is potential for income here in the savings that would be realized by not having to buy power as well as the income generated from selling power to SaskPower. Currently SaskPower pays \$.11/kWh (SaskPower, 2001) for power put into their grid. This use of methane can be used to contribute to the achievement of Kyoto levels for GHG emissions. There may be a possibility to sell carbon credits to other companies with this kind of venture. The wastewater that comes from the process could also be sold to area farmers as irrigation water. The waste heat that is produced could be piped into the warehouse that will be built to package the dry enriched manure, thereby increasing power savings. The company feels that with the use of power and heat created on farm it would make the operation almost entirely self-sustaining, which would reduce the fixed costs associated with daily activities.

Operations Plan

2.0 Operations Plan

2.1 The Organizational Structure

The organizational structure for our company Bio-green Inc. is that the four founding members of BioGreen Inc. will control seventy percent of the company with SaskPower owning the other thirty percent of the company. From the two groups there will be three board of directors appointed that will control the direction the company takes. The seven directors of the board will be two founding members of BioGreen Inc. and one other personnel appointed by SaskPower. These individuals will vote on all important issues that will decide the direction that the company will take in the future.

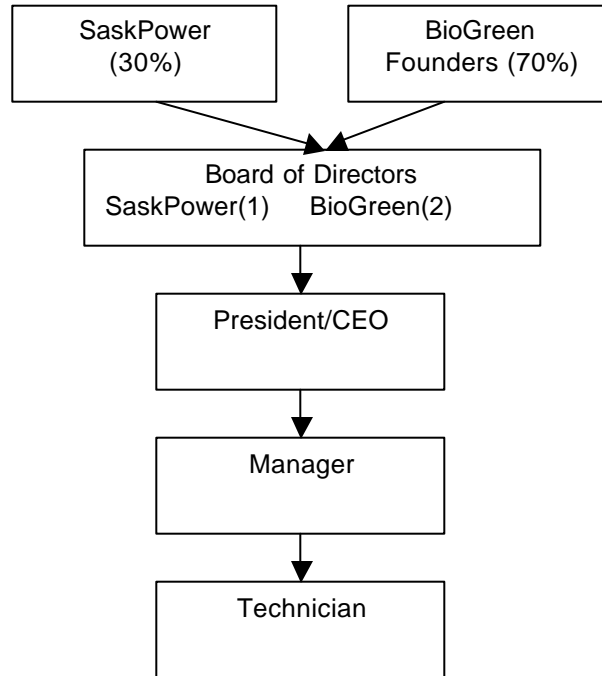


Figure 2.1 *Organizational Structure*

The manager of the company will be a person who is a trained technician, they will have experience in the field and have additional skills that will manage and motivate his workers. The manager must be an enthusiastic person who knows exactly what needs to be done and the best way to get things done. The manager will be supervised and accountable to the president. The president will be one of the four founding members of BioGreen Inc. who is also on the board of directors, which will allow the president to know the best interests of the board of directors and act accordingly to those interests.

2.2 The Average Business Day

The BioGreen Inc. biodigester plant will be operational twenty-four hours a day. To insure maximum efficiency of the plant, workers must have extreme attention to detail when working. The average business day for BioGreen Inc. will have one of the technician workers check the various gauges at regular intervals. The technician must insure proper pH levels are maintained, and also they must maintain the proper microbial population so the proper functions of the biodigester can be carried out. The technician must also keep up with general maintenance of the building, along with maintaining the machines and the electrical components of the plant. The

plant will have automatic alarm systems that will alert the employee to problems with the machines or the general process, so as to prevent any further problems in the plant processes. Generally it will be the employee's responsibility to keep the plant running at its highest possible potential, and to also keep the plant in the best condition as possible.

2.3 The Average Business Week

The average business week will consist of the main weekly activity at the plant being the emptying of its fertilizer tank to storage. The fertilizer will be loaded onto a truck, which will take the fertilizer to storage. The fertilizer will be marketed in the future and will be distributed to the costumers as the company views fitting. The fertilizer will be an additional source of income for the business.

2.4 The Average Business Month

The average business month will consist of the normal activities of each day, with the removal of the fertilizer from the storage tank. Accounting records will be kept accordingly and updated on a monthly business as to keep the best possible records for future references. The accounting records are one of the company's highest priorities, as the board of directors will base future decisions on the records.

2.5 Supply and Service Providers

The most important material that BioGreen Inc. will be supplied with is the raw waste that the livestock will produce at the neighbouring feedlot. A steady and constant supply will be needed and provided to keep the biodigester at its maximum efficiency and therefore insuring maximum profit for the company. This manure handling will be at a charge to the feedlot. It will be imperative to keep good relations to the feedlot as they supply the lifeblood to our operation. The only limitation on the plants capacity for production will be the amount of hours it is operational, assuming that manure will be supplied in abundance from the feedlot. The environmental limitations for the biodigester will be minimal to none. As long as the plant is kept in good working order its capacity should be reached or nearly reached.

2.6 Building Layout and Site Plan

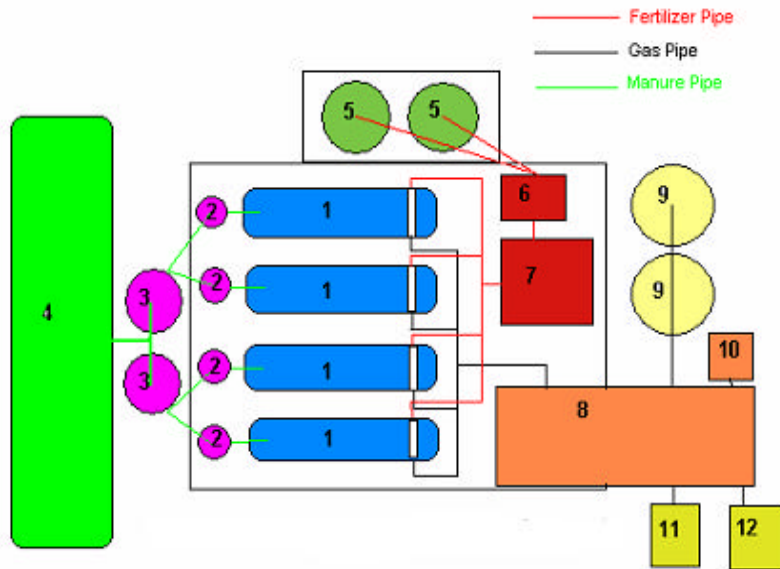


Figure 2.2 *Building Layout*
Source- Own Drawing

- | | |
|--------------------------|-----------------------------------|
| 1. Biodigester | 2. Pre Mixing Tanks |
| 3. Outside Storage Tanks | 4. Manure Pit |
| 5. Fertilizer Tanks | 6. Water Removal Press (optional) |
| 7. Biofilter | 8. Technical Room |
| 9. BioGas Storage Tanks | 10. Technical Room |
| 11. CHP Unit | 12. Boiler Unit |

2.7 Product Flow

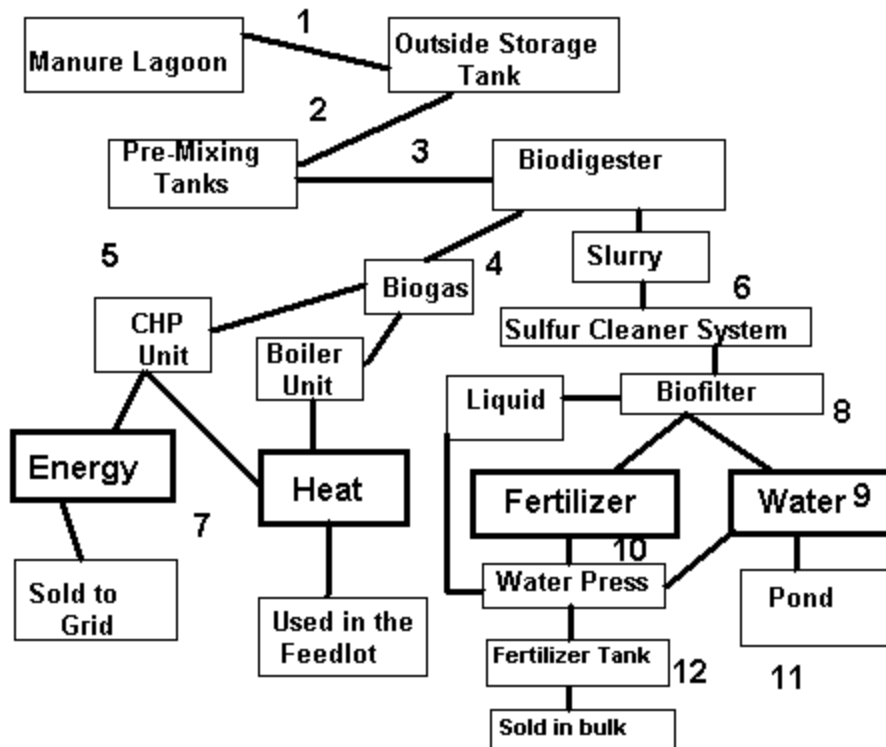


Figure 2.4 *Physical Product Flow*
Source- Own Drawing

Step 1 Approx 80 m³ of manure/water is transported from the manure pit to the outside storage tanks each day, which hold 600 m³ each. There are screens on these tanks to stop straw from getting into the system. This manure is stirred and heated in these outside storage tanks to provide optimal manure for the biodigester. This manure is slurry of about 90% water. This is needed to make the digestion process work.

Step 2 There are 4 pre-mixing tanks that hold 30 m³ each. 20 m³ of manure is agured to each tank from the outside holding tank. This is where final mixing and heating occurs so that the manure is at the optimal 37°C.

Step 3 When the manure reaches an appropriate temperature it is transported from the pre-mixing tanks to its corresponding stainless steal digester tank so the digestion process can take place. The Biogas and slurry are separated. The biogas is of a low pressure and rises quickly off of the slurry and into the pipes. The slurry is drained into the through the sulphur cleaning system. The 20m³ of manure put into the tanks each day is equal to the amount of digested slurry taken out at the end of each day.

Step 4 The biogas is then transported to the storage tanks (not common unless there is a surplus of power on the grid), CHP unit or the boiler unit.

Step 5 The biogas can then be put through the CHP unit or the boiler unit and turned into heat or energy respectively.

Step 6 The slurry is drained from the digester tanks and the sulphur is removed. It is then transported to the bio filter.

Step 7 The energy is sold to SaskPower and is put back on the grid. The heat that is produced will be transported to the feedlot where it can heat things like barns, watering bowls etc.

Step 8 The slurry then passes through the biofilter, which separates a lot of the liquid and the fertilizer.

Step 9– The water is transported outside to the holding ponds or can be retained in the building to be used in the digesters as cattle do not produce a lot of water in their manure (not as much as pigs) and some additional water may be needed to carry out the process.

Step 10- The fertilizer then goes through the biofilter to remove any large particles.

Step 11-The water is stored outside in a pond, which can be pumped out onto nearby farmland or can be put back into the lagoon.

Step 12 The liquid bulk fertilizer is stored in two large 34,500 bu steel bins where it is stored until the contractor comes and picks it up.

2.8 Capital Budget

Table 2.1 Site Costs

Cost	Cost	Source
Land	2,000	
Site Setup:		
Building Material Package	62,000	Nelson Lumber Ltd.
Assembly Labour	72,000	Rusway Construction
Cement	12,000	Lehigh Inland Cement
Utilities Hook Up To Grid	10,000	SaskPower/SaskEnergy
Site Preparation	20,000	Rusway Construction
Total Site Costs	178,000	

Table 2.2 Equipment Costs

Type of Equipment	Cost	Source
Biodigester Package	1,059,194	Folkecenter
Aluminum Plated Steel Coat for Insulation		Folkecenter
Gas Storage Facility		Folkecenter
Couplings for agitators		Folkecenter
Manure Pumps		Folkecenter
Water Valves		Folkecenter
Actuators for manure pumps		Folkecenter
Sulphur Cleaner	Breakdown	Folkecenter
Gas Counters	Not	Folkecenter
CHP Unit	Available	Folkecenter
Boiler Unit		Folkecenter
Pumps for heating system		Folkecenter
Valve and valve motors for heating system		Folkecenter
Lab Equipment		Folkecenter
Scale		Folkecenter
Ph meter		Folkecenter
Sample pump and test pipe for gas		Folkecenter
Computer w/interface cards		Folkecenter
Control Box		Folkecenter
Temperature sensors		Folkecenter
Level sensors		Folkecenter
Installation of package and plant set up		Folkecenter
4-8m x 4.2m (300m3) stainless steel tanks	222,000	Hanson Tank Ltd.
2- Fertilizer Steel Storage tanks (34,500bu each	53,000	Buhler Ltd.
Bio filter	12,000	S&H GMBH & Co.
2- Manure slurry steel holding tanks (600 m3 each)	25,000	Hanson Tank Ltd.
4- Buffer tanks (30m3 each)	30,000	Hanson Tank Ltd.
4- agitating systems for digesters	16,000	Hanson Tank Ltd.
Water and Gas Piping	3,500	SaskEnergy
Manure and Fertilizer Piping	24,000	Sheahan Industries Inc.
Office Equipment:	4,000	
Total Equipment Costs	1,626,694	

Table 2.3 *Working Capital Year One*

Cash	0
Accounts Receivable	0
Inventory in Progress	0
Finished Inventory	48,767
Accounts Payable	(4,894)
Total Net Working Capital	43,873

Table 2.4 *Capital Budget Summary*

Site Costs	178,000
Equipment Costs	1,626,694
Net Working Capital	43,873
Total Capital Required	1,848,567

2.9 Costs of Goods Manufactured and Sold

2.9.1 Cost of Goods Manufactured

Table 2.5 *Cost of Goods Manufactured*

Year	2006	2008	2010	2012	2014
Direct Materials	0	0	0	0	0
Direct Labour + Benefits	19,940	20,746	21,584	22,456	23,363
<i>Technician Salary</i>	18,000	18,727	19,484	20,271	21,090
<i>Technician Benefits</i>	1,940	2,019	2,100	2,185	2,273
Variable Mfg Overhead	18,000	18,878	19,893	21,050	22,354
<i>Maintenance</i>	18,000	18,878	19,893	21,050	22,354
Fixed Mfg Overhead	158,369	226,071	150,782	102,549	71,658
<i>Electricity</i>	1,000	1,040	1,082	1,126	1,172
<i>Property Taxes</i>	500	520	541	563	586
<i>Capital Cost Allowance</i>	148,869	216,187	140,499	91,851	60,527
<i>Natural Gas</i>	6,000	6,242	6,495	6,757	7,030
<i>Insurance</i>	2,000	2,081	2,165	2,252	2,343
Total Cost of Goods Manufactured	196,310	265,695	192,259	146,055	117,375

2.9.2 Costs of Goods Sold

Table 2.6 *Cost of Goods Sold*

Year	2006	2008	2010	2012	2014
Beg. Finished Goods Inv.	0	49,742	51,752	53,842	56,018
Cost of Goods Manufactured	196,310	265,695	192,259	146,055	117,375
Goods Available for Sale	196,310	315,437	244,011	199,897	173,393
End. Finished Goods Inv.	48,767	50,737	52,787	54,919	57,138
Cost of Goods Sold	147,543	264,700	191,224	144,978	116,255

2.10 Operating Expenses

Table 2.7 *Operating Expenses*

Year	2006	2008	2010	2012	2014
Salary (Manager)	40,000	41,616	43,297	45,046	46,866
Benefits (Manager)	3,512	3,654	3,802	3,955	4,115
Start up Training	640	0	0	0	0
Interest on Long Term Debt	62,495	53,132	42,412	30,139	16,087
Total Operating Expenses	106,647	98,402	89,511	79,140	67,068

Human Resource Plan

3.0 Human Resources Plan

The human resources plan generally outlines the proposal of the job descriptions and the general outlay of the entitled work, carried out by the employees at BioGreen Incorporated.

3.1 Board of Directors

The Board of directors is made up with the two Internal members, which consist of Mike Mckevitt and Jimmy Wright. There is also one External Board of director that is a representative from SaskPower and SaskEnergy. These people make up the Board of directors for the company. The duties that the boards of directors are in charge of are the well being of the company and the well being of all actions that the company takes. The Board of Directors are skilled individuals that have taken some sort of post-secondary education to further their knowledge in the process which biodigestion occurs. The other two founding partners will be silent partners.

3.2 President and Chief Executive Officer

The President and CEO of Biogreen is a member of the Board of directors and they are responsible for the relations between the feedlot manager and between SaskPower and SaskEnergy. The President and CEO is a leader within the company that sees a strong forwarding future for Biogreen Incorporated. This person has the abilities to maintain a strong working relationship with all parties, which have ties to Biogreen, either within the plant and feedlot but also the local community. The President Overseas the sales relationship with initial and future investors as well as the receivers of the products, which are produced at BioGreen.

3.3 General Manager

The General Manager has the position that is to clearly see all aspects within the plant. The General Manager has to be very motivated and have experience with the livestock industry as well as the process, which take place during the anaerobic process. The General Manager will have experience in the everyday duties of management as well as an Agricultural or Engineering education. The General Manager is in charge of overseeing the plants activities as well as maintaining books, payroll and doing secretarial duties. The General Manager also is in charge of hiring and overseeing the technician of the biodigester. The general manger does most of the marketing and also is present when the technician has day off. The starting salary for this person is \$40,000 per year with a 2% increase each year.

3.4 Technicians and Maintenance

The Technician/Maintenance employee will be skilled individual who is very motivated and self organized. This employee will have an education with a strong electrical background as well as a steam certificate. This employee will be journeymen or credited in there fields of study. This person will be required to be present at the facility for three hours each day to do various tasks. They will have to perform regular maintenance on the equipment, fill digester tanks everyday and monitor the digester. This technician will work about 5 days a week for 50 weeks out of the year. Starting salary for this individual is \$18,000 with a 2% increase each year.

3.5 Temporary Maintenance Crew

These employees have been added to the staff of BioGreen to assist in the major work that will have to be carried out by the plant. These duties will include the emptying the lagoons, and general overhaul of the facility. The employees will only be required to be at the plant during these times throughout the working year.

3.6 Training

There will be training provided for the employees upon joining the BioGreen staff. There will be certain courses that will have to be taken to work at certain jobs in the facility. With different employees they will have to have a strong educated background. For example there will be members in our team with an agricultural and engineering education as well as operators with electrical and steam certificates. There will also be a strong demand for computer and secretarial knowledge and experience.

3.7 Human Resource Strategy

The human resource strategy is on that is quite simple. The employees will work to achieve and have a common goal set by the company. These procedures will be followed in everyday activities and will be one's that will be clearly stated and exhibited by all personal. We hope by setting up a working environment that is suitable to all working employees that it will create a sense of accomplishment. The main focus will be on that should be followed in everyday life - Treat others like you, like to be treated. There will be many goals in place to motivate employees to achieve their duties at the standard that the plant expects. This in place will create a great working atmosphere that should be enjoyed by all.

The line of authority that the employees will follow will strictly be there supervisors. These people will be picked based upon knowledge and a strong work ethic. The employees will report to the supervisors of each designated roll within the plant.

There will be shareholders within BioGreen Inc. that will be made up of 70% that is owned by BioGreen and 30% made up with SaskPower and SaskEnergy. These partnerships will be ones that are functional and very practical. Working together we will be able to achieve a standard of excellence.

The operations at BioGreen will be ones that will have to have experience in the designated fields because of the high level of standards that will have to be followed. All employees at the plant will have to have some type of technical training to ensure a knowledgeable and qualified staff. This will be very important to maintain a level of productivity that is acceptable. Training in the designated fields will be a must because the high level of production.

The management team is made of the allocated supervisors and the Board of Directors. All these employees are very knowledgeable and have the ability to manage an operation of this type. These employees are very important because they will ensure the well being of the company. The management team at BioGreen are capable of ensuring an environment, which is educated in the best interest for all employees.

Marketing Plan

4.0 Marketing Plan

4.1 The Marketing Mix

4.1.1 Products and Services

The products that will be produced at BioGreen will be of the utmost quality and provided in a manner that is acceptable and economical. The main products that will be marketed will be energy and fertilizer. The other product that is produced will be heat and this will be used to heat the BioGreen facility. The energy that is produced from the anaerobic process will be marketed as an environmentally friendly energy source that will pave the way when looking to secure a source for environmentally friendly products in the world. The fertilizer that will be a by-product from the above processes will be a leading source when looking at the traditional manure management systems. This product will also be an environmentally friendly and an alternative to traditional methods. The fertilizer that will be the end product when looking at the anaerobic process will be something that is referred to as a biosolids. This product is a nutrient enriched component because it comes from organic waste. BioGreen will also offer manure handling and management for the adjacent feedlot, which will involve adding value to it and utilizing it fully. This saves the feedlot the hassle of disposing of the manure, by bringing it to this facility.

4.1.2 Pricing

The pricing for the above materials will solely be based around the going competition rates and what they are charging for their product. The pricing for the energy will be set up under a contract based system that determines the going yearly price from the amount that is produced. "SaskPower purchase power for the grid at a firm rate that is reviewed annually. The rate SaskPower pays for purchased energy is based on all average variable costs for electricity from all sources." (Small Power Producers Policy, SaskPower 2004) This will determine the amount that we will be paid for this product based on quantity through the company we are marketing this product through. The nutrient enriched fertilizer that will also be produced will be sold for the same amount as our leading competitors for this type of product. The fertilizer will be sold based on the quantity the customer needs and the load weight at which we sell the product. When looking at the marketing aspect of the fertilizer we will have to determine the going rate for a product of this type. The main industry we are focusing will be golf course based businesses. There really is not any specific pricing guideline at which a product of this type is sold but we estimate that we can receive at least \$40 per cubic meter.

4.1.3 Promotion

The promotion side of things that deals with BioGreen will really be quite simple. There aren't many promotional things you can do to market an alternative energy source. With the fertilizer part of thing we will aim to promote the product as a very environmentally friendly alternative to other fertilizers. Hopefully in years to come the BioGreen Company will be able to acquire a water press and we could look at marketing the fertilizer in bags. This would allow us to reach a broader market and it would allow for the company to look into further processing of a material of this sort. I think that the water press would open up new doors for the company and it would allow for more promotion from our side of the fence. The reason we have not added a water press to the operation is because it is too expensive and it adds too much to our already existing overhead.

4.1.4 Place

The BioGreen Company is located west of Rosetown, Saskatchewan. There will be an already existing feedlot so it won't be very hard to miss the facility. This facility in conjunction with the feedlot will allow us plenty of access to all major service roads and highways. This facility is quite accessible for any type of vehicle. The targeted markets that we will be looking to sell too sell the fertilizer will be golf courses. With the central location where the facility is, it will allow us to reach

a bigger cliental because we are located within close proximity to all major centers in Saskatchewan. The energy will be sold through contract and transferred right to the processing company. In terms with the fertilizer it will be sold also via contract and depending on the terms set up in the contract the product quite possible could be delivered. These contracts will clearly state the position of BioGreen and what role they have to accomplish to meet potential buyers needs. With the target market of the energy there really will only be the invested player, because of the contract that has been set into place. The main focus right now for the fertilizer will be the golf courses, but with the addition of the water press the product could be sold to a wider variety of markets. Price of manure removal service will be the difference in price if they had to haul it away from the feedlot compared to if they hauled it to the BioGreen facility

4.2 Segmentation

When it comes to the term of segregation our company will be looking to market the products to perspective buyers that have the same goal in the future. This will allow BioGreen to meet the demands of the buyers and assist them when looking to purchase product from us. This marketing method will ideally work when looking to market the fertilizer because it will allow different purchasing business to follow a guide line for how much product they will need to meet the specific specifications of their operation. This segmentation will allow the BioGreen business to look after potential buyers and assist them when looking to make decisions based around their own business. Segmentation is a key when looking to make sure that the perspective purchasers are satisfied with the product we provide. Dealing with energy that is produced there won't really be any segmentation because the energy is contracted all to one company.

4.3 Targeting

The main target markets that BioGreen will be focusing on as mentioned before will be the golf course industry. This type of marketing will allows our company to make decisions based on the needs of the customer. The goal that BioGreen has in mind is to assist the perspective business when looking to make a safe, efficient decision when looking to fertilize their courses. BioGreen will be looking to target the golf industry because it is one that is flourishing throughout the world and there is a demand for a safe, natural and effective alternative to the norm of fertilizers, which are used. The only target that will be in place with regards to the energy industry will be the leading contract holder that will be receiving the energy.

4.4 Positioning

The consumer of the fertilizer is going to be someone who is leading the way when looking to provide a safe a logical method in maintaining a suitable environment. BioGreen wants to promote safe environmentally friendly product. The marketing motto will be "it is worse for the environment to not produce these products than to produce them." This statement stands true to the BioGreen name. BioGreen is taking a commodity that is harmful to the environment and would be otherwise wasted and adding value to it while generating it into an environmentally friendly product. That is our mission statement and that is what we will try to put into the citizens of Saskatchewan's minds. To the consumers of the products, BioGreen wants them to be assured that they are getting a top quality product that will be consistent year in and year out. They too are concerned with the environmental impacts and BioGreen will work hard to ease these concerns.

4.5 S.W.O.T Analysis

4.5.1 Human Resources

The board of directors will all bring unique qualities to the company. These include knowledge and understanding of the agriculture industry, also business knowledge and an understanding of how government works. If any employees need training in any areas of the operation they will

undergo a training period before beginning work. As this technology is new it can be presumed most employees will have to go through some sort of training.

4.5.2 Physical Resources

One of the strengths of the physical resources is that all components of the biodigester will be new as well as the buildings used to house it. However, with the digester coming from Europe it may be hard to obtain parts and expertise when needed, which may cause excessive down time. The raw product coming from the digester can be sold as is, but it can also be converted from slurry into a dry product for easier shipping. At present the company does not have a water press, which would be needed for the dry product, but this machinery can be added at any time. This means the company isn't tied to one product and can produce whichever product is in most demand at any given time.

4.5.3 External Opportunities and Threats

There are many opportunities that will arise from this venture. As this is one of the most environmentally friendly ways to produce power and fertilizer, demand is certain to grow as the public adopts more environmentally friendly lifestyles. With the price of natural gas constantly on the rise, this form of fertilizer will be more economical for farmers. This process will also take away some of the odour from feedlots, which will appease any urban residents near it. Also if in the future the company decides to start packaging a dry form of fertilizer, consumer preference (once educated about the product) would dictate a switch to this form from chemically produced fertilizers. Being that this is a new venture there is very little competition in the marketplace, which would be one of the company's greatest strengths.

4.6 Market Analysis

4.6.1 Power

4.6.1.1 Product Description

BioGreen plans on marketing energy produced from biogas that is generated in a co generation plant. The manure digesters will produce the methane gas that is needed in the plant. This facility will provide an environmentally friendly power source to the Grid in Saskatchewan. Unlike other alternative power sources, this will provide a constant supply of renewable energy to the grid. This power will be sold on a market basis to SaskPower and since there are very little similar facilities, there will not be tremendous competition in this area.

4.6.1.2 Past Performance

In Saskatchewan, a crown corporation, SaskPower maintains the monopoly of the market for power. SaskPower provides all of the power used in Saskatchewan. There have been many innovations into alternative power sources that would replace traditional methods of producing power. Traditionally there have only been a couple of natural power sources available in Saskatchewan. Today there are a wide range of alternatives including wind, solar, hydro and co-generation plants. Producers who sell their power to the grid operate a lot of these systems. Although there are a lot of opportunities out there for producing power, the market is pretty limited or scarce when it comes to manure biodigesters. There are only a handful of biodigesters functioning in Canada. There is only one other one in Saskatchewan providing power to the grid. Therefore there is a lot of room for expansion into this market.

4.6.1.3 Target Markets

This technology is not new, but is one that provides a clean burning energy source. The world wants a healthy environment, but do not want to give up the luxury of free range of power. This will be the market concept that will be targeted when it comes to energy sales and trying to generate more facilities like the one proposed. Manure Biodigesters can provide a clean and economical way of meeting these requirements. This will appeal to many consumers, which could cause a big push for this more in the future. This will have an environmental trend labelled to it, as these issues will play a huge role in the success of such businesses. That is why there would be huge benefits if the consumers realized this was an environmentally friendly form of power, they would push for more government funding for such projects like BioGreen.

4.6.1.4 Market and Competition

There is really no market for power other than what is sold to SaskPower. Therefore there is no concern over who will buy the product. It is sold to SaskPower on the basis of the total amount of alternative power sources providing power to the grid. This is where competition will come into effect. Although there are a lot of empty spaces to fill in this market, it still may create competition in the future when there are more types of enterprises like this one. These other competitors will be wind turbines, solar power generation and hydroelectric dams. They will all have a share in the market for power; however there will be need in the future for a reliable constant source of power. Other than the hydro electric dams, the manure biodigester will be the biggest way of providing a cheap constant power source for the grid and will have a relatively low capital cost compared to the hydro dams.

There is a lot of potential in this market as it is basically untapped. Economic trends will have quite a huge impact on the market for biogas in the future. Consumers are going to want their power cheap and have a lot of it. This biogas is made from an otherwise wasted material and converted into usable energy and is essentially a renewable resource, as long as there are intensive livestock operations then there can be biogas produced.

4.6.2 Fertilizer

4.6.2.1 Product Description

Fertilizer will be a major source of sales for BioGreen. The manure biodigesters produce an organically rich fertilizer as a by-product. Approximately ninety five percent of the total material that enters the digester comes out as rich liquid fertilizer. This fertilizer will be sold so that no part of this process is wasted. This will provide consumers with the realization that this process is completely for the environment.

4.6.2.2 Past Performance

There has been a lot of interest over the past few years about the use of organic fertilizer particularly by organic farmers, gardeners and golf courses. There is quite a lot of information available regarding the use of organic fertilizers. However there has been no market established in Saskatchewan or Canada for that matter. There has been markets established in the United States, with reported success, but as of yet the market is still trying to break into a traditional fertilizer market.

4.6.2.3 Target Markets

The target market in the first few years will be to provide large amounts of this fertilizer in bulk to potential contractors. These contractors will include golf courses and organic farmers. These biodigester will produce over 20,000 cubic meters of organic fertilizer in the liquid form every year and these two markets would have the easiest way of using the liquid fertilizer. The fertilizer will

be marketed as completely organic and nutrient analysis will be done on every load to determine the components of it so that it is applied at the appropriate rate.

4.6.2.4 Market, Customers and Competition

The market for this organically rich fertilizer will have to fall into the traditional fertilizer market. Presently there is no market for bulk, liquid, organic fertilizer. Therefore it will be sold and in direct competition with bulk liquid fertilizer distributors. BioGreen will try and secure pickup contracts with local organic farmers or golf courses. This will provide organic farmers with an approved fertilizer to be used in their soils without jeopardizing their credibility as an organic producer. The real challenge will be to get golf courses to use this product. They traditionally use a granular fertilizer, which is what BioGreen will have to compete with. These Golf Courses are set up for granular fertilizer and is will take some expert marketing explaining the advantages to get them to switch over to BioGreen Fertilizer.

4.7 Future Market Opportunity

Opportunities for BioGreen Products are at opposite ends. There are not really any other opportunities for the energy side of sales other than maybe an expansion of the facility to produce more power for the grid. However as far as new market opportunities opening up, this market is limited to the power supplied.

The markets for Fertilizer are endless. BioGreen Fertilizers will be sold firstly as bulk liquid organic fertilizers and will be sold to organic farmers or golf courses at competitive prices. Maybe in the future with the addition of the expensive water press, than the liquid component could be removed and a solid fertilizer would be produced. This would mean that BioGreen could package and sell small amounts of their fertilizer. This bagged dry fertilizer would yield sales close to double that of the liquid fertilizer. This would mean that new markets would open up, such as gardeners, tree nurseries, garden markets and other related industries. This would definitely provide a lot o competition for composted fertilizer, as this product would provide higher amount of nutrients at a reduced cost.

If the feedlot proposed with this biodigester fails to provide enough manure for the digester than it may be required that BioGreen gets into the manure hauling business. If this need ever arises, BioGreen may have to truck in its manure just to keep the digester at full capacity. This would mean that there would be the opportunity to provide a service to neighbouring farms to clean up their manure and provide competition to other corral cleaners.

4.8 Select Markets/Product/Service Mix

4.8.1 Objective

“To provide at least 1,500,910 kWh of energy each year from a renewable, constant, environmentally friendly power source, this is to be sold to the Saskatchewan Grid and to sell more than 26,600 cubic meters of liquid organic fertilizer to golf courses and organic farmers.”

4.9 Advantages of Products

This energy will be produced by clean burning biogas and will be renewable and a constant source of energy. It is completely environmentally friendly and is better to produce than not to produce. The fertilizer will be of an organic base and will and excellent source for macronutrients. Both of these markets are not dominated by any company, which will make it quite easy to get into the market and provide competition quite easily and effectively.

4.10 Disadvantages of Products

The Capital Cost of this facility will be the most limiting factor for BioGreen. It will take quite a bit of capital to get this facility running to full capacity and to leave the option open for expansion in the future. This will be quite difficult and some outside funding may be needed to secure this business. Fertilizer sales may also be another problem for BioGreen. With different percentages of nutrients making the fertilizer up for every load there may be an inconsistency in the fertilizer and may scare some potential customers away. BioGreen will have to spend the money to have each load tested and the price based on the analysis outcome.

4.11 Selling and Advertising

Selling of these products will be based solely on contracts set up between the buyers and BioGreen. These products will be sold under the BioGreen name, which will become a Trademark name. The first contract will be with SaskPower and will be set on these terms. "To provide energy to the SaskPower grid for five years at a constant rate and to be sold each day at the price received by energy producers on that particular day. The energy can be shut off for no more than five days at a time if required by BioGreen for yearly overhaul and maintenance."

The other contracts will be with golf courses and organic farmers to begin with and will be for one year and will be set on these terms. "Fertilizer will be available in spring and fall for pickup by contract holder and all buyers must take all the fertilizer stated in their contract by fall of the said year. Price received will be based on the current rate per cubic meter for liquid fertilizer on the day the contract is signed. The fertilizer must consist of a certain percentage of nutrients with a nutrient analysis provided at time of delivery. There will be no refunds made for fertilizer not used and all sales are final."

There will be no current need for advertising of BioGreen Products as this is a market based pricing and buying system and with not a lot of competition, and a small amount of buyers there will be no need to do any advertising. If the time comes that BioGreen starts marketing fertilizer in the bagged form or manure hauling then there may be some need to let the consumers know about the products and service and the environmental approach by BioGreen.

4.12 Marketing Plan Budget

The only costs associated with marketing will be those for the travel expenses, telephone, brochures and a website. When setting up the contracts for the products and letting citizens know about our environmental approach.

Table 4.1 *Marketing Expenses*

	2006	2008	2010	2012	2014
Vehicle (Lease, Fuel & Insurance)	10,776	10,776	10,776	10,776	10,776
Telephone	2,160	2,247	2,338	2,433	2,531
Brochures	1,590	1,931	2,345	2,848	3,458
Web page	2,500	306	318	331	345
Total Marketing Expenses	17,026	15,260	15,777	16,387	17,110

4.13 Projected Sales

4.13.1 Energy Sales

Projected Sales of Energy are to be approximately 1,500,910 kWh, which is based on a 350 days of operation a year. This amount was derived from the Folkecenter Statistics on their experimental biodigester that is similar to this one. The Biodigester will be running at full capacity

in year one so there should be no changes in the amount sold each year unless the process is shut down for extra maintenance. The energy will be sold to SaskPower per kWh and the price shall be what the current yearly price is for energy bought for the grid.

Table 4.2 *Energy Sales (kWh)*

	2006	2008	2010	2012	2014
Quantity Sold (kWh)	1,500,910	1,500,910	1,500,910	1,500,910	1,500,910
Price(\$/kWh)	0.11	0.11	0.12	0.12	0.13
Revenue(\$)	\$165,100	\$171,770	\$178,710	\$185,930	\$193,441

*Quantity Produced Numbers Derived From Folkecenter Statistics
Prices sourced from Tim Zulkoski, SaskPower Bulk Power Management, 2005.*

4.13.2 Manure Handling

Projected Sales of manure handling are to be for approximately 28,000 cubic meters the first year and 31,500 cubic meters after that to account for any problems in the first year, which is also based on a 350 days of operation a year. This amount was derived from the Folkecenter Statistics. The Price received for this heat will be \$2.00 per cubic meter and will be offered as a service to the feedlot.

Table 4.3 *Manure Handling (per cubic meter) Sales*

Year	2006	2008	2010	2012	2014
Quantity Sold (kWh)	28,000	31,500	31,500	31,500	31,500
Price(\$/m ³)	2.00	2.08	2.16	2.25	2.34
Revenue(\$)	56,000	65,545	68,193	70,948	73,815

Quantity Produced Numbers Derived From Folkecenter Statistics

4.13.3 Fertilizer Sales

Projected Sales of Fertilizer are to be approximately 26,600 cubic meters of fertilizer per year. This fertilizer will be a somewhat liquid fertilizer and would be sold on the liquid fertilizer basis. The plan is to have the biodigester running at full capacity in year one so the amount of fertilizer being produced would be about 76 cubic meters per day for and expected 350 days of production. It is expected also that for every 80 cubic meters that go into the biodigester that about 70-76 cubic meters comes out. This is about 90-95 percent of the manure going in. The price received per cubic meter is based on current liquid fertilizer prices and expected fertilizer prices in five years. The sale of fertilizer will be on a contract basis to some local business.

Table 4.4 *Fertilizer (m³) (Liquid) Sales*

	2006	2008	2010	2012	2014
Quantity Sold (m ³)	26,600	26,600	26,600	26,600	26,600
Price (\$/m ³)	5.50	5.72	5.95	6.19	6.44
Revenue (\$)	146,300	152,211	158,360	164,758	171,414

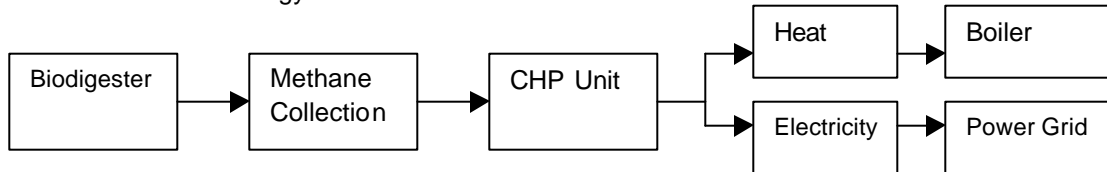
*Quantity of Produced Numbers Derived From Bio Digester Capacities
Price Received Quoted by Shawn Mudryk, Bulani Agro Ltd, 2005.*

Table 4.5 Summary of Revenue

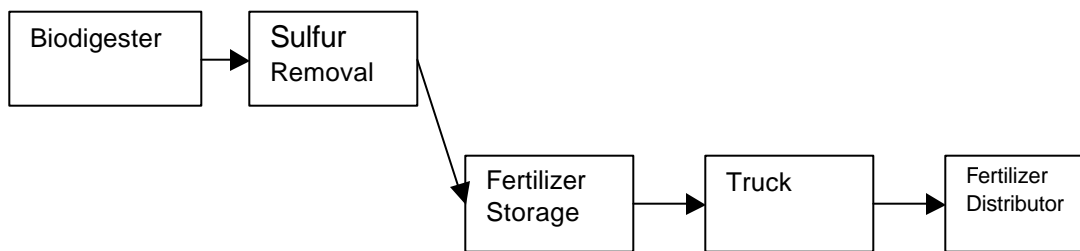
	2006	2008	2010	2012	2014
Energy (\$)	165,100	171,770	178,710	185,930	193,441
Manure Removal(\$)	56,000	65,545	68,193	70,948	73,815
Fertilizer (\$)	146,300	152,211	158,360	164,758	171,414
Total Projected Sales Revenue (\$)	367,400	389,526	405,263	421,635	438,669

4.14 Channels of Distribution

4.14.1 Distribution for Energy and Heat



4.14.2 Distribution for Fertilizer



4.15 Pricing Policy

The price that was used for the fertilizer sales was the going rate for liquid fertilizer and the five-year estimates (Shawn Mudryk, Bulani Agro Ltd, 2005). The fertilizer will be sold on the liquid fertilizer rate, as there is not current market for organic fertilizer so there is no pricing policy for it. The price for fertilizer was based on 21-0-0 fertilizer, which may differ from the BioGreen Fertilizer and therefore may have different pricing. The Power Price was determined from prices received from SaskPower (Tim Zulkoski, Bulk Power Management, SaskPower, 2005). “The rate SaskPower pays for energy is based on their average variable cost of electricity from all sources. Updated annually, this rate is calculated using information from SaskPower’s Annual Report.” (Source, Small Power Producers Policy, SaskPower 2004). And there are no prices needed for heat as BioGreen buys back and uses the heat in the biodigester Facility. The prices per year are inflated at 3%. The price for manure handling was calculated by taking the difference between hauling manure away from the feedlot and hauling it to this facility. The difference in mileage is the average selling price and may be lower or higher depending on variable trucking costs.

Financial Plan

5.0 Financial Plan

5.1 Financing Budget

In order for BioGreen Inc. to have sufficient funding for its capital costs and to achieve a constant cash flow a total of \$1,785,567 must be secured with long-term debt and equity financing. The long term debt financing will make up fifty percent of the total capital and will be secured with the assets and internal collateral. The other fifty percent will come from internal and external equity financing from potential shareholders. (See table 5.1)

Table 5.1 *Financing Budget*

Total Financing Required	1,785,567
Long Term Debt	892,783
Owners Equity	892,783
Total Financing	1,785,567

5.2 Loan Amortization

The loan will probably be secured under Farm Credit Corporation, as this is an Ag business. The loan will hopefully be secured with 7% percent interest with an amortization schedule of ten years. The yearly fixed debt payment will be \$127,112 plus interest. (See Schedule 8 of Spreadsheet). This works out to \$189,607 in year one for the debt payment

5.3 Income Taxes

BioGreen Inc. is a corporation so annual corporate taxes are assessed. Income Tax is only assessed if the income before taxes is above zero. If it is then the taxable income is income before taxes with the addition of any losses generated in income the year before or loss carry forward. Income taxes the calculated with federal tax at 21%, federal surtax at 4%, and provincial tax at 5% with a small business tax credit of 16%. (See Schedule 10 of spreadsheet)

5.4 Dividend Policy

Dividends are paid to equity investors only when profits are sufficient. BioGreen must ensure that there is enough cash for operating the business each year. Operating expenses are not that high thus BioGreen is able to pay out large amounts of dividend after the first few years. Thus the dividend policy is cash minus working capital increased by a factor of 5 to allow for income operating fluctuations and to allow for retained earnings in the first few years to allow for any changes. Any positive value from this calculation will be paid to equity investors as a dividend. (See table 5.2 for dividends paid)

$$\text{Dividend} = \text{Cash} - (\text{working capital} * 5) > 0$$

Table 5.2 *Dividends Paid to Investors*

2006	2007	2008	2009	2010
0	100,075	186,974	187,896	187,682

5.5 Economic Forecast

The ten-year financial reports have been made using a 7 percent interest rate for loans and a rate of 2 percent was used to for expected inflation on all sales, other expenses, wages, and salaries.

5.6 Ratio AnalysisTable 5.3 *Ratio Analysis*

Ratio	Company Average(over 10 years)
1.Liquidty Ratios	
Current Ratio	97
2.Activity and Operating Ratios	
Total Asset Turnover	0.35
Inventory Turnover	3.42
Average Days Inventory	123.60
3.Operating Expenses Ratios	
Direct Labour/Sales	5.3%
Overhead/Sales	39.3%
Selling/Sales	25.7%
Total Expenses/Sales	70.3%
4.Solvency Ratios	
Debt Ratio	33.6%
Debt to Equity Ratio	0.57
5.Profibility Ratios	
Gross Profit Margin	55%
Net Profit Margin	33.5%
Return on Assets	14.7%
Return on Equity	22.6%

5.7 Summary of Financial Analysis

Table 5.4 *Summary of Financial Analysis*

Year	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>
Sales	367,400	381,888	389,526	397,316	405,263
COGS	147,543	316,089	264,700	223,756	191,224
Gross Margin	219,857	65,799	124,826	173,561	214,038
Expenses	80,161	73,003	68,392	63,461	58,189
Net Income Before Tax	139,696	(7,204)	56,434	110,099	155,849
Income Tax	15,143	0	5,337	11,935	16,894
Net Income After Tax	124,553	(7,204)	51,097	98,165	138,955
Total Net Cash Flow to Equity	323,805	191,407	192,417	192,273	193,836

Year	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>
Sales	413,368	421,635	430,068	438,669	447,443
COGS	165,392	144,978	128,866	116,255	106,413
Gross Margin	247,976	276,657	301,202	322,415	341,030
Expenses	52,553	46,526	40,084	33,197	25,836
Net Income Before Tax	195,423	230,131	261,118	289,217	315,194
Income Tax	21,184	24,946	28,305	31,351	36,598
Net Income After Tax	174,239	205,185	232,813	257,866	278,596
Total Net Cash Flow to Equity	196,176	199,111	202,557	206,383	549,083
Net Present Value (NPV)					89,005
Internal Rate of Return on Equity Investment					22.9%
External Rate of Return on Equity Investment					15.6%

5.8 Critical Variables

There are seven variables that must be looked at when determining the economic viability of BioGreen Inc. These include quantity of electricity, fertilizer, manure removal and the price of electricity, fertilizer, manure removal and the price of the Biodigester package. The most critical variable for BioGreen is the price paid for electricity as this has the greatest effect on the books.

Table 5.5 *Quantity Variables*

Variable	IRR	Quantity
Electricity (Kwh)	0	133,287
Fertilizer (m ³)	0	(19)
Manure Removal (m ³)	0	(47,377)

Table 5.6 *Price Variables*

Variable	IRR	Price
Electricity (\$/Kwh)	0	0.01
Fertilizer (\$/m ³)	0	0
Manure Removal (\$/m ³)	0	(3.38)
Biodigester Price	0	2,570,278

5.9 Breakeven Analysis

BioGreen must also determine the breakeven amounts for its critical variable to determine where the price of electricity can go. This includes an economic (IRR) breakeven, a Cash Flow breakeven and an Income break even.

Table 5.7 *Breakeven Analysis*

Breakeven	Value	Price of Electricity	% change
Economic (IRR)	=0	.01	-90.1%
Cash	=0	(.02)	-118.18%
Income	=0	(.04-.05)	-145.45%

5.10 Worst, Best Case Scenarios

The worst and best case scenarios are used to determine the best economic situation for BioGreen Inc and the worst situation for BioGreen Inc. and comparing them to the base case. A decrease of twenty percent for prices for worst case and an increase for price of twenty percent for best case would best describe the economic situation present. This will be represented by the IRR value.

Table 5.8 *Worst, Best Case Analysis*

	Worst (-20%)	Base	Best (+20%)
IRR	14.4%	22.8%	31.9%
Price of Energy(\$)	0.09	0.11	0.13
Price of Fertilizer(\$)	4.58	5.50	6.60
Price of Manure Removal(\$)	1.67	2.00	3.04

6.0 Assumptions

The future in the biodigester industry is one that is very bright. These industry products are highly competitive and certain costs regarding the cost of production and other costs were unavailable. Here are a few assumptions that we had to make to complete the feasibility study.

- BioGreen will start operations at Rosetown with the completion of the feedlot. The biodigester will begin operations as the feedlot begins operating;
- BioGreen is able to contract the energy, fertilizer and manure removal;
- The contracts set by BioGreen will be locked and stable;
- The biodigester will work with a feedlot to maintain a level of productivity which is acceptable as compared to a hog or dairy operation;
- The biodigester will work in the cold climate of Canada with the use of cattle manure;
- Inflation rates will remain at the same level;
- The loan is locked at a fixed interest rate;
- The feedlot maintains a level of productivity and manure is always present;
- Operation will fall under the Capital Cost Allowance (CCA) under set guidelines;
- The biodigester will be filled continuously and the fertilizer will be removed regularly;
- Products generated will be considered environmentally friendly and natural;
- SaskPower will buy this much electricity
- Manure handling services will generate income

7.0 Conclusion and Recommendations

Throughout the investigation of BioGreen the company has been questioned many times regarding the feasibility of constructing a biodigester, which is incorporated with a cattle feedlot in rural Saskatchewan. With the initial investigation most of the research that has been done has been investigated in other countries that have reached technology advancements when looking at the biodigestion process. There has been minimal investigation regarding the biodigester in Saskatchewan and there will be problems associated with the process as any new venture has seen. Employee training and technological transfer will be a major role as employees will have to be knowledgeable in the process that will be taking place throughout the biodigestion process. Through the investigation with BioGreen the products that are generated have to be present, because with the elimination of one product the operation would not be feasible. With no real problems that would be encountered because of technology advancement, mechanical difficulties are the main concern. Because the process relies solely on the mechanical placement of product, failure during some point in the future will be unavoidable. A problem of this sort would be devastating to the company because of the economic disturbance it would cause.

BioGreen would recommend other businesses to research the following topics:

- Because there is not a lot of information regarding the biodigestion process with cattle feedlot further information is needed.
- Biodigesters in Saskatchewan have been developed with lower capital costs compared to this operation; therefore this makes them more economically viable.
- That there is long term contracts in place for each output to guarantee markets.
- Adequate market analysis is looked at to determine the need for the final product.

8.0 References

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