

Solar Panel – Business Plan



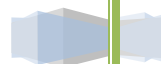
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Complete Solar panel Business Plan for a
company to enter in a South East Asian
Market to provide solar products and
facilitate during the time of energy crisis.

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COMPANY NAME

GREEN CO.
Your next energy solution

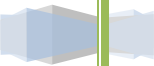
MISSION STATEMENT

To properly initiate, market and provide best solar lighting systems, while considering customer's cost cutting factor in this economical era and keeping our solar panels affordable, keeping customer requirements in focus.



GREEN SOL LTD.

EXECUTIVE SUMMARY



Nature of Business

With the prevalent electricity crisis in the country, people are using generators and UPS (Uninterrupted Power Supply) to meet their requirements for electricity. We plan to provide them with a cost efficient solution through which the electricity expense and replacement costs of their backup devices can be reduced. Our plan is to import solar panels of different capacities and LED (light emission diode) bulbs from China. We will assemble the solar lights using LEDs, as they are cost effective and environment friendly.

We are primarily focusing on the creative applications of solar technology and LED lights, further creating the awareness among people about the benefits of solar energy along with its long run usage that would minimize costs. LED bulbs/lights are environment friendly and cost effective because their electricity consumption is very low. Solar panels receive energy from sunlight and the energy is stored in the batteries which are used as the alternate power supply.

✓ **Project Background**

Keeping in view the current demand for electricity in our country, the project is designed according to the requirements of both corporate and consumer sector. Pakistan being the 6th country in the world that receives the most sunlight unfortunately does not utilize it properly. Our aim is to provide such solar products that would be cost effective in the long run.

The basic initiative is to provide solar panels and LED lights to the consumers so that they can meet their lighting requirements. Another aspect in using LEDs is that they are more environment friendly than ordinary energy savers. Moreover we would be providing

customized solar products for different events and parties according to their ambience and event requirements.

✓ **Project Objectives**

The foremost objectives are:

- Provide quality service in a reasonable price.
- Improve the total sales by 50% annually.
- Provide the product/service quicker than the competitors.
- Increase the growth rate in sales for the first year.
- Increase average monthly sales in first year to reach break-even.
- Provide quality long lasting economical products.
- Increase customer awareness through integrated marketing communication tools.

✓ **Competitive Advantage**

Green Co. is emphasizing on creating a competitive advantage through technological innovation and cost effectiveness. The company is committed to making green, clean and renewable solar energy affordable to both household and the corporate sector and to further promote solar energy as the alternative solution to curb energy crisis prevalent in the country.

- Savings in electricity and generator bills
- Providing Solar Trackers
- Overcoming the energy crises
- Use of effective Integrated Marketing Communication tools
- Save replacement costs of electronic appliances

- Durability of products
- Cost effectiveness
- Emerging market
- Savings cost because of no customs duties on importing solar chips
- Business to Business services (B2B) (Billboard Advertising and Led lightings in events)
- B2C services (fittings and Installation of products)

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COMPANY SUMMARY



✓ **Company ownership**

Green Co. will be a sole proprietorship business entity.

✓ **Company Location & Facilities**

To start the business, a finance and marketing manager will be hired along with a supervisor for three technicians. As a new entrant in the market we would be doing our business operations in Lahore with a creative vision. The company being is currently in its introduction stage, hence in the short run Green Co. will operate on a small scale. When the market and demand for our brand and products will be established, the business will likely expand nationwide.

✓ **Office Location**

The office will be set up in two rented shops .Lahore is selected as the primary location for starting the business because it's an emerging market and all the major businesses have their offices in Lahore.



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PRODUCTS & SERVICES



✓ **Products**

Green Co. is offering a wide range of solar energy products depending upon the requirements of its customers. Our product line includes LED lights/bulbs, laptop chargers, cell phone chargers, pendant lights and LED flood lights. A wide range of customized packages of solar energy backup systems is also available for the consumers depending upon their requirement of electricity. We are also offering four standard packages for household and commercial usage.

✓ **Items imported from our suppliers include:**

1. Solar Panels

There are 3 types of solar panels available:

- a.) Mono crystalline
- b.) Poly crystalline
- c.) Multi crystalline

The best ones are Mono crystalline and Multi crystalline and as Green Co. focus on providing a quality service to its potential customers, we will be importing both types of solar panels. These solar panels have a relatively longer economical life and their productivity reduces only 20% even after 20 years.

Once installed, it has no maintenance costs. The energy stored in the batteries with these solar panels can be used to power lights for almost two to three days.



2. LED Lights/Bulbs

LED (Light Emission Diode) are environment friendly lights because they don't have any mercury content in them unlike ordinary tube lights and energy savers. The life of one LED bulb is 50000-60000 hours (i.e. approximately 6 years).

Items purchased from local market wholesalers:

1. Battery

Solar panels are used to store energy in the batteries which can be used as an alternate source of electricity. The batteries required for this purpose are lead acid batteries; similar to the regular UPS batteries.

2. Charger

Charger is a device that is connected with the solar panel and the battery and its purpose is to allow the flow of current from the battery during night time so that energy is stored in battery during day time.

3. Pendant Lights

These refer to the decoration lights used in party lighting.

4. Flood Lights

They are used to light up the bill-boards and outdoor events.

5. Solar Tracker

It is a small torque motor that is installed with the movable solar panels in order to generate greater efficiency of charging by moving the solar panels in the direction of the Sun. This

motor has a small sensor which identifies the direction of the Sun and moves the panel accordingly so utilize maximum sunlight. These are operated by the power generated by the solar panels.

- **Inverter**

The Inverter is used to convert the 12 volt system to 220 volt and 50Hz. There are two kinds of inverters, modified sine wave and true sine wave inverters.

- **Modified sine wave:**

Modified sine wave inverters are comparatively less costly and are locally manufactured. But most of the modern electronics cannot be operated on them.

- **True sine wave inverter:**

True sine wave inverters are relatively more expensive as they support the products like high-end audio video units, plasma displays, gaming systems, and certain scientific testing equipments.

✓

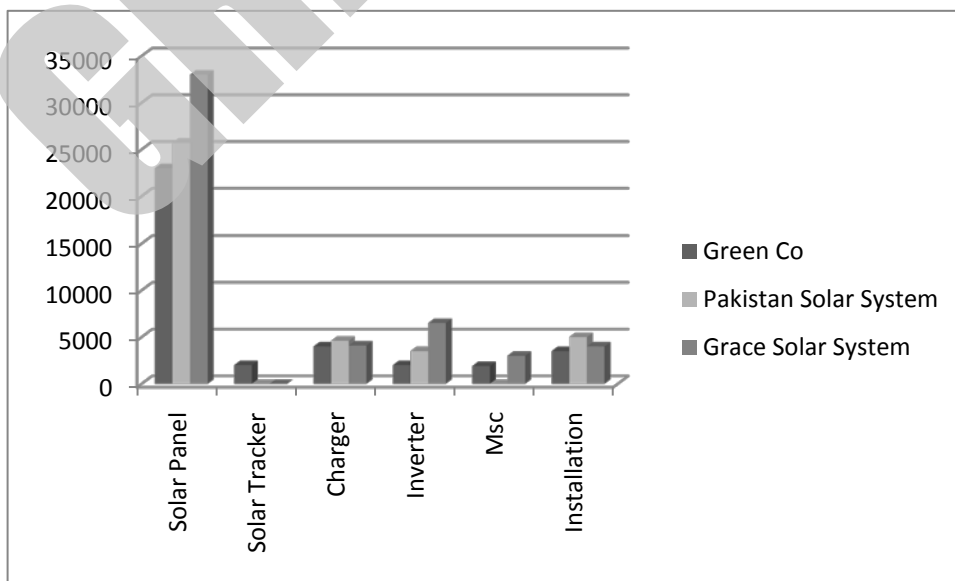
- ✓ **Services**

The services provided by Green Co. include the rentals of solar panel units to the corporate clients by providing them with LED lightings at the bill-boards and lighting services for event management companies.



✓ Competitive Comparison (Products and Services)

	Green Co	Pakistan Solar System	Grace Solar System
Capacity	100W	100W	100W
Solar Panel	23000	25700	33000
Solar Tracker	2000	n/a	n/a
Charger	4000	4600	4100
Inverter	2000	3500	6500
Msc	1900	n/a	3000
Installation	3500	5000	4000
<i>Total</i>	<i>36400</i>	<i>38800</i>	<i>50600</i>



✓ **Sales Literature**

Green co. will be providing manuals and guide books to its customers for putting the presented information into practice and solving problems as they occur. Brochures will also be provided.

✓ **Future Products and Services**

Customized products such as laptop solar chargers and mobile phone solar chargers will be available for the consumers in the near future. Moreover, we are looking forward to convert traffic signals and street lights to solar power in our long term plan.

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MARKET ANALYSIS SUMMARY



✓ **Industry participants**

Our main competitors are:

- Crest Co.
- Shaheen Solar Co.
- Solar Solutions Co. etc

Currently the marketing strategies of the competitors are not very effective and they are unable to create demand for the solar products. Hence our main focus will be on the proper marketing of our products along with their usage and benefits that would attract the customers and create demand for our solar products.

✓ **Suppliers**

Our main suppliers would be the Chinese for solar panels and LED lights. Major suppliers from the Chinese market are:

- Zhejiang Jiaying Coursertech Co., Ltd
- Delight LED Lighting Co., Ltd.
- Danyang Hopesun World Business Co.,Ltd.
- Greenwood Solar China. Co Ltd.

✓ **Target market**

Our target market is primarily the households and secondly the corporate sector that uses street light poles for lighting their bill boards. We are also offering our valuable services to

the event management companies for lightings at various indoor events. Green Co. is thus providing these companies with a solution through solar panels and LED bulbs through which the billboards will lighten up even at night when there is no electricity.

The target market also includes the retail outlets, shops, beauty salons, fast food chains and educational institutes etc that also use billboards for advertisements. In the long run, we will be targeting street lights and traffic signals to convert to solar energy.

✓ **Corporate Target Market (Outdoor):**

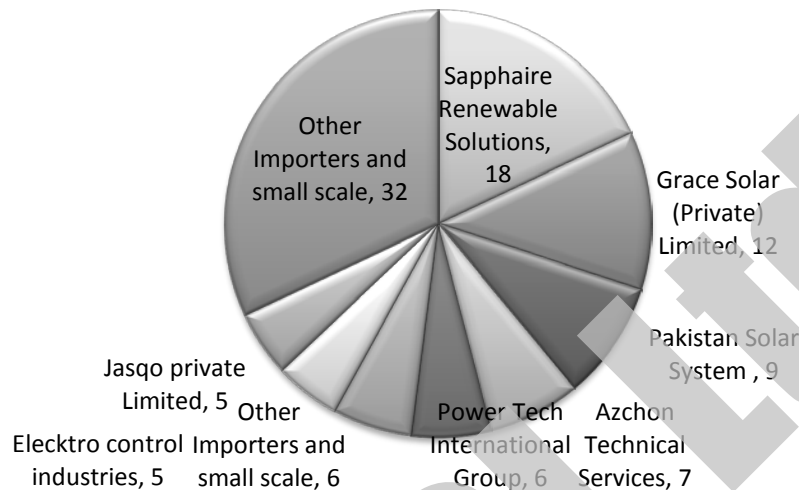
- Corporate sector (using bill boards for their advertisement)
- Retail outlets
- Beauty saloons
- Fast food chains
- Educational institutes
- Street lights and Traffic signals(long-term)

✓ **Corporate Target Market (Indoor):**

This section includes the lightning solutions to event management companies and decor services for parties and seminars.



✓ Current Market Share



The market survey conducted by Jasco Ltd. Sep 2008 clearly shows that a major pie of the market share is gained by the small scale importers, who have not been able to position their brand yet but still retain a huge share in the solar industry. Sapphaire Renewable Solutions is currently the leading brand here with merely 18% of the market share, followed up by Grace Solar Ltd with a 12% from the overall pie of solar industry. The market has the potential to grow at new levels of innovation in solar products and services.

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STRATEGY AND IMPLEMENTATION



✓ **Start up strategy**

The business plan is to import solar panels and LED bulbs in order to assemble the solar panel systems. The batteries required for energy storage are the normal car batteries which would be purchased from the local market wholesalers. Adequate marketing of the products would be done by conducting seminars at corporate level to create awareness of the cost efficient use to solar energy. The start-up business will include two managers and one technical supervisor. Green Co. being a new entrant in the market would be conducting its business operations only in Lahore.

✓ **Marketing strategies to achieve objectives**

We will be conducting seminars on corporate level to attract our main target market. Promotional strategies like sale discounts will be given in the post launch phase of the company to attract the potential customers. Further attractions such as giving away products like LED key chains with purchases of solar panel systems will also be launched. Trade discounts will be introduced on bulk purchases. The prices of our products will be set lower than our competitors in order to capture a sizeable market share as we are focusing on retaining a high sales volume. Owing to the government restrictions on night time electricity usage for billboards, Green Co. would be targeting bill-board owners and advertising agencies to promote its commercial outdoor products/services.



✓ **Growth and expansion**

Green Co. will initially operate in Lahore and when our products and services are highly in demand, we would expand our business operations nationwide. In the long run we will be manufacturing the solar panels and expand our assembling plant to cater the market demand.

Given an adequate support from the government, we also plan to power the street lights, traffic signals, street signs on the high ways and park lights on the solar energy. We would adopt latest technology in LED's and solar panels in order to ensure the quality service that we promise to deliver to our customers. Solar technology is being used all over the globe as a cost efficient source of energy and this business plan has the potential to cater the untapped market for solar energy in Pakistan.

✓

✓ **Promotion Strategy**

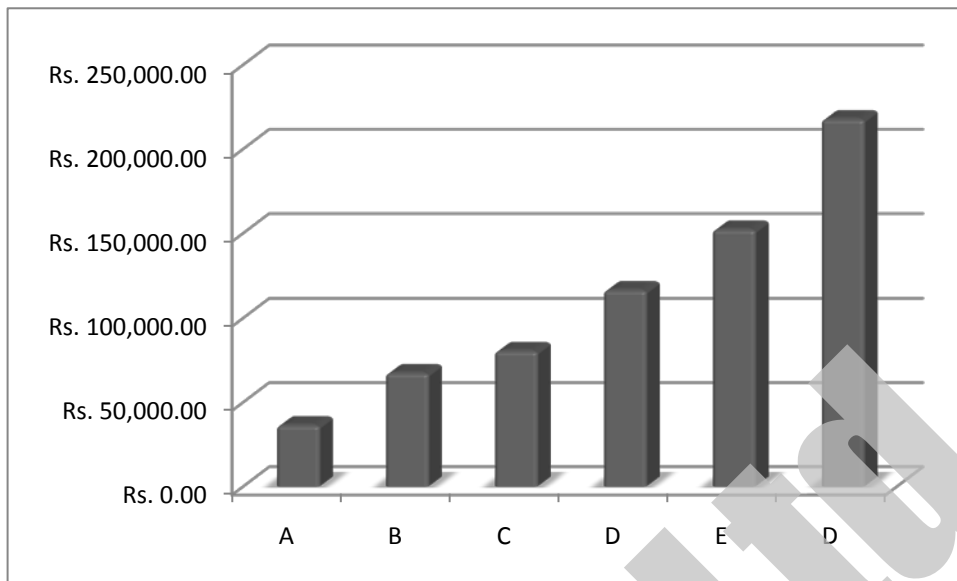
- **Public Relations** : Green Co. will be conducting seminars on corporate level to attract clients of advertising agencies and event management companies
- **Interactive Media** : Information about company and products/services on Website will be displayed
- **Mobile marketing** will also be conducted. Text messages will be sent to our clients making them aware of the new product offerings and sales promotions.
- **Above the Line & Below the Line**
- **Advertisements** on billboards and news papers
- **Sale Discounts**: Discounts on bulk buying of products

- Direct Marketing : Use of mail, telephone, internet and other non-personal contact tools to communicate with customers and household

✓ PRICING STRATEGY

Product	A	B	C	D	E	F
Capacity (Watts)	350	500	1000	1500	2200	3000
Solar Panel	Rs. 23,000.00	Rs. 52,500.00	Rs. 62,100.00	Rs. 90,000.00	Rs. 120,750.00	Rs. 181,500.00
Solar Tracker	2,000	2,000	2,000	2,000	2,000	2,000
Charger	4,000	4,000	4,000	7,500	8,700	13,500
Inverter	2,000	2,000	3,500	5,200	8,900	8,900
Msc	1,900	1,900	1,900	1,900	1,900	1,900
Installation	3,500	5,000	7,000	10,000	10,000	10,000
<i>Total</i>	<i>Rs. 36,400.00</i>	<i>Rs. 67,400.00</i>	<i>Rs. 80,500.00</i>	<i>Rs. 116,600.00</i>	<i>Rs. 152,250.00</i>	<i>Rs. 217,800.00</i>
Rental Charges	1200	1560	2880	4080	N/A	N/A





	Year 1	Year 2	Year 3	Year 4	Year 5
Revenue	<i>(in Rs)</i>				
Gross revenue	5982261	6101906	6345982	6726741	7264881
Cost of goods sold	1727191	1761735	1832204	1942137	2097508
Gross Profit	4255070	4340171	4513778	4784605	5167373



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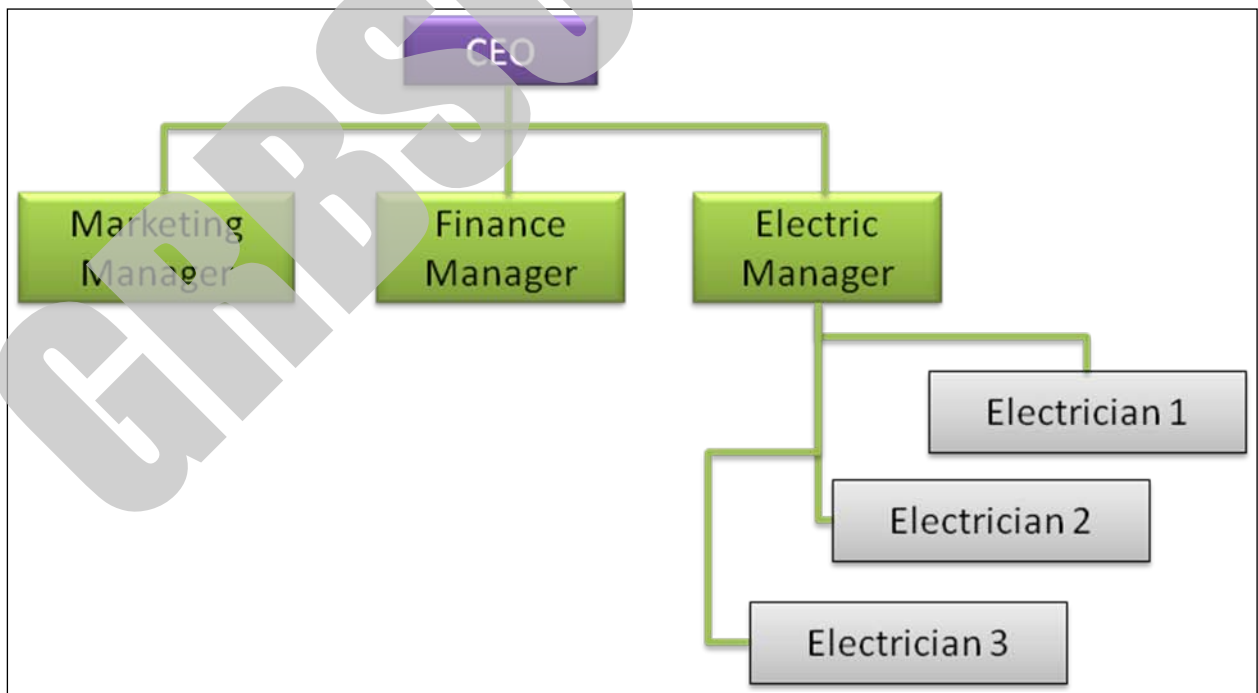
MANAGEMENT SUMMARY



✓ Management

The management would comprise of two managers for the marketing and finance department. A technical supervisor will also be hired look upon three professional electricians. As it is Startup Company and we have not launched the brand in the market, we have a limited budget for recruitment and wages for the employees. Given the market for our products will mature in the fore coming years as projected in the financial analysis of the company, we will expand our work staff accordingly.

✓ Organizational Structure



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WEB PLAN



Today the customers want everything according to the latest trends. They are more inclined towards rapid services, product security and reliability, technological compatibility and most of all accessible information. Readily available information is the first step towards developing the customer satisfaction in today's world. Following the standards and ease for the customers, we will be launching our company's website which will contain all the necessary information in an attractive and convenient format. In the long run, we will also insert the online order payment facility on our web page for customer convenience. The major elements that will be included in the website of Green Co. will be:

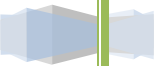
1. Home – Description of company and a banner ad
2. Products – Detailed description of product packages and prices
3. Awareness programs – How to be more energy efficient. Learnings will be available for consumers
4. Update News – News from around the globe in the energy sector
5. Contact us – includes feedback, complete contact details using interactive Google maps as well.
6. Site map

A well organized website with a valid security and capacity to expand in the future can easily be developed nowadays from a vast variety of web developers present in the market.

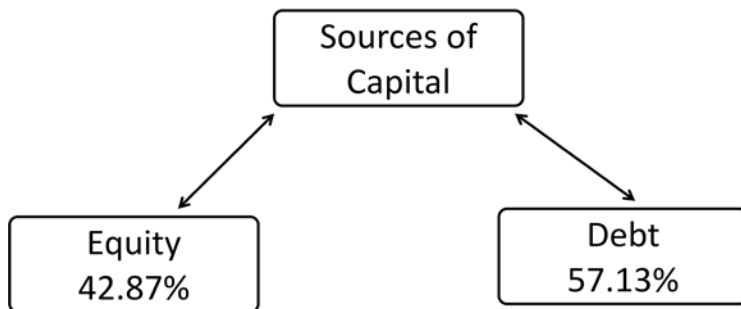


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FINANCIAL PLAN



✓ Initial Capital Requirement



Total Funds Required	Rs. 3,500,000
Owner's Injection:	
Owner(s) put into the business	Rs. 1,500,450
Recommended Minimum Level	Rs. 1,000,000
Owner's injection as a percent of the total	42.87%
Outside Financing Required:	
	Rs. 2,000,000
Recommended Financing Structure:	
	Rs.
Commercial Loan	2,000,000
Interest Rate	15.00%
Term in Months	60
Monthly Loan Payment Amount	Rs. 46,597

✓ Break –Even Analysis

Product	A	B	C	D	
Units Sold	40	25	10	5	
Cost per unit	36400	80500	116600	152250	385750
VC	795	2813	10186	26602	
Price Per unit	49140	94360	159862.5	228690	
Profit per unit	35605	77687	106414	125648	
Revenue	1965600	2359000	1598625	1143450	
FC % age	357702	429293	290919	208086	
Break Even Point	10	6	3	2	



✓ Cost saving comparison

	VOL TS (W)	UNITS CONSUMED	PER UNIT PRICE (Rs)	PER MONTH (Rs)	PER ANUM (Rs)	COST PER LIGHT (Rs)
TUBE LIGHT	80W	5	11	55	660	210
LED- TUBE LIGHT	40W	2.5	11	27.5	330	170

(Between ordinary tube light and LED tube lights)

An ordinary tube light consumes 5 units per month on average usage and per month cost, assuming that one unit cost is Rs.11, will be Rs.55 for one tube light and per annum cost of one tube light which is used averagely will be Rs.660. Thus in the long run the consumer will have greater cost benefit.



✓ **Cost saving comparison for 5 years**

	5 YEARS COST(Rs) Of (Electricity)	HOURS OF USAGE IN 5 YEARS
TUBE LIGHT	3300	7000 HOURS
LED-TUBE LIGHT	1650	50,000 – 60, 000 HOURS

LED lights are comparatively more beneficial for the consumers in the long run. As we can see that they not even have the longest running hours but also have the lowest cost. This provides an ease for consumers to buy the LED lights along with the solar panels, and to maximize their energy efficiency.



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FINANCIAL PROJECTIONS



✓ **Assumptions taken in making the financial projections:**

1. It is assumed that sales starts from the first year as by the industry numbers.
2. Bank loan is taken at 15% rate of interest.
3. The mangers required are skill full, committed to their work and determined.
4. The discount rate for NPV calculation is taken at 15%.
5. The sales are assumed to increase steady as due to the growing demand of energy
6. It is assumed that all sales are done on cash basis.

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[Green Co.]

5-Year

✓ **Balance sheet projections**

Assets	Initial balance	Year 1	Year 2	Year 3	Year 4	Year 5
			<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	
Cash and short-term investments	Rs. 675,000	<i>Rs. 1,964,267</i>	3,233,589	4,515,600	5,843,693	<i>Rs. 7,254,118</i>
Accounts receivable	0	0	0	0	0	0
Total inventory	2,000,000	2,000,000	2,040,000	2,121,600	2,248,896	2,428,808
Prepaid expenses	216,000	216,000	220,320	229,133	242,881	262,311
Other current assets	500,000	500,000	500,000	500,000	500,000	500,000
			<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>
Total current assets	<i>Rs. 3,391,000</i>	<i>Rs. 4,680,267</i>	5,993,909	7,366,333	8,835,470	10,445,237

Capital Improvements	10,000	10,000	10,000	10,000	10,000	10,000
Machinery and equipment	100,000	100,000	100,000	100,000	100,000	100,000
Less: Accumulated depreciation expense	0	22,000	44,440	67,320	90,640	114,400
Net property/equipment	<i>Rs. 110,000</i>	<i>Rs. 88,000</i>	<i>Rs. 65,560</i>	<i>Rs. 42,680</i>	<i>Rs. 19,360</i>	<i>(Rs. 4,400)</i>
			<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>
Total assets	<i>Rs. 3,501,000</i>	<i>Rs. 4,768,267</i>	<i>6,059,469</i>	<i>7,409,013</i>	<i>8,854,830</i>	<i>10,440,837</i>

Liabilities	Initial balance	Year 1	Year 2	Year 3	Year 4	Year 5
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			<i>Rs.</i>			
Long-term debt from loan payment calculator	<i>Rs. 2,000,000</i>	<i>Rs. 1,703,369</i>	<i>1,362,243</i>	<i>Rs. 969,948</i>	<i>Rs. 518,810</i>	<i>Rs. 0</i>

			<i>Rs.</i>			
Total debt	<i>Rs. 2,000,000</i>	<i>Rs. 1,703,369</i>	<i>1,362,243</i>	<i>Rs. 969,948</i>	<i>Rs. 518,810</i>	<i>Rs. 0</i>

	<i>Rs.</i>					
Total liabilities	<i>Rs. 2,000,000</i>	<i>Rs. 1,703,369</i>	<i>1,362,243</i>	<i>Rs. 969,948</i>	<i>Rs. 518,810</i>	<i>Rs. 0</i>
Equity	Initial balance	Year 1	Year 2	Year 3	Year 4	Year 5
			<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	
Owner's equity (common)	<i>Rs. 1,501,000</i>	<i>Rs. 1,501,000</i>	<i>1,501,000</i>	<i>1,501,000</i>	<i>1,501,000</i>	<i>Rs. 1,501,000</i>
Retained earnings	<i>0</i>	<i>1,563,898</i>	<i>3,191,905</i>	<i>4,924,931</i>	<i>6,808,140</i>	<i>8,893,525</i>
			<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>
Total equity	<i>Rs. 1,501,000</i>	<i>Rs. 3,064,898</i>	<i>4,692,905</i>	<i>6,425,931</i>	<i>8,309,140</i>	<i>10,394,525</i>
			<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>
Total liabilities and equity	<i>Rs. 3,501,000</i>	<i>Rs. 4,768,267</i>	<i>6,055,149</i>	<i>7,395,880</i>	<i>8,827,949</i>	<i>10,394,525</i>

[Green Co.]

5-Year Financial Plan

✓ **Profit and loss
projections**

Year-by-year profit and loss assumptions					
	Year 1	Year 2	Year 3	Year 4	Year 5
Annual cumulative price (revenue) increase	-	2.00%	4.00%	6.00%	8.00%
Annual cumulative inflation (expense) increase	-	2.00%	4.00%	6.00%	8.00%

	Year 1	Year 2	Year 3	Year 4	Year 5
Revenue	(in Rs)				

Gross revenue	5982261	6101906	6345982	6726741	7264881
Cost of goods sold	1727191	1761735	1832204	1942137	2097508

Gross Profit	4255070	4340171	4513778	4784605	5167373
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Operating expenses

Sales and marketing	260000	265200	275808	292356	315745
Salaries	1008000	1028160	1069286	1133444	1224119
Depreciation	22000	22440	22880	23320	23760
Insurance	40000	40800	42432	44978	48576
Maintenance, repair, and overhaul	5000	5100	5200	5300	5400
Utilities	50000	51000	53040	56222	60720
Property Rent	216000	220320	229133	242881	262311

Administrative fees	18000	18360	19094	20240	21859
Other	4000	4080	4243	4498	4858
Total operating expenses	1623000	1655460	1721117	1823239	1967349
Operating Profit	2632070	2684711	2792661	2961366	3200024
Interest expense on long-term debt	262528	218033	166864	108020	40349
Operating income before other items	2369542	2466678	2625797	2853346	3159675
Earnings before taxes	2369542	2466678	2625797	2853346	3159675
Taxes on income	34%	805644	838671	970138	1074290

Net income (loss)	1563898	1628008	1733026	1883208	2085386
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✓ **5-Year Financial Plan**

Cash flow

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Year 1	Year 2	Year 3	Year 4	Year 5	Total
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Operating activities

	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>
Net income	<i>1,563,897.81</i>	<i>1,628,007.60</i>	<i>1,733,026.09</i>	<i>1,883,208.21</i>	<i>2,085,385.79</i>	<i>8,893,525.49</i>
Depreciation	<i>22,000</i>	<i>22,440</i>	<i>22,880</i>	<i>23,320</i>	<i>23,760</i>	<i>114,400</i>
Accounts receivable	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
Inventories	<i>0</i>	<i>(40,000)</i>	<i>(81,600)</i>	<i>(127,296)</i>	<i>(179,912)</i>	<i>(428,808)</i>
Unearned Revenue	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
Total operating activities	<i>1,585,897.81</i>	<i>1,610,447.60</i>	<i>1,674,306.09</i>	<i>1,779,232.21</i>	<i>1,929,234.11</i>	<i>8,579,117.81</i>

Financing activities

Long-term debt/financing	<i>-Rs. 296,631.10</i>	<i>-Rs. 341,125.77</i>	<i>-Rs. 392,294.64</i>	<i>-Rs. 451,138.83</i>	<i>-Rs. 518,809.66</i>	<i>2,000,000.00</i>
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Total financing activities	-Rs. 296,631.10	-Rs. 341,125.77	-Rs. 392,294.64	-Rs. 451,138.83	-Rs. 518,809.66	-Rs. 2,000,000.00
Cumulative cash flow	Rs. 1,289,266.70	Rs. 1,269,321.83	Rs. 1,282,011.45	Rs. 1,328,093.37	Rs. 1,410,424.45	Rs. 6,579,117.81
Beginning cash balance	Rs. 675,000.00	Rs. 1,964,266.70	Rs. 3,233,588.53	Rs. 4,515,599.98	Rs. 5,843,693.36	
Ending cash balance	Rs. 1,964,266.70	Rs. 3,233,588.53	Rs. 4,515,599.98	Rs. 5,843,693.36	Rs. 7,254,117.81	

✓ NPV(Net Present Value)

Discount rate is 13%

Year	Cash flows	PVs
1	1563898	1383980.358
2	1628008	1274968.756
3	1733026	1201074.01
4	1883208	1155006.86
5	2085386	1131863.859
	NPV	6146893.844

NPV is **positive** which means that the project is feasible.

CONCLUSION

The project can be implemented because all the projections have been made on real time data collected through market analysis and the Chinese suppliers. Plus, the government is also supporting the usage of alternate energy. So it is a feasible plan and can be implemented on real terms and all the financial aspects are given in detail that proves that the project would be profitable. The NPV is positive and cash flows are managed effectively.

The major advantage of a Solar panel system is the cost effectiveness of our products that would attract potential customers from corporate and consumer level. Other advantages include:

- The savings in electricity and generator bills
- Overcoming the energy crises
- Reducing replacement costs of electronic appliances
- Durability of the products
- Cost effectiveness
- Emerging market
- Saving on cost of goods sold as there is no customs duty on importing solar panels and LED lights.

GREEN SOL LTD.

APPENDIX

✓ Questionnaire:

ALTERNATE ELECTRICAL ENERGY -SURVEY-

Please provide some of your time to fill this survey. We ensure you that the information here will remain confidential and is solely used for the research purpose. Thanks in Anticipation

* Required

Is load shedding creating problem or decreasing your daily productivity? *

- To great extent
- To some extent
- Very little
- Not at all

Do you have any backup electricity source at your residence? *Select the sources which you have

- UPS
- Diesel Generator
- Gas Generator
- Rechargeable/Battery Light
- No I don't have any Electricity Backup source
- Other:

Are you satisfy with your current backup *Even if you don't have any backup answer

- Yes
- No

If NO then are you planning to change your backup source? *

- Yes
- No

While purchasing any Electricity Backup source how much preference you give to "PRICE" *Please select from the preference scale

1 2 3 4 5

Most Preferred Least Preferred

While purchasing any Electricity Backup source how much preference you give to "CONSUMPTION and MAINTENANCE COST"*Please select from the preference scale

1 2 3 4 5

Most Preferred Least Preferred

While purchasing any Electricity Backup source how much preference you give to "INSTALLATION EASE" *Please select from the preference scale

1 2 3 4 5

Most Preferred Least Preferred

While purchasing any Electricity Backup source how much preference you give to "DURABILITY" *Please select from the preference scale

1 2 3 4 5

Most Preferred Least Preferred

While purchasing any Electricity Backup source how much preference you give to "EASY TO USE" *Please select from the preference scale

1 2 3 4 5

Most Preferred Least Preferred

While purchasing any Electricity Backup source how much preference you give to "AVAILABILITY" *Please select from the preference scale

1 2 3 4 5

Most Preferred Least Preferred

While purchasing any Electricity Backup source how much preference you give to "POPULARITY" *Please select from the preference scale

1 2 3 4 5

Most Preferred Least Preferred

How much you know about Solar Panels as Electricity Backup for households in Pakistan? *

- To great extent
- To some extent
- Very little
- Not at all

How much willing you will be to use the Solar panel for your electronics, if it has only one time purchase cost, and no other costs as Gas, Petrol, Diesel, or electricity charging? *

- I will definitely buy it
- I am not sure
- No i will not buy it

What should be the price for a solar panel system which can generate power for 800W almost equal to provide power for 4 fans, 6 energy savers, 2 laptops and mobile chargers? *

- Rs. 10,000 to 15,000
- Rs. 15,000 to 30,000

- Rs. 30,000 to 55,000
- Rs. 55,000 to 80,000

Other than complete solar panel system Which solar panel products you will most likely to purchase and use in your daily life here in Pakistan? *

- Portable Mobile Charger
- Portable Light
- Portable battery Charger
- Garden lamps
- Solar bags
- Portable power supplier (for modems, routers etc)
- Portable Laptop Charger

✓ Respondent Details

Please Select your Age Group *

- 18 to 25
- 25 to 35
- 35 to 50
- 50 +

Which City are you from *

Your Occupation *

- Student
- Business
- Job
- Student
- Retiree
- Other:

Untitled Question

Link : <http://spreadsheets.google.com/viewform?formkey=dFgxdVJ2SDBPTTISTH14Yk1jbGkzWFE6MA..>

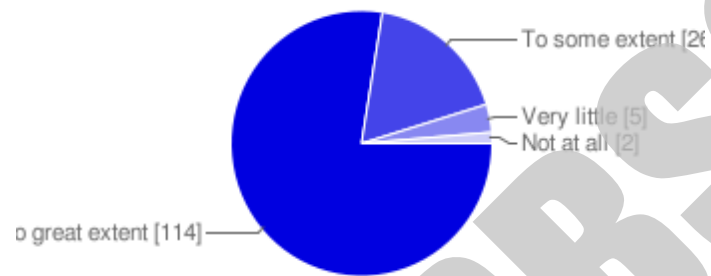
- ✓ Sample Size = 147
- ✓ Convenience Sampling
- ✓ CAPI, CAWI

✓ Survey Results:

147 responses

Summary [See complete responses](#)

Is load shedding creating problem or decreasing your daily productivity?



To great extent 114 78%

To some extent 26 18%

Very little 5 3%

Not at all 2 1%

Do you have any backup electricity source at your residence?

UPS

Diesel Generator

Gas Generator

Rechargable/Battery Lighty

No I don't have any Electricity Backup source

Other

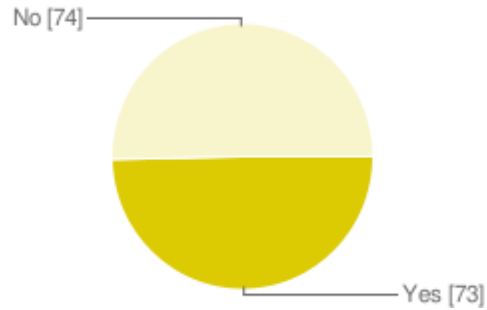
People may select more than one checkbox, so percentages may more than 100%.

Are you satisfy with your current backup



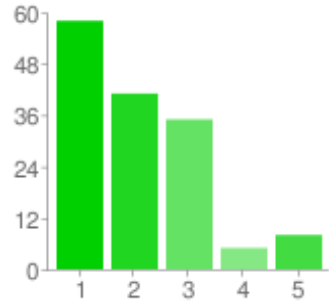
Yes	41	28%
No	106	72%

If NO then are you planning to change your backup source?



Yes	73	50%
No	74	50%

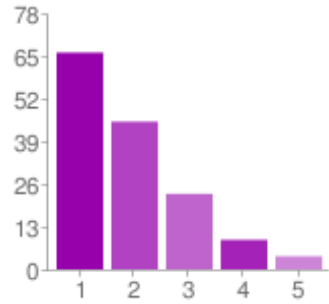
While purchasing any Electricity Backup source how much preference you give to "PRICE"



1 - Most Preferred	58	39%
2	41	28%
3	35	24%
4	5	3%
5 - Least Preferred	8	5%

Most Preferred Least Preferred

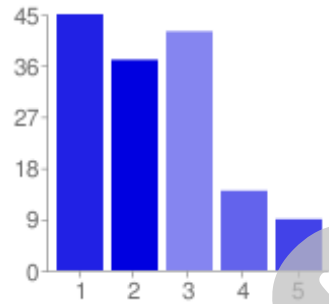
While purchasing any Electricity Backup source how much preference you give to "CONSUMPTION and MAINTENANCE COST"



Most Preferred Least Preferred

1 - Most Preferred	66	45%
2	45	31%
3	23	16%
4	9	6%
5 - Least Preferred	4	3%

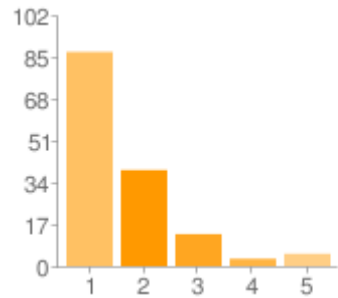
While purchasing any Electricity Backup source how much preference you give to "INSTALLATION EASE"



Most Preferred Least Preferred

1 - Most Preferred	45	31%
2	37	25%
3	42	29%
4	14	10%

While purchasing any Electricity Backup source how much preference you give to "DURABILITY"



Most Preferred Least Preferred

5 - Least Preferred 9 6%

1 - Most Preferred 87 59%

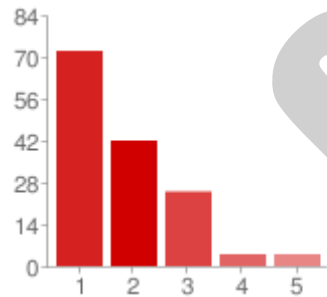
2 39 27%

3 13 9%

4 3 2%

5 - Least Preferred 5 3%

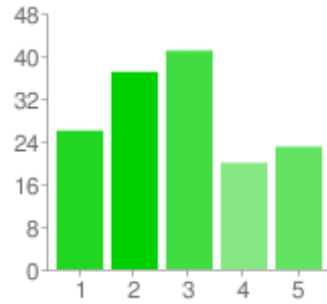
While purchasing any Electricity Backup source how much preference you give to "EASY TO USE"



1 - Most Preferred 72 49%

2 42 29%

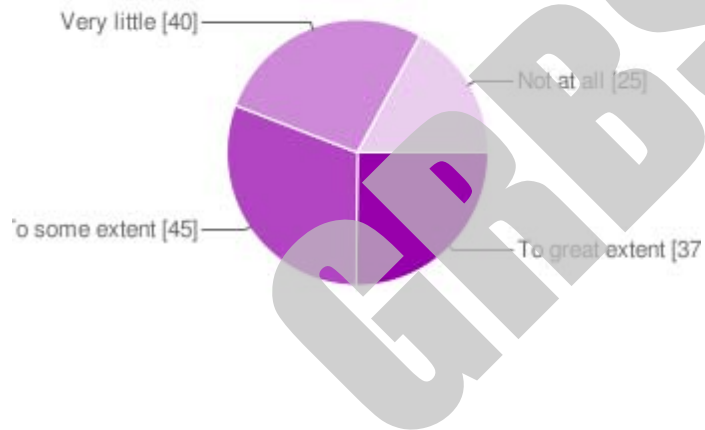
3 25 17%



Most Preferred Least Preferred

1 - Most Preferred	26	18%
2	37	25%
3	41	28%
4	20	14%
5 - Least Preferred	23	16%

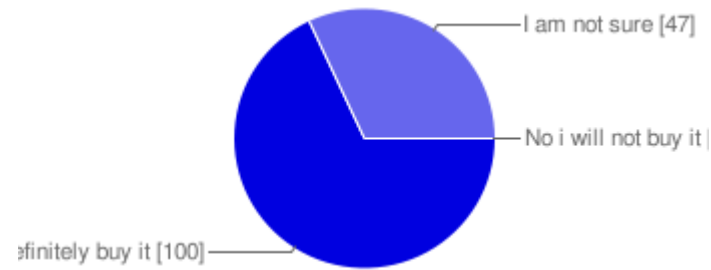
How much you know about Solar Panels as Electricity Backup for households in Pakistan?



To great extent	37	25%
To some extent	45	31%
Very little	40	27%
Not at all	25	17%

How much willing you will be to use the Solar panel for your electronics, if it has only one time purchase cost, and no other costs as Gas,

Petrol, Diesel, or electricity charging?



I will definitely buy it 100 68%

I am not sure 47 32%

No i will not buy it 0 0%

What should be the price for a solar panel system which can generate power for 800W almost equal to provide power for 4 fans, 6 energy savers, 2 laptops and mobile chargers?

Rs. 10,000 to 15,000 57 39%

Rs. 15,000 to 30,000 59 40%

Rs. 30,000 to 55,000 29 20%

Rs. 55,000 to 80,000 2 1%

Other than complete solar panel system Which solar panel products you will most likely to purchase and use in your daily life here in Pakistan?

Portable Mobile Charger

Portable Light

Portable battery Charger

Garden lamps

Solar bags

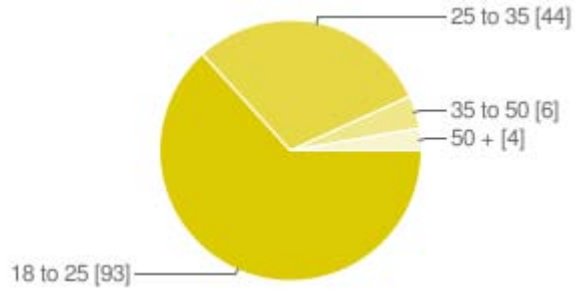
Portable power supplier (for modems, routers etc)

Portable Laptop Charger

People may select more than one checkbox, so percentages may
100%.

✓ Respondent Details

Age Group



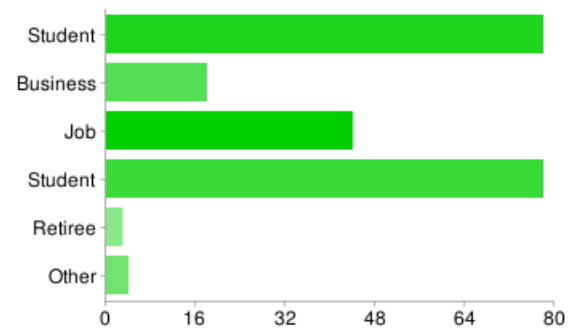
18 to 25	93	63%
25 to 35	44	30%
35 to 50	6	4%
50 +	4	3%

Which City are you from

sahiwalLahoreLahoreLahoreLahorelahoreLahoreLahorePeshawarLahoregujranwalagujranwalaLahoreLahoreRawalpindiLahorelhrLahoreLahorelahoreLahoresa
hiwallahorelahoreLahoreLahoreBahawalpurlahoreLahorelahorel...

Number of daily responses

Your Occupation



Student	78	53%
Business	18	12%
Job	44	30%
Student	78	53%
Retiree	3	2%
Other	4	3%

GRBSOL Ltd.

✓ Article : Published in WIE Chronicles

Solar panels as a cost efficient energy source for Pakistan

By: *Muhammad Omer*

The long term effects resulting from the industrialization of Earth and its natural resources are beginning to crack the surface of our daily reality. Some people are trying to minimize the damage by recycling, going green, eating healthy diets etc, but one of the most effective practices to help mother Earth is by improving and conserving the daily quota of energy. A practical yet functional method in this regard is the use of solar light.

Solar energy is by and large the best developed and largely used method of energy conservation used by companies and a normal Joe like us. Solar power works by deriving power from sun's rays falling on a series of panels, which absorb and later convert them into energy for household use.

Redefining an entire home's electrical pathway to a solar powered system requires finances which are not affordable by all. Small steps taken in this regard can however amount up to both monetary and ecological savings.

Home owners can use solar powered LED lights and devices to utilize sun's energy for everyday usage. These lights can be used in and around the house at no cost of electricity, emission of fossil fuels or carbon dioxide. Other methods which can drastically reduce a consumer's expenditure include usage of solar energy for heating, cooling and ventilation systems. Although all these methods require some form of equipment, which employs solar energy in a direct or passive way, the end result is cost effective for the everyday man.

Absorption of heat by such an apparatus results in maintaining a cooler environment within a home/building during warmer months. This stored heat can subsequently be used as electricity when needed, thus reducing the electrical shortage.

A few eco-friendly companies are bringing this technology to the Pakistani soil. Backed by the government, these private corporations are seeking to effectively employ this never ending source of energy to a better and permanent use. Pakistan is one of the six countries to receive huge amounts of sunlight which unfortunately go to waste due to lack of consumer awareness on this matter. These private companies are aiming to bring in relatively simple, cheaper yet productive apparatus to us. Solar panels, chargers, batteries, conductors and much more are part of the package to utilize sun's energy on a commercial and domestic level.

This viable and inexhaustible source of energy needs to be captured and put to better use for the sake of the environment and the people of Pakistan. Given the economic conditions of our country and the power outages, the electricity crisis can be effectively overcome if sun's energy is utilized at a commercially large level. This will not only help a common man to save a few rupees of his hard earned money but will also help Pakistan's energy crisis and economic downfall.

The application of solar energy has been around for quite some time. Increase in human population has undeniably increased the need for its harvest too. Radios, lights, chargers, calculators and now even cars are being modified to capture the sun's power. The decision to choose and employ a solar powered product over a traditional energy source brings us one step closer to a better environment and a decrease in our dependency on non renewable energy resources. We, in Pakistan, need to act on this stimulus too.

Last month, we asked you guys to send us your articles related to women, science and technology. We received loads of entries and have decided to include Muhammad Omer's article on Solar Energy in this issue of WIE Chronicles!

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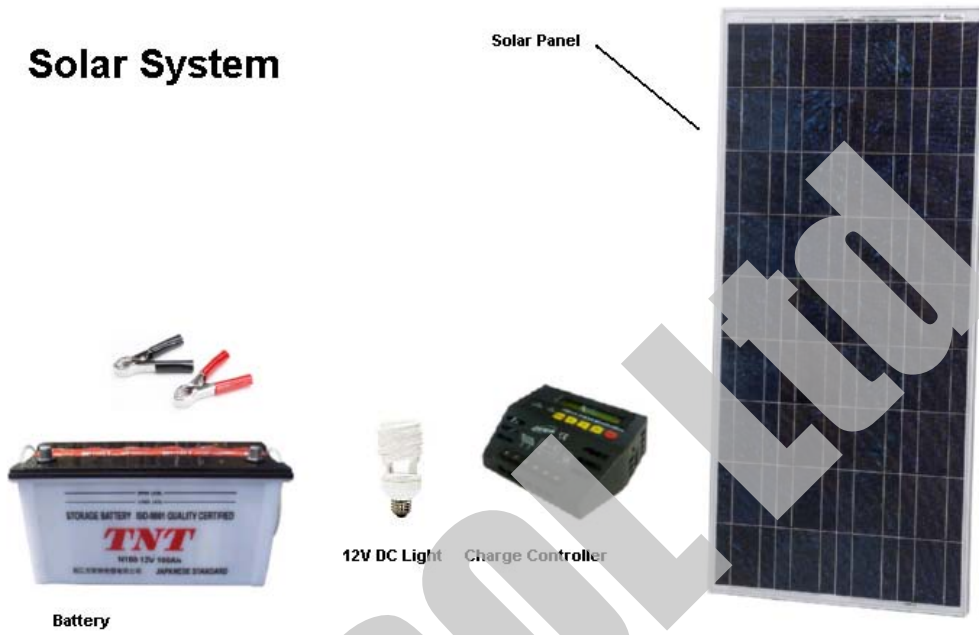
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PRODUCTS PICTURES



✓ **Solar Panel System**

Solar System



✓ **Flood light**



✓ **Street light lamp**



✓ **LED Bulbs**



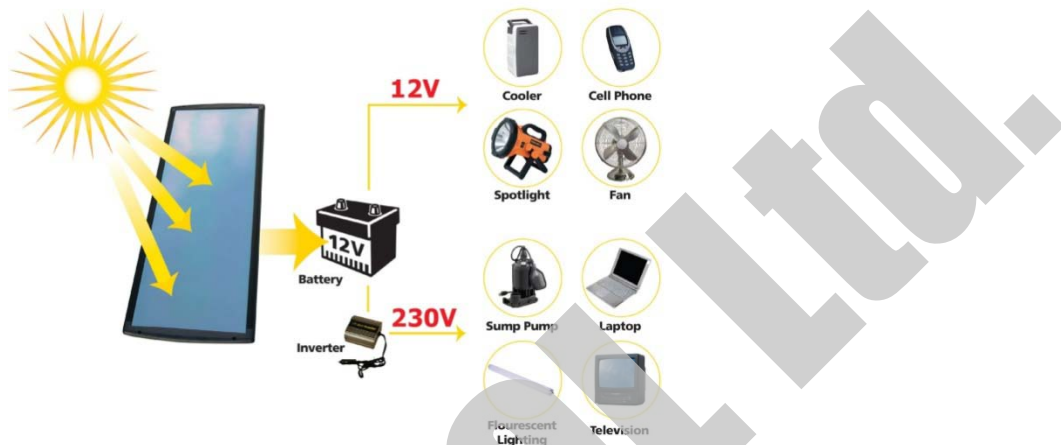
✓ **Event decoration lights**



✓ **Solar panels**



How Solar Works



$100W \times 3 \text{ hours} = 300W$



Sunshine = 6 hours

$300W / 6 \text{ hours} = 50W$



= 50 Watt