



**Pre-feasibility Study**

# **SOLAR POWER /SOLAR HEATING SYSTEMS DESIGNING AND INSTALLATION SERVICES**

**May 2021**

*“The figures and financial projections are approximate due to fluctuations in exchange rates, energy costs, and fuel prices etc. Users are advised to focus on understanding essential elements such as production processes and capacities, space, machinery, human resources, and raw material etc. requirements. Project investment, operating costs, and revenues can change daily. For accurate financial calculations, utilize financial calculators on SMEDA’s website and consult financial experts to stay current with market conditions.”*

**Small and Medium Enterprises Development Authority**  
Ministry of Industries and Production  
Government of Pakistan

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## 1. DISCLAIMER

This information memorandum is to introduce the subject matter and provide a general idea and information on the said matter. Although, the material included in this document is based on data / information gathered from various reliable sources; however, it is based upon certain assumptions, which may differ from case to case. The information has been provided on, as is where is basis without any warranties or assertions as to the correctness or soundness thereof. Although, due care and diligence has been taken to compile this document, the contained information may vary due to any change in any of the concerned factors, and the actual results may differ substantially from the presented information. SMEDA, its employees or agents do not assume any liability for any financial or other loss resulting from this memorandum in consequence of undertaking this activity. The contained information does not preclude any further professional advice to be obtained by the user. The prospective user of this memorandum is encouraged to carry out additional diligence and gather any information which is necessary for making an informed decision, including taking professional advice from a qualified consultant / technical expert before taking any decision to act upon the information.

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### **Document Control**

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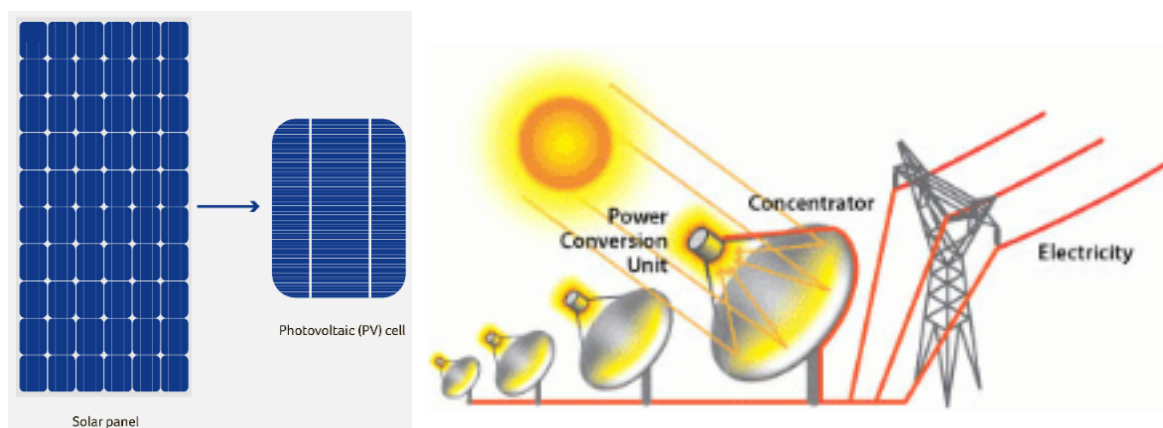
## 2. EXECUTIVE SUMMARY

In today's world, global energy demand is increasing consistently due to the rapid growth of population, industrialization and ongoing developmental activities. The rate of this growth in demand is higher in developing countries. With the depleting resources of fossil fuels, the importance of renewable energy sources is increasing with every passing day. Renewable energy sources are preferred due to their less impact on the environment by reducing the fossil fuel consumption. Moreover, per unit operating cost of renewable energy is low which results in reducing energy bills for the common man.

Renewable energy can be obtained from sustainable and environment friendly natural resources. Currently, renewable energy is obtained from different sources; such as solar, wind, tidal (energy from the tides of water), hydro (energy from the power of water in motion) and biomass (energy from plants or animals). Of these, solar energy has been able to attract more attention; especially in the developing countries. Solar energy is considered to be a promising renewable energy alternative as it converts sunlight directly to electrical energy. Pakistan has some of the highest values of irradiance in the world, with eight to nine hours of sunshine per day and ideal climatic conditions for solar power generation. Solar irradiance is the power per unit area received from the Sun in the form of electromagnetic radiation.

Solar power is the energy converted from sunlight using either solar panel made of Photovoltaic (PV) cells or solar dish made of mirrors that concentrate solar radiations. **Figure 1** shows a solar panel made of PV cells and a solar dish concentrating energy from sunlight.

**Figure 1: Solar Panel and Solar Dish**



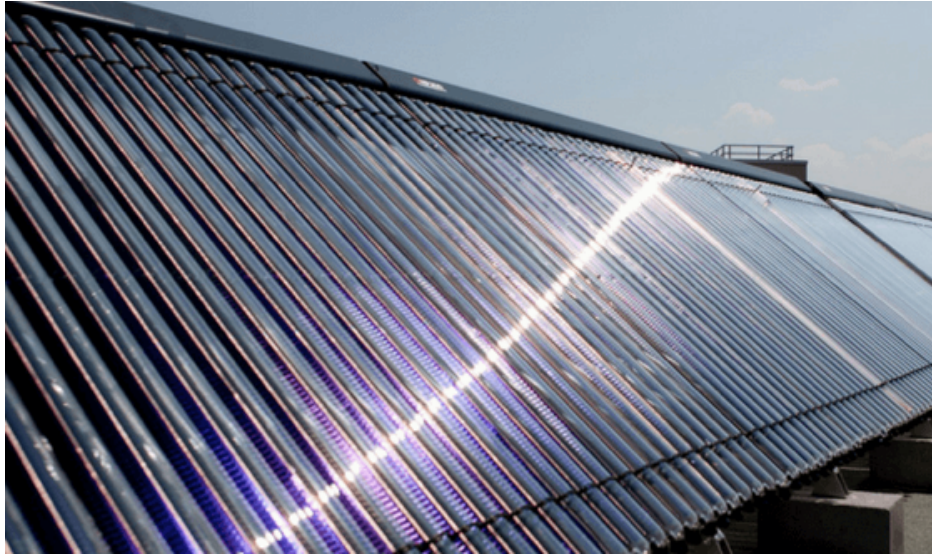
This “Pre-feasibility Document” provides details on “Solar Power /Solar Heating Systems Designing and Installation Services” based on solar panels made of Photovoltaic cells.

The principal activity of the business includes providing Solar Power System Designing and Installation services and Solar Heating System Designing and Installation services. The basic difference between solar power system and solar heating system is that in the former, solar energy is converted into electrical energy

while in later it is used to directly heat either a liquid or air. Further, in solar power system, PV panels are used while in heating system thermal panels are used.

Thermal panels are commonly known as thermal collectors, the collector absorbs solar energy and transfers it to heat the adjoining tubes, which contain fluid or air to be heated. Figure 2 shows thermal panels used for heating water.

**Figure 2: Thermal Panels**



This study does not provide information regarding net metering services. As solar energy related service providers/vendors have to qualify the eligibility criteria as mentioned in the Alternative Energy Development Board Certification Regulations 2018. The regulations further require that the service providers/vendors “must possess inventory of renewable power equipment as per standards & specifications approved by NEPRA and AEDB”.

Keeping in view above criteria the net metering service providers have to be vendors also. The scope of this study covers system designing and installation services only. This study has been conducted keeping system designing and installation services in consideration.

The proposed business has a service capacity of designing and installing 747 KW (Kilo watts) of energy systems in a year at a maximum capacity of 100%. The initial operational capacity in “Year One” is estimated at 60%, which is 448 KW.

The proposed setup of solar power designing and installation services will ideally be established in metropolitan cities of Lahore, Karachi, Rawalpindi-Islamabad, Peshawar, Quetta, Hyderabad, Faisalabad, Gujranwala, Multan, Sialkot, etc. The main reason is the presence of large customer base in such large urban population centers. Moreover, such big cities have all the required modern facilities and the infrastructure, along with easy availability of labor, technicians and qualified staff.

The project will be set up in a rented building with an area of 1,125 square feet. The project requires a total investment of PKR 4.71 million. This includes capital investment of PKR 4.15 million and working capital of PKR 0.56 million. It is proposed



that the project shall be financed through 100% equity. The Net Present Value (NPV) of project is PKR 18.07 million with an Internal Rate of Return (IRR) of 57% and a Payback period of 2.61 years. Further, this project is expected to generate Gross Annual Revenues of PKR 8.96 million during 1<sup>st</sup> year, Gross Profit (GP) ratio ranging from 46% to 70% and Net Profit (NP) ratio ranging from 2% to 31% during the projection period of ten years. The proposed project will achieve its estimated breakeven point at capacity of 52% (390 KW) with annual revenue of PKR 7.81 million.

The proposed project may also be established using leveraged financing. At 50% debt financing at a cost of KIBOR+3%, the proposed business provides Net Present Value (NPV) of PKR 22.63 million, Internal Rate of Return (IRR) of 56% and Payback period of 2.68 years. Further, this project is expected to generate Net Profit (NP) ratio ranging from 2% to 31% during the projection period of ten years. The proposed project will achieve its estimated breakeven point at capacity of 53% with breakeven revenue of PKR 7.89 million.

The proposed project will provide employment opportunities to 10 to 15 people including the owner. High return on investment and steady growth of business is expected with the entrepreneur having some prior experience or education in the related field of business. The legal business status of this project is proposed as "Sole Proprietorship". Further, the proposed project may also be established as a "Partnership Concern".

### **3. INTRODUCTION TO SMEDA**

The Small and Medium Enterprises Development Authority (SMEDA) was established in October 1998 with an objective to provide fresh impetus to the economy through development of Small and Medium Enterprises (SMEs).

With a mission "to assist in employment generation and value addition to the national income, through development of the SME sector, by helping increase the number, scale and competitiveness of SMEs", SMEDA has carried out 'sectoral research' to identify policy, access to finance, business development services, strategic initiatives and institutional collaboration and networking initiatives. Preparation and dissemination of prefeasibility studies in key areas of investment has been a successful hallmark of SME facilitation by SMEDA.

Concurrent to the prefeasibility studies, a broad spectrum of business development services is also offered to the SMEs by SMEDA. These services include identification of experts and consultants and delivery of need-based capacity building programs of different types in addition to business guidance through help desk services.

National Business Development Program for SMEs (NBDP) is a project of SMEDA, funded through Public Sector Development Program of Government of Pakistan.

The NBDP envisages provision of handholding support / business development services to SMEs to promote business startup, improvement of efficiencies in existing SME value chains to make them globally competitive and provide conducive business environment through evidence-based policy-assistance to the Government of

Pakistan. The Project is objectively designed to support SMEDA's capacity of providing an effective handholding to SMEs. The proposed program is aimed at facilitating around 314,000 SME beneficiaries over a period of five years.

#### **4. PURPOSE OF THE DOCUMENT**

The objective of the pre-feasibility study is primarily to facilitate potential entrepreneurs in project identification for investment. The project pre-feasibility may form the basis of an important investment decision and in order to serve this objective, the document/study covers various aspects of project concept development, start-up, and production, marketing, finance and business management.

The purpose of this document is to provide information to the potential investors about “Solar Power/Solar Heating Systems Designing and Installation Services”. The document provides a general understanding of the business to facilitate potential investors in crucial and effective investment decisions.

The need to come up with pre-feasibility reports for undocumented or minimally documented sectors attains greater imminence as the research that precedes such reports reveal certain thumb rules; best practices developed by existing enterprises by trial and error, and certain industrial norms that become a guiding source regarding various aspects of business set-up and its successful management.

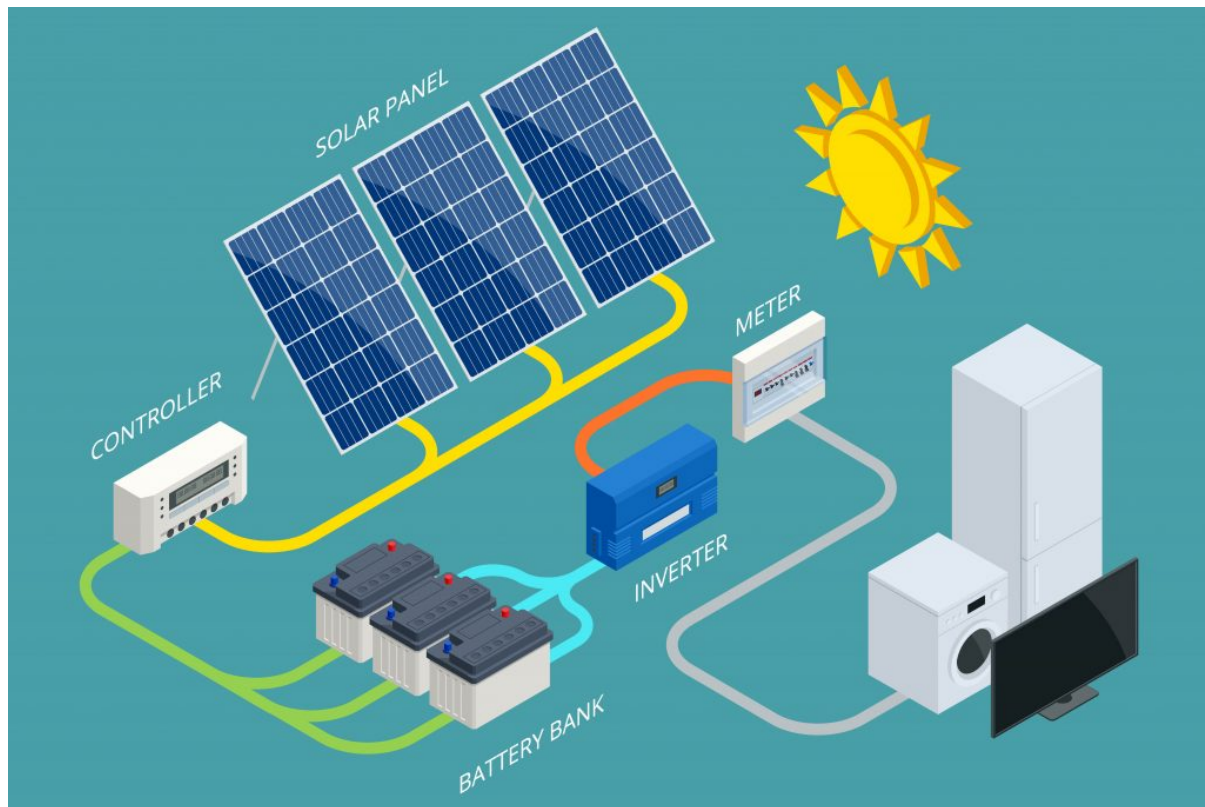
Apart from carefully studying the whole document one must consider critical aspects provided later on, which form the basis of any investment decision.

#### **5. BRIEF DESCRIPTION OF PROJECT & SERVICES**

This document provides details for rendering of Solar Power /Solar Heating Systems Designing and Installation Services. Solar photovoltaic power system is one of the renewable energy systems, which uses photovoltaic (PV) panels to convert sunlight into electricity. The electricity generated can be stored or used directly, fed back into grid line or combined with one or more other electricity generators or more renewable energy sources. Solar PV system is very reliable and clean source of electricity that can suit a wide range of applications such as residence, industry, agriculture, livestock, etc.

Solar Photovoltaic system is composed of solar panels, inverter, power meter, solar monitoring equipment, storage batteries and wires to connect the system. Solar panels are composed of cells, which receive sunlight and convert it to direct current. Figure 3 shows a PV solar system.



**Figure 3: Photovoltaic System**

This direct current is then passed through power controller and solar monitoring equipment for its controlled generation. From power controller and monitoring system, the direct current is converted into alternating current by passing it through an inverter.

The generated alternating current (AC)<sup>1</sup> can be used for operating electrical installation equipment. Along with being used directly, the received electrical charge can also be stored in the batteries. Numbers of panels and batteries depend upon the use and electricity demand of the client.

Demand for solar system is increasing day by day due to electricity load shedding and rising prices of WAPDA electricity. Installing a solar electrical generation system is a onetime expense, which can provide electricity without any further charges.

Another utility of solar energy is the solar heating system, in which solar energy is converted into heat energy that is then used to heat either liquid or air.

Both Solar Power System and Solar Heating System require same kind of services with the only difference that for solar power, PV panels are used while for heating system, thermal panels are used.

The proposed project will be established in a rented building in any major city; such as Lahore, Karachi, Rawalpindi-Islamabad, Peshawar, Faisalabad, Gujranwala, Multan, Sialkot, etc. It includes the services of design, sale and installation of solar

<sup>1</sup> Alternating Current (AC) is a type of electrical current, in which the direction of the flow of electrons switches back and forth at regular intervals or cycles. Direct current (DC) is electrical current, which flows consistently in one direction.

panels, along with the after-sales services. The project will employ around 14 to 15 persons.

### 5.1. Components of Solar System

A solar system has following components:

- Solar Panels
- Mounting Structure
- Charge Controller
- Batteries
- Inverter
- Power Meter and Solar Monitoring Equipment

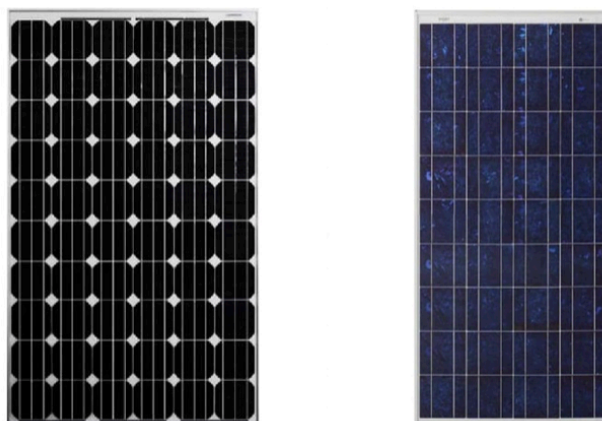
#### **Solar Panels**

Solar Panels are made up of photovoltaic cells combined in series and parallel form. Commonly two types of solar panels are used, Mono-crystalline panels are suitable for high temperature areas (more than 35 degree Centigrade) whereas Poly-crystalline panels are suitable for areas where the temperature remains less than 35 degrees Centigrade.

Different sizes of solar panels produce different power. The size of solar panel depends upon the number of cells configured. Normally these contain 32, 36, 48, 60, 72 and 96 cells. A solar panel comprising 32 cells typically can produce 14.72 volts output (each cell producing about 0.46 volt of electricity).

These panels are available in different power and voltage options, which ranges from 150 watt to 300 watt and 12V, 24V and 48V. Figure 4 shows mono and poly crystalline solar panels.

**Figure 4: Mono (left) and Poly (right) Crystalline Solar Panels**



### **Mounting Structure**

The PV panels are mounted on ground or roof with the help of structured rods made of aluminium or steel. The mounting structure is adjusted at appropriate angles to receive maximum solar irradiance. Figure 5 shows a ground-mounted structure.

**Figure 5: Mounting Structure**



### **Charge Controller**

The charge controller manages the power going from solar panels to batteries. It ensures the batteries are not overcharged during daytime and not run out of charge in night. There are two types of charge controllers.

- i. Maximum Power Point Tracking (MPPT)

A controller has 150V DC (Voltage Direct Current) input PV voltage and 12/24/48V DC output voltages to the batteries and current rating of 10-60 amperes. Its function depends on load and charging condition of batteries. If the batteries are full then it provides the power to the capacity of running load only. With increase in load, it automatically increases the power supply and vice versa. Figure 6 shows an MPPT charge controller.

**Figure 6: MPPT Charge Controller**



## ii. Pulse Width Modulation (PWM)

This controller has less than 50V DC input PV voltage and 12/24/48VDC output voltages to the batteries and current rating of 10-40 amperes. It functions like a switch that connects the solar system to batteries. When a battery is fully charged, the PWM slowly reduces the charging current to avoid heating and gassing of the battery, resulting a higher charging efficiency, rapid recharging, and a healthy battery at full capacity. Figure 7 shows a PWM charge controller.

**Figure 7: PWM Charge Controller**



## Inverter

An inverter is used to convert DC into AC. While choosing an inverter, it should be kept in mind that the total energy consumption requirement should not override power rating (total voltage supplied by the inverter for the electric appliances) and the type of appliances to be run. Power rating of an inverter is defined in Volt Amperes (VA).

To determine VA, total power requirement is divided by efficiency of appliances i.e. power factor which is generally 80% or 0.8. General power requirement of some basic home appliances is given below;

- Split AC 1.5 ton – 1600 watts
- LED Bulb – 10 watts
- Electric Iron – 1000 watts
- Microwave Oven – 1200 watts
- Ceiling Fan – 80 watts
- Laptop – 40 watts
- LED 32" – 50 watts
- Energy Saver – 20 watts

A total of 4000 watts of power is required to run these appliances in one hour. So, an inverter of 5000 VA ( $4000 \times 0.8$ ) will be required for above appliances.

There are three types of inverters available in market, which are described below:

### i. Off-Grid/Stand-alone Inverter

It is an inverter that is used where there is no access to the local grid. It works in isolated system. An Off-Grid inverter is shown in Figure 8.

**Figure 8: Off-Grid Inverter**



ii. Grid-Tied Inverters

It is an inverter that is synched with local grid. It does not work stand-alone and shuts down automatically when there is no power. Figure 9 shows a grid tie inverter.

**Figure 9: Grid Tie Inverter**



iii. Hybrid Inverters

A hybrid inverter may work both as standalone and as grid-tied system. These types of inverters are more commonly used in solar systems. A hybrid inverter is shown in Figure 10.

**Figure 10: Hybrid Inverter****Power Meter and Solar Monitoring Equipment**

A power meter and monitoring system shows power production and consumption levels. It collects this information and sends to cloud-based monitoring systems and applications for real time monitoring. It is shown in Figure 11.

**Figure 11: Power Meter and Solar Monitoring Equipment****Batteries**

Batteries are devices, composed of cells, used to store electric power. Ampere Hour (Ah) is used as symbol to show the energy a battery can store. The most common Ah values of a battery are 100, 120, 150, 180, and 200 Ah. Higher Ah means a stronger battery. Figure 12 shows batteries used for storage.



**Figure 12: Batteries**

There are mainly four types of batteries they may be used in solar power system.

**Lead Acid** in which electrodes (anodes and cathode) are of lead oxides and electrolyte is diluted sulfuric acid. Voltage of a lead acid battery is 2V per cell.

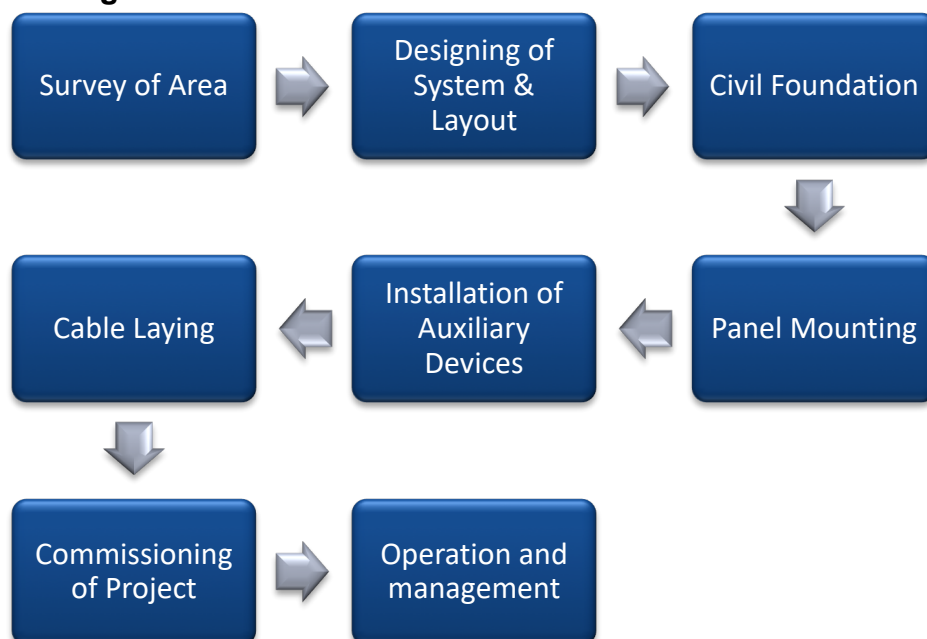
**Lithium (Li)** batteries have lithium as anode. Voltage of Li battery cell is 3.2V.

**Nickel cadmium (Ni-Cd)** batteries have nickel-iron and cadmium as electrodes. Its average cell voltage is 1.2V.

**Flow** batteries have electrochemical cells, with its cell voltage ranging from 1 to 2.43 volts.

### 5.2. Services Process Flow

The process flow of designing and installation of solar power/heating system is shown in Figure 13.

**Figure 13: Process Flow of Solar Power Installation Services**

The process flow is explained as follows:

### **Survey of Location**

Before the installation of the solar system, survey of the target location is carried out. For installation of solar panels, best sunny place without any shady area should be selected. Batteries and inverter position is identified by the client.

### **Designing of Solar Energy System**

Solar energy system design will be carried out by the team. This design will include at least the following factors:

- Total load/energy requirement
- Areas, equipment and appliances to be electrified and their compatibility
- Type and number of panels to be used
- Types of Charge Controllers, Inverters Power Meter and other components
- Type and number of batteries required
- Type and length of cable/ wire required
- Location and inclination of the panels

In addition to the above, any other factors, which may be specific to a particular location, should also be considered in system design.

### **Designing of Layout**

After initial survey, design of layout will be prepared. It may be ground mounted or roof mounted system. Its design depends upon the availability of space. Normally, a 1000 W residential solar system would require an area of 2,250 sq. feet. On a roof, it may be installed as RCC (reinforced cement concrete) roof mounted or Galvalume sheet<sup>2</sup> roof mounted.

### **Civil Foundation**

To provide the structural stability to the panels, they are fixed on concrete foundation blocks. These foundation blocks can be cylindrical or typically, a concrete cuboid. The size depends upon the number of panels.

The basic purpose of the foundation block is to give firm support to the panels against high winds, storms or earthquakes.

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<sup>2</sup> A type of sheet made up of zinc, aluminium and silicon.

**Figure 14: Civil Foundation of Solar Panel****Figure 15: Mounting of Panels on Foundation****Panel Mounting**

Panel mounting is of three types, which are RCC roof mounting, Galvalume sheet roof mounting and ground mounting. Rooftop solar PV structures typically use a combination of purlins, rafters (beams used in mounting structure) and posts mounted. Selection depends upon on the space or area.

Panels are mounted in a sunny place and in a less shady area where it receives plenty of energy from sun. They are wired together and joined before connecting it to the main junction.



**Figure 16: Ground Mounted Solar Panel**



**Figure 17: RCC Roof Mounted Solar Panel**



**Figure 18: Roof Mounted Galvalume Sheet of Solar Panel**



### **Installation of Auxiliary Devices**

After installing the panels, auxiliary devices are installed. These include charge controller, inverter, batteries and power meter and solar monitoring equipment.

### **Cable Laying**

Cable laying entails laying of wire from solar panel to the monitoring device and then to the inverter, batteries and other electrical components. Wires must be connected properly by skillful person otherwise it can be dangerous.

**Figure 19: Wires Connected to the Solar Panel**



### **Commissioning of Project**

Test run of the system has to be done after installation to check its efficiency and accuracy and any identified defect has to be corrected. Client should also be trained for using this system; especially in the steps to change over the system to WAPDA electricity and also in dealing with emergencies.

### **Operations and management**

Photovoltaic system will start its operation and it will be monitored through cloud/application based real time monitoring system. Repairing services and other after installation supportive services are also provided to the client.

#### **5.3. Installed and Operational Capacities**

The proposed solar installation services at maximum capacity of 100% will provide 747 KW installation services of solar system annually. During the initial year of operations, the operational capacity of the business has been assumed to be 60% (448 KW). It is projected that, during the period of 10 years, the business shall continue to operate with 10% annual increase in capacity each year.

The service team would operate for 8 hours per day, working in one shift per day for 280 working days in a year.

Services for installation of solar/heating system requires 2 hours of electrical engineer (for electrical works) and 3 hours of civil engineer (for civil works) per KW. Based on

these requirements total available annual man hours become 2,240 (8 hours per day x 280 days). The civil works operation is the bottleneck and hence determines the maximum installed capacity. Thus, the proposed project has a maximum capacity of 747 KW (i.e., minimum of  $2,240/3$  or  $2,240/2$ ).

Table 1 depicts the installed and operational capacities of the proposed unit for the first year.

**Table 1: Installed and Services Capacity**

| Services   | Time Required Per KW (Hrs)<br>A | Available Man Hours per year<br>$B = (280 \times 8)$ | Max Installations (KWs)<br>$C = (B/A)$ | Service Capacity (KWs)<br>D | Operational Capacity (KWs) @60% |
|------------|---------------------------------|--|--|-----------------------------|---------------------------------|
| Electrical | 2                               | 2,240  | 1,120                                  | 747                         | 448                             |
| Civil      | 3                               | 2,240  | 747                                    | minimum of (1,120 or 747)   |                                 |

## 6. CRITICAL FACTORS

The following factors may be taken into account while making investment decision:

- Technical know-how and basic knowledge of the solar system and other equipment
- Quality of equipment
- Availability of specialized and skilled workforce to install the system
- Proper wiring and connection to avoid risk factors
- Proper mounting of panels
- Proper maintenance of equipment
- Up-to-date knowledge of industry and new technology

## 7. GEOGRAPHICAL POTENTIAL FOR INVESTMENT

The proposed setup of “Solar Power/ Solar Heating System, Designing and Installation Services” will ideally be established in metropolitan cities like Lahore, Karachi, Rawalpindi-Islamabad, Peshawar, Quetta, Hyderabad, Faisalabad, Gujranwala, Multan, Sialkot, etc. The main reason is that major cities have all the modern facilities and infrastructure that makes it easy to establish business here. Another reason is the easy availability of labor, technicians and qualified staff in these cities. Starting the business in developed cities would provide advantage of easy acquisition of inventory and imported solar panels along with demand due to higher population and buyers to generate consistent orders.

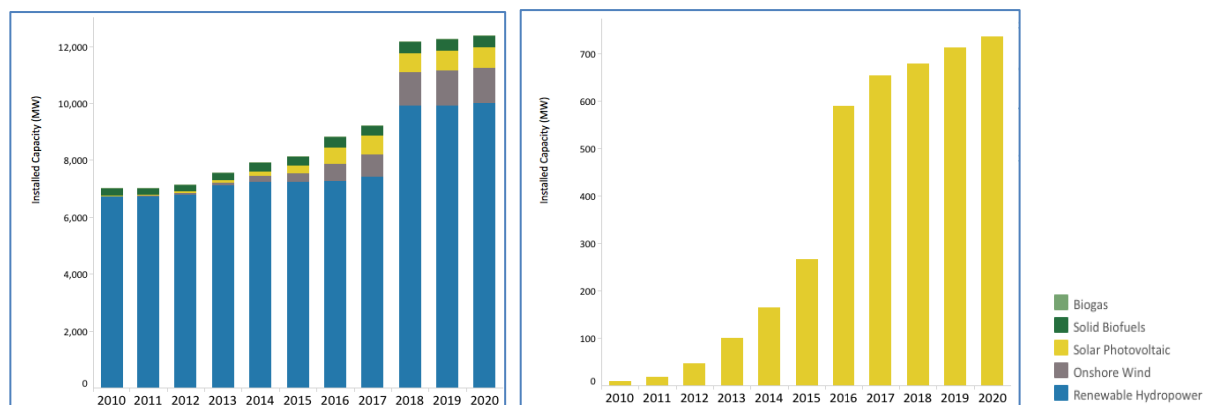


## 8. POTENTIAL TARGET MARKETS

For the success of this business, it is necessary to determine the target markets of the product. In Pakistan public is facing trouble due to load shedding and day-to-day increase in electricity prices. Demand for photovoltaic system is high in urban areas like Lahore, Karachi, Islamabad, Peshawar and Quetta due to increased price of electricity. Demand in rural and remote areas of all the provinces has increased due to excessive load shedding or complete unavailability of electricity. According to the World Bank<sup>3</sup>, until 2018 around 50 million people in Pakistan had no access to electricity. Installing the solar photovoltaic system is a good practical option to resolve this issue.

As per the data available with International Renewable Energy Agency (IRENA), the solar power consumption has increased manifold during recent years due to its cost efficiency and eco-friendliness. From 2016 to 2020, solar energy sector showed an average increasing trend of 6% with a total installed capacity of 737 mega watts in Pakistan. Figure 20 shows power consumption trends in Pakistan from all sources and solar systems.

**Figure 20: Energy Consumption Trends in Pakistan**



There is a promising demand in energy consumption in Pakistan. As per Economic Survey of Pakistan, the consumption of electricity increased from 80,187 Gigawatt hours (GWH) in 2019-20 to 84,600 GWH in 2020-21 showing 5.5% increase.

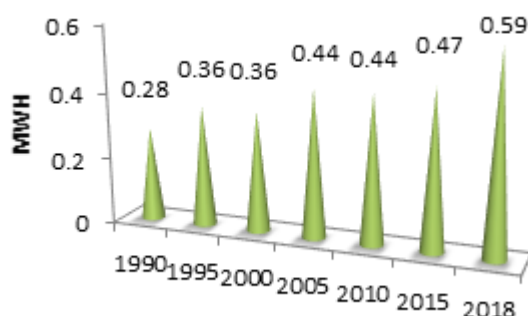
As per UN Comtrade<sup>4</sup> Pakistan imported electrical energy of 441,901 and 538,276 thousand kilowatt-hours (KWH) amounting to USD 31.1 million and 34.77 million during 2019 and 2020 respectively. This shows an increase in consumption by 11.8% in value and 21.8% in quantity.

Further, according to International Energy Agency (IEA)<sup>5</sup>, per capita consumption of electricity in 2015 was 0.47 MWH (mega watt-hour) which increased to 0.59 MWH in 2018, showing an increase of 26%. Figure 21 shows per capita consumption of electricity in MWH from 1990 to 2018.

<sup>3</sup> <https://documents1.worldbank.org/curated/en/585231536778611429/pdf/WPS8582.pdf>

<sup>4</sup> <https://comtrade.un.org/Data/>

<sup>5</sup> <https://www.iea.org/subscribe-to-data-services/world-energy-balances-and-statistics>

**Figure 21: Per Capita Electricity Consumption**

All such areas are huge potential markets; the solar energy has the potential to sort out the problem of electricity forever. Generators and UPS are only a temporary solution and not feasible in the long-run due to the high costs of fuel and maintenance and their limitations in terms of capacity whereas, photovoltaic systems requires only onetime investment.

## 9. PROJECT COST SUMMARY

A detailed financial model has been developed to analyze the commercial viability of the unit for Solar Power/ Solar Heating Systems Designing and Installation Services. Various costs and revenue related assumptions along with results of the analysis are outlined in this section.

The projected Income Statement, Cost of Goods Sold, Cash Flow Statement and Balance Sheet are attached as Annexure.

### 9.1. Project Economics

All the figures in this financial model have been calculated after carefully taking into account the relevant assumptions and target market.

The financial feasibility analysis given in Table 2 provides the information regarding projected IRR, NPV and payback period of the project based on 100% equity.

**Table 2: Financial Feasibility Analysis**

| Description                | Values     |
|----------------------------|------------|
| IRR                        | 57%        |
| NPV (PKR)                  | 18,066,454 |
| Payback Period (years)     | 2.61       |
| Projection Years           | 10         |
| Discount Rate used for NPV | 15%        |

#### 9.1.1. Financial Feasibility Debt Financing

The financial feasibility analysis given shown in Table 3 provides the information regarding projected IRR, NPV and payback period of the project based on combination of equity (50%) and debt (50%) financing for the proposed project.

**Table 3: Financial Feasibility Debt Financing**

| Description                | Project    |
|----------------------------|------------|
| IRR                        | 56%        |
| NPV (PKR)                  | 22,633,253 |
| Payback Period (years)     | 2.68       |
| Projection Years           | 10         |
| Discount Rate used for NPV | 12%        |

## 9.2. Project Cost

Total investment cost of the project has been calculated to be PKR 4.61 million. The project will be financed through 100% equity. Table 4 provides the detail of cost calculated for the proposed manufacturing unit.

**Table 4: Project Cost**

| Item                         | Cost             |
|------------------------------|------------------|
| Land                         | -                |
| Building / Infrastructure    | 199,250          |
| Machinery & equipment        | 166,000          |
| Furniture & fixtures         | 795,000          |
| Office vehicles              | 1,343,500        |
| Office equipment             | 933,500          |
| Softwares                    | 432,500          |
| Pre-operating costs          | 105,204          |
| Security against building    | 180,000          |
| <b>Total Capital Costs</b>   | <b>4,154,954</b> |
| <b>Working Capital</b>       |                  |
| Upfront building rent        | 60,000           |
| Cash                         | 500,000          |
| <b>Total Working Capital</b> | <b>560,000</b>   |
| <b>Total project Cost</b>    | <b>4,714,954</b> |

### 9.2.1. Land

The Solar Power /Solar Heating Systems Designing and Installation Services business will be established in a rented building to avoid the high cost of land. Suitable location for setting up of a business like this can be easily available on rent. Therefore, no land

cost has been added to the project cost. Total space requirement for the proposed project has been estimated as 1,125 sq. feet (5 Marla).

The breakup of the space requirement is provided in Table 5.

**Table 5: Breakup of Space Requirement**

| Description               | Breakup     | Area Sq. Ft. |
|---------------------------|-------------|--------------|
| Executive Office          | 11%         | 120          |
| Staff Workstations        | 44%         | 500          |
| Conference Room           | 11%         | 120          |
| Store                     | 25%         | 285          |
| Kitchen                   | 4%          | 50           |
| Washrooms                 | 4%          | 50           |
| <b>Total Covered Area</b> | <b>100%</b> | <b>1,125</b> |

### 9.2.2. Building and Renovation Cost

There will be no cost of building construction since the business will be started in the rented premises. However, there will be a renovation cost required to make the building ready to be used by the business. The proposed project requires estimated electricity load of 2 KW for which an electricity connection under the General Supply Tariff-Commercial three-phase will be required. Cost of such electricity connection has not been considered in this document since electricity connection is generally available in such buildings, which are offered for rent. Building rent of PKR 60,000 per month has been included in the operating cost.

Table 6 provides details of building renovation and interior decoration cost.

**Table 6: Building Renovation Cost**

| Cost Item          | UOM   | Total Liter / Area / Number | Cost/Unit/ Sq. Ft. | Total Cost     |
|--------------------|-------|-----------------------------|--------------------|----------------|
| Paint Cost         | Liter | 113                         | 500                | 56,250         |
| Labour Cost        | Feet  | 11,250                      | 8                  | 90,000         |
| Wall Racks         | Units | 1                           | 15,000             | 15,000         |
| Curtains           | Units | 6                           | 3,000              | 18,000         |
| Blinds             | Units | 4                           | 5,000              | 20,000         |
| <b>TOTAL (PKR)</b> |       |                             |                    | <b>199,250</b> |

### 9.2.3. Machinery and Equipment Requirement

Table 7 provides details of machinery and equipment required for the project.

**Table 7: Machinery and Equipment Requirement**

| Cost Item               | Number of Items | Unit Cost (PKR) | Total Cost (PKR) |
|-------------------------|-----------------|-----------------|------------------|
| Cable Crimping Tool Kit | 2               | 13,000          | 26,000           |
| Drill Set               | 2               | 10,000          | 20,000           |
| Wall Chaser             | 2               | 10,000          | 20,000           |
| General Tool Kit        | 5               | 20,000          | 100,000          |
| <b>Total</b>            |                 |                 | <b>166,000</b>   |

A cable-crimping tool is used to conjoin different cables and a wall chaser is used to make grooves on walls while laying cables. Figure 22 shows different tools used in installation of solar system.

**Figure 22: Tools**



General Tools Kit includes a mechanical and electrical tools kit as shown in Table 8.

**Table 8: General Tool Kits**

| Mechanical Tool Kit | Electrical Tool Kit         |
|---------------------|-----------------------------|
| Wrenches (Set)      | Multi-meter                 |
| Screwdrivers        | Voltage Tester              |
| Pliers              | Wire Strippers              |
| Hammer              | Circuit Finder              |
| Multi-meter         | Screw drivers & Nut drivers |
| Scissors            | Pliers                      |
| Electrical Tape     | Fish Tape                   |

|   |               |
|---|---------------|
| Hex Wrench(Set)                                 | Tape Measure  |
| LED Headlamp                                    | Hammer        |
| Mechanic Gloves (Disposable and Non-disposable) | Level         |
| Wire Terminal Crimper                           | Torch         |
| Wire Terminals (set)                            | Utility Knife |

#### 9.2.4. Furniture & Fixtures Requirement

Table 9 provides details of the furniture and fixture requirement of the project.

**Table 9: Furniture and Fixtures Requirement**

| Cost Item        | Number of Items | Unit Cost (PKR) | Total Cost (PKR) |
|------------------|-----------------|-----------------|------------------|
| Executive Chairs | 1               | 20,000          | 20,000           |
| Executive Table  | 1               | 30,000          | 30,000           |
| Staff Tables     | 6               | 20,000          | 120,000          |
| Staff Chairs     | 15              | 10,000          | 150,000          |
| Visitors' Chairs | 10              | 10,000          | 100,000          |
| Cabinets         | 15              | 25,000          | 375,000          |
| <b>Total</b>     |                 |                 | <b>795,000</b>   |

#### 9.2.5. Office Equipment

Table 10 provides detail of office equipment requirement of the project.

**Table 10: Office Equipment**

| Cost Item              | Number of Items | Unit Cost (PKR) | Cost (PKR) |
|------------------------|-----------------|-----------------|------------|
| Air Conditioners       | 3               | 90,000          | 270,000    |
| Laptop Computers       | 4               | 80,000          | 320,000    |
| Desktop Computers      | 5               | 30,000          | 150,000    |
| Printer                | 2               | 40,000          | 80,000     |
| Water Dispenser        | 1               | 20,000          | 20,000     |
| Security System (2 MP) | 4               | 2,000           | 8,000      |
| DVR                    | 1               | 12,000          | 12,000     |



|                            |   |        |                |
|----------------------------|---|--------|----------------|
| LED                        | 1 | 40,000 | 40,000         |
| WI-FI/ Internet Connection | 1 | 5,000  | 5,000          |
| Ceiling Fan                | 5 | 4,500  | 22,500         |
| Exhaust Fan                | 3 | 2,000  | 6,000          |
| <b>Total</b>               |   |        | <b>933,500</b> |

### 9.2.6. Office Vehicle Requirement

Details of office vehicles required for the project is provided in Table 11.

**Table 11: Office Vehicle Requirement**

| Cost Item    | Number of Vehicles | Unit Cost (PKR) | Registration Cost @ 1% | Total Cost (PKR) |
|--------------|--------------------|-----------------|------------------------|------------------|
| Carry Van    | 1                  | 1,250,000       | 12,500                 | 1,262,500        |
| Motorcycle   | 1                  | 80,000          | 1,000                  | 81,000           |
| <b>Total</b> |                    |                 |                        | <b>1,343,500</b> |

### 9.2.7. Software

Details of software required for the project is provided in Table 12.

**Table 12: Software Requirement**

| Cost Item                    | Cost (USD) | Conversion Rate (PKR/USD) | Total Cost (PKR) |
|------------------------------|------------|---------------------------|------------------|
| Design and Sales Software    | 1,500      | 173                       | 259,500          |
| Database Management Software | 1,500      | 173                       | 173,000          |
| <b>Total</b>                 |            |                           | <b>432,500</b>   |

Design and Sales software helps in designing engineering layout of the installations, requirements and aids in streaming sales data.

Database management software supports in maintaining and analyzing data, real-time oversight of input/output of energy and in operations and management of the system.

### 9.2.8. Pre-Operating Cost

Table 13 provides details of estimated pre operating cost.

**Table 13: Pre-Operating Cost**

| Staff                             | No. | Hiring Before Year 0 (Months) | Unit Cost (PKR) | Total (PKR)    |
|-----------------------------------|-----|-------------------------------|-----------------|----------------|
| Electrical Engineer               | 1   | 1                             | 70,000          | 70,000         |
| Office Boy                        | 1   | 1                             | 20,000          | 20,000         |
| Electricity expenses <sup>6</sup> |     |                               | 15,204          | 15,204         |
| <b>Total</b>                      |     |                               |                 | <b>105,204</b> |

### 9.2.9. Security against Building Rent

Details of pre-operating cost for the project are provided in Table 14.

**Table 14: Security against Building Rent**

| Cost item                 | Month | Unit Cost (PKR) | Total Cost (PKR) |
|---------------------------|-------|-----------------|------------------|
| Security against building | 3     | 53,000          | 159,000          |
|                           |       |                 |                  |

### 9.2.10. Licenses, Permits, etc.

No license or permit is required to start such a business. For getting certification/ pre-qualification from Alternative Energy Development Board (AEDB), Ministry of Energy, Power Division, Government of Pakistan, the vendors/service providers/firms/ joint ventures have to meet eligibility criteria pursuant to regulations 3(2), Schedule 2 of Alternative Energy Development Board (Certification) Regulations, 2018. The certification is mandatory for service providers/vendors involved in net metering installation and services.

<sup>6</sup> These are expenses incurred for one month estimated in proportion of total expenses in initial year.

### 9.3. Breakeven Analysis

Breakeven analysis is provided in Table 15.

**Table 15: Breakeven Analysis**

| Particulars          | Amount First Year (PKR) | Ratios |
|----------------------|-------------------------|--------|
| Sales                | 8,960,000               | 100%   |
| Variable Cost        | 5,572,600               | 62%    |
| Contribution         | 3,387,400               | 38%    |
| Fixed Cost           | 2,951,414               | 33%    |
| <b>Breakeven</b>     |                         |        |
| Breakeven Units (KW) | 390                     |        |
| Breakeven Revenue    | 7,806,774               |        |
| Breakeven Capacity   | 52%                     |        |

### 9.4. Revenue Generation

Based on the 60% capacity utilization of the unit, sales revenue during the first year of operations is estimated in Table 16.

**Table 16: Revenue Generation**

| Estimated Sale Units (KW)<br>(A) | Estimated Sales Price (B) | Annual Revenue (PKR) (A*B) |
|----------------------------------|---------------------------|----------------------------|
| 448                              | 20,000                    | 8,960,000                  |

### 9.5. Variable Cost Estimate

Variable costs of the project have been provided in detail in Table 17.

**Table 17: Variable Cost Estimate**

| Description  | Total Cost (PKR) |
|--|------------------|
| Vehicle running expenses   | 384,000          |
| Staff salaries   | 4,440,000        |
| Annual software subscription charges                                   | 138,400          |
| Communications expense (phone, fax, mail, internet, etc.)              | 135,000          |
| Office Vehicles running expense  | 120,000          |
| Office expenses (stationery, entertainment, janitorial services, etc.) | 355,200          |

|                            |                  |
|----------------------------|------------------|
| <b>Total Variable Cost</b> | <b>5,572,600</b> |
|----------------------------|------------------|

### 9.6. Fixed Cost Estimate

Details of fixed cost for the project are provided in Table 18.

**Table 18: Fixed Cost Estimate**

| <b>Descriptions</b>                 | <b>Total Cost (PKR)</b> |
|-------------------------------------|-------------------------|
| Staff Salaries                      | 900,000                 |
| Administration benefits expense     | 267,000                 |
| Building rental expense             | 720,000                 |
| Utilities                           | 182,448                 |
| Promotional expense                 | 268,800                 |
| Depreciation expense                | 505,625                 |
| Amortization of pre-operating costs | 21,041                  |
| Amortization of Softwares           | 86,500                  |
| <b>Total Fixed Cost</b>             | <b>2,951,414</b>        |

### 9.7. Human Resource Requirement

For the 1<sup>st</sup> year of operations, the human resource requirements are projected in Table 19.

**Table 19: Human Resource Requirement**

| <b>Description</b>            | <b>Number Of Employees</b> | <b>Monthly Salary</b> | <b>Annual Salary</b> |
|-------------------------------|----------------------------|-----------------------|----------------------|
| Electrical Engineer           | 1                          | 70,000                | 840,000              |
| Assistant Electrical Engineer | 4                          | 30,000                | 1,440,000            |
| Civil Engineer                | 1                          | 70,000                | 840,000              |
| Assistant Civil Engineer      | 1                          | 30,000                | 360,000              |
| Labor                         | 4                          | 20,000                | 960,000              |
| Admin and Accounts Officer    | 1                          | 35,000                | 420,000              |
| Office Boy                    | 1                          | 20,000                | 240,000              |
| Security Guard                | 1                          | 20,000                | 240,000              |
| <b>Total</b>                  | <b>14</b>                  |                       | <b>5,340,000</b>     |

Annual increment of staff salaries has been estimated at 7.3%. Further the owner draws dividends instead of monthly salary.

## 10. CONTACT DETAILS

Details of suppliers of Products and Equipment are provided in Table 20.

**Table 20: Service Providers and Suppliers of Products & Equipment**

| Name of supplier                | City       | Email/ Website   | Contact Number |
|---------------------------------|------------|--|----------------|
| HiSEL Power Corporation         | Lahore     | <a href="http://www.hiselpower.com/">www.hiselpower.com/</a>   | 042-35940088   |
| Makka Solar System              | Peshawar   | <a href="https://makka-solar-system.business.site">https://makka-solar-system.business.site</a>      | 091-2214556    |
| Sunrise Solar Systems           | Quetta     | -  | 0345-3808550   |
| Pakistan Solar Services         | Karachi    | <a href="http://www.pakistansolarservices.business.site">www.pakistansolarservices.business.site</a> | 021-34160010   |
| Vertex Engineering and Services | Rawalpindi | <a href="http://www.vertexengineering.com.pk/">www.vertexengineering.com.pk/</a>                     | 051-4102199    |
| Hayat Solar Systems             | Sialkot    | <a href="http://www.hayatsolars.com">http://www.hayatsolars.com</a>                                  | 0336-6112020   |
| Solar Grid                      | Multan     | <a href="https://solargrid.pk">https://solargrid.pk</a>  | 0321-4067276   |
| City Home Solar                 | Gujranwala | <a href="https://cityhomesolar.com">https://cityhomesolar.com</a>                                    | 0312-6586872   |
| Scnergy Engineering Solutions   | Fasialabad | <a href="http://www.scnergy.com">http://www.scnergy.com</a>  | 0344-4090207   |

## 11. USEFUL LINKS

**Table 21: Useful Links**

| Name of Organization  | Website  |
|---|--|
| Small and Medium Enterprises Development Authority (SMEDA)          | <a href="http://www.smeda.org.pk">www.smeda.org.pk</a>   |
| National Business Development Program (NBDP)                        | <a href="http://www.nbdp.org.pk">www.nbdp.org.pk</a>   |
| Government of Pakistan  | <a href="http://www.pakistan.gov.pk">www.pakistan.gov.pk</a>   |
| Ministry of Industries and Production                               | <a href="http://www.moip.gov.pk">www.moip.gov.pk</a>   |
| Ministry of Energy Power Division                                   | <a href="http://www.mowp.gov.pk/">www.mowp.gov.pk/</a>   |
| Alternative Energy Development Board (AEDB)                         | <a href="https://www.aedb.org">https://www.aedb.org</a>  |
| Government of Punjab  | <a href="http://www.punjab.gov.pk">www.punjab.gov.pk</a>   |
| Government of Sindh   | <a href="http://www.sindh.gov.pk">www.sindh.gov.pk</a>   |
| Government of Balochistan   | <a href="http://www.balochistan.gov.pk">www.balochistan.gov.pk</a>   |
| Government of Khyber Pakhtunkhwa                                    | <a href="http://www.kp.gov.pk">www.kp.gov.pk</a>   |
| Roshan Pakistan Portal  | <a href="http://www.roshanpakistan.pk/">www.roshanpakistan.pk/</a>   |
| National Electric Power Regulatory Authority (NEPRA)                | <a href="https://nepra.org.pk/">https://nepra.org.pk/</a>  |
| Trade Development Authority of Pakistan                             | <a href="http://www.tdap.gov.pk">www.tdap.gov.pk</a>   |
| Security and Exchange Commission of Pakistan                        | <a href="http://www.secp.gov.pk">www.secp.gov.pk</a>   |
| State Bank of Pakistan  | <a href="http://www.sbp.gov.pk">www.sbp.gov.pk</a>   |
| Federation of Pakistan Chambers of Commerce and Industry (FPCCI)    | <a href="http://www.fpcci.com.pk">www.fpcci.com.pk</a>   |
| Punjab Small Industries Corporation (PSIC)                          | <a href="http://www.psic.gop.pk">www.psic.gop.pk</a>   |
| Sindh Small Industries Corporation                                  | <a href="http://www.ssic.gos.pk">www.ssic.gos.pk</a>   |
| Small Industries Development Board Government of Khyber Pakhtunkhwa | <a href="http://www.small_industries_de.kp.gov.pk/">www.small_industries_de.kp.gov.pk/</a>   |
| Industries and Commerce – Government of Balochistan                 | <a href="http://www.balochistan.gov.pk/departments-download/industries-and-commerce">www.balochistan.gov.pk/departments-download/industries-and-commerce</a> |



## 12. ANNEXURES

### 12.1. Income Statement

| Calculations   | SMEDA          |                  |                  |                  |                  |                  |                  |                  |                  |                  |
|--|----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Income Statement   |                |                  |                  |                  |                  |                  |                  |                  |                  |                  |
|  | Year 1         | Year 2           | Year 3           | Year 4           | Year 5           | Year 6           | Year 7           | Year 8           | Year 9           | Year 10          |
| Revenue from services  | 8,960,000      | 11,328,180       | 14,004,295       | 17,072,009       | 20,552,489       | 22,258,346       | 24,105,788       | 26,106,569       | 28,273,414       | 30,620,107       |
| <i>Cost of sales</i>   |                |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| Vehicle running expenses   | 384,000        | 415,872          | 450,389          | 487,772          | 528,257          | 572,102          | 619,587          | 671,012          | 726,706          | 787,023          |
| Staff salaries   | 4,440,000      | 4,765,600        | 5,115,077        | 5,490,183        | 5,892,796        | 6,324,935        | 6,788,763        | 7,286,606        | 7,820,957        | 8,394,494        |
| Total cost of sales  | 4,824,000      | 5,181,472        | 5,565,467        | 5,977,955        | 6,421,053        | 6,897,037        | 7,408,350        | 7,957,618        | 8,547,663        | 9,181,517        |
| Gross Profit   | 4,136,000      | 6,146,708        | 8,438,828        | 11,094,055       | 14,131,436       | 15,361,309       | 16,697,438       | 18,148,950       | 19,725,751       | 21,438,590       |
| <i>General administration &amp; selling expenses</i>                   |                |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| Staff Salaries   | 900,000        | 966,000          | 1,036,840        | 1,112,875        | 1,194,486        | 1,282,081        | 1,376,101        | 1,477,015        | 1,585,329        | 1,701,587        |
| Administration benefits expense  | 267,000        | 286,580          | 307,596          | 330,153          | 354,364          | 380,351          | 408,243          | 438,181          | 470,314          | 504,804          |
| Building rental expense  | 720,000        | 792,000          | 871,200          | 958,320          | 1,054,152        | 1,159,567        | 1,275,524        | 1,403,076        | 1,543,384        | 1,697,722        |
| Annual software subscription charges                                   | 138,400        | 149,887          | 162,328          | 175,801          | 190,393          | 206,195          | 223,309          | 241,844          | 261,917          | 283,656          |
| Utilities  | 182,448        | 198,424          | 215,800          | 234,697          | 255,248          | 277,599          | 301,908          | 328,345          | 357,097          | 388,367          |
| Communications expense (phone, fax, mail, internet, etc.)              | 135,000        | 144,900          | 155,526          | 166,931          | 179,173          | 192,312          | 206,415          | 221,552          | 237,799          | 255,238          |
| Office vehicles running expense  | 120,000        | 129,960          | 140,747          | 152,429          | 165,080          | 178,782          | 193,621          | 209,691          | 227,096          | 245,945          |
| Office expenses (stationery, entertainment, janitorial services, etc.) | 355,200        | 381,248          | 409,206          | 439,215          | 471,424          | 505,995          | 543,101          | 582,928          | 625,677          | 671,560          |
| Promotional expense  | 268,800        | 339,845          | 420,129          | 512,160          | 616,575          | 667,750          | 723,174          | 783,197          | 848,202          | 918,603          |
| Depreciation expense   | 505,625        | 505,625          | 505,625          | 505,625          | 505,625          | 505,625          | 343,725          | 916,201          | 916,201          | 916,201          |
| Amortization of pre-operating costs                                    | 21,041         | 21,041           | 21,041           | 21,041           | 21,041           | -                | -                | -                | -                | -                |
| Amortization of Softwares  | 86,500         | 86,500           | 86,500           | 86,500           | 86,500           | 127,097          | 127,097          | 127,097          | 127,097          | 127,097          |
| Subtotal   | 3,700,014      | 4,002,011        | 4,332,537        | 4,695,746        | 5,094,060        | 5,483,355        | 5,722,217        | 6,729,128        | 7,200,114        | 7,710,779        |
| Operating Income   | 435,986        | 2,144,697        | 4,106,291        | 6,398,309        | 9,037,376        | 9,877,954        | 10,975,221       | 11,419,822       | 12,525,637       | 13,727,811       |
| Gain / (loss) on sale of machinery & equipment                         | -              | -                | -                | -                | -                | -                | 41,500           | -                | -                | -                |
| Gain / (loss) on sale of office equipment                              | -              | -                | -                | -                | -                | -                | 233,375          | -                | -                | -                |
| Gain / (loss) on sale of office vehicles                               | -              | -                | -                | -                | -                | -                | 335,875          | -                | -                | -                |
| Earnings Before Interest & Taxes                                       | 435,986        | 2,144,697        | 4,106,291        | 6,398,309        | 9,037,376        | 9,877,954        | 11,585,971       | 11,419,822       | 12,525,637       | 13,727,811       |
| Subtotal   | -              | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Earnings Before Tax  | 435,986        | 2,144,697        | 4,106,291        | 6,398,309        | 9,037,376        | 9,877,954        | 11,585,971       | 11,419,822       | 12,525,637       | 13,727,811       |
| Tax  | 265,846        | 761,372          | 1,330,235        | 1,994,920        | 2,760,249        | 3,004,017        | 3,454,798        | 3,565,071        | 3,885,758        | 4,234,388        |
| <b>NET PROFIT/(LOSS) AFTER TAX</b>                                     | <b>170,140</b> | <b>1,383,325</b> | <b>2,776,056</b> | <b>4,403,389</b> | <b>6,277,127</b> | <b>6,873,937</b> | <b>8,131,173</b> | <b>7,854,751</b> | <b>8,639,879</b> | <b>9,493,423</b> |

## 12.2. Balance Sheet

| Calculations                                  | SMEDA            |                  |                  |                  |                   |                   |                   |                   |                   |                   |                   |
|---|------------------|------------------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Balance Sheet                                 |                  |                  |                  |                  |                   |                   |                   |                   |                   |                   |                   |
|   | Year 0           | Year 1           | Year 2           | Year 3           | Year 4            | Year 5            | Year 6            | Year 7            | Year 8            | Year 9            | Year 10           |
| <b>Assets</b>                                 |                  |                  |                  |                  |                   |                   |                   |                   |                   |                   |                   |
| <i>Current assets</i>                         |                  |                  |                  |                  |                   |                   |                   |                   |                   |                   |                   |
| Cash & Bank                                   | 500,000          | 1,229,921        | 2,854,032        | 5,366,464        | 8,772,307         | 12,451,244        | 16,566,006        | 19,148,646        | 22,119,991        | 25,319,647        | 28,910,986        |
| Accounts receivable                           |                  | 320,000          | 404,578          | 500,153          | 609,715           | 734,017           | 794,941           | 860,921           | 932,377           | 1,009,765         | 1,093,575         |
| Pre-paid building rent                        | 60,000           | 66,000           | 72,600           | 79,860           | 87,846            | 96,631            | 106,294           | 116,923           | 128,615           | 141,477           | -                 |
| <b>Total Current Assets</b>                   | <b>560,000</b>   | <b>1,615,921</b> | <b>3,331,210</b> | <b>5,946,477</b> | <b>9,469,868</b>  | <b>13,281,892</b> | <b>17,467,241</b> | <b>20,126,490</b> | <b>23,180,984</b> | <b>26,470,889</b> | <b>30,004,562</b> |
| <i>Fixed assets</i>                           |                  |                  |                  |                  |                   |                   |                   |                   |                   |                   |                   |
| Land  | -                | -                | -                | -                | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| Building/Infrastructure                       | 199,250          | 179,325          | 159,400          | 139,475          | 119,550           | 99,625            | 79,700            | 59,775            | 39,850            | 19,925            | -                 |
| Machinery & equipment                         | 166,000          | 141,100          | 116,200          | 91,300           | 66,400            | 41,500            | 16,600            | 284,495           | 241,821           | 199,146           | 156,472           |
| Furniture & fixtures                          | 795,000          | 675,750          | 556,500          | 437,250          | 318,000           | 198,750           | 79,500            | 1,362,490         | 1,158,117         | 953,743           | 749,370           |
| Office vehicles                               | 1,343,500        | 1,141,975        | 940,450          | 738,925          | 537,400           | 335,875           | 134,350           | 2,728,334         | 2,319,084         | 1,909,834         | 1,500,584         |
| Office equipment                              | 933,500          | 793,475          | 653,450          | 513,425          | 373,400           | 233,375           | 93,350            | 1,599,855         | 1,359,877         | 1,119,898         | 879,920           |
| Security against building                     | 180,000          | 180,000          | 180,000          | 180,000          | 180,000           | 180,000           | 180,000           | 180,000           | 180,000           | 180,000           | 180,000           |
| <b>Total Fixed Assets</b>                     | <b>3,617,250</b> | <b>3,111,625</b> | <b>2,606,000</b> | <b>2,100,375</b> | <b>1,594,750</b>  | <b>1,089,125</b>  | <b>583,500</b>    | <b>6,214,949</b>  | <b>5,298,748</b>  | <b>4,382,547</b>  | <b>3,466,346</b>  |
| <i>Intangible assets</i>                      |                  |                  |                  |                  |                   |                   |                   |                   |                   |                   |                   |
| Pre-operation costs                           | 105,204          | 84,163           | 63,122           | 42,082           | 21,041            | -                 | -                 | -                 | -                 | -                 | -                 |
| Softwares                                     | 432,500          | 346,000          | 259,500          | 173,000          | 86,500            | 635,484           | 508,388           | 381,291           | 254,194           | 127,097           | -                 |
| <b>Total Intangible Assets</b>                | <b>537,704</b>   | <b>430,163</b>   | <b>322,622</b>   | <b>215,082</b>   | <b>107,541</b>    | <b>635,484</b>    | <b>508,388</b>    | <b>381,291</b>    | <b>254,194</b>    | <b>127,097</b>    | <b>-</b>          |
| <b>TOTAL ASSETS</b>                           | <b>4,714,954</b> | <b>5,157,709</b> | <b>6,259,832</b> | <b>8,261,934</b> | <b>11,172,159</b> | <b>15,006,502</b> | <b>18,559,128</b> | <b>26,722,730</b> | <b>28,733,926</b> | <b>30,980,533</b> | <b>33,470,908</b> |
| <b>Liabilities &amp; Shareholders' Equity</b> |                  |                  |                  |                  |                   |                   |                   |                   |                   |                   |                   |
| <i>Current liabilities</i>                    |                  |                  |                  |                  |                   |                   |                   |                   |                   |                   |                   |
| Accounts payable                              |                  | 306,643          | 329,329          | 353,695          | 379,866           | 407,975           | 438,167           | 470,596           | 505,427           | 542,839           | 583,023           |
| <b>Total Current Liabilities</b>              | <b>-</b>         | <b>306,643</b>   | <b>329,329</b>   | <b>353,695</b>   | <b>379,866</b>    | <b>407,975</b>    | <b>438,167</b>    | <b>470,596</b>    | <b>505,427</b>    | <b>542,839</b>    | <b>583,023</b>    |
| <i>Other liabilities</i>                      |                  |                  |                  |                  |                   |                   |                   |                   |                   |                   |                   |
| <b>Total Long Term Liabilities</b>            | <b>-</b>         | <b>-</b>         | <b>-</b>         | <b>-</b>         | <b>-</b>          | <b>-</b>          | <b>-</b>          | <b>-</b>          | <b>-</b>          | <b>-</b>          | <b>-</b>          |
| <i>Shareholders' equity</i>                   |                  |                  |                  |                  |                   |                   |                   |                   |                   |                   |                   |
| Paid-up capital                               | 4,714,954        | 4,714,954        | 4,714,954        | 4,714,954        | 4,714,954         | 4,714,954         | 4,714,954         | 4,714,954         | 4,714,954         | 4,714,954         | 4,714,954         |
| Retained earnings                             |                  | 136,112          | 1,215,549        | 3,193,285        | 6,077,339         | 9,883,572         | 13,406,007        | 21,537,180        | 23,513,545        | 25,722,740        | 28,172,930        |
| <b>Total Equity</b>                           | <b>4,714,954</b> | <b>4,851,066</b> | <b>5,930,503</b> | <b>7,908,239</b> | <b>10,792,293</b> | <b>14,598,526</b> | <b>18,120,961</b> | <b>26,252,134</b> | <b>28,228,499</b> | <b>30,437,694</b> | <b>32,887,884</b> |
| <b>TOTAL CAPITAL AND LIABILITIES</b>          | <b>4,714,954</b> | <b>5,157,709</b> | <b>6,259,832</b> | <b>8,261,934</b> | <b>11,172,159</b> | <b>15,006,502</b> | <b>18,559,128</b> | <b>26,722,730</b> | <b>28,733,926</b> | <b>30,980,533</b> | <b>33,470,908</b> |

### 12.3. Cash Flow Statement

| Calculations                                       | SMEDA       |           |           |           |           |           |           |             |           |           |            |
|--|-------------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|-----------|-----------|------------|
| Cash Flow Statement                                |             |           |           |           |           |           |           |             |           |           |            |
|  | Year 0      | Year 1    | Year 2    | Year 3    | Year 4    | Year 5    | Year 6    | Year 7      | Year 8    | Year 9    | Year 10    |
| <i>Operating activities</i>                        |             |           |           |           |           |           |           |             |           |           |            |
| Net profit   |             | 170,140   | 1,383,325 | 2,776,056 | 4,403,389 | 6,277,127 | 6,873,937 | 8,131,173   | 7,854,751 | 8,639,879 | 9,493,423  |
| Add: depreciation expense                          |             | 505,625   | 505,625   | 505,625   | 505,625   | 505,625   | 505,625   | 343,725     | 916,201   | 916,201   | 916,201    |
| amortization of pre-operating costs                |             | 21,041    | 21,041    | 21,041    | 21,041    | 21,041    | -         | -           | -         | -         | -          |
| amortization of Software                           |             | 86,500    | 86,500    | 86,500    | 86,500    | 86,500    | 127,097   | 127,097     | 127,097   | 127,097   | 127,097    |
| Accounts receivable                                |             | (320,000) | (84,578)  | (95,576)  | (109,561) | (124,303) | (60,923)  | (65,980)    | (71,456)  | (77,387)  | (83,810)   |
| Pre-paid building rent                             | (60,000)    | (6,000)   | (6,600)   | (7,260)   | (7,986)   | (8,785)   | (9,663)   | (10,629)    | (11,692)  | (12,862)  | 141,477    |
| Accounts payable                                   |             | 306,643   | 22,686    | 24,366    | 26,171    | 28,109    | 30,192    | 32,429      | 34,831    | 37,412    | 40,185     |
| Other liabilities                                  |             | -         | -         | -         | -         | -         | -         | -           | -         | -         | -          |
| Cash provided by operations                        | (60,000)    | 763,949   | 1,927,999 | 3,310,753 | 4,925,178 | 6,785,314 | 7,466,264 | 8,557,814   | 8,849,732 | 9,630,341 | 10,634,572 |
| <i>Financing activities</i>                        |             |           |           |           |           |           |           |             |           |           |            |
| Issuance of shares                                 | 4,714,954   | -         | -         | -         | -         | -         | -         | -           | -         | -         | -          |
| Purchase of (treasury) shares                      |             |           |           |           |           |           |           |             |           |           |            |
| Cash provided by / (used for) financing activities | 4,714,954   | -         | -         | -         | -         | -         | -         | -           | -         | -         | -          |
| <i>Investing activities</i>                        |             |           |           |           |           |           |           |             |           |           |            |
| Capital expenditure                                | (4,154,954) | -         | -         | -         | -         | (635,484) | -         | (5,975,174) | -         | -         | -          |
| Acquisitions                                       |             |           |           |           |           |           |           |             |           |           |            |
| Cash (used for) / provided by investing activities | (4,154,954) | -         | -         | -         | -         | (635,484) | -         | (5,975,174) | -         | -         | -          |
| NET CASH   | 500,000     | 763,949   | 1,927,999 | 3,310,753 | 4,925,178 | 6,149,830 | 7,466,264 | 2,582,640   | 8,849,732 | 9,630,341 | 10,634,572 |

## 13. KEY ASSUMPTIONS

### 13.1. Operating Cost Assumptions

**Table 22: Economic Rates**

| <b>Economic Rates</b>              | <b>2020</b> | <b>2019</b> | <b>2018</b> | <b>Average</b> |
|------------------------------------|-------------|-------------|-------------|----------------|
| Inflation rate                     | 11.2%       | 8.1%        | 5.6%        | 8.3%           |
| Electricity growth rate            | 7.1%        | 14.3%       | 4.9%        | 8.8%           |
| Water price growth rate            | 7.1%        | 14.3%       | 4.9%        | 8.8%           |
| Gas price growth rate              | 7.1%        | 14.3%       | 4.9%        | 8.8%           |
| Wage growth rate                   | 11.2%       | 7.0%        | 3.8%        | 7.3%           |
| Office equipment price growth rate | 13.9%       | 6.7%        | 3.4%        | 8.0%           |
| Office vehicles price growth rate  | 13.6%       | 8.1%        | 10.3%       | 10.7%          |

**Table 23: Operating Cost Assumptions**

| <b>Description</b>                 | <b>Details</b> |
|------------------------------------|----------------|
| Building rent growth rate          | 10%            |
| Furniture and fixture depreciation | 15%            |
| Vehicle depreciation               | 15%            |
| Office equipment depreciation      | 15%            |
| Inflation rate                     | 8.3%           |
| Wage growth rate                   | 7.3%           |
| Electricity price growth rate      | 8.8%           |
| Office equipment price growth rate | 8.0%           |
| Office vehicle price growth rate   | 10.7%          |

### 13.2. Revenue Assumptions

**Table 24: Revenue Assumptions**

| <b>Description</b>           | <b>Details</b> |
|------------------------------|----------------|
| Sale price growth rate       | 8.3%           |
| Initial capacity utilization | 60%            |
| Capacity growth rate         | 10%            |
| Maximum capacity utilization | 95%            |

**13.3. Financial Assumptions****Table 25: Financial Assumptions**

| Description                | Details |
|----------------------------|---------|
| Project life (Years)       | 10      |
| Debt: Equity               | 0:100   |
| Discount Rate used for NPV | 15%     |

**13.4. Cash Flow Assumptions****Table 26: Cash Flow Assumptions**

| Description                         | Details |
|-------------------------------------|---------|
| Accounts receivable cycle (in days) | 45      |
| Accounts payable cycle (in days)    | 30      |

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