“FEASIBILITY STUDY OF COLD ROOM RENOVATIONS FOR P.O.V.E”

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Chapter 1

INTRODUCTION

Pismo Oceano Vegetable Exchange (POVE) is a cooperative grower-shipper of fresh produce located along the Central Coast in the town of Oceano. POVE services a large area of consumers providing produce year round. Because POVE ships almost half of its produce to the east coast, high quality, at the time of departure and through transit, is vital. The first step to keeping the produce at its highest quality is maintaining ideal storage temperatures.

For companies like POVE who deal with fresh specialty vegetables, the ideal temperature for a cold room is thirty-two degrees Fahrenheit (Sutton, 2009). Although thirty-two degrees is the perfect temperature, the produce can maintain a maximum shelf life at temperatures ranging from thirty-two degrees up to thirty-six degrees Fahrenheit (Kader, 2002). Temperatures outside of that range can cause damage to the produce by allowing microbial growth, wilting, or many other adverse affects linked to increased temperatures.

Beginning with the 2006 E. coli outbreak, where bagged spinach was traced to the hospitalization and even death of consumers, many truck drivers carrying produce were required to take pulp temperatures of the produce prior to loading in order to ensure proper shipping conditions (Sutton, 2009). This was because part of the problem that resulted in the contamination of the spinach was the mismanaged temperatures of the produce which allowed the infectious bacteria to multiply (Frazen, 2005). To meet the standards that are expected by transporters, it is essential to have facilities that are capable of creating an atmosphere that will keep the produce at the ideal temperatures.

With its current facilities, POVE has had some problems keeping their product at proper temperatures and is looking for methods to help reach the standards, which are being enforced. In the past, the shipping manager has ordered the loaded produce to be re-cooled using one of the pre-cooling methods available in order to get the product to an acceptable temperature. This method uses a significant amount of time and energy which directly leads to increased costs for the company.

The proposed solution to renovate the cold room facilities is to make the storing process more efficient. The renovations will include switching from the present Freon system to a more energy efficient ammonia system, as well as adding an extra engine room to house the refrigeration compressors allowing for more storage space in the cold rooms. There are currently four cold rooms that are in need of renovation. Cold room four is the largest and most heavily used cold room. Cold rooms one, two, and three all possess similar capacities as far as storage space is concerned. For a project of this size, it will be necessary to finance the process through a bank loan.

Problem Statement

Will it be economically feasible to renovate the cold rooms at Pismo Oceano Vegetable Exchange?

Hypothesis

POVE will repay the renovation loan, for the refrigeration systems, through increase revenues, generated by rebates and improved quality, and decreased costs, in the form of energy and labor savings.

The renovation project of all four cold rooms will be paid off in full through profit generated from the renovations in 15 years.

Objectives

1. To estimate the annual gains in profits that POVE will gain from the investment.
2. To determine the time period that will be needed to pay off the renovation investment.
3. To evaluate alternative options that may be used in renovation

Justification

Pismo Oceano Vegetable Exchange has been a grower-shipper in the Arroyo Grande Valley for over seventy-five years. They are one of the world's top suppliers of nappa cabbage (Lilley, 2006). Along with their top commodities, they also provide a consistent supply of many fresh vegetables such as: bok choi, leaf lettuces, cabbages, broccoli, celery and many other items. The cold rooms and refrigeration systems have become outdated and have affected the quality of product that they are able to distribute. It has also caused the facilities to become much less energy efficient.

In today's society, it has become important to save electricity where possible, and these renovations will create a significant savings in electricity used. Saving energy has become such a main objective for today's government, they are beginning to put strict regulations on how much energy agricultural facilities are using. They have proposed a program that will penalize companies for increasing their energy used at peak hours based on their previous usage (Souza, 2009). These types of actions show how serious the energy crisis is, and the government feels that voluntary cuts in electricity usage are not working to the magnitude that is necessary.

Instead of using passive actions, they are going to continue to pass mandatory regulations toward this issue until results are seen.

The improvements to the storage facilities will not only decrease the total energy used by POVE, but will also better the quality of their available product. Both advancements will result in increased revenues for the company. Companies that are becoming technologically obsolete should consider this type of action while still give the choice, because with the current status of the energy crisis, these types of renovations may become mandatory in order to stay in business.

Chapter 2

REVIEW OF THE LITERATURE

The Feasibility Study

The purpose for all business decisions is to increase the profitability of that business in some manner. In a study that examined the economics of a business decision, the deciding factor, as to whether or not a business should proceed in a particular direction, should be if the foreseen benefits are greater than the foreseen costs (Kobara, 1977). A business feasibility study should be used to help the decision making process by performing a cost benefit analysis featuring the proposed action. Relevant information should be gathered in order to accurately project the financial implications of the proposed change. An article dedicated to proper analysis of a business feasibility study suggests using projected financial statements in order to organize the collected data (Thompson, 2005). It was also emphasized that the study should highlight the important components of each projected statement. In the book *Farm Management,* partial budgets were used as a way to compare two business options for this type of study (Kay, 2008). After the conclusion of the study, a clear recommendation should be made. This recommendation should be consistent with the conclusions which were drawn from the information gathered during the study. A good analysis of the business sector is important in order to fully determine the feasibility of a business concept (Thompson, 2005).

Analysis of Business Sector

It is not enough to know that Pismo Oceano Vegetable Exchange (POVE) is a grower-shipper located along the Central Coast which provides its services to local produce growers. It must be taken a step further to find out the specifics of the operation. It is felt that to properly perform this study, the industry should first be defined in heavy detail in order to recognize all

opportunities that may be present (Thompson, 2005). Dan Sutton, General Manager at POVE, was very confident in his assessment that POVE has been greatly surpassed by the industry in terms of cold room technology (Sutton, 2009). POVE's Freon system cold rooms were built based on the technology that was being developed in the 1950's. The postharvest technologies developed during this time period provided the opportunity for produce storage to become a highly profitable enterprise (Stelpflug, 1950). As times have changed so have the technologies. It is this type of feeling that has prompted the proposed change from a Freon refrigeration system to a newer, more effective ammonia system. In an article from the *Encyclopedia of Food Science and Technology,* it is stated that the ammonia system is being used in most all commercial type cold rooms and will continue to gain popularity in refrigeration systems of this size (Hui 1992, p. 1265). What the new system will provide for POVE is a much more reliable room temperature that can easily be controlled and maintained.

The more consistent temperatures produced by the newer system will produce a more consistent product for shipping. According to an article from the *Journal of Agricultural and Food Industrial Organization,* agriculture has begun to become much more personal as the large buyers, mainly supermarkets, have started to surpass the middle-men of the industry. They have been shown to buy about 64% of fresh produce directly from the grower-shippers (Dimitri, 2003). Because buyers will be directly linking the grower-shipper with their product, it now becomes extremely important to provide a high quality product at all times. Also noted was the fact that the easiest way to ensure repeat business from a client is to give them what they want when they want it (Dimitri, 2003).

Another recent change that the industry has seen is that traceability of the products has become much more readily available. It is now required that the trucks only load product that is

below a specified temperature when taken from the cold rooms. Because the transport refrigeration units only have the power to maintain product temperature, it is the responsibility of the shippers to cool the product to the necessary level prior to loading (Heap, 1998). These types of changes have been made not only to combat a repeat of the recent food bourn illness scares, but also to fix the fact that one-third of the fresh produce being grown is lost due to deterioration at some point during transportation (Kader, 2002). Temperature plays a major role in fresh produce deterioration rates. A study from the Department of Horticulture as a part of the North Carolina Extension Service showed that for every eighteen degrees Fahrenheit increase in temperature, over the optimal storage level, the product will begin to deteriorate at a rate three times faster (Wilson, 1995). After developing a clearer understanding of POVE's industry, it should be apparent why the current cold room equipment in place is no longer suitable for the purpose which it needs to serve.

Cold Rooms Expectations

The main problem that POVE is faced with at this time is the fact that its cold room systems struggles to maintain a temperature that is ideal for the product which the business stores. POVE's main commodities are the Chinese cabbages, nappa and bok choy. The USDA's Agricultural Handbook No. 66 states that the ideal storage temperature for such commodities is thirty-two degrees Fahrenheit (Hardenburg, 1986, p. 130). The current system rarely ever reaches temperatures of that level (Sutton, 2009). So in order for the product to reach that temperature forklift drivers must constantly move the product to the pre-cooling units which wastes time and energy. It also defeats the purpose of having cold storage rooms. The purpose, and biggest advantage, of featuring a cold storage room is to limit the need to re-handle the product (Maguire, 2003).

The results of using this underpowered equipment are higher costs and less productivity. That is not a good combination for any business. A study analyzing underpowered equipment showed that the costs, related to that equipment, grows exponentially as time progresses (Saltzman, 2002). This occurs because the equipment must be overused therefore causing more damage. Once the equipment is damaged it becomes weakened and becomes even more susceptible to further damage in the future. To fix this problem, the solution has been proposed for POVE to renovate their cold rooms by completely replacing the old refrigeration systems. This solution will not only bring about consistent temperature in the cold rooms, but it will also allow for temperature variability through a computerized control system that can be accessed by on site computers (Pereira 2009).

Costs

As does any solution to a problem, there are consequences, both good and bad, that will need to be addressed. First of all, a large loan will be needed to fund the project. Farm Credit West, a private bank focused on making loans in the agriculture industry, has put in a bid that will finance the renovation over a two year draw period, followed by an eighteen year repayment span (Gulliver, 2009). The total loan will be for a total of $900,000. This total will cover the costs of all the equipment that will be needed to power all four cold rooms at POVE. As was said before, not all consequences of this project are negative.

Benefits

In order for the project to be feasible, the positive consequences have to outweigh the negative consequences. The newly installed ammonia system is designed to be much more efficient than the old Freon system. Hawkins Engineering has estimated that with rooms the size of POVE's, considering the current and proposed systems, the company should see savings of

355,000 kW-hr/year. With an estimated energy cost of $0.135/kW-hr, POVE should save and estimated $48,000 per year. Other benefits are available to companies opting to perform projects that will result in energy conservation. One such a benefit is PG&E's non-residential retrofit (NRR) incentive that qualifies businesses to receive a rebate if they replace old equipment with new energy-efficient machinery. This energy savings program will allow POVE to be eligible for a reimbursement of $0.18 for every kW-hr saved over the first year (Hawkins, 2009). This would equal a $67,000 lump sum that would be received by POVE just for saving electricity. Saving this much money in the first year would be beneficial when trying to pay off the loan, because the timing of the revenues is important as it can reduce the interest costs by reducing principle payments before they are due (Scherpinksi, 2005).

Along with the money that is being saved on energy costs, the cold rooms will also operate at a higher level, providing a higher quality product to the buyers. In order to avoid product quality issues, it is advised that the storage temperatures be kept within two degrees Fahrenheit of what is ideal for the commodity. Anything higher will shorten shelf life, and anything lower may cause chilling injury (Kader, 2002). The increase in product quality will not be a result of increased labor because the facilities that are in place will be functioning as expected.

The recent increase in labor at POVE has been due to the unpredictable conditions of the cold rooms, therefore, after renovations, the labor to keep product properly cooled is actually expected to decrease (Sutton, 2009). This is because the temperatures in the cold rooms will match the optimal commodity temperatures and there will no longer be the need to constantly ship the product to the pre-cooling units prior to loading.

Proposed Refrigeration Unit

A refrigeration unit is comprised of five key components: the evaporator, compressor, condenser, expansion valve, and motor. The evaporator coils serve the purpose of turning the refrigerant, in this case ammonia, into a gas so that it can pass to the compressor. It then goes through a process creating the gaseous ammonia to become very hot using the heat from within the system. This heat is given off in the condenser as the ammonia is liquefied. The heat does not stay in the system as fans are used to move the heat outside the enclosed system leaving less energy and causing a drop in temperature. The expansion valve regulates the flow of refrigerant into the evaporator and keeps the pressure within the coils very low. The low pressure allows for the refrigerant to be vaporized at very low temperatures. The motor of the system simply helps pass the refrigerant from one component to the next (Hui, 1992).

To determine the load that a refrigeration unit can handle, it is important to consider the target temperature and relative humidity. The Agricultural Experiment Station at the University of California, Davis showed higher relative humidity can be achieved by placing oversized evaporator coils into the cold room (Thompson, 1996). Relative humidity of the fresh produce is considered to be at one hundred percent, therefore all levels lower would cause water to be extracted from the product. Because the commodities that POVE handles prefer to be held in a humid environment, the highest possible levels of relative humidity would be beneficial.

The maintaining of a thirty-two degree Fahrenheit cold room would need about 0.0075 tons of refrigeration per square foot of cold room storage space (Thompson, 1996). This number is a basic guideline but can be changed due to the average weather, temperature of the product before storage, and insulation of the cold rooms.

The new system, as proposed by CIM Electric, includes two compressors, one condenser, and an engine room which will have the capacity to power the entire facility. Each individual cold room would have evaporator coils and three or fours fans, depending on the size of the rooms (Pereira, 2009). This system would have the ability of maintaining the rooms at thirty-two degrees Fahrenheit while at full holding capacity.

Chapter 3

METHODOLOGY

Procedure for Data Collection

The cold room renovation process, while being rather expensive, will cause POVE to save costs by cutting energy and labor. The company should also experience an increase in revenues that will be generated due to higher quality produce, a result of maintaining proper temperatures in storage. To help analyze these issues, past financial records will be called upon and industry experts will be interviewed. Among the experts will be: Dan Sutton, General Manager of POVE, Scott Hawkins of Hawkins Engineering, and Larry Pereria of CIM Electric. Each individual possesses highly useful insight toward this feasibility study. Larry Pereria will design the newly renovated refrigeration system within the cold rooms. Scott Hawkins will be in charge of determining the electrical usage of the proposed project based on the equipment used by Pereria. Dan Sutton has complete access to past financial records of POVE, as well as insight to future production plans at the facilities. More specifically, he should be able to discuss certain trends of the company that will help lead to projecting package count, quality adjustments, and unnecessary pre-cooling.

In order to renovate the cold rooms at POVE, the business will need to take out a sizeable loan from a third party. This loan will be provided by Farm Credit West, a loan provider that services the agriculture industry. Their proposed loan agreement will give terms such as loan type, interest rates, and borrowing period.

The renovation can be done in stages if it proves to be economically advantageous. The cold rooms vary in holding capacity which will ultimately vary the amount of product that can be stored throughout the year. With more renovated square footage, more profit should be gained.

However, doing more square footage in the earlier stages of the renovation process will cause higher initial costs. Because the renovations can not be done by usable square footage, it will be important to analyze the benefits that will be gained from each individual cold room. This will take into consideration the usable square footage, current electrical usage, proposed electrical usage, and current cold room temperatures.

All information that was used to determine prior objectives will be used to establish which option should be used during the renovations. Although the loan particulars, such as the loan terms and energy savings, will be slightly different, no extra information will be needed from any outside sources.

Procedures for Data Analysis

In order to determine the economics of this renovation project, the collected information, mentioned prior, will be used to compile pro forma financial statements that will reflect the feasibility of the project. The statements will be assembled as educated projections of the business, based on gathered information and prior knowledge. These statements will include a cash flow and partial budget. The projections will express recent trends of the company, the proposed differences in energy used, and estimated quality improvements. All variables will be expressed in terms of dollars. This will lead to determining the total costs and returns that this project will produce, therefore forecasting the total profits that can be expected.

The gains that result form the renovation will be transferred over to make payments on the loan, which will be required to begin the process. In order to determine when, and if, the loan could be paid off for the project, loan calculations would need to be done using the terms of the loan provided by the agency. Calculating the interest will be the factor that determines how much money must be generated in order to make payments. These calculations will allow the

business to establish a repayment schedule in order to meet the agreements of the loan. For the schedule to work, the business will have to match the repayment plan with the increased profits. The resulting gains, provided by the projected financial statements, will determine when and how much P.O.V.E. can repay the loan agency. Ultimately, the frequency and magnitude of the payments will determine the time period in which the loan can be repaid in its entirety.

To take full advantage of the renovation process, P.O.V.E. must consider multiple options. The business can reduce its up-front costs by separating the renovation process into multiple stages. The best possible solution will be conjured by analyzing the costs and benefits of each such possibility. This process will be aided by using comparisons of each option. A recommendation will be made on which option is best suited for the project based on the findings of the study.

Assumptions

The study assumes normal growing conditions for the POVE growers. The growing conditions are predominantly determined by the mild weather experienced on the Central Coast. This assumption will also result in typical yields that have been determined over years of growing experience.

Limitations

This study is focused on renovating cold room facilities for a specialized product. The conditions should not be duplicated for all fresh produce. Also the proposed change in both costs and benefits of this project are projected values based on the recent trends of the industry but cannot be definitive.

Chapter 4

DEVELOPMENT OF THE STUDY

This study addresses the problem that Pismo Oceano Vegetable Exchange (P.O.V.E.) faces with its current cooling facilities. In order to properly cool the products that P.O.V.E. handles, as was discussed in previous chapters, the cooling facilities must have the capacity of maintaining an environment of 34° Fahrenheit. At this current time, the coolers at P.O.V.E. no longer have the ability to cool the products to the appropriate temperature. Many times, the facilities are above ideal temperature by 5-10° Fahrenheit. This rise in temperature is due to outdated refrigeration equipment that powers all four of the cooling rooms at P.O.V.E. Currently, P.O.V.E. operates using a Freon based system, known as an R-22 refrigerant-based chiller. These rooms also use a total of sixty 0.5 horsepower evaporator fans for maintaining set temperatures. This system runs a very inefficient defrost system which uses electricity as the heating mechanism. While the new proposed system will improve maintained temperature in the cold rooms, the change in cooling system will also provide much more efficiency in many aspects of the business.

The proposal to improve the cold rooms has called for a change from the current R-22 Freon system to a more modern R-717 Ammonia system. The ammonia is more readily available, as well as being cheaper, than the Freon which is currently used at P.O.V.E. Along with changing the actual refrigerant, new compressors, condensers, and evaporators will also be installed for the new system. The retrofitted condensing units will be housed in a strategically located engine room, which will also be newly built. Along with these mandatory features of any refrigeration system, P.O.V.E. has elected to install floating head pressure controls, variable

frequent drives, and a hot gas bypass. All these additional features are believed to add extra benefits to the renovation.

The floating head pressure controls will allow the compressors to only operate at a level that is necessary to get the needed work done. By allowing for pressure variation, rather than setting a fix discharge pressure, the compressor operates much more efficiently as well as at a higher capacity. Higher efficiency, is achieved when the variation feature allows the compressors to run at a lower discharge pressure, which in return lowers the amount of work that is done.

The variable frequent drives, often referred to as VFDs, will be installed on the evaporator and condenser fans. These drives will allow for the new system to be made up of fewer more powerful fans that will ultimately use less energy to run properly. These variable drives will allow for the fans to match with the surrounding conditions to meet the needed cooling capacity. When the outside conditions are cooler, the compressor need not work as hard nor will the fans motor speed need to be as high. Both the reduction in compressor work and fan speed will lead to less energy use, resulting in increased savings.

In the largest cold room at the P.O.V.E. facilities, an electrical defrost system is intact which serves as the means to remove the ice build up on the evaporator coils. The new hot gas bypass method being proposed will significantly decrease energy use by using the already circulating refrigerant as the means to defrost the coils. This is done by routing the heated refrigerant, which would normally emit the heat into the outside atmosphere, through the coils. In this system the ice is melted by the refrigerant's heat rather than electricity, which will drastically reduce the energy that is currently being used in this particular cold room.

Itemized List of Costs

As was mentioned earlier in the study, the estimated cost of the improvement is about $900,000. Below is a breakdown of the costs in itemized lists. The lists have been separated into breakdowns of the engine room, cold room #4, and the other three cold rooms. These three lists will show the necessary equipment needed to complete the renovation in each of the aforementioned rooms or room groupings. In addition to the equipment lists, separate tables have been used to show the shipping costs and engineering costs for the three groupings of rooms.

Table 1: Complete List of Materials for the Engine Room

Quantity	Equipment	
2	Model N8WA Mycom Reciprocating Compressors	
1	BAC Model VCA-191A Evaporative Condenser	
1	RVS MRP-30 Horizontal Recirculator Package	
1	45 foot High Cube	
	Engine Room Cost	$ 126,334.00

* Estimated labor to install the equipment has been added into the cost

Table 2: Complete List of Materials for Cold Room #4

Quantity	Equipment	
2	Frick/Guntner model MDAN 066D/46-HL/8P-1/2-LRB-HGU-PCV-IP-SSCV-PWJB Air Units	
2	Coil Support Structures	
ALL	Piping, Valves, and Insulation	
1	4 ½ foot X 9 foot Diffusion Tank	

1	PLC Control (regulate temperature and defrost)	
1	Leak Detector System	
ALL	Painting of newly fabricated structures	
	Cold Room #4 Cost	$294,782.00

* Estimated labor to install the equipment has been added into the cost

Table 3: Complete List of Materials for Cold Rooms # 1, 2, & 3

Quantity	Equipment	
1	Model N8WA Mycom Reciprocating Compressor	
1	BAC Model VCA-191A Evaporative Condenser	
4	Frick/Guntner AGHN 071.2/26-HOL/24P-3/4-LRB-HGU-PCV-IP-PWJB Evaportors	
ALL	Piping, Valves, Hangers, and Insulation	
5	Coil Supports (Cold Room #1)	
ALL	Structural Steel (Cold Rooms #2 & 3)	
ALL	Electrical Controls and Wiring	
1	Leak Detection System	
	Cold Room #1, 2, & 3 Cost	$ 428,562.00

* Estimated labor to install the equipment has been added into the cost

Table 4: List of the Freight Costs

Engine Room Equipment Freight Cost	$3,600.00
Cold Room #4 Equipment Freight Cost	$6,000.00
Cold Room #1, 2, & 3 Equipment Freight Cost	$7,000.00
Total Equipment Freight Cost	$16,600.00

Table 5: List of the Engineering Costs

Engine Room Engineering Cost	$10,000.00
Cold Room #4 Engineering Cost	$15,000.00
Cold Room #1, 2, & 3 Engineering Cost	$10,000.00
Total Engineering Cost	$35,000.00

Table 6: List of Total Costs (Equipment, Freight, & Engineering)

Engine Room Cost	$139,934.00
Cold Room #4 Cost	$315,782.00
Cold Room #1, 2, & 3 Cost	$445,562.00
Total Cost	$901,278.00

Valuation of Savings

In order to provide an accurate economic evaluation of the improvement, it is necessary to place a monetary value on the savings that are expected from the investment. The following is a breakdown of the savings that are the expected results from the investment. Each item will be a recurring savings from year to year after the proposed system has been implemented. Further discussion will be provided following the table.

Table 7: List of Annual Savings

Savings	Monetary Value (Annual)
Energy	$48,384.00
Re-Icing	$12,375.00
Re-Cooling	$26,208.00
Adjustments	$36,966.00
Increase in Storage Space	$12,740.00

These monetary figures were made to reflect a conservative estimation of the savings that are expected from the renovations process.

There is one item that will not be a recurring savings from year to year. This item is a PG&E rebate that was offered to businesses that have made renovations in order to save electricity. This rebate is known as the Pacific Gas & Electric Company Non-Residential Retrofit Rebate. A third party reviewer, by the name of Greg Rybka, determined the valuation of this rebate. After all mandatory checks were made, Mr. Rybka determined that POVE was eligible to receive $67,884.50 in rebates resulting from the annual electric savings.

While determining the rebate, Greg Rybka also determined that with the renovations to the coolers, POVE would be saving 48% in electricity costs. POVE's latest annual electricity bill was about $100,725. With the 48% savings, POVE expects to save $48,384.00 per year after the renovation is complete. This savings will be added to the rebate for the first year, which brings the total return from energy savings to $116,268 in year one.

The renovation to the cooler will help POVE run more efficiently in its everyday operations by allowing for the cold chain to remain constant from start to finish. The cold chain is the steps taken to keep the product cool once it is harvested. When the cold chain is broken, the product must be reverted to previous steps and many times back to the beginning. Because of this, POVE has experienced the need to re-ice much of their iced products because the coolers have not been able to keep the ice caps frozen. This past fiscal year, POVE had to re-ice about 45,000 cartons. With a charge of $0.55 per carton, this was an added expense of $24,750. It is the feeling of POVE General Manager Dan Sutton that the renovated coolers would cause a 50% decrease in re-iced products. This would result in an annual savings of $12,375.

Another problem that POVE has been faced with under its current condition, is the fact that trucks will not accept product that have pulp temperatures over the industry standards. Because the products are not stored under ideal conditions in the cold rooms, POVE must re-cool some product by running it through its vacuum cooler immediately prior to loading. Currently this occurs about four loads per month during the growing season, which is eight months per year. With a charge of $0.65 per carton at four loads per month and 840 cartons per load, POVE has incurred an added expense of $26,208 annually. Dan Sutton, General Manager of POVE, was confident that this process would be eliminated after the renovation has been completed.

The cooler ability to better regulate temperatures in the cold rooms at POVE will also lead to savings from defective products. In the 2008 fiscal year, POVE suffered from losing $739,320 in income due to having to refund buyers for product that did not meet standards. It is a proven fact that increased temperatures increase the rate at which plants deteriorate post-harvest. This means that the inability of the cold rooms to maintain the proper temperatures has been the cause for much of the adjusted prices that POVE receives for its product. Once again,

Dan Sutton has made the estimation that a 5% decrease in adjustments will be the result of the renovation. A 5% decrease from the 2008 numbers would equal an annual savings of $36,966.

As has been addressed, the renovation will address the problem of inefficient energy use and improper storage conditions, but what has not been looked at is the fact that by restructuring the equipment in the cold rooms, the holding capacity at POVE will be increased. Currently, when POVE reaches capacity, it must transfer its product across the street to a partnering cooling facility. This process runs at a cost of $0.65 per carton. With the renovated structure, POVE will increase its holding capacity by forty pallet spaces. It is not correct to assume that these spaces will become occupied 100% of the time. It is also not correct to assume that the increase in space will eliminate the need to cross-dock products across the street. With the help of Dan Sutton, it has been calculated that the increase in storage space will result in the elimination of 19,600 cartons per year. This comes out to be an annual savings of $12,740.

The numbers discussed in this section are derived from the current charges at POVE. These charges were calculated using industry norms as well as added costs of labor.

As was mentioned before, the expected savings were meant to portray a rather conservative estimation of potential savings.

Cash Flow Projection

Four, twenty-year cash flow projections, each showing itemized expected savings, as well as the costs that will be incurred in order to renovate the facilities, have been tabulated. The initial cash flow projection shows the expected estimated savings along with the costs to determine whether the renovation process will be economically feasible. As a step of precaution, this report also includes three other projections that serve the same purpose as the initial

projection but use decreased savings. The savings are cut by 5, 10, and 15 percent, respectfully. This will allow room for error if POVE does not experience the magnitude of savings that were initially expected. All four projections can be seen in the appendix.

Partial Budget

The partial budgets are used to compare the costs and benefits of the improved operation versus the unimproved operation. Basically, the cost of the improvement will be compared to the benefits that were brought about by the improvement. Not all dollar amounts will be simply a summation of the twenty-year cash flow projection. The partial budget must take into consideration the time value of money. This is because a dollar in the present is worth more than a dollar in the future. The cost of the improvement and the rebate received for the improvement will not be altered because they are either being paid out or received in the present. However, the savings must be altered because they will not be received until future times. This is also true for the added expense in the form of interest. The annual discount of a dollar is showed at both 5 and 3 percent. When all dollar values are brought to present monetary values, a true comparison can be made between the costs and benefits of the improvement. The partial budgets can be found in the appendix following the cash flow projections.

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study has shown the costs and benefits of renovating Pismo Oceano Vegetable Exchange's cold rooms. The costs and benefits have been quantified into estimated dollar amounts. These dollar figures have been put into financial statements, which help show when the money is both being spent and being saved. To ensure that a conservative approach was taken during the analyzing process, the study also shows the effects of a decrease in all aspects of the savings. In the cash flow projections, an accumulated savings total was calculated from year to year to show when the savings of the project would equal and surpass the cost of the project. Another tool used to compare the costs and savings of the renovation was a partial budget. The focus of this statement was to express all dollar values in terms of the present day value. This would show whether the improvement was feasible in terms of what a dollar is worth in year one of the process. Preceeding the cash flow projection is a section that focuses on breaking down the costs of the improvement. Instead of seeing the cost as one large number, it has been broken down into components to show which aspects of the renovation process are the most expensive.

Conclusions

The analysis of the renovations to Pismo Oceano Vegetable Exchange's cold rooms has shown that the savings accumulated over the life of the improvement will pay for renovation, itself. The accumulated savings reaches the cost of the improvement during the sixteenth year. It has also been proved that up to a ten percent decrease in savings can be experienced without affecting the feasibility of this renovation project. A decrease any larger than ten percent will result in a situation where the accumulated savings do not total to the amount of the

improvement costs during the twenty-year payment period. The study also shows that the savings stemming from the renovation significantly surpass the cost of the improvement when set into the present value of a dollar. This was calculated at both a five and a three percent discount rate. The breakdown of the improvement costs were as expected. A larger portion of the costs were spent on the cold rooms that have a larger holding capacity, and therefore more usefulness to the company, and smaller portions were spent on the cold rooms of smaller capacity.

Recommendations

It is the recommendation of this study that Pismo Oceano Vegetable Exchange renovate its cold room using the proposed system. It is also recommended that they renovate all four cold rooms at once, therefore keeping uniform equipment and practices through their entire facility.

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APPENDIX

Cash Flow Projections

	2010	2011	2012	2013	2014	2015	2016
Non-Recurring Benefits							
PG&E Rebate	$67,884.50	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Non-Recurring Benefits	$67,884.50	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Savings from the Investments							
Energy	$48,384.00	$48,384.00	$48,384.00	$48,384.00	$48,384.00	$48,384.00	$48,384.00
Re-Ice	$12,375.00	$12,375.00	$12,375.00	$12,375.00	$12,375.00	$12,375.00	$12,375.00
Re-Cool	$26,208.00	$26,208.00	$26,208.00	$26,208.00	$26,208.00	$26,208.00	$26,208.00
Adjustments	$36,966.00	$36,966.00	$36,966.00	$36,966.00	$36,966.00	$36,966.00	$36,966.00
Increase in Space	$12,740.00	$12,740.00	$12,740.00	$12,740.00	$12,740.00	$12,740.00	$12,740.00
Total Savings	$136,673.00	$136,673.00	$136,673.00	$136,673.00	$136,673.00	$136,673.00	$136,673.00
Total Increase in Cash	$204,557.50	$136,673.00	$136,673.00	$136,673.00	$136,673.00	$136,673.00	$136,673.00
Loan Payments							
Interest Payment	$60,076.33	$58,541.53	$56,899.85	$55,143.87	$53,265.63	$51,256.61	$49,107.70
Principal Payment	$22,043.03	$23,577.83	$25,219.51	$26,975.49	$28,853.73	$30,862.75	$33,011.66
Total Loan Payments	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36
Unpaid Loan Balance	$877,956.97	$854,379.14	$829,159.63	$802,184.14	$773,330.41	$742,467.66	$709,456.00
	$122,438.14	$54,553.64	$54,553.64	$54,553.64	$54,553.64	$54,553.64	$54,553.64
Accumulated Savings	$122,438.14	$176,991.78	$231,545.42	$286,099.06	$340,652.70	$395,206.34	$449,759.98

20 year loan of :	$900,000.00
loan rate:	6.75%

	2017	2018	2019	2020	2021	2022	2023
Non-Recurring Benefits							
PG&E Rebate	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Non-Recurring Benefits	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Savings from the Investments							
Energy	$48,384.00	$48,384.00	$48,384.00	$48,384.00	$48,384.00	$48,384.00	$48,384.00
Re-Ice	$12,375.00	$12,375.00	$12,375.00	$12,375.00	$12,375.00	$12,375.00	$12,375.00
Re-Cool	$26,208.00	$26,208.00	$26,208.00	$26,208.00	$26,208.00	$26,208.00	$26,208.00
Adjustments	$36,966.00	$36,966.00	$36,966.00	$36,966.00	$36,966.00	$36,966.00	$36,966.00
Increase in Space	$12,740.00	$12,740.00	$12,740.00	$12,740.00	$12,740.00	$12,740.00	$12,740.00
Total Savings	$136,673.00	$136,673.00	$136,673.00	$136,673.00	$136,673.00	$136,673.00	$136,673.00
Total Increase in Cash	$136,673.00	$136,673.00	$136,673.00	$136,673.00	$136,673.00	$136,673.00	$136,673.00
Loan Payments							
Interest Payment	$46,809.17	$44,350.60	$41,720.84	$38,907.98	$35,899.26	$32,681.05	$29,238.78
Principal Payment	$35,310.19	$37,768.76	$40,398.52	$43,211.38	$46,220.10	$49,438.31	$52,880.58
Total Loan Payment	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36
Unpaid Loan Balance	$674,145.81	$636,377.05	$595,978.53	$552,767.15	$506,547.05	$457,108.74	$404,228.16
	$54,553.64	$54,553.64	$54,553.64	$54,553.64	$54,553.64	$54,553.64	$54,553.64
Accumulated Savings	$504,313.62	$558,867.26	$613,420.90	$667,974.54	$722,528.18	$777,081.82	$831,635.46

	2024	2025	2026	2027	2028	2029
Non-Recurring Benefits						
PG&E Rebate	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Non-Recurring Benefits	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Savings from the Investments						
Energy	$48,384.00	$48,384.00	$48,384.00	$48,384.00	$48,384.00	$48,384.00
Re-Ice	$12,375.00	$12,375.00	$12,375.00	$12,375.00	$12,375.00	$12,375.00
Re-Cool	$26,208.00	$26,208.00	$26,208.00	$26,208.00	$26,208.00	$26,208.00
Adjustments	$36,966.00	$36,966.00	$36,966.00	$36,966.00	$36,966.00	$36,966.00
Increase in Space	$12,740.00	$12,740.00	$12,740.00	$12,740.00	$12,740.00	$12,740.00
Total Savings	$136,673.00	$136,673.00	$136,673.00	$136,673.00	$136,673.00	$136,673.00
Total Increase in Cash	$136,673.00	$136,673.00	$136,673.00	$136,673.00	$136,673.00	$136,673.00
Loan Payments						
Interest Payment	$25,556.80	$21,618.48	$17,405.93	$12,900.07	$8,080.48	$2,925.30
Principal Payment	$56,562.56	$60,500.88	$64,713.43	$69,219.29	$74,038.88	$79,193.12
Total Loan Payment	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,118.42
Unpaid Loan Balance	$347,665.60	$287,164.72	$222,451.29	$153,232.00	$79,193.12	$0.00
	$54,553.64	$54,553.64	$54,553.64	$54,553.64	$54,553.64	$54,554.58
Accumulated Savings	$886,189.10	$940,742.74	$995,296.38	$1,049,850.02	$1,104,403.66	$1,158,958.24

Cash Flow Projections (5% reduction in savings)

	2010	2011	2012	2013	2014	2015	2016
Non-Recurring Benefits							
PG&E Rebate	$67,884.50	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Non-Recurring Benefits	$67,884.50	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Savings from the Investments							
Energy	$45,964.80	$45,964.80	$45,964.80	$45,964.80	$45,964.80	$45,964.80	$45,964.80
Re-Ice	$11,756.25	$11,756.25	$11,756.25	$11,756.25	$11,756.25	$11,756.25	$11,756.25
Re-Cool	$24,897.60	$24,897.60	$24,897.60	$24,897.60	$24,897.60	$24,897.60	$24,897.60
Adjustments	$35,117.70	$35,117.70	$35,117.70	$35,117.70	$35,117.70	$35,117.70	$35,117.70
Increase in Space	$12,103.00	$12,103.00	$12,103.00	$12,103.00	$12,103.00	$12,103.00	$12,103.00
Total Savings	$129,839.35	$129,839.35	$129,839.35	$129,839.35	$129,839.35	$129,839.35	$129,839.35
Total Increase in Cash	$197,723.85	$129,839.35	$129,839.35	$129,839.35	$129,839.35	$129,839.35	$129,839.35
Loan Payments							
Interest Payment	$60,076.33	$58,541.53	$56,899.85	$55,143.87	$53,265.63	$51,256.61	$49,107.70
Principal Payment	$22,043.03	$23,577.83	$25,219.51	$26,975.49	$28,853.73	$30,862.75	$33,011.66
Total Loan Payments	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36
Unpaid Loan Balance	$877,956.97	$854,379.14	$829,159.63	$802,184.14	$773,330.41	$742,467.66	$709,456.00
	$115,604.49	$47,719.99	$47,719.99	$47,719.99	$47,719.99	$47,719.99	$47,719.99
Accumulated	$115,604.49	$163,324.48	$211,044.47	$258,764.46	$306,484.45	$354,204.44	$401,924.43

20 year loan of :	$900,000.00
loan rate:	6.75%

	2017	2018	2019	2020	2021	2022	2023
Non-Recurring Benefits							
PG&E Rebate	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Non-Recurring Benefits	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Savings from the Investments							
Energy	$45,964.80	$45,964.80	$45,964.80	$45,964.80	$45,964.80	$45,964.80	$45,964.80
Re-Ice	$11,756.25	$11,756.25	$11,756.25	$11,756.25	$11,756.25	$11,756.25	$11,756.25
Re-Cool	$24,897.60	$24,897.60	$24,897.60	$24,897.60	$24,897.60	$24,897.60	$24,897.60
Adjustments	$35,117.70	$35,117.70	$35,117.70	$35,117.70	$35,117.70	$35,117.70	$35,117.70
Increase in Space	$12,103.00	$12,103.00	$12,103.00	$12,103.00	$12,103.00	$12,103.00	$12,103.00
Total Savings	$129,839.35	$129,839.35	$129,839.35	$129,839.35	$129,839.35	$129,839.35	$129,839.35
Total Increase in Cash	$129,839.35	$129,839.35	$129,839.35	$129,839.35	$129,839.35	$129,839.35	$129,839.35
Loan Payments							
Interest Payment	$46,809.17	$44,350.60	$41,720.84	$38,907.98	$35,899.26	$32,681.05	$29,238.78
Principal Payment	$35,310.19	$37,768.76	$40,398.52	$43,211.38	$46,220.10	$49,438.31	$52,880.58
Total Loan Payment	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36
Unpaid Loan Balance	$674,145.81	$636,377.05	$595,978.53	$552,767.15	$506,547.05	$457,108.74	$404,228.16
	$47,719.99	$47,719.99	$47,719.99	$47,719.99	$47,719.99	$47,719.99	$47,719.99
Accumulated Savings	$449,644.42	$497,364.41	$545,084.40	$592,804.39	$640,524.38	$688,244.37	$735,964.36

	2024	2025	2026	2027	2028	2029
Non-Recurring Benefits						
PG&E Rebate	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Non-Recurring Benefits	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Savings from the Investments						
Energy	$45,964.80	$45,964.80	$45,964.80	$45,964.80	$45,964.80	$45,964.80
Re-Ice	$11,756.25	$11,756.25	$11,756.25	$11,756.25	$11,756.25	$11,756.25
Re-Cool	$24,897.60	$24,897.60	$24,897.60	$24,897.60	$24,897.60	$24,897.60
Adjustments	$35,117.70	$35,117.70	$35,117.70	$35,117.70	$35,117.70	$35,117.70
Increase in Space	$12,103.00	$12,103.00	$12,103.00	$12,103.00	$12,103.00	$12,103.00
Total Savings	$129,839.35	$129,839.35	$129,839.35	$129,839.35	$129,839.35	$129,839.35
Total Increase in Cash	$129,839.35	$129,839.35	$129,839.35	$129,839.35	$129,839.35	$129,839.35
Loan Payments						
Interest Payment	$25,556.80	$21,618.48	$17,405.93	$12,900.07	$8,080.48	$2,925.30
Principal Payment	$56,562.56	$60,500.88	$64,713.43	$69,219.29	$74,038.88	$79,193.12
Total Loan Payment	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,118.42
Unpaid Loan Balance	$347,665.60	$287,164.72	$222,451.29	$153,232.00	$79,193.12	$0.00
	$47,719.99	$47,719.99	$47,719.99	$47,719.99	$47,719.99	$47,720.93
Accumulated Savings	$783,684.35	$831,404.34	$879,124.33	$926,844.32	$974,564.31	$1,022,285.24

Cash Flow Projections (10% reduction in savings)

	2010	2011	2012	2013	2014	2015	2016
Non-Recurring Benefits							
PG&E Rebate	$67,884.50	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Non-Recurring Benefits	$67,884.50	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Savings from the Investments							
Energy	$43,545.60	$43,545.60	$43,545.60	$43,545.60	$43,545.60	$43,545.60	$43,545.60
Re-Ice	$11,137.50	$11,137.50	$11,137.50	$11,137.50	$11,137.50	$11,137.50	$11,137.50
Re-Cool	$23,587.20	$23,587.20	$23,587.20	$23,587.20	$23,587.20	$23,587.20	$23,587.20
Adjustments	$33,269.40	$33,269.40	$33,269.40	$33,269.40	$33,269.40	$33,269.40	$33,269.40
Increase in Space	$11,466.00	$11,466.00	$11,466.00	$11,466.00	$11,466.00	$11,466.00	$11,466.00
Total Savings	$123,005.70	$123,005.70	$123,005.70	$123,005.70	$123,005.70	$123,005.70	$123,005.70
Total Increase in Cash	$190,890.20	$123,005.70	$123,005.70	$123,005.70	$123,005.70	$123,005.70	$123,005.70
Loan Payments							
Interest Payment	$60,076.33	$58,541.53	$56,899.85	$55,143.87	$53,265.63	$51,256.61	$49,107.70
Principal Payment	$22,043.03	$23,577.83	$25,219.51	$26,975.49	$28,853.73	$30,862.75	$33,011.66
Total Loan Payments	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36
Unpaid Loan Balance	$877,956.97	$854,379.14	$829,159.63	$802,184.14	$773,330.41	$742,467.66	$709,456.00
	$108,770.84	$40,886.34	$40,886.34	$40,886.34	$40,886.34	$40,886.34	$40,886.34
Accumulated	$108,770.84	$149,657.18	$190,543.52	$231,429.86	$272,316.20	$313,202.54	$354,088.88

20 year loan of :	$900,000.00
loan rate:	6.75%

	2017	2018	2019	2020	2021	2022	2023
Non-Recurring Benefits							
PG&E Rebate	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Non-Recurring Benefits	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Savings from the Investments							
Energy	$43,545.60	$43,545.60	$43,545.60	$43,545.60	$43,545.60	$43,545.60	$43,545.60
Re-Ice	$11,137.50	$11,137.50	$11,137.50	$11,137.50	$11,137.50	$11,137.50	$11,137.50
Re-Cool	$23,587.20	$23,587.20	$23,587.20	$23,587.20	$23,587.20	$23,587.20	$23,587.20
Adjustments	$33,269.40	$33,269.40	$33,269.40	$33,269.40	$33,269.40	$33,269.40	$33,269.40
Increase in Space	$11,466.00	$11,466.00	$11,466.00	$11,466.00	$11,466.00	$11,466.00	$11,466.00
Total Savings	$123,005.70	$123,005.70	$123,005.70	$123,005.70	$123,005.70	$123,005.70	$123,005.70
Total Increase in Cash	$123,005.70	$123,005.70	$123,005.70	$123,005.70	$123,005.70	$123,005.70	$123,005.70
Loan Payments							
Interest Payment	$46,809.17	$44,350.60	$41,720.84	$38,907.98	$35,899.26	$32,681.05	$29,238.78
Principal Payment	$35,310.19	$37,768.76	$40,398.52	$43,211.38	$46,220.10	$49,438.31	$52,880.58
Total Loan Payment	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36
Unpaid Loan Balance	$674,145.81	$636,377.05	$595,978.53	$552,767.15	$506,547.05	$457,108.74	$404,228.16
	$40,886.34	$40,886.34	$40,886.34	$40,886.34	$40,886.34	$40,886.34	$40,886.34
Accumulated Savings	$394,975.22	$435,861.56	$476,747.90	$517,634.24	$558,520.58	$599,406.92	$640,293.26

	2024	2025	2026	2027	2028	2029
Non-Recurring Benefits						
PG&E Rebate	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Non-Recurring Benefits	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Savings from the Investments						
Energy	$43,545.60	$43,545.60	$43,545.60	$43,545.60	$43,545.60	$43,545.60
Re-Ice	$11,137.50	$11,137.50	$11,137.50	$11,137.50	$11,137.50	$11,137.50
Re-Cool	$23,587.20	$23,587.20	$23,587.20	$23,587.20	$23,587.20	$23,587.20
Adjustments	$33,269.40	$33,269.40	$33,269.40	$33,269.40	$33,269.40	$33,269.40
Increase in Space	$11,466.00	$11,466.00	$11,466.00	$11,466.00	$11,466.00	$11,466.00
Total Savings	$123,005.70	$123,005.70	$123,005.70	$123,005.70	$123,005.70	$123,005.70
Total Increase in Cash	$123,005.70	$123,005.70	$123,005.70	$123,005.70	$123,005.70	$123,005.70
Loan Payments						
Interest Payment	$25,556.80	$21,618.48	$17,405.93	$12,900.07	$8,080.48	$2,925.30
Principal Payment	$56,562.56	$60,500.88	$64,713.43	$69,219.29	$74,038.88	$79,193.12
Total Loan Payment	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,118.42
Unpaid Loan Balance	$347,665.60	$287,164.72	$222,451.29	$153,232.00	$79,193.12	$0.00
	$40,886.34	$40,886.34	$40,886.34	$40,886.34	$40,886.34	$40,887.28
Accumulated Savings	$681,179.60	$722,065.94	$762,952.28	$803,838.62	$844,724.96	$885,612.24

Cash Flow Projections (15% reduction in sales)

	2010	2011	2012	2013	2014	2015	2016
Non-Recurring Benefits							
PG&E Rebate	$67,884.50	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Non-Recurring Benefits	$67,884.50	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Savings from the Investments							
Energy	$41,126.40	$41,126.40	$41,126.40	$41,126.40	$41,126.40	$41,126.40	$41,126.40
Re-Ice	$10,518.75	$10,518.75	$10,518.75	$10,518.75	$10,518.75	$10,518.75	$10,518.75
Re-Cool	$22,276.80	$22,276.80	$22,276.80	$22,276.80	$22,276.80	$22,276.80	$22,276.80
Adjustments	$31,421.10	$31,421.10	$31,421.10	$31,421.10	$31,421.10	$31,421.10	$31,421.10
Increase in Space	$10,829.00	$10,829.00	$10,829.00	$10,829.00	$10,829.00	$10,829.00	$10,829.00
Total Savings	$116,172.05	$116,172.05	$116,172.05	$116,172.05	$116,172.05	$116,172.05	$116,172.05
Total Increase in Cash	$184,056.55	$116,172.05	$116,172.05	$116,172.05	$116,172.05	$116,172.05	$116,172.05
Loan Payments							
Interest Payment	$60,076.33	$58,541.53	$56,899.85	$55,143.87	$53,265.63	$51,256.61	$49,107.70
Principal Payment	$22,043.03	$23,577.83	$25,219.51	$26,975.49	$28,853.73	$30,862.75	$33,011.66
Total Loan Payments	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36
Unpaid Loan Balance	$877,956.97	$854,379.14	$829,159.63	$802,184.14	$773,330.41	$742,467.66	$709,456.00
	$101,937.19	$34,052.69	$34,052.69	$34,052.69	$34,052.69	$34,052.69	$34,052.69
Accumulated	$101,937.19	$135,989.88	$170,042.57	$204,095.26	$238,147.95	$272,200.64	$306,253.33

20 year loan of :	$900,000.00
loan rate:	6.75%

	2017	2018	2019	2020	2021	2022	2023
Non-Recurring Benefits							

PG&E Rebate	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Non-Recurring Benefits	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Savings from the Investments							
Energy	$41,126.40	$41,126.40	$41,126.40	$41,126.40	$41,126.40	$41,126.40	$41,126.40
Re-Ice	$10,518.75	$10,518.75	$10,518.75	$10,518.75	$10,518.75	$10,518.75	$10,518.75
Re-Cool	$22,276.80	$22,276.80	$22,276.80	$22,276.80	$22,276.80	$22,276.80	$22,276.80
Adjustments	$31,421.10	$31,421.10	$31,421.10	$31,421.10	$31,421.10	$31,421.10	$31,421.10
Increase in Space	$10,829.00	$10,829.00	$10,829.00	$10,829.00	$10,829.00	$10,829.00	$10,829.00
Total Savings	$116,172.05	$116,172.05	$116,172.05	$116,172.05	$116,172.05	$116,172.05	$116,172.05
Total Increase in Cash	$116,172.05	$116,172.05	$116,172.05	$116,172.05	$116,172.05	$116,172.05	$116,172.05
Loan Payments							
Interest Payment	$46,809.17	$44,350.60	$41,720.84	$38,907.98	$35,899.26	$32,681.05	$29,238.78
Principal Payment	$35,310.19	$37,768.76	$40,398.52	$43,211.38	$46,220.10	$49,438.31	$52,880.58
Total Loan Payment	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36
Unpaid Loan Balance	$674,145.81	$636,377.05	$595,978.53	$552,767.15	$506,547.05	$457,108.74	$404,228.16
	$34,052.69	$34,052.69	$34,052.69	$34,052.69	$34,052.69	$34,052.69	$34,052.69
Accumulated Savings	$340,306.02	$374,358.71	$408,411.40	$442,464.09	$476,516.78	$510,569.47	$544,622.16

	2024	2025	2026	2027	2028	2029

Non-Recurring Benefits						
PG&E Rebate	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Non-Recurring Benefits	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Savings from the Investments						
Energy	$41,126.40	$41,126.40	$41,126.40	$41,126.40	$41,126.40	$41,126.40
Re-Ice	$10,518.75	$10,518.75	$10,518.75	$10,518.75	$10,518.75	$10,518.75
Re-Cool	$22,276.80	$22,276.80	$22,276.80	$22,276.80	$22,276.80	$22,276.80
Adjustments	$31,421.10	$31,421.10	$31,421.10	$31,421.10	$31,421.10	$31,421.10
Increase in Space	$10,829.00	$10,829.00	$10,829.00	$10,829.00	$10,829.00	$10,829.00
Total Savings	$116,172.05	$116,172.05	$116,172.05	$116,172.05	$116,172.05	$116,172.05
Total Increase in Cash	$116,172.05	$116,172.05	$116,172.05	$116,172.05	$116,172.05	$116,172.05
Loan Payments						
Interest Payment	$25,556.80	$21,618.48	$17,405.93	$12,900.07	$8,080.48	$2,925.30
Principal Payment	$56,562.56	$60,500.88	$64,713.43	$69,219.29	$74,038.88	$79,193.12
Total Loan Payment	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,119.36	$82,118.42
Unpaid Loan Balance	$347,665.60	$287,164.72	$222,451.29	$153,232.00	$79,193.12	$0.00
	$34,052.69	$34,052.69	$34,052.69	$34,052.69	$34,052.69	$34,053.63
Accumulated Savings	$578,674.85	$612,727.54	$646,780.23	$680,832.92	$714,885.61	$748,939.24

Partial Budget (5%)

Additional Costs	Additional Revenues
Cost of the Improvement $900,000.00	Rebate $67,884.50
Interest Cost $519,890.48	

Reduced Revenues	Reduced Costs
N/A	Energy Savings $602,971.59
	Re-Ice Savings $154,219.85
	Re-Cool Savings $326,609.61
	Adjustments Savings $460,678.07
	Increase in Space Savings $158,768.56

Total Additional Costs & Reduced Revenue	Total Additional Revenue & Reduced Costs
$1,419,890.48	$1,771,132.18
	Net Change in Profit $351,241.70

Partial Budget (3%)

Additional Costs	Additional Revenues
Cost of the Improvement $900,000.00	Rebate $67,884.50
Interest Cost $594,446.96	

Reduced Revenues	Reduced Costs
N/A	Energy Savings $719,831.74
	Re-Ice Savings $184,108.75
	Re-Cool Savings $389,908.86
	Adjustments Savings $549,960.74
	Increase in Space Savings $189,539.03

Total Additional Costs & Reduced Revenue $1,494,446.96	Total Additional Revenue & Reduced Costs $2,101,233.62
	Net Change in Profit $606,786.66