FINANCIAL ANALYSIS OF USE OF DOMESTIC SOLAR SYSTEMS IN SRI LANKA

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Degree of Master of Science

Department of Mathematics

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Thesis/Dissertation submitted in partial fulfillment of the requirements for the degree Master of Science

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Abstract

Srilanka is a country which produces electricity via hydropower, thermal power, coal power and wind power. Mainly, the Ceylon Electricity Board and Lanka Electricity Company Pvt Ltd have the authority access to the power grid and they distribute electricity to domestic and commercial customers. Due to the droughts, crude oil prices rise, and continuous breakdowns of coal power station, the unit price of the usage had increased rapidly through- out last decade. Hence the domestic users faced more difficulties and they had to search for low cost electricity power generation methods. Initial cost of the Solar systems is very high. Therefore in my intention was to find out are there any financial benefits of investing money on solar system. According to the cost functions and the revenue functions built, it can be identified that 5.0kw system has a brake even point of 84 units for monthly. When considering the net income for the systems, 5.0kw system has higher percentage (94.60%). According to the Balance Sheet of each project, 5.0kw project is more viable for the investor. Considering the cash flow statement, 5.0kw solar system has a positive closing cash balance up to the 8th year and after that it is moving to negative values while 3.3kw system has negative values throughout the period. Project Internal Rate of Return for 5.0kw project with 60 units consumption 5.0kw system has a profit value with the amount of Rs 55, 361.80 at the end of the period and 3.3kw system has a loss value of Rs 315,912.50. These findings can be used to find a suitable investment for the viable solution to the electricity cost in Srilanka.

Acknowledgement

I would also like to take this opportunity to thank the following people for their tremendous contribution made to successfully complete this research project.

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List of Abbreviations

NPV – Net Present Value

PV – Photovoltaic

CEB - Ceylon Electricity Board

LECO - Lanka Electricity Company (Pvt) Ltd

IRR - Internal Rate of Return

CF_0 - Initial Investment

CF_t - net after-tax cash inflow-outflows during a single period *t*

n - Each Period

N- Holding Period

P & L - Profit & Loss

DC - Direct Current

AC- Alternating current

USA – United State of America

CHAPTER 1. INTRODUCTION

Ceylon Electricity Board (CEB) and Lanka Electricity Company (Pvt) ltd (LECO) are the main electricity providers in Sri Lanka. They produce electricity mainly by hydropower and thermal power. Coal power and wind power also used to produce electricity at present. Over the past few years the domestic usage cost per unit has been increased rapidly. Hence the domestic customers are searching for other alternations such as generators and solar power system. Due to the high cost of diesel, fuel generated electricity power is not beneficial to the customer. Therefore such alternative finders were empower to use solar power system by the government by giving them lowest interest loan scheme and granted fix unit price for the purchasing solar unit. There are so many companies that provide solar systems and I selected Nawaloka (Pvt) Ltd to purchase quotations for my solar systems.

1.1 What Are Solar Panels?

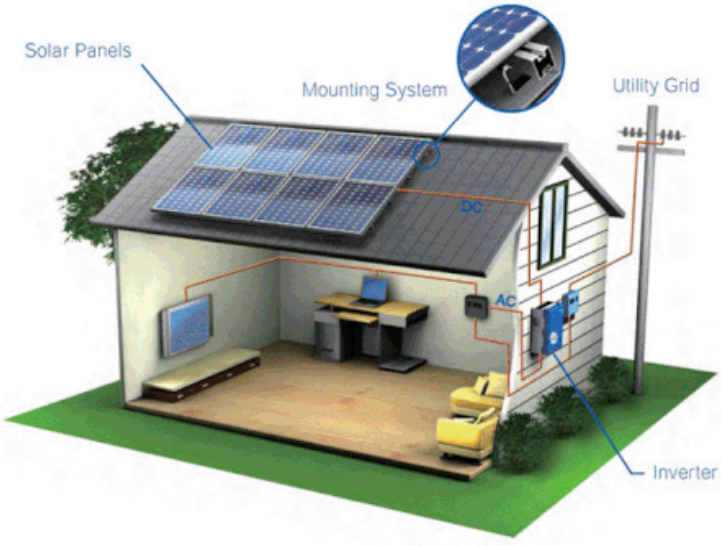


Figure 1.1 Solar panel

The phrase solar panels are used for a few different types of items that make energy by collecting sunlight from natural sun rays. The main function of the solar panel is converts sunlight directly into DC (Direct Current) electricity. Other than

above definition, people use the solar panel in various purposes, such as heats a liquid such as water, or solar air heaters, which heats air directly.

1.2 Solar Photovoltaic (Solar PV): Background

In 1954 Solar cells and photovoltaic's were first invented by conducting lots of studies about solar cells and photoelectric technologies and researchers beginning to use the sun's energy for other purposes. Since that day solar cells has been using for many decades. That has proved the consistently work of solar.

Similar to most other technologies, solar power has enhanced immensely over time, gaining more efficiency and becoming a more practicable alternative for homes and industry. At the time it was first invented, every cell had a 6.00% efficiency rate. Today, most cells process an efficiency rate of 25.00% though there are cells being build with more than 40.00% efficiency. It is a truly remarkable transformation, and a testament to current technology.

Sometimes this solar PV can be difficult to comprehend, especially when it is using for your home or industry. There are many things to consider, but the initial step is to identify with the basic technology under the panels.

As the researcher above mentioned, solar panels contain solar cells which observed heat energy from the sun. After this solar energy is trapped, an inverter is used to convert the solar energy so that it is utilizable within your home or industry to power items with electricity.

This solar PV is considered 'pure' energy because it observes energy from a renewable power resource, which is our sun. Our planet earth is constantly getting energy from the sun, overall solar is a wonderful environmentally friendly solution in the world that uses huge amounts of energy.

1.2.1 How does a solar panel work?

In a sunny day, rays of huge sunlight strike solar cells, moving the inside electrons in the cell through the wires to generate electricity. According to the definition of Direct Current (DC) this generated electricity is in one direction. As

opposed for Alternating Current (AC), where the electrons are going back and forth 50-60 times (50-60Hz) per second. Due to the above factor the installing process need an inverter to correct it. This inverter process makes the Direct Current to Alternating Current and creates it usable with our home's accessory in daily life.

In the inside of the panel, one part of the cell, there's an overabundance of electrons and on the other side there is a short of electrons. This current static imbalance of charges on the cell is created by manufacture to doping each side of the silicon solar cell with various chemicals. Every side of the solar cell is effectively linked to wires or soldered leads. The positive(+) and negative(-) wires linked to whatever you want to electrically charge or power. Linking the leads in its own electrical load, while shut downing the current path, does not let to the electrons to flow, even though the positive(+) and negative(-) imbalance. It takes sunlight hitting the silicon in the solar cells to loosen up electrons. After they a freed up, they straight away start flowing through the wires to supply power the electrical loads. The more strong sunlight shines on the cells, the more electrons loosen up, the more electrical current flows and the more power it makes.

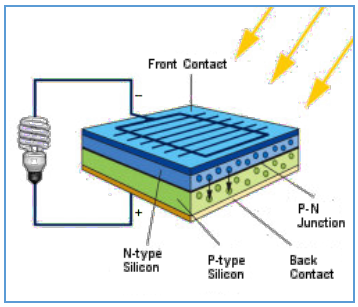


Figure1.2 How Solar panel generate energy

In this research the researcher explain how cells work jointly to create various voltage options, and what all the various ratings in the specification brochures mean.

1.2.2 Are solar power systems practical for home owners?

In this part the researcher reviews when solar systems are practical for homes and when they're not. If you consider a house or apartment with roof that roughly points south (north if south of the equator) with no shading by trees, hills, other

homes with good sun light around 9.00AM to 3.00PM, then you have some prime real estate for putting a solar system on that house or apartment. Government gaudiness to support “Rivi Bala Sangramaya” has make the cost for the solar panel dropped considerably in the last few years, making it such that, with tax incentives or rebates, a grid-tie solar system will pay for itself in just a few years. Basically, for the price of last year electricity, you get 25 to 35 years of electricity. In fact, our solar systems will likely keep on making electricity at a lower rate for even decades after that.

Places that get lots of gloom throughout the day are not efficient to install solar power systems. It’s clear that with the advent of micro inverters and grid-tie inverters that have DC optimizers connected to each individual solar panel, some places with a bit of shading can still be an alternative.

1.2.3 Types of solar power systems

- Grid-Tie Solar Systems- This is for those who wish to significantly decrease their electric bill while having their electricity utility services.
- Grid-Tie Solar Systems with Battery Backup- Best for those who want the security of continuous power in outage-prone locations already have electric utility service.
- Off-Grid Cabin Solar Systems- This is for the scaled-down electricity power needs of tiny homes and isolated cabins, going off the electricity grid.
- Off-Grid Solar Systems- Those who didn’t want an electric bill. This system is planned for the power needs of mid-to-large size residency, going off a grid.

1.2.4 The benefits of solar energy at residence solar system contain:

- free of charge electricity
- solar is a non-polluting renewable power resource
- Solar panels are lifelong and need minor maintenance

For a solar PV installation, it's unique procedure , some materials will require to be acquire separately to suit the needs of our specific project and local rules and regulations. Solar systems harness the power of the sun to create electricity for our resident palaces. Above renewable energy systems are exists for resident that are linked to the electric power grid, off-grid locations, and a hybrid of grid-tied with battery back-up.

1.3 Research Problem

Sri Lanka is a country which frequently dependent on the following power source to complete our electricity requirements.

- Hydropower
- Thermal power
- Coal power
- Wind power

According to the higher growth of industry of manufacturing and increasing population in Sri Lanka may increase the current electricity utilization and it's obvious that generation of electricity must be enlarge considerably in near future. The Sri Lankan Government had step into fulfill this high demand of electricity. According to this concept "Rivi Bala Sangramaya" the Government has been taken to promote the use of solar energy. It's an excellent alternative for energy crises. This is a totally eco friendly project which reduce environmental pollution. In Sri Lanka the electricity supply industry is dominated by state sector institutions.

- Ceylon Electricity Board (CEB)
- Lanka Electricity Company (Pvt) Ltd (LECO).

From the beginning of the year 2014 Sri Lanka caused by severe drought yearly. This was highly making an impact on hydroelectric plants on Sri Lanka. The Country had gone through rolling blackouts for 3 to 5 hours per day power cuts.

Therefore the Sri Lankan government initiates to support the domestic electricity customers to turn in to solar power producing in houses to supply

electricity to national grid by introducing loan scheme with the law interest rate through government sector and private sector bank. The private sector company supplies the solar panel system to customer with various capacity output. In this research we look those several option given to customer by some private company and understand the economical benefit of investing on that solar project and invest them with efficiency. Ceylon Electricity Board will pay for the domestic customers as follows when they provide units to national grid.

CEB has introduce three main scheme for solar system

CEB has introduce three main scheme for solar system

1. **Net Accounting**

If electricity units generated using solar panels installed in their homes / premises are more than he consumed, the customer will be paid Rs. 22.00 per unit for the first seven years and Rs. 15.50. If the consumption exceeds the amount he generates, the consumer must pay the existing electricity tariff for the excess electricity consumed.

2. **Net Plus**

Payment for electricity generated using solar panels installed in their homes / premises. Unlike net measurement, there is no relationship between the consumer's electricity consumption and electricity generation. The consumer has to pay for the electricity consumed at the current rates. The Electricity Board will pay for all the electricity he generates.

3. **Net Metering**

The customer produce electricity using their solar panels fixed on their places and linked to the grid through net metering system. The end user has to pay only for the net amount of electricity that he used. In this system, if that specific customer’s generation exceeds his utilization, he can bring forward the balance and consume it in the future. No charge will be paid for the surplus electricity generated. The client will be given the choice of using the balance electricity within ten year period time.

In a circular dated May 28, 2019, the Deputy General Manager – Western Province North, under the directive of the Additional General Manager (Distribution Division 2) directs those responsible for approval, to “refrain from giving consent/approval for connecting rooftop Solar PV connections to CEB network which has the capacity over 50kW until further instructions.”

Hence here we analyze the net Accounting system which is majority of the solar users were using it. If We Assume the number of Unit is “X” and then the cost can be calculated as follows

If we use units between 1-30 they will charge us Rs 30.00 fix cost and Rs 2.5 per unit and our Total Cost will be 2.5*X+30. If we use units between 31-60 they will charge us Rs 105.00 fix cost and Rs 4.85 per unit and our Total Cost will be 4.85*(X-30)+105. If we use units between 61-90 they will charge us Rs 561.00 fix cost and Rs 10 per unit and our Total Cost will be 10*(X-60)+561. If we use units between 91-120 they will charge us Rs 1251 fix cost and Rs 27.27 per unit and our Total Cost will be 27.27*(X-90)+1251. (Refer to the Appendix A: Table of CEB units Charges)

Table 1.1 CEB Payment for solar unit

	Up to 7 Year	After 7 Years
Rs per Unit	Rs 22/-d	Rs 15/-

Table 1.2 CEB Domestic customer billing Charges

Monthly Consumption(kwh)	Unit Charge(Rs)	Fixed Charge(Rs)
61-90	10.00	90.00
91-120	27.75	480.00
121-180	32.00	480.00
>180	45.00	540.00

1.4 Research Objectives

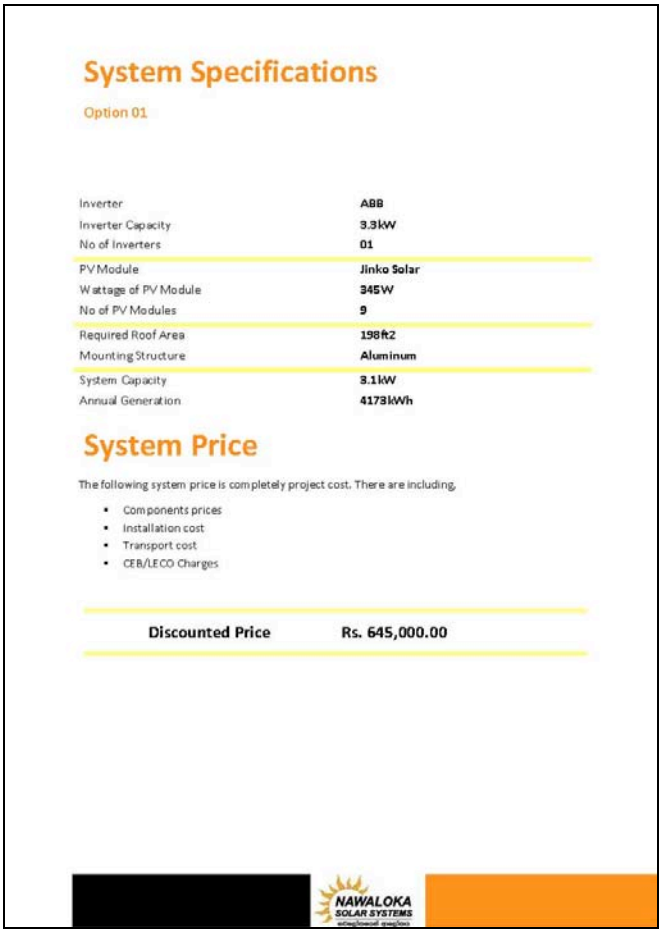
1. To build a model to identify the economical solar system that customer must choose
2. To find out which number of units for each to be produce for the break-even point for relevant solar system.
3. To find out the economical benefits of investing a solar system through a bank loan.
4. To identify factors which need to be improved in order to enhance the financial productivity.

1.5 Significance of the Study

This study will throw light on how the customer choose suitable solar system which give them the best economical benefit. This will also show how the investment should make and outcomes of each investment. It will be possible to find out the factors which will enhance the productivity.

1.6 Scope of the Study

This research will be limited to the solar system supply Company in Sri Lanka Nawaloka (Pvt) Ltd Peliyagoda. The Quotations has been submitted according the request done by me for the purpose of this project. According to the solar system supplying company in Sri Lanka we selected Nawaloka (Pvt) Ltd Peliyagoda which was registered company under Sri Lanka Sustainable Energy Authority for selling solar system. They have most number of selling solar system are 3.3kw and 5kw to the domestic customers, they have give us following quotation.



System Specifications

Option 01

Inverter	ABB
Inverter Capacity	3.3kW
No of Inverters	01
PV Module	Jinko Solar
Wattage of PV Module	345W
No of PV Modules	9
Required Roof Area	198ft2
Mounting Structure	Aluminum
System Capacity	3.1kW
Annual Generation	4173kWh

System Price

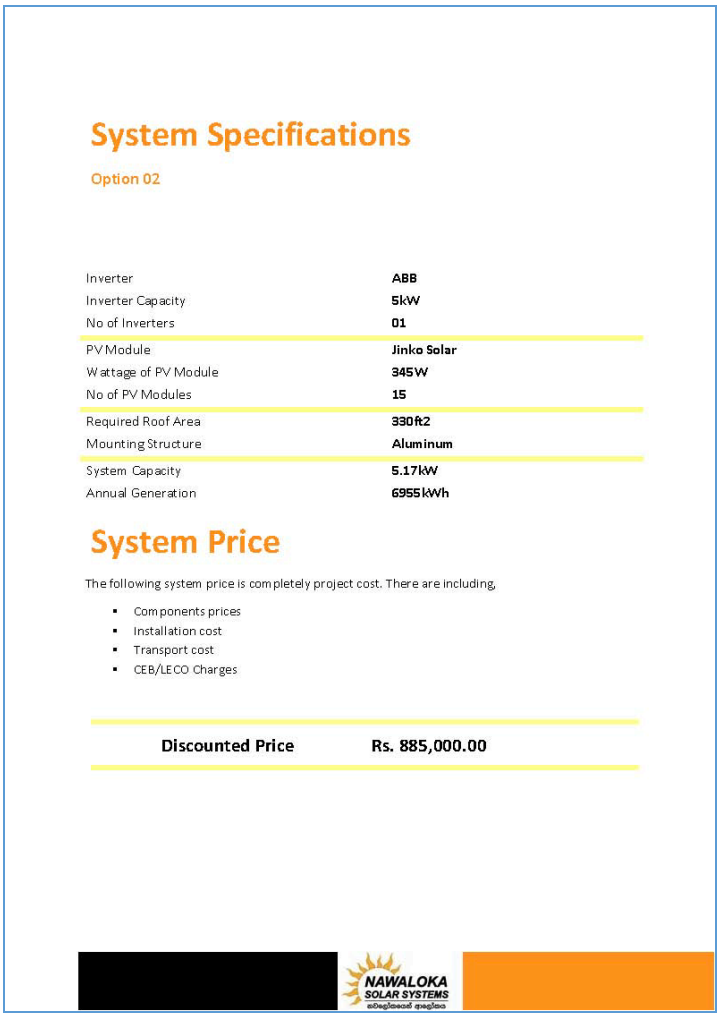
The following system price is completely project cost. There are including,

- Components prices
- Installation cost
- Transport cost
- CEB/LECO Charges

Discounted Price	**Rs. 645,000.00**

NAWALOKA SOLAR SYSTEMS

Figure 1.3 Quotation for 3.3kw solar system



System Specifications

Option 02

Inverter	ABB
Inverter Capacity	5kW
No of Inverters	01
PV Module	Jinko Solar
Wattage of PV Module	345W
No of PV Modules	15
Required Roof Area	330ft2
Mounting Structure	Aluminum
System Capacity	5.17kW
Annual Generation	6955kWh

System Price

The following system price is completely project cost. There are including,

- Components prices
- Installation cost
- Transport cost
- CEB/LECO Charges

Discounted Price	Rs. 885,000.00

NAWALOKA SOLAR SYSTEMS

Figure 1.4 Quotation for 5.0 kw solar system

They have given a Warranty Terms Inverter 10 Years, PV Module 25 Years, Aluminum Structure 25 Years and Switchgears 01 Years. According to payment schedule we have to pay To confirm the order 30% , Before delivery 20%, After installation 40.00% and After commissioning 10%

We selected Bank of Ceylon, a government bank as the facility provider to this project. They have introduced loan scheme under Enterprise Sri Lanka as “Rooftop Solar Power Generation Line Of Credit Project” with a repayment period of 10 years and interest rate of 8% p.a. According to this scheme for residential purpose they have no maximum and minimum loan amount and up to Rs 1,500,000/- 100% installation cost could be financed by bank if the maximum capacity is under

50kw. The bank has conditioned the warranty periods given by supplier should be minimum 20 years for solar panels, invertors minimum 10 years and solar system minimum 3 years. Therefore our selected company has full fill above requirements.

1.7 Summery

During eight months of 2017, relevant electricity generation shares in total generation were 23.00% hydropower and other renewable (NCRE) ,40.00% Coal, and 37.00% Oil

Source	Capacity	No. of Power Plant
Major Hydro	1,364 MW	17
Thermal		
Coal	900 MW	1
CEB	604 MW	7
IPP	611 MW	5
Renewable Energy		
Mini Hydro	356 MW	182
Wind	128 MW	15
Solar	51 MW	8
Biomass	29 MW	9
Total Capacity	**4,043 MW**	244

Figure1.5 Source of Generation of Electricity in year 2017

From the year 2018 to year 2037, Sri Lanka plans to increase 842.00MW of Major Hydro, 215.00MW of Mini Hydro, 1,389.00MW of solar, 1,205.00MW of wind, 85.00MW of biomass, 425.00MW of oil-based power, 1,500.00MW of natural gas and 2,700.00MW of coal power into the national electricity generation system. The annual total electricity requirement is about 14,150.00GWh. This annual demand for electricity is anticipated to boost by 6% to 8%.

CHAPTER 2. LITERATURE REVIEW

In this chapter the researcher had discussed past research and publication done on profitability and the effectiveness of using solar Photovoltaics. There are many researches and publication done on worldwide on this subject. Unfortunately Sri Lanka is not yet in the aggressive mode to do more research and develops this technology. Hence the researcher had gone through following research and publication to get idea to do this research.

Lisa Bosman from University of Wisconsin Milwaukee has carried out a research on 2014 August on "A Decision Support System to Analyze, Predict, and Evaluate Solar Energy System Performance: PVSysCO (photovoltaic System Comparison)". Her research done on 2010 reveal that the department of energy of United State of America announce that the sun shot initiative, which was targeted to decrease the cost of solar installation technology by 75%from the year 2010 to 2020 to implies the solar is a top main concern at United State of America and also other fast developing countries around the world wide. The main objective of the researcher was listing careful on developing a model to identify the consistency and performance of solar Photovoltaic (PV) system over time. According to the model she expressed will be used to evaluate, analyze and predict the performance of solar PV energy system, according to technological and geographical location attributes. The researcher's main goal was to create a "Solar Energy Blue Book" conceptually equal to the "Kelly Blue Book", which was similar model, used to estimate the value of a used Vehicle. This solar energy system evaluation model "Solar Energy Blue Book" will help the customer to estimate the value of a used solar system after considerations of many facts. For example latitude which helps to identify the quantity of sunlight and zip code which identify the approximate cost of electricity. This model also allows the customers to measure the return of the investment for existing solar as well as new users.

There are other easily accessible tools available online to predict the PV energy production performance and associated value, however, many can be costly, focus on hybrid renewable energy systems, or are simply outdated. Parameter Array Performance Model is a Parameter Array Performance Model was created in 1989 by

the Wisconsin Solar Energy Laboratory. It's an semi-empirical model, utilizing data from manufacturers in addition to theoretical equations, to predict the power outcome of solar modules based off 5 parameters: light current (IL), diode reverse saturation current (Io), series resistance (Rs), shunt resistance (Rsh). The major benefit of this model is module produce data sheets that can be used to calculate the required parameters. This model can be downloaded for free online (http://sel.me.wisc.edu/software.shtml).

The researcher used following mentioned General design manners to conduct the research. Per-treatment unit Contains sandfilter, active carbon filter and cartridge filter. For process intensification, Sand filter and active carbon filter may be connected as dual media filter; solar sub unit (PV modules) Multi-crystalline and mono-crystalline PV cells are widely utilized. Solar tracking of PV modules can increase the overall power output, Pumping unit, High pressure pump and motor also her concern to approach the build the model. She has gone thorough following obstacles on her project. The first obstacle was considerable capital investment to a conventional electricity used by users. Lowe reliability of availability and lager footprint of plant are other obstacle which were identify during the research. Increasing the permeability of reverse osmosis membrane was identify. She had attempted to make modification in poly-amide layer either by surface modification or by imparting non-material for better water flux and lower fouling. She has make Efforts to increase the photovoltaic efficiency by cooling. In her conclusion she has reveal that solar powered reverse osmosis has been the most practiced desalination among its other Renewable energy counterparts. Solar thermal powered desalination and solar PV powered desalination are two options when the water has to be desalinated by solar power. Photovoltaic powered desalination is the most attractive option owing to its simplicity and decreasing cost because of research and development. The combined approach of utilizing the captured thermal energy from solar photovoltaic for Reverse Osmosis and making morphological changes in membrane can make the solar powered reverse osmosis frugal from energy point of view and thus attractive.

National renewable energy laboratory of United State of America (U.S.A) had conducted a research with Paul Denholm, Robert M. Margolis, Sean Ong, and Billy Roberts 2009 December. In their research they forecast on the key drivers and sensitivities to find the Break-Even Cost for Residential Photovoltaics. This research team had widely gave an update of Photovoltaics break-even cost for residential customers in United State of America. This research team had defined the point of break-even cost in following manner.

Net Present Cost of Photovoltaics= Net present Benefit

The net present cost of Photovoltaics system included the all financing with home equity loan and down payment. Net present benefit was cumulative discounted benefits of decreased electricity bill of residency. This research team had considered a period of 30 years. They had selected a sample of largest 1,000 utilities in the United State of America in the period of end of year 2008 to beginning of year 2009 to examine the break –even cost. At that time break-even cost of Photovoltaics in United State of America change by more than a factor of 10. They had identified that key drivers of the brake-even cost of Photovoltaics effects on following selected factors.

- Non-technical factors.
- The rate structure.
- Availability of system finance.

Hence going through the break-even conditions, the general trend that they identify was that the Southwest of United State of America driven by resources ad Northwest of United State of America was driven by high electricity cost. Due to the price deduction of solar PV system, Southeast and Midwest areas break even conditions began too. The low Cost for the electricity will preclude the break-even conditions in some identify areas such as Northwest and Midwest. In their research procedure they do not consider the sustained market in United State of America.

CHAPTER 3. METHODOLOGY

This chapter discusses the study area and theoretical background of this research. This section refers to fixed annuities which provide regular periodic payments, net present values of the project, interest rate, internal rate of return, profit & loss table, balance sheet, cash flow statement of project and project pay back method.

3.1 Fixed Annuity

This refers a fixed annuity is a type of annuity contract that allows for the accumulation of capital on a tax-deferred basis. This fixed annuity can be annuitized to present the annuitant with a guaranteed income payout for a specified term. Considering the monthly annuity amount we have following equation.

$$MontlyAmount = \frac{Total}{\left[\frac{(1+r)^{(n+1)}-1}{r}-1\right]}$$, Where

n – No of months

r – Monthly interest rate

3.2 Net Present Value (NPV)

This is the difference between the present value of cash inflow and the present value (PV) of cash outflow over a period of time. Net Present Value is used in capital budgeting and investment planning to analyze the profitability of a project.

$$NPV= \sum_{t=0}^{n} \frac{Rt}{(1+i)^t}$$, Where

R_t=net cash inflow-outflows during a single period t

i=discount rate or return that could be earned in alternative investments

t=number of time periods

3.3 Nominal Interest Rate

If given an effective rate of interest, a nominal rate of interest can be determined

$$i^{(m)} = m[(1 + i)^{1/m} - 1]$$, Where

i = interest, *i*, paid at the end of the year

m sub-periods per year

3.4 Loan Amortization Schedule

This schedule is a table that lists each regular payment on a mortgage over time. A portion of each payment is applied toward the principal balance and interest, and the amortization schedule details how much will go toward each component of the mortgage payment done by customer. Basically, most of your payment goes toward the interest rather than the capital partial payment. The Amortization schedule will show as the term of your loan progresses, a larger share of your payment goes toward paying down the principal until the loan is paid in full at the end of the loan period.

Interest Payment

I_t is intended to cover the interest obligation that is payable at the end of year *t*. The interest is based on the outstanding loan balance at the beginning of year *t*.

$$I_t = 1 - v^{n-(t-1)}$$

Principal Repayment

once the interest owed for the year is paid off, then the remaining portion of the amortization payment goes towards paying back the principal:

$$P_t = v^{n-(t-1)}$$

Outstanding Loan Balance

The outstanding loan balance is calculated using the prospective method. However, the outstanding loan at the end of year *t* can also be viewed as the outstanding loan at the beginning of year *t less* the principal repayment that has just occurred.

$$\text{Out Standing Loan}_t = a_{\overline{n-t}|i}$$

n=loan be repaid with end-of-year payments of 1 over the next *n* years

The following amortization schedule illustrates the progression of the loan repayments

Year (t)	Payment	I_t	P_t	O/S Loan$_t$
1	1	$1 - v_i^n$	v_i^n	$a_{\overline{n-1}\|_i}$
2	1	$1 - v_i^{n-1}$	v_i^{n-1}	$a_{\overline{n-2}\|_i}$
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
t	1	$1 - v_i^{n-(t-1)}$	$v_i^{n-(t-1)}$	$a_{\overline{n-t}\|_i}$
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
$n-1$	1	$1 - v_i^2$	v_i^2	$a_{\overline{1}\|_i}$
n	1	$1 - v_i$	v_i	0
Total	n	$n - a_{\overline{n}\|_i}$	$a_{\overline{n}\|_i}$	

$$\text{Monthly Payment} = \frac{rP}{n\left[1-\left(1+\frac{r}{n}\right)^{-nt}\right]}$$

$$\text{Total Interest} = npt - P \text{, Where}$$

P= Principal Amount

r= interest rate

t= number of years

n=payment for a year

3.5 Internal Rate of Return – IRR

This is a metric used in capital budgeting to estimate the profitability of potential investments of a project. The IRR is a discount rate that makes the net

present value (NPV) of all cash flows from a particular project equal to 0 values. Internal Rate of Return calculations rely on the same formula as NPV dose on calculation.

$$0 = CF_0 + \frac{CF_1}{(1+IRR)} + \frac{CF_2}{(1+IRR)^2} + \frac{CF_3}{(1+IRR)^3} + \ldots + \frac{CF_n}{(1+IRR)^n}$$

Or

$$0 = NPV = \sum_{n=0}^{N} \frac{CF_n}{(1+IRR)^n}$$, Where

CF_0 = Initial Investment

CF_t = net after-tax cash inflow-outflows during a single period *t*

n= Each Period

N= Holding Period

NPV= Net Present Value

IRR=Internal Rate of Return

3.6 Profit & Loss Account (P&L)

This profit & loss account statement is a financial statement that summarizes the revenues, costs and expenses incurred during a specified period, usually a fiscal quarter or year which we decide. The P&L statement is synonymous with the income statement. These records provide information about a company's ability or inability to generate profit by increasing revenue, reducing costs or both for specify period. Some facts refer to the P&L statement as a statement of profit or loss, income statement, statement of operations, statement of financial results or income, earnings statement or expense statement.

To calculate net profit, follow this path:

1. Deduct discounts and allowances from your gross income (excluding VAT) to get your net income.

2. Deduct the cost of sales from your net incomes to find your gross profit.
3. Deduct overheads from your gross profit to get your operating profit.
4. Deduct any other expenses from your operating profit (plus any other income) to find your profit before tax.
5. Deduct tax to reach your net profit or net loss.

3.7 Balance Sheet

This balance sheet an financial statement that reports a company's or individual proprietor’s assets, liabilities and shareholders' equity at a specific point in time, and provides a basis for computing rates of return and evaluating its capital structure. Balance sheet is a financial statement that provides a snapshot of what a company owns and owes, as well as the amount invested by shareholders. This is used alongside other important financial statements such as the income statement and statement of cash flows in conducting fundamental analysis or which calculating financial ratios.

3.8 Cash Flow Statement

This statement is a financial statement that provides aggregate data regarding all cash inflows a company receives from its ongoing operations and external investment sources. This also includes all cash outflows that pay for business activities and investments during a given period. A company's or individual proprietor’s financial statements offer investors and analysts a portrait of all the transactions that go through the business, where every transaction contributes to its success. The cash flow statement is believed to be the most intuitive of all the financial statements because it follows the cash made by the business in three main ways—through operations, investment, and financing. The sum of these three segments is called net cash flow.

3.9 Project Pay Back Method

This method refers to the amount of time it takes to recover the cost of an investment. Simply put, the payback period is the length of time an investment reaches a breakeven point. The desirability of an investment is directly related to its payback period. Shorter paybacks mean more attractive investments.

3.10 Weighted average price

Here weighted average method used to assign the average cost of production to products which have several values for each product. Assume a product has unit price “x” and other product has “y”. Considering the “x” units for time period “z” and “y” units for the time period “w”

No of Years	Unit Price	Weight
Z	X	zx
W	Y	wy
z+w	$\frac{zx+wy}{z+w}$	(zx+wy)

3.11 Assumptions

1. It is assumed that Electricity board will not change the unit cost for 10 years
2. Solar system can be used without any repair &maintenance cost for 10 years
3. Solar system will generate exact number of units which manufacture mention on their quotations throughout the 10 year.
4. The Payment for the solar income will pay at the end of the year.
5. There is no depreciated during 10 years for Solar system due to the comprehensive warranty given by company
6. Average Domestic usage for period of one month is considered as 60 units.
7. Bond rate has been average from 2010 to date (June 2019) 10.74%

CHAPTER 4. ANALYSIS

4.1 Research Process

According to the project we can consider our cost and income as follows.

Income= Solar Income from CEB

Cost= Loan Installment cost + Electricity Bill Cost Per Month

Considering those Cost and Income for the each usage level, calculations done for the each solar systems as follows.

If we consider a period of “n” number of years with a monthly usage of CEB units “X” and “L” as the loan installment, we can build a model as follow for the separate usage category.

Category I 0<X<=30;

C_1= (2.5X+30)* $a^{(12)}_{\overline{n}|}$+L* $a^{(12)}_{\overline{n}|}$

Category II 30<X<=60;

C_2= (4.85(X-30)+150)* $a^{(12)}_{\overline{n}|}$+L* $a^{(12)}_{\overline{n}|}$

Category III 60<X<=90;

C_3= (10(X-60)+561)* $a^{(12)}_{\overline{n}|}$+L* $a^{(12)}_{\overline{n}|}$

Category IV 90<X<=120;

C_4= (27.27(X-90)+1251)* $a^{(12)}_{\overline{n}|}$+L* $a^{(12)}_{\overline{n}|}$

Considering the Revenue function the only revenue comes from selling generated solar units to CEB. Let consider “U” as the number of units generated by a each year, then our revenue will be as follows

R_1=U*22* $a_{\overline{7}|}$* $(1+i)^{n-7}$+ U* 15* $a_{\overline{n-7}|}$;

Solving above cost function and revenue function equations we can identify the relationship between the cost and the revenue at each usage level and find break-even number of units by equalizing cost function and revenue functions.

According to our selected 3.3kw and 5kw system and first we check the Loan Amortization schedule for each system if we purchase through a loan scheme.

First we look at the 3.3kw system purchase through a loan which has repayment period up to 10 years (120 months) and an interest rate of 8% with the installment of Rs 7,825.63. Refer to the Appendix B: Table of Loan Amortization schedule for Rs 645,000/-. Then we look at the 5.0kw system purchase through a loan which has repayment period up to 10 years (120 months) and interest rate of 8% with the installment of Rs 10,737.49. Refer to the Appendix C: Table of Loan Amortization schedule for Rs 885,000/-.

Cost function for the 3.3kw system with the monthly usage of units<=30

If the number of monthly units used by domestic customer=X

Then the future value of the cost function for period of 10 years

C1= (2.5X+30)* $a_{\overline{10}|}^{(12)}$ +7,825.63* $a_{\overline{10}|}^{(12)}$;

The future value for the Income function for the total project period of 10 years

R1=4,173*22* $a_{\overline{7}|} * (1+i)^3$ + 4,173* 15* $a_{\overline{3}|}$;

$$a_{\overline{10}|}^{(12)} = \left(\frac{(1+\frac{10.74\%}{12})^{10*12}}{\frac{10.74\%}{12}} - \frac{1}{\frac{10.74\%}{12}} \right)$$

$$a_{\overline{7}|} = \left(\frac{(1+10.74\%)^7}{10.74\%} - \frac{1}{10.74\%} \right) ((1+10.74\%)^3)$$

$$a_{\overline{3}|} = \left(\frac{(1+1074\%)^3}{10.74\%} - \frac{1}{10.74\%} \right)$$

Therefore we plot above cost function and income function on the same graph using matlab software.

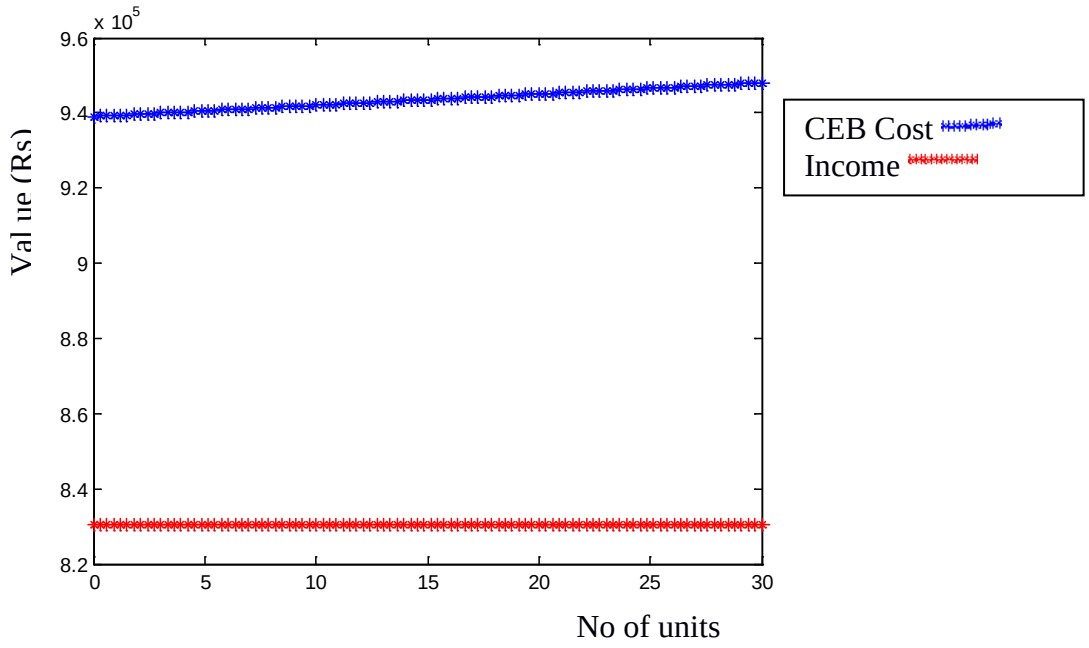


Figure 4.1 Cost Function and the Income Function of the 3.3kw with monthly usage of units<=30

According to the Figure 4.1 there is no intersection point. There is no Brake Even point for this situation. The Cost is high for the system compared to the income of the system for the given usage range.

Cost function for the 3.3kw system with the monthly usage of 30< units <=60

Then the future value of the cost function for period of 10 years

C2= (4.85(X-30)+105)* $a_{\overline{10}|}^{(12)}$ +7,825.63* $a_{\overline{10}|}^{(12)}$;

The future value for the Income function for the total project period of 10 years

R2=4,173*22* $a_{\overline{7}|} * (1+i)^3$+ 4,173* 15* $a_{\overline{3}|}$;

Therefore we plot above cost function and income function on the same graph using matlab software.

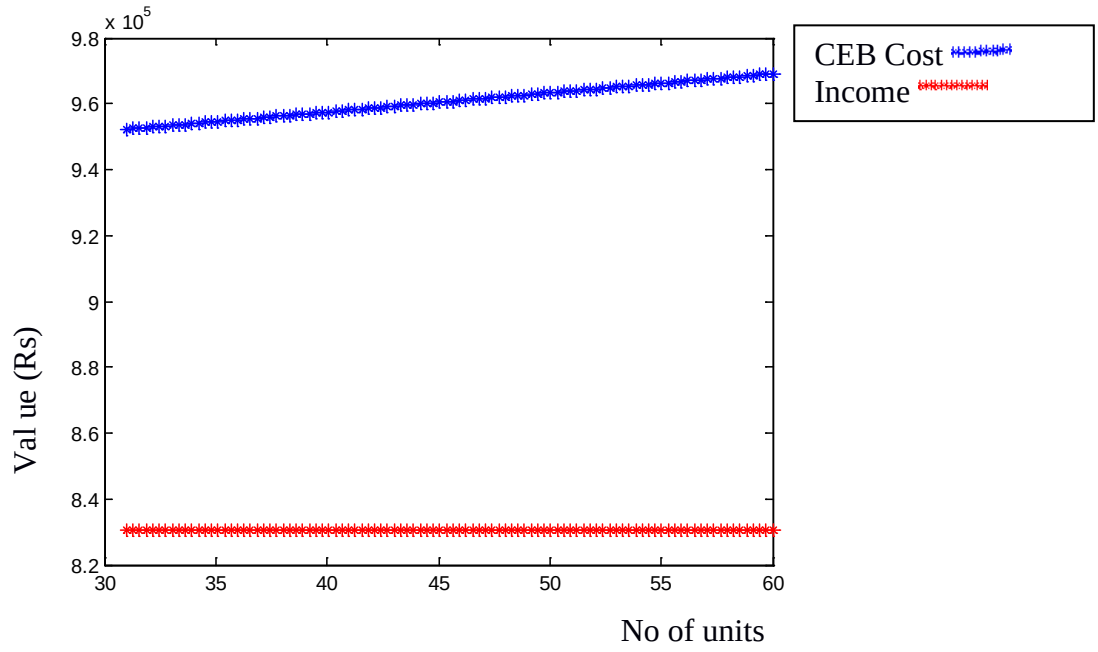


Figure 4.2 Cost Function and the Income Function of the 3.3kw with monthly usage of 31<units<=60

According to the Figure 4.2 there is no intersection point. There is no Brake Even point for this situation. The Cost is high for the system compared to the income of the system for the given usage range.

Cost function for the 3.3kw system with the monthly usage of 60<units<=90

Then the future value of the cost function for period of 10 years

C3= (10(X-60)+561) * $a_{\overline{10}|}^{(12)}$+7,825.63* $a_{\overline{10}|}^{(12)}$;

The future value for the Income function for the total project period of 10 years

R3=4,173*22* $a_{\overline{7}|}$* $(1+i)^3$+ 4,173* 15* $a_{\overline{3}|}$;

Therefore we plot above cost function and income function on the same graph using mathlab software.

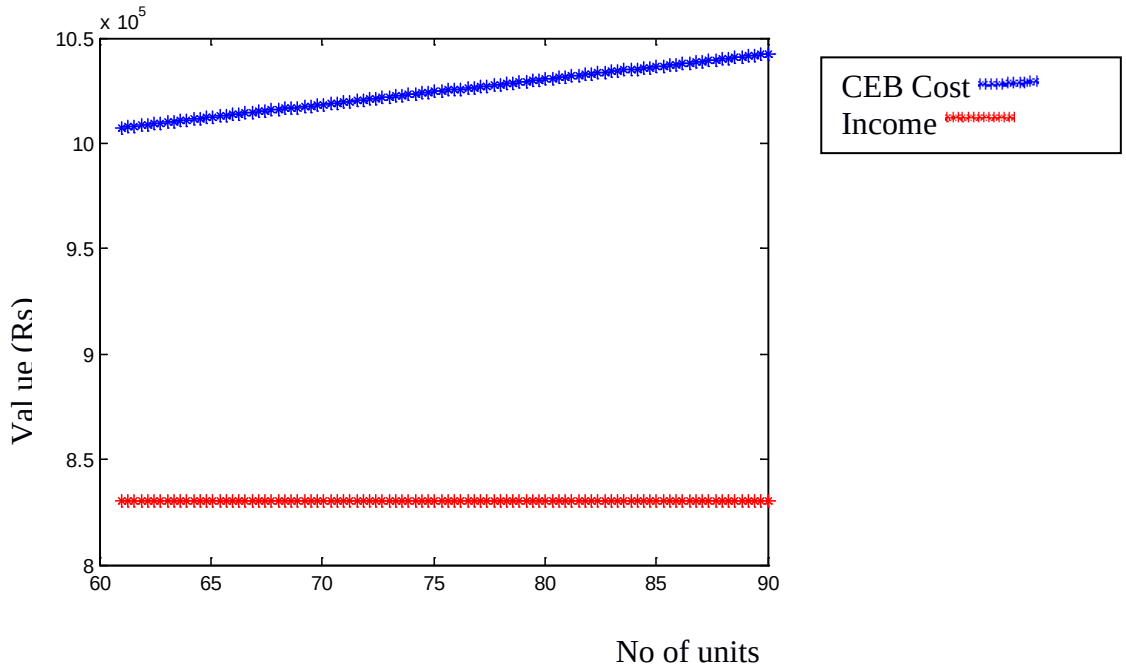


Figure 4.3 Cost Function and the Income Function of the 3.3kw with monthly usage of 61<units<=90

According to the Figure 4.3 there is no intersection point. There is no Brake Even point for this situation. The Cost is high for the system compared to the income of the system for the given usage range.

Cost function for the 3.3kw system with the monthly usage of 90<units<=120

Then the future value of the cost function for period of 10 years

C4= (27.27(X-90)+1251) * $a_{\overline{10}|}^{(12)}$ +7,825.63* $a_{\overline{10}|}^{(12)}$;

The future value for the Income function for the total project period of 10 years

R3=4,173*22* $a_{\overline{7}|} * (1+i)^3$ + 4,173* 15* $a_{\overline{3}|}$;

Therefore we plot above cost function and income function on the same graph using matlab software.

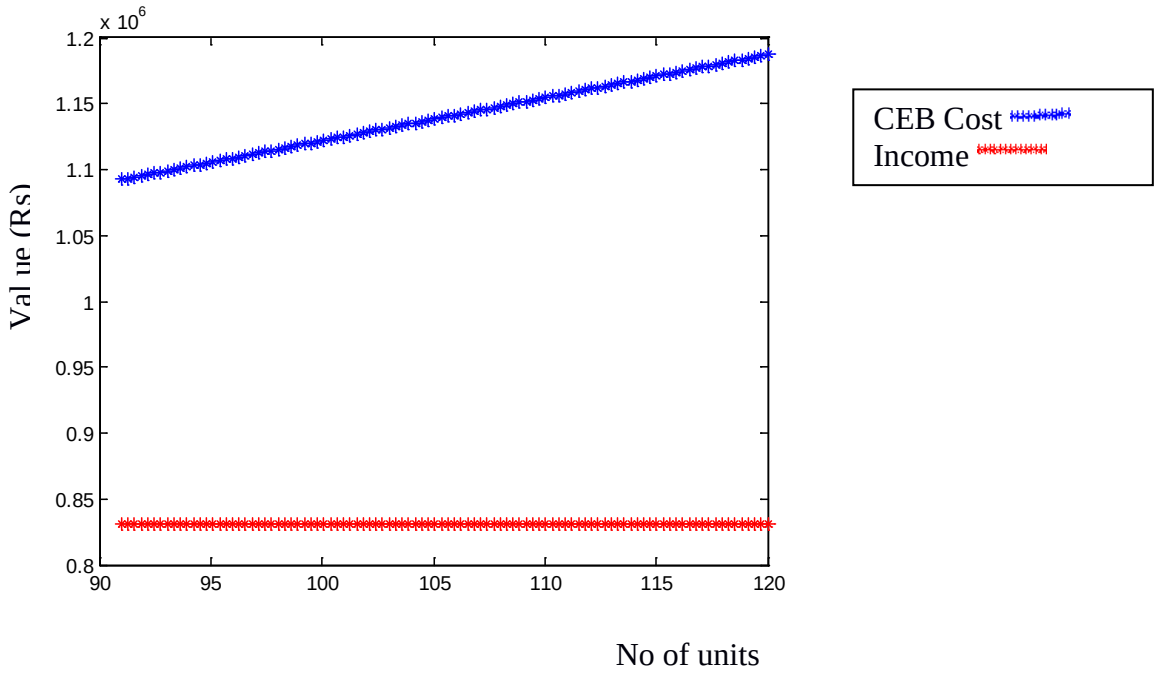


Figure 4.4 Cost Function and the Income Function of the 3.3kw with monthly usage of 91<units<=120

According to the Figure 4.4 there is no intersection point. There is no Brake Even point for this situation. The Cost is high for the system compared to the income of the system for the given usage range.

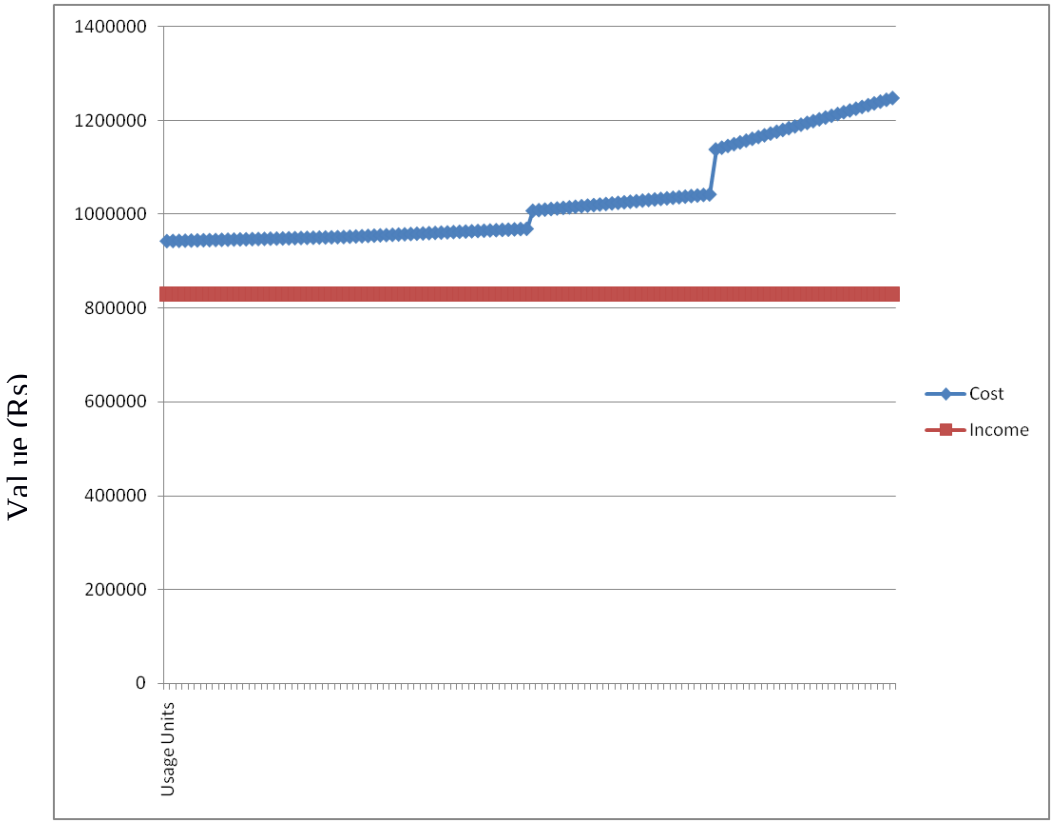


Figure 4.5 Summery of Cost Function and the Income Function of the 3.3kw

According to the Figure 4.5 there is no intersection point. There is no Brake Even point for this situation. The Cost is high for the system compared to the income of the system for the given usage range

Cost function for the 5.0kw system with the monthly usage of units<=30

If the number of monthly units used by domestic customer=X

Then the future value of the cost function for period of 10 years

C5= (2.5X+30) * $a_{\overline{10}|}^{(12)}$ +10,737.49* $a_{\overline{10}|}^{(12)}$;

The future value for the Income function for the total project period of 10 years

R5=6,955*22* $a_{\overline{7}|}$ * $(1+i)^3$ + 6,955* 15* $a_{\overline{3}|}$;

Therefore we plot above cost function and income function on the same graph using matlab software.

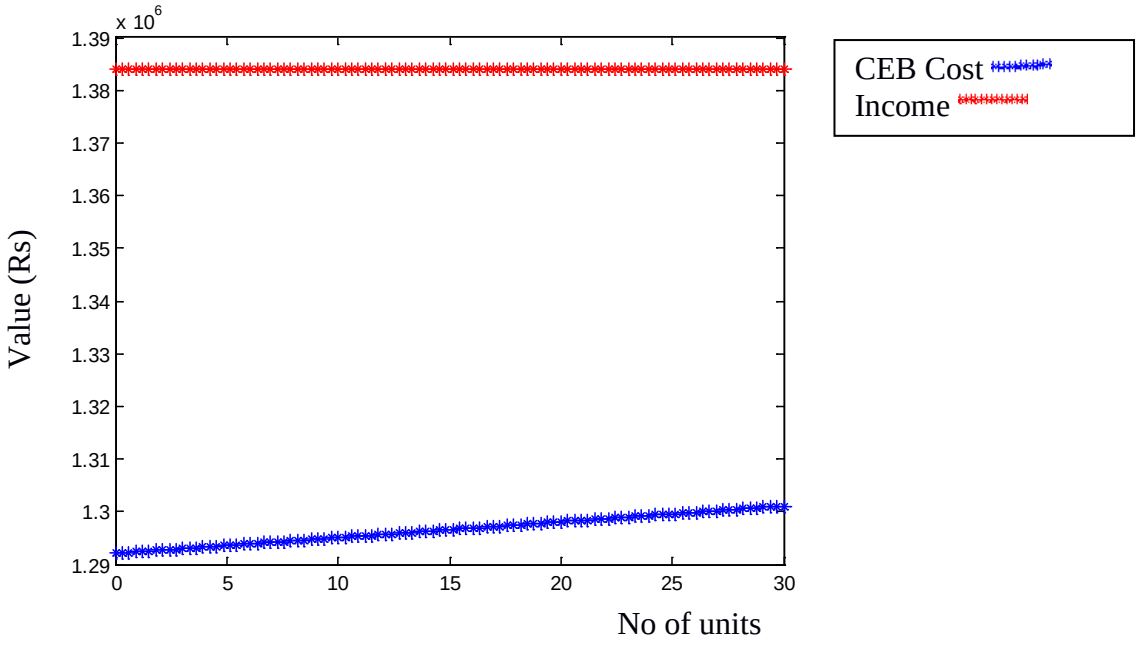


Figure 4.6 Cost Function and the Income Function of the 5.0kw with monthly usage of units<=30

According to the Figure 4.6 there is no intersection point. There is no Brake Even point for this situation. The income is high for the system compared to the cost of the system for the given usage range. This usage will benefit the customer.

Cost function for the 5.0kw system with the monthly usage of 30< units <=60

Then the future value of the cost function for period of 10 years

C6= (4.85(X-30)+105)* $a_{\overline{10}|}^{(12)}$ +10,737.49* $a_{\overline{10}|}^{(12)}$;

The future value for the Income function for the total project period of 10 years

R6=6,955*22* $a_{\overline{7}|} * (1+i)^3$ + 6,955* 15* $a_{\overline{3}|}$;

Therefore we plot above cost function and income function on the same graph using matlab software.

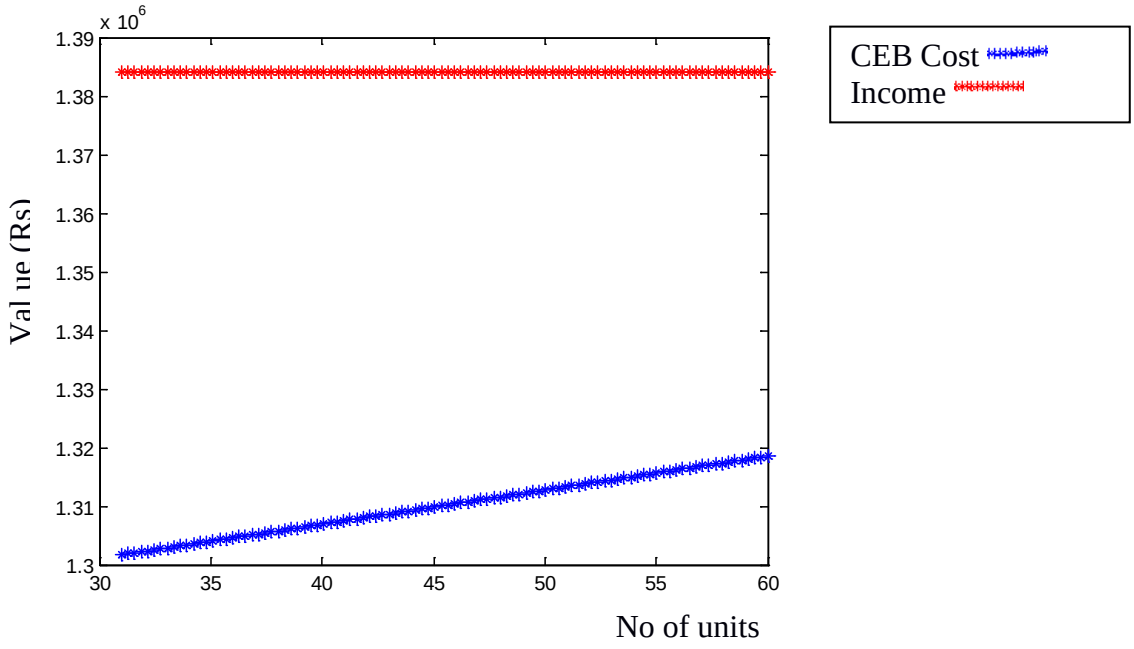


Figure 4.7 Cost Function and the Income Function of the 5.0kw with monthly usage of 31<units<=60

According to the Figure 4.7 there is no intersection point. There is no Brake Even point for this situation. The income is high for the system compared to the cost of the system for the given usage range. This usage will benefit the customer.

Cost function for the 5.0kw system with the monthly usage of 60<units<=90

Then the future value of the cost function for period of 10 years

C7= (10(X-60)+561)* $a\overline{\frac{(12)}{10}}$ +10,737.49* $a\overline{\frac{(12)}{10}}$;

The future value for the Income function for the total project period of 10 years

R7=6,955*22* $a_{\overline{7}|}$* $(1+i)^3$+ 6,955* 15* $a_{\overline{3}|}$;

Therefore we plot above cost function and income function on the same graph using matlab software.

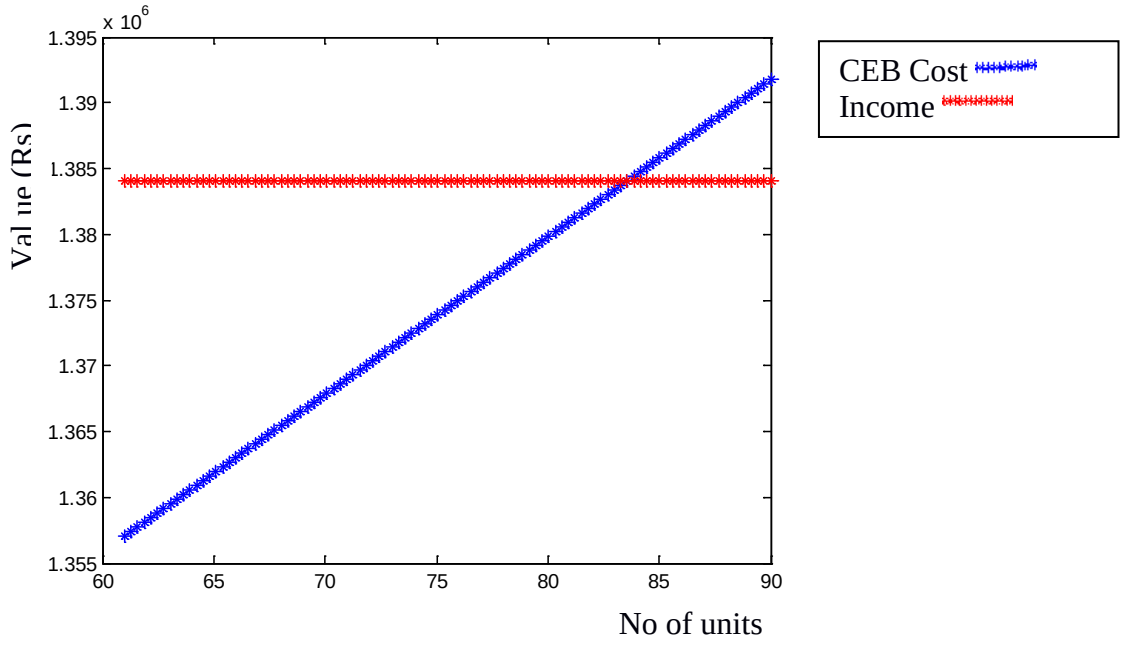


Figure 4.8 Cost Function and the Income Function of the 5.0kw with monthly usage of 61<units<=90

According to the Figure 4.8 there is a intersection point. There is Brake Even point for this situation at the point 84 usage units. Below the Usage of 84 units per month the system has produce higher income. After that the system has produced higher cost compared to the income.

Cost function for the 5.0kw system with the monthly usage of 90<units<=120

Then the future value of the cost function for period of 10 years

C8= (27.27(X-90)+1251)* $a^{(12)}_{\overline{10}|}$ +10,737.49* $a^{(12)}_{\overline{10}|}$;

The future value for the Income function for the total project period of 10 years

R8=6,955*22* $a_{\overline{7}|}$* $(1+i)^3$+ 6,955* 15* $a_{\overline{3}|}$;

Therefore we plot above cost function and income function on the same graph using matlab software.

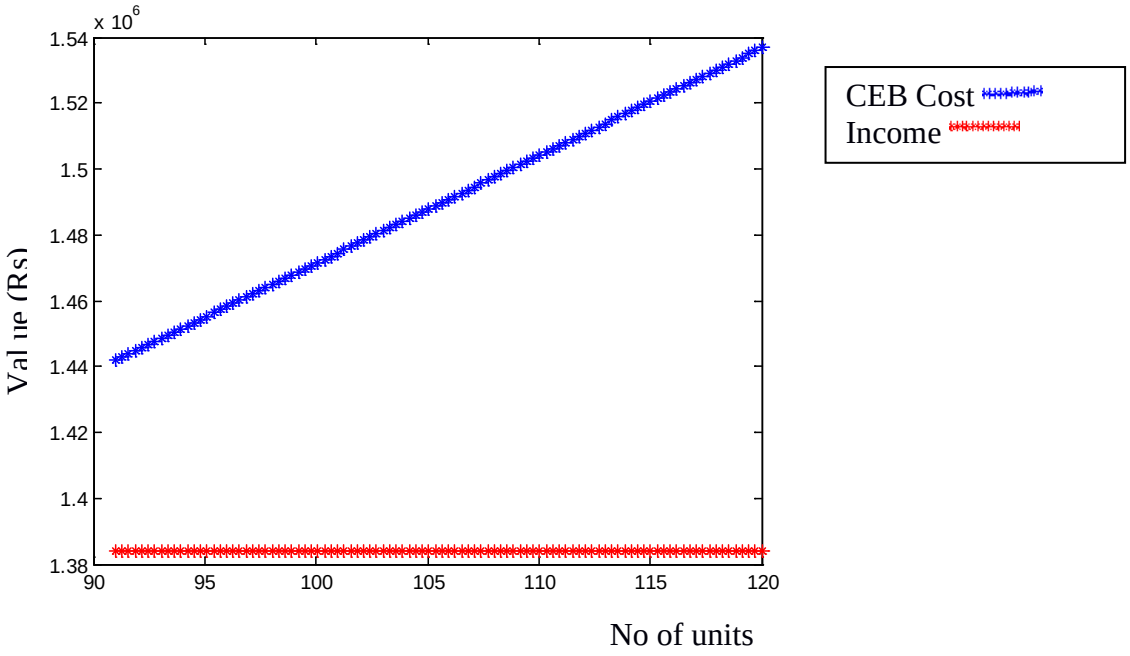


Figure 4.9 Cost Function and the Income Function of the 5.0kw with monthly usage of 91<units<=120

According to the Figure 4.9 there is no intersection point. There is no Brake Even point for this situation. The Cost is high for the system compared to the income of the system for the given usage period.

No of units

Figure 4.10 Summery of Cost Function and the Income Function of the 5.0 kw

According to the Figure 4.10 there is a intersection point. There is Brake Even point for this situation at the point 84 usage units. Below the Usage of 84 units per month the system has produce higher income. After that the system has produced higher cost compared to the income.

Table 4.1: Summary of the Capital and Interest recover annually for systems

3.3kw solar system			**5.0kw solar system**		
Year	CAPITAL	INTEREST	Year	CAPITAL	INTEREST
1	(43,893.83)	(50,013.73)	1	(60,226.42)	(68,623.49)
2	(47,537.00)	(46,370.56)	2	(65,225.18)	(63,624.72)
3	(51,482.54)	(42,425.01)	3	(70,638.84)	(58,211.07)
4	(55,755.57)	(38,151.99)	4	(76,501.83)	(52,348.08)
5	(60,383.25)	(33,524.30)	5	(82,851.44)	(45,998.46)
6	(65,395.04)	(28,512.52)	6	(89,728.07)	(39,121.83)
7	(70,822.79)	(23,084.77)	7	(97,175.46)	(31,674.45)
8	(76,701.05)	(17,206.51)	8	(105,240.97)	(23,608.93)
9	(83,067.20)	(10,840.36)	9	(113,975.92)	(14,873.98)
10	(89,961.73)	(3,945.82)	10	(123,435.87)	(5,414.04)
Total Payment	(645,000.00)	(294,075.58)		(885,000.00)	(403,499.05)

According to the Table 4.1 At the end of 10 years for the 3.3Kw system we have to pay Rs 645,000.00 amount of capital and interest of Rs 294,075.58 according to this schedule, which calculated by using the formula

Total Interest= $pt - P$;

Monthly Payment (p)= $\frac{rP}{n\left[1-\left(1+\frac{r}{n}\right)^{-nt}\right]}$

Where P=645,000.00, n=12, t=10 years and r=8%

At the end of 10 years for the 5.0Kw system we have to pay Rs 885,000.00 amount of capital and interest of Rs 403,499.05 according to this schedule, calculated by using above formula Where P=885,000.00, n=12, t=10 years and r=8%

4.2 Profit & Loss Account

Consider the 3.3kw system and calculate the profit & loss account for whole project at 60 units of usage

Table 4.2: Profit & Loss account for whole project

	Units (Per annum)			
Production	4,173.00			
Domestic usage	(720.00)	(60*12 months)		
Sold units	3,453.00			
	Unit price	Units	Total income	
First 7 years	22.00	24,171.00	531,762.00	
Last 3 years	15.00	10,359.00	155,385.00	687,147.00
EXPENDITURES				
		Year	Per annum	
Interest expenses		1	50,013.73	
		2	46,370.56	
		3	42,425.01	
		4	38,151.99	
		5	33,524.30	
		6	28,512.52	
		7	23,084.77	
		8	17,206.51	
		9	10,840.36	
		10	3,945.82	(294,075.58)
Total profit for the project				393,071.42

According to the Table 4.2 3.3kw system for the 10 year period has produce Rs 687,147.00 income with 24,141 units up to 7 years and after that 10,359 units up to 10 years and expenditure of interest expense of Rs 294,075.58 for the period of 10 years (Table 4.1) and net Profit for the project will be Rs 393,071.42.

Consider the 3.3kw system and calculate the profit & loss account for whole project at 60 units of usage

Table 4.3: Profit & Loss account for whole project of 5kw

	Units (Per annum)			
Production	6,955.00			
Domestic usage	(720.00)	(60*12 months)		
Sold units	6,235.00			
	Unit price	Units	Total income	
First 7 years	22.00	43,645.00	960,190.00	
Last 3 years	15.00	18,705.00	280,575.00	1,240,765.00
EXPENDITURES				
		Year	Per annum	
Interest expenses		1.00	68,623.49	
		2.00	63,624.72	
		3.00	58,211.07	
		4.00	52,348.08	
		5.00	45,998.46	
		6.00	39,121.83	
		7.00	31,674.45	
		8.00	23,608.93	
		9.00	14,873.98	
		10.00	5,414.04	(403,499.05)
Total profit for the project				837,265.95

According to the Table 4.3 5kw system for the 10 year period has produce Rs 1,240,765.00 income with 43,645 units up to 7 years and after that 18,705 units up to 10 years and expenditure of interest expense of Rs 837,265.95 (Table 4.1) and net Profit for the project will be Rs 837,265.95

Considering the 10 year period of time calculate the year wise profit and loss for the each system separately.

Table 4.4 Net Profit or Loss At Each Year for Solar 3.3kw

Year	Interest Expenditure	Total Number of Units Produced at the consumption of 60 units per month	Net Income produce by selling units(Rs)	Net Profit/ Loss (Rs)
1	50,013.73	3,453	75,966.00	25,952.27
2	46,370.56	3,453	75,966.00	29595.44
3	42,425.01	3,453	75,966.00	33,540.99
4	38,151.99	3,453	75,966.00	37,814.01
5	33,524.30	3,453	75,966.00	42,441.70
6	28,512.52	3,453	75,966.00	47,453.48
7	23,084.77	3,453	75,966.00	52,881.23
8	17,206.51	3,453	51,759.00	34,588.49
9	10,840.36	3,453	51,759.00	40,954.64
10	3,945.82	3,453	51,759.00	47,849.18

According to the Table 4.4 Net Profit or Loss at Each Year for Solar 3.3kw we have interest Expenditure (Table 4.1), the 3.3kw system produce 4173 units and 60 monthly units and yearly 60*12=720 units. Therefore total number of units will produce for Net income will be 3,453.

Income up to 7^{th} year=3,453*22 = Rs 75,966.00

Income from 8^{th} to 10^{th} year=3,453*15=Rs 51,759.00

Net Profit or income =Net Income- Net Expense (Interest Expenditure)

Table 4.5 Net Profit or Loss At Each Year for Solar 5.0kw

Year	Interest Expenditure	Total Number of Units Produced at the consumption of 60 units per month	Net Income produce by selling units(Rs)	Net Profit/ Loss (Rs)
1	68,623.49	6,235	137,170.00	68,546.51
2	63,624.72	6,235	137,170.00	73,545.28
3	58,211.07	6,235	137,170.00	78,958.93
4	52,348.08	6,235	137,170.00	84,821.92
5	45,998.46	6,235	137,170.00	91,171.54
6	39,121.83	6,235	137,170.00	98,048.17
7	31,674.45	6,235	137,170.00	105,495.55
8	23,608.93	6,235	93,525.00	69,916.07
9	14,873.98	6,235	93,525.00	78,651.02
10	5,414.04	6,235	93,525.00	88,110.96

According to the Table 4.5 Net Profit or Loss at Each Year for Solar 5.0kw We have interest Expenditure (Table 4.1) , the 5.0kw system produce 6,235 units and 60 monthly units and yearly 60*12=720 units. Therefore total number of units will produce for Net income will be 6,235.

Income up to 7^{th} year=6,235*22 = Rs 137,170.00

Income from 8^{th} to 10^{th} year=6,235*15=Rs 93,525.00

Net Profit or income =Net Income- Net Expense (Interest Expenditure)

4.3 Balance Sheets

This is the financial statement that reports a basis for computing rates of return and evaluating its capital structure. Therefore we calculate for each solar system separately year wise.

According to the Appendix D, Table of Balance Sheet for 3.3kw for 1st Year solar system will recover Rs 43,893.83 from Capital Outstanding and Rs 50,013.73 from interest Outstanding and Loan repayment for the 2nd year is Rs 93,907.56 (Refer Table 4.1). The total Loan Outstanding is Rs 845,168.02. According to the Table 4.4 Net Profit or Loss at Each Year for Solar 3.3kw, the 1st year revenue is Rs 75,966.00 and Profit for the 1st year is Rs 25,952.27. Hence at the end of the 1st year we have Rs (17,941.56) value of Current assets and Retained earning Balance of Rs 25,952.27 on the balance sheet.

According to the Appendix E, Table of Balance Sheet for 3.3kw for 2nd Year solar system will recover Rs 47,537.00 from Capital Outstanding and Rs 46,370.56 From interest Outstanding and Loan repayment for the 2nd year is Rs 93,907.56 (Refer Table 4.1). The total Loan Outstanding is Rs 751,260.46. According to the Table 4.4 Net Profit or Loss at Each Year for Solar 3.3kw , the 2nd year revenue is Rs 75,966.00 and Profit for the 2nd year is Rs 29,595.44. Hence at the end of the 2nd year we have Rs (35,883.12) value of Current assets and Retained earning Balance of Rs 55,547.71 on the balance sheet.

According to the Appendix F, Table of Balance Sheet for 3.3kw for 3rd Year solar system will recover Rs 51,482.54 from Capital Outstanding and Rs 42,425.01 From interest Outstanding and Loan repayment for the 3rd year is Rs 93,907.56 (Refer Table 4.1). The total Loan Outstanding is Rs 657,352.91. According to the Table 4.4 Net Profit or Loss at Each Year for Solar 3.3kw , the 3rd year revenue is Rs 75,966.00 and Profit for the 3rd year is Rs 33,540.99. Hence at the end of the 3rd t year we have Rs (53,824.67) value of Current assets and Retained earning Balance of Rs 89,088.70 on the balance sheet.

According to the Appendix G, Table of Balance Sheet for 3.3kw for 4th Year solar system will recover Rs 55,755.57 from Capital Outstanding and Rs 38,151.99 from interest Outstanding and Loan repayment for the 4th year is Rs 93,907.56 (Refer Table 4.1). The total Loan Outstanding is Rs 563,445.35. According to the Table 4.4 Net Profit or Loss at Each Year for Solar 3.3kw, the 4th year revenue is Rs 75,966.00 and Profit for the 4th year is Rs 37,818.01. Hence at the end of the 4th year we have Rs (71,766.23) value of Current assets and Retained earning Balance of Rs 126,902.71 on the balance sheet.

According to the Appendix H, Table of Balance Sheet for 3.3kw for 5th Year solar system will recover Rs 60,383.25 from Capital Outstanding and Rs 33,524.30 from interest Outstanding and Loan repayment for the 4th year is Rs 93,907.56 (Refer Table 4.1). The total Loan Outstanding is Rs 469,537.79. According to the Table 4.4 Net Profit or Loss at Each Year for Solar 3.3kw, the 5th year revenue is Rs 75,966.00 and Profit for the 5th year is Rs 42,441.70. Hence at the end of the 5th year we have Rs (89,707.79) value of Current assets and Retained earning Balance of Rs 169,344.41 on the balance sheet.

According to the Appendix I, Table of Balance Sheet for 3.3kw for 6th Year solar system will recover Rs 65,395.04 from Capital Outstanding and Rs 28,512.52 from interest Outstanding and Loan repayment for the 6th year is Rs 93,907.56 (Refer Table 4.1). The total Loan Outstanding is Rs 375,630.23. According to the Table 4.4 Net Profit or Loss at Each Year for Solar 3.3kw, the 6th year revenue is Rs 75,966.00 and Profit for the 6th year is Rs 47,453.48. Hence at the end of the 6th year we have Rs (107,649.35) value of Current assets and Retained earning Balance of Rs 216,797.88 on the balance sheet.

According to the Appendix J, Table of Balance Sheet for 3.3kw for 7th Year solar system will recover Rs 70,822.79 from Capital Outstanding and Rs 23,084.77 from interest Outstanding and Loan repayment for the 7th year is Rs 93,907.56 (Refer Table 4.1). The total Loan Outstanding is Rs 281,722.67. According to the Table 4.4 Net Profit or Loss at Each Year for Solar 3.3kw, the 7th year revenue is Rs 75,966.00 and Profit for the 7th year is Rs 52,881.23. Hence at the end of the 7th year we have Rs (125,590.91) value of Current assets and Retained earning Balance of Rs 269,679.12 on the balance sheet.

According to the Appendix K, Table of Balance Sheet for 3.3kw for 8th Year solar system will recover Rs 76,701.05 from Capital Outstanding and Rs 17,206.51 from interest Outstanding and Loan repayment for the 8th year is Rs 93,907.56 (Refer Table 4.1). The total Loan Outstanding is Rs 187,815.12. According to the Table 4.4 Net Profit or Loss at Each Year for Solar 3.3kw, the 8th year revenue is Rs 51,795.00 and Profit for the 8th year is Rs 34,588.49. Hence at the end of the 8th year we have Rs (167,703.46) value of Current assets and Retained earning Balance of Rs 304,267.61 on the balance sheet.

According to the Appendix L, Table of Balance Sheet for 3.3kw for 9th Year solar system will recover Rs 83,067.20 from Capital Outstanding and Rs 10,840.36 from interest Outstanding and Loan repayment for the 9th year is Rs 93,907.56 (Refer Table 4.1). The total Loan Outstanding is Rs 93,907.56. According to the Table 4.4 Net Profit or Loss at Each Year for Solar 3.3kw, the 9th year revenue is Rs 51,795.00 and Profit for the 9th year is Rs 40,954.64. Hence at the end of the 9th year we have Rs (209,816.02) value of Current assets and Retained earning Balance of Rs 345,222.24 on the balance sheet.

According to the Appendix M, Table of Balance Sheet for 3.3kw for 10th Year solar system will recover Rs 89,961.73 from Capital Outstanding and Rs 3,945.82 from interest Outstanding and Loan repayment for the 10th year is Rs 93,907.56 (Refer Table 4.1). The total Loan Outstanding is Rs 0. According to the Table 4.4 Net Profit or Loss at Each Year for Solar 3.3kw, the 10th year revenue is Rs 51,795.00 and Profit for the 10th year is Rs 47,849.18. Hence at the end of the 10th year we have Rs (251,928.58) value of Current assets and Retained earning Balance of Rs 393,071.42 on the balance sheet.

According to the Appendix N, Table of Balance Sheet for 5.0kw for 1st Year solar system will recover Rs 60,226.42 from Capital Outstanding and Rs 68,623.49 from interest Outstanding and Loan repayment for the 1st year is Rs 128,849.91 (Refer Table 4.1). The total Loan Outstanding is Rs 1,159,649.15. According to the Table 4.5 Net Profit or Loss at Each Year for Solar 5.0kw, the 1st year revenue is Rs 137,170.00 and Profit for the 1st year is Rs 68,546.51. Hence at the end of the 1st year we have Rs 8,320.09 value of Current assets and Retained earning Balance of Rs 68,546.51 on the balance sheet.

According to the Appendix O, Table of Balance Sheet for 5.0kw for 2nd Year solar system will recover Rs 65,225.18 from Capital Outstanding and Rs 63,624.72 from interest Outstanding and Loan repayment for the 2nd year is Rs 128,849.91 (Refer Table 4.1). The total Loan Outstanding is Rs 1,030,799.24. According to the Table 4.5 Net Profit or Loss at Each Year for Solar 5.0kw, the 2nd year revenue is Rs 137,170.00 and Profit for the 2nd year is Rs 73,545.28. Hence at the end of the 2nd year we have Rs 16,640.19 value of Current assets and Retained earning Balance of Rs 142,091.79 on the balance sheet.

According to the Appendix P, Table of Balance Sheet for 5.0kw for 3rd Year solar system will recover Rs 70,638,84 from Capital Outstanding and Rs 58,211.07 from interest Outstanding and Loan repayment for the 3rd year is Rs 128,849.91 (Refer Table 4.1). The total Loan Outstanding is Rs 901,949.34. According to the Table 4.5 Net Profit or Loss at Each Year for Solar 5.0kw, the 3rd year revenue is Rs 137,170.00 and Profit for the 3rd year is Rs 78,958.93. Hence at the end of the 3rd year we have Rs 24,960.28 value of Current assets and Retained earning Balance of Rs 221,050.72 on the balance sheet.

According to the Appendix Q, Table of Balance Sheet for 5.0kw for 4th Year solar system will recover Rs 76,501.83 from Capital Outstanding and Rs 52,348.08 from interest Outstanding and Loan repayment for the 4th year is Rs 128,849.91 (Refer Table 4.1). The total Loan Outstanding is Rs 773,099.43. According to the Table 4.5 Net Profit or Loss at Each Year for Solar 5.0kw, the 4th year revenue is Rs 137,170.00 and Profit for the 4th year is Rs 84,821.92. Hence at the end of the 4th year we have Rs 33,280.38 value of Current assets and Retained earning Balance of Rs 305,872.652 on the balance sheet.

According to the Appendix R, Table of Balance Sheet for 5.0kw for 5th Year solar system will recover Rs 82,851.44 from Capital Outstanding and Rs 45,998.46 from interest Outstanding and Loan repayment for the 5th year is Rs 128,849.91 (Refer Table 4.1). The total Loan Outstanding is Rs 644,249.53. According to the Table 4.5 Net Profit or Loss at Each Year for Solar 5.0kw, the 5th year revenue is Rs 137,170.00 and Profit for the 5th year is Rs 91,171.54. Hence at the end of the 5th year we have Rs 41.600.47 value of Current assets and Retained earning Balance of Rs 397,044.19 on the balance sheet.

According to the Appendix S, Table of Balance Sheet for 5.0kw for 6th Year solar system will recover Rs 89,728.07from Capital Outstanding and Rs 39,121.83 from interest Outstanding and Loan repayment for the 6th year is Rs 128,849.91 (Refer Table 4.1). The total Loan Outstanding is Rs 515,399.62. According to the Table 4.5 Net Profit or Loss at Each Year for Solar 5.0kw, the 6th year revenue is Rs 137,170.00 and Profit for the 6th year is Rs 98,048.17. Hence at the end of the 6th year we have Rs 49,920.57 value of Current assets and Retained earning Balance of Rs 495,092.35 on the balance sheet.

According to the Appendix T, Table of Balance Sheet for 5.0kw for 7th Year solar system will recover Rs 89,728.07from Capital Outstanding and Rs 39,121.83 from interest Outstanding and Loan repayment for the 6th year is Rs 128,849.91 (Refer Table 4.1). The total Loan Outstanding is Rs 386,549.72. According to the Table 4.5 Net Profit or Loss at Each Year for Solar 5.0kw, the 7th year revenue is Rs 137,170.00 and Profit for the 7th year is Rs 98,048.17. Hence at the end of the 7th year we have Rs 58,240.66value of Current assets and Retained earning Balance of Rs 600,587.90 on the balance sheet.

According to the Appendix U, Table of Balance Sheet for 5.0kw for 8th Year solar system will recover Rs 105,240.97from Capital Outstanding and Rs 23,608.93 from interest Outstanding and Loan repayment for the 8th year is Rs 128,849.91 (Refer Table 4.1). The total Loan Outstanding is Rs 257,699.81. According to the Table 4.5 Net Profit or Loss at Each Year for Solar 5.0kw, the 8th year revenue is Rs 93,525.00 and Profit for the 8th year is Rs 69,916.07. Hence at the end of the 8th year we have Rs 22,915.76 value of Current assets and Retained earning Balance of Rs 670,503.97 on the balance sheet.

According to the Appendix V, Table of Balance Sheet for 5.0kw for 9th Year solar system will recover Rs 113,975.92from Capital Outstanding and Rs 14, 873,98 from interest Outstanding and Loan repayment for the 9th year is Rs 128,849.91 (Refer Table 4.1). The total Loan Outstanding is Rs 128,849.91. According to the Table 4.5 Net Profit or Loss at Each Year for Solar 5.0kw, the 9th year revenue is Rs 93,525.00 and Profit for the 9th year is Rs 78,651.02. Hence at the end of the 9th year we have Rs (12,409.15) value of Current assets and Retained earning Balance of Rs 749,154.99 on the balance sheet.

According to the Appendix W, Table of Balance Sheet for 5.0kw for 10th Year solar system will recover Rs 123,435.87from Capital Outstanding and Rs 5,414.04 from interest Outstanding and Loan repayment for the 10th year is Rs 128,849.91 (Refer Table 4.1). The total Loan Outstanding is Rs 0. According to the Table 4.5 Net Profit or Loss at Each Year for Solar 5.0kw, the 10th year revenue is Rs 93,525.00 and Profit for the 10th year is Rs 88,110.96. Hence at the end of the 10th year we have Rs (47,734.05) value of Current assets and Retained earning Balance of Rs 837,265.95 on the balance sheet.

4.4 Cash Flow Statements

To find out the cash inflows of the two solar systems from its ongoing operations and external investment sources. This also includes all cash outflows that pay for business activities and investments during a given period.

For the 3.3kw solar system income for the first 7 years is Rs 75,966.00 and 8 to 10 year it is Rs51,795.00.(Refer Table 4.4 Net Profit or Loss At Each Year for Solar 3.3kw) The cash outflow only comes from the loan installment which is Rs 7,825.63 *12=93,907.56. Using above details calculate the cash balance for the end of each year.

Table 4.6 Cash Flow Statements for 3.3kw for 1st Year

Inflow			
Income			75,966.00
Outflow			
Loan installment	(7,825.63)	*12	(93,907.56)
Net cash inflow / (outflow)			(17,941.56)
Opening cash balance			-00
Closing cash balance			(17,941.56)

According to the table 4.6 apply the cash inflow values and the constant value of Rs 93,907.56 as cash outflow. Considering the previous year closing balance as the opening value of the next year opening balance we can calculate the cash flow balance at the end of the 10th year as Rs -209,816.02.

For the 5.0kw solar system income for the first 7 years is Rs 137,170.00 and 8 to 10 year it is Rs93,525.00.(Refer Table 4.5 Net Profit or Loss At Each Year for Solar 5.0kw) The cash outflow only comes from the loan installment which is Rs 10,737.49 *12=128,849.91. Using above details calculate the cash balance for the end of each year.

Table 4.7 Cash Flow Statements for 5.0kw for 1st Year

Inflow			
Income			137,170.00
Outflow			
Loan installment	(10,737.49)	*12	(128,849.91)
Net cash inflow / (outflow)			8,320.09
Opening cash balance			-00
Closing cash balance			8,320.09

According to the table 4.7 apply the cash inflow values and the constant value of Rs 128,849.91 as cash outflow. Considering the previous year closing balance as the opening value of the next year opening balance we can calculate the cash flow balance at the end of the 10th year as Rs -22,915.75

4.5 Project Pay Back Period Method

Considering the Monthly usage as 60 and calculate the Project Pay Back Period Method for 3.3kw solar system using the 3.4 Cash Flow Statements data.

Year	Cash outflow Loan installment	Cash inflow Income of the year	Net cash inflow (Note *)	Accumulated net cash flow
1	(93,907.56)	75,966.00	(17,941.56)	(17,941.56)
2	(93,907.56)	75,966.00	(17,941.56)	(35,883.12)
3	(93,907.56)	75,966.00	(17,941.56)	(53,824.67)
4	(93,907.56)	75,966.00	(17,941.56)	(71,766.23)
5	(93,907.56)	75,966.00	(17,941.56)	(89,707.79)
6	(93,907.56)	75,966.00	(17,941.56)	(107,649.35)
7	(93,907.56)	75,966.00	(17,941.56)	(125,590.91)
8	(93,907.56)	51,795.00	(42,112.56)	(167,703.46)
9	(93,907.56)	51,795.00	(42,112.56)	(209,816.02)
10	(93,907.56)	51,795.00	(42,112.56)	(251,928.58)
	(939,075.58)	687,147.00	(251,928.58)	

There is no project payback period for 3.3kw system since they have minus Cash flow at the end of the project.

Considering the Monthly usage as 60 and calculate the Project Pay Back Period Method for 5.0kw solar system using the 3.4Cash Flow Statements data.

Year	Cash outflow Loan installment	Cash inflow Income of the year	Net cash inflow (Note *)	Accumulated net cash flow
1	(128,849.88)	137,170.00	8,320.12	8,320.12
2	(128,849.88)	137,170.00	8,320.12	16,640.24
3	(128,849.88)	137,170.00	8,320.12	24,960.36
4	(128,849.88)	137,170.00	8,320.12	33,280.48
5	(128,849.88)	137,170.00	8,320.12	41,600.60
6	(128,849.88)	137,170.00	8,320.12	49,920.72
7	(128,849.88)	137,170.00	8,320.12	58,240.84
8	(128,849.88)	93,525.00	(35,324.88)	22,915.96
9	(128,849.88)	93,525.00	(35,324.88)	(12,408.92)
10	(128,849.88)	93,525.00	(35,324.88)	(47,733.80)
	(1,288,498.80)	1,240,765.00	(47,733.80)	

There is no project payback period for 5.0kw system since they have minus Cash flow at the end of the project.

4.6 Project Internal Rate of Return

Considering the 10 years period of the 3.3kw solar project, the cost for a year is loan installment which is Rs 7825.63* 12. If we assume there is no usage only cost will be the loan installment payment only.

Break Even units for project = $\sum_{i=0}^{i=7} \frac{7825.63*12}{22} + \sum_{i=8}^{i=10} \frac{7825.63*12}{15}$ = 57,605.00

Total Number of units Produced by 3.3kw solar system $\sum_{i=1}^{i=10} 4{,}173$=41,730.00

IRR value for 3.3kw solar system at the usage of 60 units. Yearly Analysis

Year	Breakeven of each year	Minimum capacity	Excess (deficit)	Accumulated excess (deficit)
1	5,142	4,173	(969)	(969)
2	5,142	4,173	(969)	(1,937)
3	5,142	4,173	(969)	(2,906)
4	5,142	4,173	(969)	(3,874)
5	5,142	4,173	(969)	(4,843)
6	5,142	4,173	(969)	(5,811)
7	5,142	4,173	(969)	(6,780)
8	7,205	4,173	(3,032)	(9,812)
9	7,205	4,173	(3,032)	(12,843)
10	7,205	4,173	(3,032)	**(15,875)**
	57,605			

Analysis of Whole Project at 60 units of consumption

Annual Generation 4,173*10 =41,730

Break even no of units to be produced during 10 years =57,605

Total loss of units = (15,875)

Value (Total loss units* Weighted average price) = Rs (315,912.50)

Weighted average price

No of years	Unit price	Weight
7	22	154
3	15	45
10	19.9	199

Considering the 10 years period of the 5.0kw solar project, the cost for a year is loan installment which is Rs 7825.63* 12. If we assume there is no usage only cost will be the loan installment payment only.

Break Even units for project= $\sum_{i=0}^{i=7} \frac{10,787.49*12}{22} + \sum_{i=8}^{i=10} \frac{10,787.49*12}{15}$ = 66,768.00

Total Number of units produced by 3.3kw solar system= $\sum_{i=1}^{i=10} 6,955$=69,550.00

IRR value for 5.0kw solar system at the usage of 60 units. Yearly Analysis

Year	Break even of each quantity	Minimum capacity	Excess (deficit)	Accumulated excess (deficit)
1	5,857	6,955	1,098	1,098
2	5,857	6,955	1,098	2,196
3	5,857	6,955	1,098	3,295
4	5,857	6,955	1,098	4,393
5	5,857	6,955	1,098	5,491
6	5,857	6,955	1,098	6,589
7	5,857	6,955	1,098	7,687
8	8,590	6,955	(1,635)	6,052
9	8,590	6,955	(1,635)	4,417
10	8,590	6,955	(1,635)	2,782
	66,768			

Analysis of Whole Project at 60 units of consumption

Annual Generation 6,955*10 =69,550

Break even no of units to be produced during 10 years =66,768

Total Profit of units = 2,782

Value (Total loss units* Weighted average price) = Rs 55,361.80

4.7 Net Present Value

Here we calculated the Net Present Value using NPV formula using Bond rate has been average from 2010 to date (June 2019) 10.74%, Loan Installment for each solar project.

Net Present Value for 3.3kw Solar System

$= \sum_{t=1}^{7} \frac{7,825.63}{\left(1+\frac{10.74}{12}\right)^t} + \sum_{t=7}^{10} \frac{7,825.63}{\left(1+\frac{10.74}{12}\right)^t}$ =559,124/97

Net Present Value for 5.0kw Solar System

$= \sum_{t=0}^{7} \frac{10,737.49}{\left(1+\frac{10.74}{12}\right)^t} + \sum_{t=7}^{10} \frac{10,737.49}{\left(1+\frac{10.74}{12}\right)^t}$ =767,171/32

According to our calculation 3.3kw system has 559,124.97 NPV and 5.0kw system 767,171.32 NPV.

4.8 Summery

In this chapter we analyze the cost and the income of system using annuities. 3.0 kw system does not generate enough solar units to recover the cost.5.0 kw system was able to generate enough solar units up to 84 units of usage to recover the cost. Using Project Payback Method for 3.3kw and 5.0kw solar systems there are no project payback period for both system since they have minus Cash flow at the end of the project. when we consider the Project Internal Rate of Return for 3.3kw project with 60 units consumption it has a loss value of Rs 315,912.50.But the Project Internal Rate of Return for 5.0kw project with 60 units consumption it has a profit value with the amount of Rs55,361.80 at the end of the period, Hence 5.0kw is more preferable comparing through Internal Rate of Return.

CHAPTER 5. CONCLUSION AND RECOMMENDATIONS

5.1 Overview

This chapter concludes the thesis and describes some of the limitation of the research. In addition to that we critically evaluate and discuss the finding of the thesis and describe the recommendation for future studies.

5.2 Conclusion and Recommendations

According to our objective mention on chapter 1.4, built a model to identifying an economical model, we have find following models

Usage Level	Model for the cost	Model for the Income
0<Units<=30	C_1= (2.5X+30)* $a_{\overline{n}\vert}^{(12)}$+L* $a_{\overline{n}\vert}^{(12)}$	R_1=U*22* $a_{\overline{7}\vert}$* $(1+i)^{n-7}$+ U* 15* $a_{\overline{n-7}\vert}$
30<Units<=60	C_2= (4.85(X-30)+150)* $a_{\overline{n}\vert}^{(12)}$+L* $a_{\overline{n}\vert}^{(12)}$	
60<Units<=90	C_3= (10(X-60)+561)* $a_{\overline{n}\vert}^{(12)}$+L* $a_{\overline{n}\vert}^{(12)}$	
90<Units<=120	C_4= (27.27(X-90)+1251)* $a_{\overline{n}\vert}^{(12)}$+L* $a_{\overline{n}\vert}^{(12)}$	

Table 5.1 Economical Model for Solar System

According to the considered usage ranges for the 3.3kw system the Cost is high for the system compared to the income of the system for the given all usage ranges . This will make the customer not benefit when using a 3.3kw solar system. According to 5.0kw system, the income is high for the system compared to the cost of the system for the given usage range of 0 usage to 60 units of usage. This usage will benefit the customer. Below the Usage of 84 units per month the system has produce higher income. After that the system has produced higher cost compared to the income and continues for the higher usage**.** This usage range will not benefit the customer.

The 3.3kw solar system with a value Rs 645,000.00 purchase through a bank loan which has repayment period up to 10 years (120 months) and a interest rate of

8% and interest of Rs 294,075.58 will be recovered at the end of the period. The5.0kw system with a value Rs 885,000.00 purchase through a loan which has repayment period up to 10 years (120 months) and interest rate of 8% and interest of Rs 403,499.05 will be recovered at the end of the period.

For the 3.3kw project with the annual production of 4,173.00 units and domestic usage of 60 units per month the domestic user will send 3,453 units to CEB. Selling this units Customer can earn Rs 687,147.00. The Total Profit for the project will be Rs 393,071.42.For the 5.0kw project with the annual production of 6,955.00 units and domestic usage of 60 units per month the domestic user will send 3,453 units to CEB. Selling this units Customer can earn Rs 1,240,765.00. The Total Profit for the project will be Rs 837,265.95.The Percentage of the net income for

3.3kw project=393,071.42/645,000*100=60.94%

5.0kw Project=837,265.95/885,000*100= 94.60%

According to this value, 5.0kw project is a more efficient choice for the customer.

When we consider the Balance Sheet of 3.3kw Solar System Cash book balance is a minus and retain earning value is positive value for the 10 year period. The Balance Sheet of 5.0kw solar system has positive retain earning value is positive throughout the period, but the Cash book balance is a positive value up to the 8th year, after that that value is become minus value. Therefore considering the balance sheet of each project 5.0kw project is more viable for the investor.

Considering the cash flow statement of the 3.3kw solar system it all the closing cash balance is negative. But the 5.0kw solar system has positive closing cash balance up to the 8th year and after that is moving to the negative values.

Using Project Payback Method for 3.3kw and 5.0kw solar systems there are no project payback period for both system since they have minus Cash flow at the end of the project.

when we consider the Project Internal Rate of Return for 3.3kw project with 60 units consumption it has a loss value of Rs 315,912.50.But the Project Internal Rate of Return for 5.0kw project with 60 units consumption it has a profit value with the amount of Rs 55,361.80 at the end of the period, hence 5.0kw is more preferable comparing through Internal Rate of Return.

Net Present Value of the 3.3kw Solar System has Rs 559,124.97 and 5.0kw Solar System has Rs 767,171.32 with a percentage to the total interest and capital amount paid by customer for each system

=559,124.97/939,075.58*100=59.53%

=767,171.32/1,288,409.05*100=59.54%

Two systems have same values.

Considering above facts Customer is recommended to use 5.0kw system instead of 3.3kw. It will bring more benefits to the customer with more financial benefits comparing to the 3.3kw project.

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APPENDIX A: Table of CEB Units Charges

Monthly Consumption(kwh)	Unit Charge(Rs)	Fixed Charge(Rs)
61-90	10.00	90.00
91-120	27.75	480.00
121-180	32.00	480.00
>180	45.00	540.00

APPENDIX B: Table Of Loan Amortization Schedule For RS 645,000/- with a constant Equated installment of Rs 7,825/63.

Month	Principle	Interest	Cum.Prin.	Cum-Int.	O/S
1	3,525.63	4,300.00	3,525.63	4,300.00	641,474.37
2	3,549.13	4,276.50	7,074.76	8,576.50	637,925.24
3	3,572.79	4,252.83	10,647.56	12,829.33	634,352.44
4	3,596.61	4,229.02	14,244.17	17,058.35	630,755.83
5	3,620.59	4,205.04	17,864.76	21,263.39	627,135.24
6	3,644.73	4,180.90	21,509.49	25,444.29	623,490.51
7	3,669.03	4,156.60	25,178.52	29,600.89	619,821.48
8	3,693.49	4,132.14	28,872.00	33,733.03	616,128.00
9	3,718.11	4,107.52	32,590.11	37,840.55	612,409.89
10	3,742.90	4,082.73	36,333.01	41,923.29	608,666.99
11	3,767.85	4,057.78	40,100.86	45,981.07	604,899.14
12	3,792.97	4,032.66	43,893.83	50,013.73	601,106.17
13	3,818.26	4,007.37	47,712.09	54,021.10	597,287.91
14	3,843.71	3,981.92	51,555.80	58,003.02	593,444.20
15	3,869.34	3,956.29	55,425.13	61,959.32	589,574.87
16	3,895.13	3,930.50	59,320.26	65,889.82	585,679.74
17	3,921.10	3,904.53	63,241.36	69,794.35	581,758.64
18	3,947.24	3,878.39	67,188.60	73,672.74	577,811.40
19	3,973.55	3,852.08	71,162.15	77,524.81	573,837.85
20	4,000.04	3,825.59	75,162.20	81,350.40	569,837.80
21	4,026.71	3,798.92	79,188.91	85,149.32	565,811.09
22	4,053.56	3,772.07	83,242.46	88,921.39	561,757.54
23	4,080.58	3,745.05	87,323.04	92,666.44	557,676.96
24	4,107.78	3,717.85	91,430.83	96,384.29	553,569.17
25	4,135.17	3,690.46	95,566.00	100,074.75	549,434.00
26	4,162.74	3,662.89	99,728.73	103,737.64	545,271.27
27	4,190.49	3,635.14	103,919.22	107,372.78	541,080.78

28	4,218.42	3,607.21	108,137.65	110,979.99	536,862.35
29	4,246.55	3,579.08	112,384.19	114,559.07	532,615.81
30	4,274.86	3,550.77	116,659.05	118,109.84	528,340.95
31	4,303.36	3,522.27	120,962.41	121,632.12	524,037.59
32	4,332.05	3,493.58	125,294.45	125,125.70	519,705.55
33	4,360.93	3,464.70	129,655.38	128,590.40	515,344.62
34	4,390.00	3,435.63	134,045.38	132,026.04	510,954.62
35	4,419.27	3,406.36	138,464.64	135,432.40	506,535.36
36	4,448.73	3,376.90	142,913.37	138,809.30	502,086.63
37	4,478.39	3,347.24	147,391.76	142,156.55	497,608.24
38	4,508.24	3,317.39	151,900.00	145,473.93	493,100.00
39	4,538.30	3,287.33	156,438.30	148,761.27	488,561.70
40	4,568.55	3,257.08	161,006.85	152,018.35	483,993.15
41	4,599.01	3,226.62	165,605.86	155,244.97	479,394.14
42	4,629.67	3,195.96	170,235.52	158,440.93	474,764.48
43	4,660.53	3,165.10	174,896.06	161,606.02	470,103.94
44	4,691.60	3,134.03	179,587.66	164,740.05	465,412.34
45	4,722.88	3,102.75	184,310.54	167,842.80	460,689.46
46	4,754.37	3,071.26	189,064.91	170,914.06	455,935.09
47	4,786.06	3,039.57	193,850.97	173,953.63	451,149.03
48	4,817.97	3,007.66	198,668.94	176,961.29	446,331.06
49	4,850.09	2,975.54	203,519.03	179,936.83	441,480.97
50	4,882.42	2,943.21	208,401.45	182,880.04	436,598.55
51	4,914.97	2,910.66	213,316.43	185,790.69	431,683.57
52	4,947.74	2,877.89	218,264.17	188,668.58	426,735.83
53	4,980.72	2,844.91	223,244.89	191,513.49	421,755.11
54	5,013.93	2,811.70	228,258.82	194,325.19	416,741.18
55	5,047.36	2,778.27	233,306.18	197,103.47	411,693.82
56	5,081.00	2,744.63	238,387.18	199,848.09	406,612.82
57	5,114.88	2,710.75	243,502.06	202,558.84	401,497.94
58	5,148.98	2,676.65	248,651.03	205,235.50	396,348.97

59	5,183.30	2,642.33	253,834.34	207,877.82	391,165.66
60	5,217.86	2,607.77	259,052.20	210,485.59	385,947.80
61	5,252.64	2,572.99	264,304.84	213,058.58	380,695.16
62	5,287.66	2,537.97	269,592.50	215,596.55	375,407.50
63	5,322.91	2,502.72	274,915.42	218,099.26	370,084.58
64	5,358.40	2,467.23	280,273.82	220,566.49	364,726.18
65	5,394.12	2,431.51	285,667.94	222,998.00	359,332.06
66	5,430.08	2,395.55	291,098.02	225,393.55	353,901.98
67	5,466.28	2,359.35	296,564.30	227,752.90	348,435.70
68	5,502.73	2,322.90	302,067.03	230,075.80	342,932.97
69	5,539.41	2,286.22	307,606.44	232,362.02	337,393.56
70	5,576.34	2,249.29	313,182.78	234,611.31	331,817.22
71	5,613.52	2,212.11	318,796.29	236,823.42	326,203.71
72	5,650.94	2,174.69	324,447.23	238,998.12	320,552.77
73	5,688.61	2,137.02	330,135.84	241,135.13	314,864.16
74	5,726.54	2,099.09	335,862.38	243,234.23	309,137.62
75	5,764.71	2,060.92	341,627.09	245,295.15	303,372.91
76	5,803.14	2,022.49	347,430.23	247,317.63	297,569.77
77	5,841.83	1,983.80	353,272.07	249,301.43	291,727.93
78	5,880.78	1,944.85	359,152.84	251,246.28	285,847.16
79	5,919.98	1,905.65	365,072.83	253,151.93	279,927.17
80	5,959.45	1,866.18	371,032.27	255,018.11	273,967.73
81	5,999.18	1,826.45	377,031.45	256,844.56	267,968.55
82	6,039.17	1,786.46	383,070.63	258,631.02	261,929.37
83	6,079.43	1,746.20	389,150.06	260,377.22	255,849.94
84	6,119.96	1,705.67	395,270.02	262,082.88	249,729.98
85	6,160.76	1,664.87	401,430.79	263,747.75	243,569.21
86	6,201.84	1,623.79	407,632.62	265,371.54	237,367.38
87	6,243.18	1,582.45	413,875.80	266,953.99	231,124.20
88	6,284.80	1,540.83	420,160.60	268,494.82	224,839.40
89	6,326.70	1,498.93	426,487.30	269,993.75	218,512.70

90	6,368.88	1,456.75	432,856.18	271,450.50	212,143.82
91	6,411.34	1,414.29	439,267.52	272,864.79	205,732.48
92	6,454.08	1,371.55	445,721.60	274,236.34	199,278.40
93	6,497.11	1,328.52	452,218.71	275,564.87	192,781.29
94	6,540.42	1,285.21	458,759.13	276,850.08	186,240.87
95	6,584.02	1,241.61	465,343.15	278,091.68	179,656.85
96	6,627.92	1,197.71	471,971.07	279,289.39	173,028.93
97	6,672.10	1,153.53	478,643.17	280,442.92	166,356.83
98	6,716.58	1,109.05	485,359.76	281,551.97	159,640.24
99	6,761.36	1,064.27	492,121.12	282,616.23	152,878.88
100	6,806.44	1,019.19	498,927.56	283,635.43	146,072.44
101	6,851.81	973.82	505,779.37	284,609.24	139,220.63
102	6,897.49	928.14	512,676.86	285,537.38	132,323.14
103	6,943.48	882.15	519,620.34	286,419.53	125,379.66
104	6,989.77	835.86	526,610.10	287,255.40	118,389.90
105	7,036.36	789.27	533,646.47	288,044.66	111,353.53
106	7,083.27	742.36	540,729.74	288,787.02	104,270.26
107	7,130.49	695.14	547,860.24	289,482.16	97,139.76
108	7,178.03	647.60	555,038.27	290,129.76	89,961.73
109	7,225.88	599.74	562,264.15	290,729.50	82,735.85
110	7,274.06	551.57	569,538.21	291,281.07	75,461.79
111	7,322.55	503.08	576,860.76	291,784.15	68,139.24
112	7,371.37	454.26	584,232.13	292,238.41	60,767.87
113	7,420.51	405.12	591,652.64	292,643.53	53,347.36
114	7,469.98	355.65	599,122.62	292,999.18	45,877.38
115	7,519.78	305.85	606,642.40	293,305.03	38,357.60
116	7,569.91	255.72	614,212.31	293,560.75	30,787.69
117	7,620.38	205.25	621,832.69	293,766.00	23,167.31
118	7,671.18	154.45	629,503.87	293,920.45	15,496.13
119	7,722.32	103.31	637,226.20	294,023.75	7,773.80
120	7,773.80	51.83	645,000.00	294,075.58	0.00

APPENDIX C: Table of Loan Amortization schedule for Rs 885,000/- with a constant Equated installment of Rs 10,737/49.

Month	Principle	Interest	Cum.Prin.	Cum-Int.	O/S
1	4,837.49	5,900.00	4,837.49	5,900.00	880162.51
2	4,869.74	5,867.75	9,707.23	11,767.75	875292.77
3	4,902.21	5,835.29	14,609.44	17,603.04	870390.56
4	4,934.89	5,802.60	19,544.33	23,405.64	865455.67
5	4,967.79	5,769.70	24,512.12	29,175.34	860487.88
6	5,000.91	5,736.59	29,513.02	34,911.93	855486.98
7	5,034.25	5,703.25	34,547.27	40,615.18	850452.73
8	5,067.81	5,669.68	39,615.08	46,284.86	845384.92
9	5,101.59	5,635.90	44,716.67	51,920.76	840283.33
10	5,135.60	5,601.89	49,852.27	57,522.65	835147.73
11	5,169.84	5,567.65	55,022.11	63,090.30	829977.89
12	5,204.31	5,533.19	60,226.42	68,623.49	824773.58
13	5,239.00	5,498.49	65,465.42	74,121.98	819534.58
14	5,273.93	5,463.56	70,739.35	79,585.54	814260.65
15	5,309.09	5,428.40	76,048.44	85,013.95	808951.56
16	5,344.48	5,393.01	81,392.92	90,406.96	803607.08
17	5,380.11	5,357.38	86,773.03	95,764.34	798226.97
18	5,415.98	5,321.51	92,189.01	101,085.85	792810.99
19	5,452.09	5,285.41	97,641.09	106,371.26	787358.91
20	5,488.43	5,249.06	103,129.53	111,620.32	781870.47
21	5,525.02	5,212.47	108,654.55	116,832.79	776345.45
22	5,561.86	5,175.64	114,216.40	122,008.42	770783.60
23	5,598.93	5,138.56	119,815.34	127,146.98	765184.66
24	5,636.26	5,101.23	125,451.60	132,248.21	759548.40
25	5,673.84	5,063.66	131,125.44	137,311.87	753874.56
26	5,711.66	5,025.83	136,837.10	142,337.70	748162.90
27	5,749.74	4,987.75	142,586.84	147,325.45	742413.16

28	5,788.07	4,949.42	148,374.91	152,274.87	736625.09
29	5,826.66	4,910.83	154,201.57	157,185.70	730798.43
30	5,865.50	4,871.99	160,067.07	162,057.69	724932.93
31	5,904.61	4,832.89	165,971.68	166,890.58	719028.32
32	5,943.97	4,793.52	171,915.65	171,684.10	713084.35
33	5,983.60	4,753.90	177,899.24	176,438.00	707100.76
34	6,023.49	4,714.01	183,922.73	181,152.00	701077.27
35	6,063.64	4,673.85	189,986.37	185,825.85	695013.63
36	6,104.07	4,633.42	196,090.44	190,459.28	688909.56
37	6,144.76	4,592.73	202,235.20	195,052.01	682764.80
38	6,185.73	4,551.77	208,420.93	199,603.77	676579.07
39	6,226.96	4,510.53	214,647.89	204,114.30	670352.11
40	6,268.48	4,469.01	220,916.37	208,583.31	664083.63
41	6,310.27	4,427.22	227,226.64	213,010.54	657773.36
42	6,352.34	4,385.16	233,578.98	217,395.69	651421.02
43	6,394.69	4,342.81	239,973.66	221,738.50	645026.34
44	6,437.32	4,300.18	246,410.98	226,038.67	638589.02
45	6,480.23	4,257.26	252,891.21	230,295.93	632108.79
46	6,523.43	4,214.06	259,414.64	234,509.99	625585.36
47	6,566.92	4,170.57	265,981.57	238,680.56	619018.43
48	6,610.70	4,126.79	272,592.27	242,807.35	612407.73
49	6,654.77	4,082.72	279,247.04	246,890.07	605752.96
50	6,699.14	4,038.35	285,946.18	250,928.42	599053.82
51	6,743.80	3,993.69	292,689.98	254,922.12	592310.02
52	6,788.76	3,948.73	299,478.74	258,870.85	585521.26
53	6,834.02	3,903.48	306,312.76	262,774.32	578687.24
54	6,879.58	3,857.91	313,192.33	266,632.24	571807.67
55	6,925.44	3,812.05	320,117.78	270,444.29	564882.22
56	6,971.61	3,765.88	327,089.39	274,210.17	557910.61
57	7,018.09	3,719.40	334,107.47	277,929.58	550892.53
58	7,064.88	3,672.62	341,172.35	281,602.19	543827.65

59	7,111.97	3,625.52	348,284.32	285,227.71	536715.68
60	7,159.39	3,578.10	355,443.71	288,805.81	529556.29
61	7,207.12	3,530.38	362,650.83	292,336.19	522349.17
62	7,255.16	3,482.33	369,905.99	295,818.52	515094.01
63	7,303.53	3,433.96	377,209.52	299,252.48	507790.48
64	7,352.22	3,385.27	384,561.75	302,637.75	500438.25
65	7,401.24	3,336.26	391,962.98	305,974.00	493037.02
66	7,450.58	3,286.91	399,413.56	309,260.92	485586.44
67	7,500.25	3,237.24	406,913.81	312,498.16	478086.19
68	7,550.25	3,187.24	414,464.06	315,685.40	470535.94
69	7,600.59	3,136.91	422,064.65	318,822.31	462935.35
70	7,651.26	3,086.24	429,715.91	321,908.54	455284.09
71	7,702.26	3,035.23	437,418.17	324,943.77	447581.83
72	7,753.61	2,983.88	445,171.78	327,927.65	439828.22
73	7,805.30	2,932.19	452,977.09	330,859.84	432022.91
74	7,857.34	2,880.15	460,834.43	333,739.99	424165.57
75	7,909.72	2,827.77	468,744.15	336,567.76	416255.85
76	7,962.45	2,775.04	476,706.60	339,342.80	408293.40
77	8,015.54	2,721.96	484,722.14	342,064.75	400277.86
78	8,068.97	2,668.52	492,791.11	344,733.27	392208.89
79	8,122.77	2,614.73	500,913.88	347,348.00	384086.12
80	8,176.92	2,560.57	509,090.79	349,908.57	375909.21
81	8,231.43	2,506.06	517,322.23	352,414.63	367677.77
82	8,286.31	2,451.19	525,608.53	354,865.82	359391.47
83	8,341.55	2,395.94	533,950.08	357,261.76	351049.92
84	8,397.16	2,340.33	542,347.24	359,602.10	342652.76
85	8,453.14	2,284.35	550,800.38	361,886.45	334199.62
86	8,509.49	2,228.00	559,309.88	364,114.45	325690.12
87	8,566.22	2,171.27	567,876.10	366,285.71	317123.90
88	8,623.33	2,114.16	576,499.43	368,399.87	308500.57
89	8,680.82	2,056.67	585,180.25	370,456.54	299819.75

90	8,738.69	1,998.80	593,918.95	372,455.34	291081.05
91	8,796.95	1,940.54	602,715.90	374,395.88	282284.10
92	8,855.60	1,881.89	611,571.50	376,277.78	273428.50
93	8,914.64	1,822.86	620,486.13	378,100.63	264513.87
94	8,974.07	1,763.43	629,460.20	379,864.06	255539.80
95	9,033.89	1,703.60	638,494.09	381,567.66	246505.91
96	9,094.12	1,643.37	647,588.21	383,211.03	237411.79
97	9,154.75	1,582.75	656,742.96	384,793.77	228257.04
98	9,215.78	1,521.71	665,958.74	386,315.49	219041.26
99	9,277.22	1,460.28	675,235.96	387,775.76	209764.04
100	9,339.07	1,398.43	684,575.02	389,174.19	200424.98
101	9,401.33	1,336.17	693,976.35	390,510.36	191023.65
102	9,464.00	1,273.49	703,440.35	391,783.85	181559.65
103	9,527.09	1,210.40	712,967.44	392,994.25	172032.56
104	9,590.61	1,146.88	722,558.05	394,141.13	162441.95
105	9,654.55	1,082.95	732,212.60	395,224.08	152787.40
106	9,718.91	1,018.58	741,931.50	396,242.66	143068.50
107	9,783.70	953.79	751,715.21	397,196.45	133284.79
108	9,848.93	888.57	761,564.13	398,085.01	123435.87
109	9,914.59	822.91	771,478.72	398,907.92	113521.28
110	9,980.68	756.81	781,459.40	399,664.73	103540.60
111	10,047.22	690.27	791,506.63	400,355.00	93493.37
112	10,114.20	623.29	801,620.83	400,978.29	83379.17
113	10,181.63	555.86	811,802.46	401,534.15	73197.54
114	10,249.51	487.98	822,051.97	402,022.13	62948.03
115	10,317.84	419.65	832,369.81	402,441.79	52630.19
116	10,386.62	350.87	842,756.43	402,792.65	42243.57
117	10,455.87	281.62	853,212.30	403,074.28	31787.70
118	10,525.57	211.92	863,737.87	403,286.20	21262.13
119	10,595.74	141.75	874,333.62	403,427.94	10666.38
120	10,666.38	71.11	885,000.00	403,499.05	0.00

APPENDIX D: Table of Balance Sheet for 3.3kw for 1st Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	645,000.00	-00	645,000.00	645,000.00
Current assets				
Cash book				
Beginning of the year			-00	
Revenue			75,966.00	
Loan repayment			(93,907.56)	
Balance at the end of the year				(17,941.56)
				627,058.44
Long term loans	B/F BALANCE	SETTLEMENT	C/F BALANCE	
Total loan	645,000.00	(43,893.83)	601,106.17	
(-) Interest in suspense	294,075.58	(50,013.73)	244,061.85	
	939,075.58	(93,907.56)	845,168.02	845,168.02
(-) Contingent interest cost payable				(244,061.85)
Loan net of interest in suspense				601,106.17
Retained earnings				
Beginning of the year			-00	
Profit / (loss) for the year			25,952.27	
Balance at the end of the year			25,952.27	25,952.27
				627,058.44

APPENDIX E: Table of Balance Sheet for 3.3kw for 2nd Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	645,000.00	-00	645,000.00	645,000.00
(-)Depreciation				
Current assets				
Cash book				
Beginning of the year			(17,941.56)	
Revenue			75,966.00	
Loan repayment			(93,907.56)	
Balance at the end of the year				(35,883.12)
				609,116.88
Long term loans	B/F BALANCE	SETTLEMENT	C/F BALANCE	
Total loan	601,106.17	(47,537.00)	553,569.17	
(-) Interest in suspense	244,061.85	(46,370.56)	197,691.29	
	845,168.02	(93,907.56)	751,260.46	751,260.46
(-) Contingent interest cost payable				(197,691.29)
Loan net of interest in suspense				553,569.17
Retained earnings				
Beginning of the year			25,952.27	
Profit / (loss) for the year			29,595.44	
Balance at the end of the year			55,547.71	55,547.71
				609,116.88

APPENDIX F: Table of Balance Sheet for 3.3kw for 3rd Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	645,000.00	-00	645,000.00	645,000.00
(-)Depreciation				
Current assets				
Cash book				
Beginning of the year			(35,883.12)	
Revenue			75,966.00	
Loan repayment			(93,907.56)	
Balance at the end of the year				(53,824.67)
				591,175.33
Long term loans	B/F BALANCE	SETTLEMENT	C/F BALANCE	
Total loan	553,569.17	(51,482.54)	502,086.63	
(-) Interest in suspense	197,691.29	(42,425.01)	155,266.28	
	751,260.46	(93,907.56)	657,352.91	657,352.91
(-) Contingent interest cost payable				(155,266.28)
Loan net of interest in suspense				502,086.63
Retained earnings				
Beginning of the year			55,547.71	
Profit / (loss) for the year			33,540.99	
Balance at the end of the year			89,088.70	89,088.70
				591,175.33

APPENDIX G: Table of Balance Sheet for 3.3kw for 4th Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	645,000.00	-00	645,000.00	645,000.00
(-)Depreciation				
Current assets				
Cash book				
Beginning of the year			(53,824.67)	
Revenue			75,966.00	
Loan repayment			(93,907.56)	
Balance at the end of the year				(71,766.23)
				573,233.77
Long term loans	B/F BALANCE	SETTLEMENT	C/F BALANCE	
Total loan	502,086.63	(55,755.57)	446,331.06	
(-) Interest in suspense	155,266.28	(38,151.99)	117,114.29	
	657,352.91	(93,907.56)	563,445.35	563,445.35
(-) Contingent interest cost payable				(117,114.29)
Loan net of interest in suspense				446,331.06
Retained earnings				
Beginning of the year			89,088.70	
Profit / (loss) for the year			37,814.01	
Balance at the end of the year			126,902.71	126,902.71
				573,233.77

APPENDIX H: Table of Balance Sheet for 3.3kw for 5th Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	645,000.00	-00	645,000.00	645,000.00
(-)Depreciation				
Current assets				
Cash book				
Beginning of the year			(71,766.23)	
Revenue			75,966.00	
Loan repayment			(93,907.56)	
Balance at the end of the year				(89,707.79)
				555,292.21
Long term loans	B/F BALANCE	SETTLEMENT	C/F BALANCE	
Total loan	446,331.06	(60,383.25)	385,947.80	
(-) Interest in suspense	117,114.29	(33,524.30)	83,589.99	
	563,445.35	(93,907.56)	469,537.79	469,537.79
(-) Contingent interest cost payable				(83,589.99)
Loan net of interest in suspense				385,947.80
Retained earnings				
Beginning of the year			126,902.71	
Profit / (loss) for the year			42,441.70	
Balance at the end of the year			169,344.41	169,344.41
				555,292.21

APPENDIX I: Table of Balance Sheet for 3.3kw for 6th Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	645,000.00	-00	645,000.00	645,000.00
(-)Depreciation				
Current assets				
Cash book				
Beginning of the year			(89,707.79)	
Revenue			75,966.00	
Loan repayment			(93,907.56)	
Balance at the end of the year				(107,649.35)
				537,350.65
Long term loans	B/F BALANCE	SETTLEMENT	C/F BALANCE	
Total loan	385,947.80	(65,395.04)	320,552.77	
(-) Interest in suspense	83,589.99	(28,512.52)	55,077.46	
	469,537.79	(93,907.56)	375,630.23	375,630.23
(-) Contingent interest cost payable				(55,077.46)
Loan net of interest in suspense				320,552.77
Retained earnings				
Beginning of the year			169,344.41	
Profit / (loss) for the year			47,453.48	
Balance at the end of the year			216,797.88	216,797.88
				537,350.65

APPENDIX J: Table of Balance Sheet for 3.3kw for 7th Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	645,000.00	-00	645,000.00	645,000.00
(-)Depreciation				
Current assets				
Cash book				
Beginning of the year			(107,649.35)	
Revenue			75,966.00	
Loan repayment			(93,907.56)	
Balance at the end of the year				(125,590.91)
				519,409.09
Long term loans	B/F BALANCE	SETTLEMENT	C/F BALANCE	
Total loan	320,552.77	(70,822.79)	249,729.98	
(-) Interest in suspense	55,077.46	(23,084.77)	31,992.70	
	375,630.23	(93,907.56)	281,722.67	281,722.67
(-) Contingent interest cost payable				(31,992.70)
Loan net of interest in suspense				249,729.98
Retained earnings				
Beginning of the year			216,797.88	
Profit / (loss) for the year			52,881.23	
Balance at the end of the year			269,679.12	269,679.12
				519,409.09

APPENDIX K: Table of Balance Sheet for 3.3kw for 8th Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	645,000.00	-00	645,000.00	645,000.00
(-)Depreciation				
Current assets				
Cash book				
Beginning of the year			(125,590.91)	
Revenue			51,795.00	
Loan repayment			(93,907.56)	
Balance at the end of the year				(167,703.46)
				477,296.54
Long term loans	B/F BALANCE	SETTLEMENT	C/F BALANCE	
Total loan	249,729.98	(76,701.05)	173,028.93	
(-) Interest in suspense	31,992.70	(17,206.51)	14,786.19	
	281,722.67	(93,907.56)	187,815.12	187,815.12
(-) Contingent interest cost payable				(14,786.19)
Loan net of interest in suspense				173,028.93
Retained earnings				
Beginning of the year			269,679.12	
Profit / (loss) for the year			34,588.49	
Balance at the end of the year			304,267.61	304,267.61
				477,296.54

APPENDIX L: Table of Balance Sheet for 3.3kw for 9th Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	645,000.00	-00	645,000.00	645,000.00
(-)Depreciation				
Current assets				
Cash book				
Beginning of the year			(167,703.46)	
Revenue			51,795.00	
Loan repayment			(93,907.56)	
Balance at the end of the year				(209,816.02)
				435,183.98
Long term loans	B/F BALANCE	SETTLEMENT	C/F BALANCE	
Total loan	173,028.93	(83,067.20)	89,961.73	
(-) Interest in suspense	14,786.19	(10,840.36)	3,945.82	
	187,815.12	(93,907.56)	93,907.56	93,907.56
(-) Contingent interest cost payable				(3,945.82)
Loan net of interest in suspense				89,961.73
Retained earnings				
Beginning of the year			304,267.61	
Profit / (loss) for the year			40,954.64	
Balance at the end of the year			345,222.24	345,222.24
				435,183.98

APPENDIX M: Table of Balance Sheet for 3.3kw for 10th Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	645,000.00	-00	645,000.00	645,000.00
(-)Depreciation				
Current assets				
Cash book				
Beginning of the year			(209,816.02)	
Revenue			51,795.00	
Loan repayment			(93,907.56)	
Balance at the end of the year				(251,928.58)
				393,071.42
Long term loans	B/F BALANCE	SETTLEMENT	C/F BALANCE	
Total loan	89,961.73	(89,961.73)	-00	
(-) Interest in suspense	3,945.82	(3,945.82)	0.00	
	93,907.56	(93,907.56)	0.00	0.00
(-) Contingent interest cost payable				(0.00)
Loan net of interest in suspense				-00
Retained earnings				
Beginning of the year			345,222.24	
Profit / (loss) for the year			47,849.18	
Balance at the end of the year			393,071.42	393,071.42
				393,071.42

APPENDIX N: Table of Balance Sheet for 5.0kw for 1st Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	885,000.00	-00	885,000.00	885,000.00
Current assets				
Cash book				
Beginning of the year			-00	
Revenue			137,170.00	
Loan repayment			(128,849.91)	
Balance at the end of the year				8,320.09
				893,320.09
Long term loans	B/F BALANCE	SETTLEMENT	C/F BALANCE	
Total loan	885,000.00	(60,226.42)	824,773.58	
(-) Interest in suspense	403,499.05	(68,623.49)	334,875.57	
	1,288,499.05	(128,849.91)	1,159,649.15	1,159,649.15
(-) Contingent interest cost payable				(334,875.57)
Loan net of interest in suspense				824,773.58
Retained earnings				
Beginning of the year			-00	
Profit / (loss) for the year			68,546.51	
Balance at the end of the year			68,546.51	68,546.51
				893,320.09

APPENDIX O: Table of Balance Sheet for 5.0kw for 2nd Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	885,000.00	-00	885,000.00	885,000.00
Current assets				
Cash book				
Beginning of the year			8,320.09	
Revenue			137,170.00	
Loan repayment			(128,849.91)	
Balance at the end of the year				16,640.19
				901,640.19
	B/F		C/F	
Long term loans	BALANCE	SETTLEMENT	BALANCE	
Total loan	824,773.58	(65,225.18)	759,548.40	
(-) Interest in suspense	334,875.57	(63,624.72)	271,250.84	
	1,159,649.15	(128,849.91)	1,030,799.24	1,030,799.24
(-) Contingent interest cost payable				(271,250.84)
Loan net of interest in suspense				759,548.40
Retained earnings				
Beginning of the year			68,546.51	
Profit / (loss) for the year			73,545.28	
Balance at the end of the year			142,091.79	142,091.79
				901,640.19

APPENDIX P: Table of Balance Sheet for 5.0kw for 3rd Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	885,000.00	-00	885,000.00	885,000.00
Current assets				
Cash book				
Beginning of the year			16,640.19	
Revenue			137,170.00	
Loan repayment			(128,849.91)	
Balance at the end of the year				24,960.28
				909,960.28
Long term loans	B/F BALANCE	SETTLEMENT	C/F BALANCE	
Total loan	759,548.40	(70,638.84)	688,909.56	
(-) Interest in suspense	271,250.84	(58,211.07)	213,039.78	
	1,030,799.24	(128,849.91)	901,949.34	901,949.34
(-) Contingent interest cost payable				(213,039.78)
Loan net of interest in suspense				688,909.56
Retained earnings				
Beginning of the year			142,091.79	
Profit / (loss) for the year			78,958.93	
Balance at the end of the year			221,050.72	221,050.72
				909,960.28

APPENDIX Q: Table of Balance Sheet for 5.0kw for 4th Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	885,000.00	-00	885,000.00	885,000.00
Current assets				
Cash book				
Beginning of the year			24,960.28	
Revenue			137,170.00	
Loan repayment			(128,849.91)	
Balance at the end of the year				33,280.38
				918,280.38
	B/F		C/F	
Long term loans	BALANCE	SETTLEMENT	BALANCE	
Total loan	688,909.56	(76,501.83)	612,407.73	
(-) Interest in suspense	213,039.78	(52,348.08)	160,691.70	
	901,949.34	(128,849.91)	773,099.43	773,099.43
(-) Contingent interest cost payable				(160,691.70)
Loan net of interest in suspense				612,407.73
Retained earnings				
Beginning of the year			221,050.72	
Profit / (loss) for the year			84,821.92	
Balance at the end of the year			305,872.65	305,872.65
				918,280.38

APPENDIX R: Table of Balance Sheet for 5.0kw for 5th Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	885,000.00	-00	885,000.00	885,000.00
Current assets				
Cash book				
Beginning of the year			33,280.38	
Revenue			137,170.00	
Loan repayment			(128,849.91)	
Balance at the end of the year				41,600.47
				926,600.47
	B/F		C/F	
Long term loans	BALANCE	SETTLEMENT	BALANCE	
Total loan	612,407.73	(82,851.44)	529,556.29	
(-) Interest in suspense	160,691.70	(45,998.46)	114,693.24	
	773,099.43	(128,849.91)	644,249.53	644,249.53
(-) Contingent interest cost payable				(114,693.24)
Loan net of interest in suspense				529,556.29
Retained earnings				
Beginning of the year			305,872.65	
Profit / (loss) for the year			91,171.54	
Balance at the end of the year			397,044.19	397,044.19
				926,600.47

APPENDIX S: Table of Balance Sheet for 5.0kw for 6th Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	885,000.00	-00	885,000.00	885,000.00
Current assets				
Cash book				
Beginning of the year			41,600.47	
Revenue			137,170.00	
Loan repayment			(128,849.91)	
Balance at the end of the year				49,920.57
				934,920.57
	B/F		C/F	
Long term loans	BALANCE	SETTLEMENT	BALANCE	
Total loan	529,556.29	(89,728.07)	439,828.22	
(-) Interest in suspense	114,693.24	(39,121.83)	75,571.40	
	644,249.53	(128,849.91)	515,399.62	515,399.62
(-) Contingent interest cost payable				(75,571.40)
Loan net of interest in suspense				439,828.22
Retained earnings				
Beginning of the year			397,044.19	
Profit / (loss) for the year			98,048.17	
Balance at the end of the year			495,092.35	495,092.35
				934,920.57

APPENDIX T: Table of Balance Sheet for 5.0kw for 7th Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	885,000.00	-00	885,000.00	885,000.00
Current assets				
Cash book				
Beginning of the year			49,920.57	
Revenue			137,170.00	
Loan repayment			(128,849.91)	
Balance at the end of the year				58,240.66
				943,240.66
	B/F		C/F	
Long term loans	BALANCE	SETTLEMENT	BALANCE	
Total loan	439,828.22	(97,175.46)	342,652.76	
(-) Interest in suspense	75,571.40	(31,674.45)	43,896.96	
	515,399.62	(128,849.91)	386,549.72	386,549.72
(-) Contingent interest cost payable				(43,896.96)
Loan net of interest in suspense				342,652.76
Retained earnings				
Beginning of the year			495,092.35	
Profit / (loss) for the year			105,495.55	
Balance at the end of the year			600,587.90	600,587.90
				943,240.66

APPENDIX U: Table of Balance Sheet for 5.0kw for 8th Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	885,000.00	-00	885,000.00	885,000.00
Current assets				
Cash book				
Beginning of the year			58,240.66	
Revenue			93,525.00	
Loan repayment			(128,849.91)	
Balance at the end of the year				22,915.76
				907,915.76
	B/F		C/F	
Long term loans	BALANCE	SETTLEMENT	BALANCE	
Total loan	342,652.76	(105,240.97)	237,411.79	
(-) Interest in suspense	43,896.96	(23,608.93)	20,288.02	
	386,549.72	(128,849.91)	257,699.81	257,699.81
(-) Contingent interest cost payable				(20,288.02)
Loan net of interest in suspense				237,411.79
Retained earnings				
Beginning of the year			600,587.90	
Profit / (loss) for the year			69,916.07	
Balance at the end of the year			670,503.97	670,503.97
				907,915.76

APPENDIX V: Table of Balance Sheet for 5.0kw for 9th Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	885,000.00	-00	885,000.00	885,000.00
Current assets				
Cash book				
Beginning of the year			22,915.76	
Revenue			93,525.00	
Loan repayment			(128,849.91)	
Balance at the end of the year				(12,409.15)
				872,590.85
	B/F		C/F	
Long term loans	BALANCE	SETTLEMENT	BALANCE	
Total loan	237,411.79	(113,975.92)	123,435.87	
(-) Interest in suspense	20,288.02	(14,873.98)	5,414.04	
	257,699.81	(128,849.91)	128,849.91	128,849.91
(-) Contingent interest cost payable				(5,414.04)
Loan net of interest in suspense				123,435.87
Retained earnings				
Beginning of the year			670,503.97	
Profit / (loss) for the year			78,651.02	
Balance at the end of the year			749,154.99	749,154.99
				872,590.85

APPENDIX W: Table of Balance Sheet for 5.0kw for 10th Year

Fixed assets				
	B/F BALANCE	DEPRECIATION	C/F BALANCE	
Machine	885,000.00	-00	885,000.00	885,000.00
Current assets				
Cash book				
Beginning of the year			(12,409.15)	
Revenue			93,525.00	
Loan repayment			(128,849.91)	
Balance at the end of the year				(47,734.05)
				837,265.95
Long term loans	B/F BALANCE	SETTLEMENT	C/F BALANCE	
Total loan	123,435.87	(123,435.87)	-00	
(-) Interest in suspense	5,414.04	(5,414.04)	0.00	
	128,849.91	(128,849.91)	0.00	0.00
(-) Contingent interest cost payable				(0.00)
Loan net of interest in suspense				-00
Retained earnings				
Beginning of the year			749,154.99	
Profit / (loss) for the year			88,110.96	
Balance at the end of the year			837,265.95	837,265.95
				837,265.95

APPENDIX X: Mathlab codes

```
>> x=linspace(0,30);
>> z=300*x+942675.60;
>> y=830427;
>>plot(x,z,'b*',x,y,'r*')

>> x=linspace(31,60);
>> z=582*x+934215.60;
>> y=830427;
>>plot(x,z,'b*',x,y,'r*')

>> x=linspace(61,90);
>> z=1200*x+934395.60;
>> y=830427;
>>plot(x,z,'b*',x,y,'r*')

>> x=linspace(91,120);
>> z=3272.4*x+794679.60;
>> y=830427;
>>plot(x,z,'b*',x,y,'r*')

>> x=linspace(0,30);
>> z=300*x+1292098.80;
>> y=1384045;
>>plot(x,z,'b*',x,y,'r*')

>> x=linspace(31,60);
>> z=582*x+1283638.80;
>> y=1384045;
>>plot(x,z,'b*',x,y,'r*')
```

```
>> x=linspace(61,90);
>> z=1200*x+1283818.8;
>> y=1384045;
>>plot(x,z,'b*',x,y,'r*')

>> x=linspace(91,120);
>> z=3272.4*x+1144102.80;
>> y=1384045;
>>plot(x,z,'b*',x,y,'r*')
```