Electricity Distribution Company of Chaharmahal and Bakhtiari Province

Suggested package of two megawatt Solar Power Station

To attract investors through Provincial Investment Services Center

Consulting company:

Ayandenegar Spadana Company

Chahar Mahal and Bakhtiari Province, Share-e-kord city, Melat Street, ٤٥ Block.

Tell:

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Abstract

١-Investment table

All numbers are in million rials					Cost(Euro)
Year					
Row	Description	Price	Done	Required	
١	land	٠	٠	٠	٠
٢	Landscaping	١١٢٢١	٠	١١٢٢١	٤٠،٥٢٢
٣	Building	٣٠٨٩	٠	٣٠٨٩	١١،١٥٤
٤	Installations	٢٩٦	٠	٢٩٦	١،٠٦٩
٥	Luggage and office supplies	٣٨٨	٠	٣٨٨	١،٤٠٠
٦	equipment and machinery	٢٦٨٦٦٣	٠	٢٦٨٦٦٣	٩٧٠،٢١١
٧	Vehicle	١٧٠٤	٠	١٧٠٤	٦،١٥٤
٨	Costs before operation	٢٨٥٤	٠	٢٨٥٤	١٠،٣٠٥
٩	Unforeseen costs	٥٧٦٤	٠	٥٧٦٤	٢٠،٨١٦
Total fixed investment costs		٢٩٣٩٧٨	٠	٢٩٣٩٧٨	١،٠٦١،٦٣٠
Capital in the first year's turnover		٢٥٨٧	٠	٢٥٨٧	٩،٣٤٤
Total investment of the plan		٢٩٦٥٦٦	٠	٢٩٦٥٦٦	١،٠٧٠،٩٧٤

All numbers are in million rials			
Description	Build time	Operation time	total
Total Financial source	٢٩٣٩٧٨	٢٥٨٧	٢٩٦٥٦٦
Total Financial source(Euro)	١،٠٦١،٦٣٠	٩،٣٤٤	١،٠٧٠،٩٧٤

a) Point to head : ١٤ percent
b) Payback Period(PP): ٤/٤٠ year
c) Internal rate of return(IRR): ٢٠/٦٥ percent
d) Net Present Value(NPV): ٤٢٦٥٦٤ (Million Rials)= ١٥٤٠٤٣٠ (Euro)

Currency calculation (Euro) this section uses the weighted average rate of currency purchase and sale based on transactions registered in the Senate Currency Monitoring System in January ٢٠٢٢. Accordingly, the exchange rate (Euro) of ٢٧٦٩١٢ Rials has been used as the basis for currency calculations (Source: https://www.sanarate.ir/).

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Introduction

All human progress in technology depends on a vital component called energy. Without energy, none of today's tools can work. Currently, a large part of the energy resources are provided by non-renewable fossil fuels. Because these fuels are non-renewable and have very harmful effects on the environment, humans in the modern age have always been looking for a way to supply renewable energy, which is one of the best sources of energy permanently utilized. It is sunlight. Since the economic development of societies today depends on the correct and efficient use of energy, and until now fossil fuels have played an important role in providing the energy needed by human societies. But with the depletion of these resources on the one hand and the advances in technology on the other hand, the use of solar energy has attracted the attention of many advanced countries. In this regard, our country has the best opportunity to use this kind of clean energy, given its geographical location. In Iran, the idea of developing renewable power plants began in earnest and planned in the Fifth Development Plan. According to the Fifth Development Plan, by the end of the program, the country's ٥،٠٠٠ MW of electricity would be generated from renewable energy. The country now produces about ٦٠٠ to ٧٠٠ megawatts of renewable energy, far below the landscape goals (the country's Fifth Economic and Social Development Plan ended in ١٩٩٤). According to the plans under the Sixth Development Plan, at least between ٥٠٠ and ١،٠٠٠ megawatts of electricity generation capacity from renewable energy should be in circulation annually. However, the provinces of the country have a high capacity to absorb solar energy. Chaharmahal va Bakhtiari province is one of the provinces with high capacity in electricity generation from solar energy. The average hours of sunshine in the province are between ٣ and ٤،٠٠٠ hours. Therefore, the project justifies the economic justification for the construction of a solar power plant.

Chapter ١:

Specifications of the project

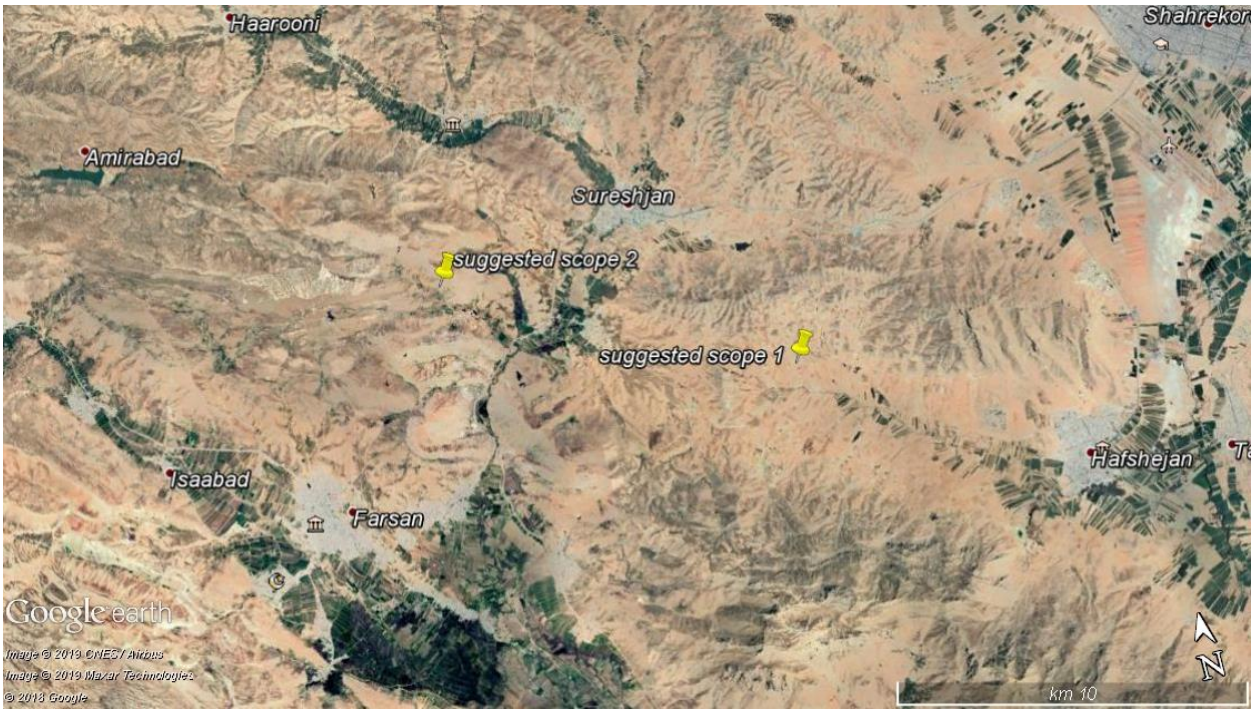
۱-۱-location

The site of the two megawatt solar power plant could be one of the proposed presented in Table ۱-۱.

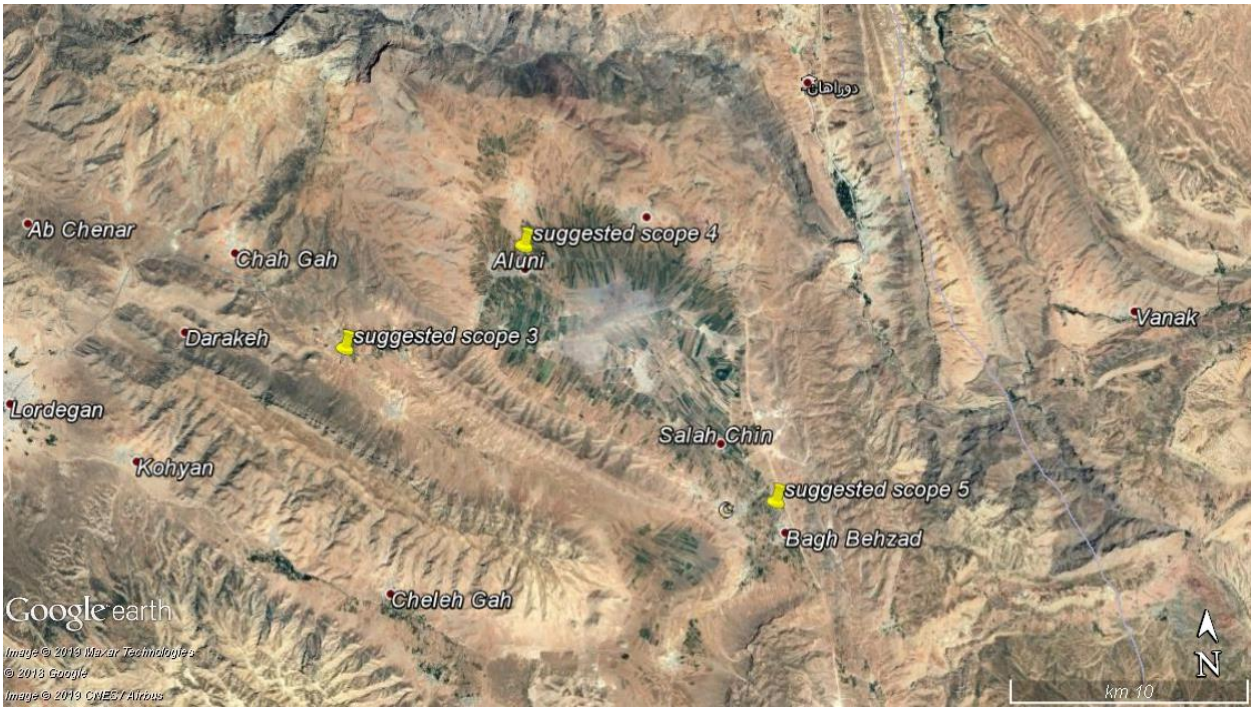
Table (۱-۱): List of Proposed Areas for the Construction of a two MW Solar Power Plant

Row	Post	Address	Capacity(MW)
۱	Shahr e Kord	The intersection of Hafshjan to Sorshjan	۲
۲	Farsan	Farsan Range to Sorshjan	
۳	Aloni	Armand Range	
٤	Aloni	Range of ten deserts to charm	
٥	Aloni	Aluni range up to three Armand Road	
٦	Dashtak	Dashtak to Samsami	

Figure ۱-۱ (a, b and c) shows the project execution boundaries in Google Earth.



A



B



C

Figure (۱-۱): Location of Project

۲-۱- Access routes

The route shown in Table ۲-۱ can be used to access any of the project implementation areas from the center of the province.

Table (۲-۱): Access routes

Row	Beginning	Address	Destination	Distance(km)
۱	Shahrekord	Hafshjan-Sorshjan	Suggested Scope One	۲٤
۲		Sureshjan-Farsan	Suggested Scope Two	۳۰/٥
۳		Sefiddasht-Faradanbe-Borujen-Gandman-Alouni	Suggested Scope Two	۱۲۰
٤		Sefiddasht-Faradanbe-Borujen-Gandman-Alouni	Suggested scope four	۱۲۰
٥		Sefiddasht-Faradanbe-Borujen-Gandman-Alouni	Suggested Scope Five	۱۲۰
٦		Shahrakian-Taghankak-Shalamzar Three-way Joonqan-Pine-Rostam-Abad-Dashtak	Suggested Scope Six	۸٥

۳-۱-Climate

According to the coupon division of Chaharmahal va Bakhtiari province, in general, the eastern part of the region has a temperate and cold climate with hot and dry summers (Dcas) which can be mentioned as examples of its stations in Shahrekord and Imam Qus. The region has ۲ to ٥ m of elevation, cold temperate climate, and dry summers (Dcas). The western part of the area is covered with oak forests, with a subtropical climate with hot and dry summers (Dcas), which is located at Lordegan and Manj station, and finally has more than ۲ m of elevation (H) that is covered by snow.

Table (۳-۱): Climatic Factor

Climatic Factor	Mean
Temperature(c)	۱۳/٥
Rain(mm)	٥۶۰
Relative Humid (%)	۳۴/٥
The number of frosty days	۱۱۱
Sunny hours	۳۱۴۲

٤-١- The population of residential centers

The purpose of the residential population survey is to identify investors in the primary target markets for product sales as well as to provide the manpower and equipment needed to continue operating. Hence, Table ١-٤ shows the average population of each proposed project implementation area.

Table (٤-١): Average population of project implementation areas (٢٠١٦)

Row	residential centers	Population(٢٠١٦)
١	Suggested Scope One	١٩٥٠٠٠
٢	Suggested Scope Two	٥٠٠٠٠
٣	Suggested Scope Two	٦٢٠٠٠
٤	Suggested scope four	١٠٧٠٠٠
٥	Suggested Scope Five	١٠٧٠٠٠
٦	Suggested Scope Six	٦٢٥٠٠
٧	Suggested range seven	٤٧٠٠٠
٨	Suggested Scope Eight	٣٧٠٠٠
٩	Suggested Scope nine	٣٢٠٠٠

٥-١- Access to infrastructure facilities

Due to the uncertainty of the exact location of the projects, infrastructure facilities are generally provided for the proposed areas in terms of telephone coverage, access and human resources in Table ١-٥.

Table (٥-١): Access status of project implementation areas to infrastructure

Infrastructure facilities	Yes	No
Phone coverage	*	
Access Road	*	The access road is asphalted
Access to human resources	*	Worker and specialist workforce

Second chapter:

Product specifications, process and method of production

١-٢-Introduction

All human progress in technology depends on a vital component called energy. Without energy, none of today's tools can work. Currently, a large part of the energy resources are provided by non-renewable fossil fuels. Because these fuels are non-renewable and have very harmful effects on the environment, humans in the modern age have always been looking for a way to supply renewable energy, making this one of the best sources of energy to be permanently utilized from sunlight.

٢-٢- History Use of Solar Energy

Recognizing solar energy and using it for various purposes goes back to prehistoric times. Perhaps during the pottery period, the clergymen at the temples were polished with the help of large golden cups and the sun's rays illuminated the altar fires. One of the Egyptian pharaohs built a temple that would open at sunrise and close at sunset. But the most important account of the use of the sun is the story of Archimedes the great scientist and inventor of ancient Greece who set fire to the Roman fleet using the sun's thermal energy. It is said that Archimedes, by mounting a large number of small square mirrors on one moving stand, focused the sun's rays on the Roman ships from a distance and thus set them on fire. In Iran too, the traditional architecture of the ancient Iranians has shown their particular interest in the proper and effective use of solar energy in ancient times. Although solar energy and its benefits were well known in the past centuries, the high cost of such systems on the one hand, and the supply of cheap oil and gas on the other hand, hampered the development of these systems, Oil prices in the second half of the year led the advanced industrialized nations to pay more attention to the issue of energy production in other ways than using fossil fuels.

٣-٢- Solar Energy Applications

According to the results of the feasibility studies of cage fish breeding in Karun ٤ fish following are the most suitable species for breeding.
Solar energy is currently used in two general ways:

١. Use of solar thermal energy for domestic, industrial and power plants.

٢. Direct conversion of sunlight to electricity by means of a device called photovoltaic.

١-٣-٢- Use of solar thermal energy

This part of the sun's energy applications includes both power plants and non-power plants.

١-١-٣-٢-Powerhouse applications

Facilities that convert the sun's absorbed heat into electricity are called solar thermal power plants. These facilities are divided into three categories based on the types of concentrators available and the geometric shapes of the concentrators:

• Power plants whose receivers are studded parabolic mirrors.

• Power plants with a receiver in a tower and reflected by large mirrors called a heliostat (central receiver).

• Power plants receiving parabolic plates (Appendix ١). The characteristics of each power plant are summarized below.

١-١-١-٣-٢- Linear parabolic solar thermal power plants

In these plants, linear parabolic reflectors are used to focus the sun's rays in their focal line, and the receiver is tubular in the focal line of the reflectors. Inside this tube is a special oil flowing through the heat of the sun's rays to warm and cool. The hot oil passes through the heat exchanger and converts the water to steam. The steam is then transferred to conventional circuits in thermal power plants to convert it to electric power using a steam turbine and generator. To further utilize and increase the efficiency of the receiving tube, the surface is coated with metal oxide with a high coefficient. Also, the surrounding glass pipes are wrapped to prevent heat loss and radiation loss, as well as to protect the receiving pipe. They also created a vacuum between the two tubes. For the sun's rays to reach the receiving tube directly throughout the day. There is also a solar tracking system in these power plants, whereby paralyzing mirrors constantly follow the sun and focus its rays on the receiving tube. Changes in solar radiation at these plants are offset by a fossil fuel storage and heating source. Linear parabolic power plants have been used in several countries, such as the United States, Spain, Egypt, Mexico, India and Morocco. Which are either under construction or in operation. Studies have also been carried out in Iran and a project for a ٢ kW power plant has been carried out by the Iranian New Energy Organization in Shiraz.

۲-۱-۱-۳-۲- Solar power plants of central receiver type

In these plants, the rays of the sun are focused on a receiver mounted on a relatively tall tower by a field consisting of a large number of mirrors, called a heliostat. As a result, the beam concentrates a lot of heat energy, which is absorbed by the operating fluid moving inside the receiver, and is transmitted to the conventional water and steam system by a heat exchanger in traditional power plants, and superheated steam at pressure and temperature. Designed for use in generator turbines. The operating fluid is placed in the heat exchanger next to the water and converts it to steam at high pressure and heat. In some systems the fluid causes water to flow directly into the receiver into the steam. For permanent use of this type of power plant when there is no sunlight (e.g., cloudy hours or nights) heat storage systems or possibly support equipment that may use fossil fuels to generate steam to generate electricity can be.

۳-۱-۱-۳-۲- Plate solar thermal power plants

In these plants, reflectors, which are in the form of a parabolic plate, are used to concentrate the solar beams in a spot, and the receivers in the parabolic center absorb the heat energy through the current fluid and use it with a thermal machine and generator. Converts to mechanical and electrical.

۲-۳-۱-۲- Non powerhouse applications

Non-power applications of solar thermal energy include many things: solar water heaters and baths - solar cooling and heating - solar desalination - solar dryers - solar ovens - solar ovens and solar homes (appendix ۲).

٤-۲- Solar Energy Potential in Iran

Research by experts in many parts of Iran shows that the solar radiation energy is much higher than the international average. So that in some places it is measured above ۱ to ۲ kWh. Statistics show that the average solar radiation energy on the surface of Iran is about ٤,٥ kWh. On the other hand, sunshine in Iran is very different from some of the lower latitudes, such as Saudi Arabia. Because the sun there is more heat, but the radiation is pleasant in Iran, this difference makes us able to use the sun's energy to generate electricity using photovoltaic systems. Because these systems are less efficient against high heat. In other words, while countries around Iran produce only ۱٤ to ۱٥ percent electricity from a photovoltaic system with a capacity of only one kilowatt, we can increase its efficiency to ۱٦ to ۱۹ percent, making Iran the most economical and economical. Most of the countries in the region use solar energy (Figure ۱-۲).

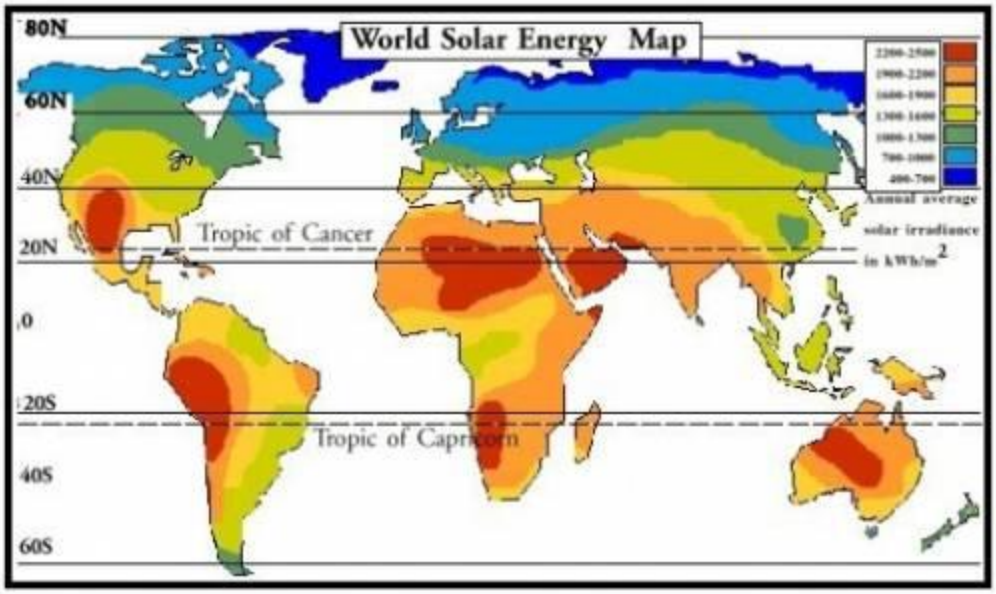


Figure (۱-۲): The average solar radiation in the world

۵-۲- Generation of electricity from the sun's rays

۱-۵-۲- Photovoltaic energy

A phenomenon that is produced by light, without the use of excitation mechanisms, generates electricity as a photovoltaic phenomenon, and any system that uses this phenomenon is called a photovoltaic system. The photoelectric effect was first described by Albert Einstein. According to this phenomenon, when a quantum of light energy, ie a photon, penetrates a material, it is likely to be absorbed by the electron and transmit the electron. Solar cells are also known as "photovoltaic cells" or "optical power". The name comes from the fact that photo means light and voltaic means electricity. These cells convert sunlight directly into electricity. Photovoltaic is a science that deals with the conversion of light into electricity, in other words, the conversion of light photons into electricity. Photovoltaic systems are one of the most widely used applications of renewable energy. Various systems with different capacities (from ۱,۲ watts to several megawatts) have been installed all over the world and their reliability and performance depend on the number of applicants every day. Acceptable voltage can be obtained from the solar cell series. They are called a series of parallel and parallel cells of the photovoltaic panel. Today, such cells are generally made of silicon material and the required silicon is made of sand, which is abundantly found in the desert regions of the country. So there is no shortage in Iran in terms of supplying the raw material to these cells. Sunlight is made of photons or particles of solar energy. Photons contain varying amounts of energy that are similar to different wavelengths of optical spectra. When photons collide with a photovoltaic cell, they may be reflected, passed through, or

absorbed directly. Only absorbed photons provide the energy to generate electricity. The simplest energy photovoltaic systems supply a large number of small calculators and wristwatches used daily.

Photovoltaic systems can generally be divided into two main sections, which we will briefly explain.

٢-٥-٢- Solar Panels

This part is actually converting the sun's radiant energy into electrical energy without mechanical intermediation. This section actually controls all of the system's specifications, powering the panels' inputs as designed and injecting and controlling the user's need for a load or battery. It should be noted that in this section the specifications and constituents vary according to the needs of the electric and consumer load as well as the local weather conditions.

٣-٥-٢- Consumer or electric charge

Depending on the DC output of the photovoltaic panels, the consumer can have two types of DC or AC, as well as different configurations of the photovoltaic panels to meet the needs of different consumers with different capacities. Given the increasing decline in fossil fuel reserves and the dangers of using nuclear power plants, in the not too distant future, electricity generated from solar energy will be used as a viable and safe alternative to fossil fuels and nuclear power plants.

٤-٥-٢- How solar cells work?

The following equipment is needed to generate electricity based on solar cells:

- ✓ Photovoltaic array
- ✓ Solar tracking systems
- ✓ DC / AC power inverter or electronic converter
- ✓ Storage
- ✓ Other equipment

The arrangement of this equipment is shown in Figure ٢-٢.



Figure(٢-٢): The process of generating electricity from solar energy

١-٤-٥-٢- Photovoltaic array

The photovoltaic array consists of a set of photovoltaic panels, which are made of photovoltaic modules. Photovoltaic modules are also composed of photovoltaic cells that convert the sun's energy into electricity.

The four main types of photovoltaic cells are:

- Single Crystal

- Polycrystalline

- Amorphous cells

- Nano-photovoltaic cells (latest solar cell introduced)

• Single crystal cell

These types of cells consist of pure single crystals. In these cells, silicon is composed of a continuous crystal lattice without impurities. The benefit of such cells is its high efficiency, which is about ١٥٪. Its disadvantages include the sophistication of this silicon, which makes it difficult to increase its price. According to research and news reports, arrays with a yield of around ١٨٪ are currently being produced and marketed.

• Polycrystalline cell

Such cells are made up of several interconnected single silicon crystals. The manufacturing process is that molten polycrystalline silicon is molded into ingots and then cut into thin tablets and prepared for solar cells. These types of cells have a much easier manufacturing process than they used to, and therefore cost less. At the same time, the efficiency of this group of solar cells is lower than before, with something estimated at about ١٢٪.

• Amorphous cells

In general, the major difference between this group of solar cells and the previous two is that instead of using the crystalline structure, the disordered cells of silicon atoms are used in thin layers. Is. These types of cells can be mounted on both a dry and flexible substrate, one of their unique advantages. The disadvantages of these cell types are their low efficiency, which is estimated at about ٦٪. Today, these cells are made of different panels in terms of shape and capacity. At present, arrays with a yield of around ٩٪ are also produced and marketed.

• Photovoltaic Nano cells: The third generation of solar cells (Nano cells) is expected to be launched in the coming years and will greatly reduce the high cost of first and second generation solar cells.

Solar cells are often made of silicon, copper, cadmium sulfide and gallium arsenide, which is better positioned among these materials because of their light properties.

Note: For proper power generation, photovoltaic arrays can be connected in different modes. For higher voltage, the arrays are parallel to each other and for greater current, or can even be connected in parallel.

Table (١-٢): Efficiency of different photovoltaic modules

module	Efficiency (%)
Single crystal silicon	١٢/٥-١٥
Polycrystalline silicon	١١-١٤
Copper Indium Gallium Selenite	١٠-١٣
Cadmium telluride	٩-١٢
Amorphous silicon	٥-٧

٢-٤-٥-٢- Solar radiation tracking systems

Photovoltaic arrays are mounted in either fixed or removable tracers that adapt to the sun's angles according to the season. However, in some cases arrays are installed in seasonal mode. The most important thing to install in photovoltaic arrays is the angle of installation. The angle of the solar radiation to the solar panels has a great impact

on its electrical energy production. The simplest way to install arrays is to fix them. However, due to the variation of the suns angle during the day and its movement in different seasons, the amount of sunlight shining on the plates decreases throughout the day and year**.**

A seasonal fixed installation method can be used to correct this weakness. In this case, the angle of installation of the photovoltaic arrays varies for each season, and the angle of installation must vary with each season. Another option is to use a removable detector. Tracks have two types:

Detectors that rotate on one axis or on two axes and always keep the photovoltaic panels in direct sunlight, thereby increasing the output efficiency of the panels.

Fixed base panels the panels are mounted on a fixed slope stand facing the sun. For areas like Iran in the Northern Hemisphere, photovoltaic panels should be installed so that the surface is light absorbing to the south as the sun is visible in the south during the year. But to maximize the annual energy uptake by a solar system, it is best to have a steep slope angle approximately equal to the latitude of the installation. For example, for the city of Shahrekord, if the panels are installed at a ۳۰ degree angle to the south, they will have the highest energy consumption throughout the year.

Table (۲-۲): Panels efficiency for different installation modes

Type of installation	Fixed	Two-season constant	Four-season constant	Bipolar tracker
To the optimal state	۷۱/۱٪	۷۵/۲٪	۷۵/۷٪	۱۰۰٪

۳-٤-۵-۲- Inverter or DC / AC power converter

A converter is a device that extracts DC power from photovoltaic arrays and converts it into standard AC current used in the home, and matches its characteristics such as voltage and frequency to the components required by the consumer. Generally, the photovoltaic units are divided into two groups, connected to the grid and separated from the grid. Therefore, converters used in each case must have their own characteristics. Power electronics converters can be divided into two general categories of separate network converters and network connected converters.

۱-۳-٤-۵-۲- Network Power Converters

Such converters convert the DC power of the solar arrays into alternating current at the desired voltage and frequency level and must be capable of supplying the load at the desired voltage and frequency in a sudden change of load. They must also be capable of reactive power exchange to feed reactive loads. Most of the grid separators are connected to the load to separate the DC and AC segments by an isolated

transformer. Two basic parameters have to be considered when selecting separate converters from the grid:

١. Output waveform

٢. Losses in unemployment

The acceptable waveform for alternating loads is the sinusoidal waveform. However, some converters produce a sine-like waveform, especially a low-voltage, square wave or waveform. Such waveforms can cause problems in starting the induction motor.

Another problem relates to inverter losses. In this case, when the transducer is switched on and the load is not connected to it, it can consume unloaded current which can lead to battery drain. Therefore, to solve this problem, the converter control system must be designed to eliminate this problem. In general, separate network converters should meet the following minimum requirements:

- Severe input voltage fluctuations

- Generates or near the sinusoidal output voltage waveform

- Output voltage control

- Top Twelve

- Ability to withstand short-term overload, such as running an induction motor

- Reactive load nutritional capacity

- Short circuit current tolerance

٢-٥-٤-٣-٢-Grid-connected converters

The output of this type of converter must be synchronized with the main power grid. Synchronization means that the voltage level, frequency and phase voltage of the converter output are consistent with the grid voltage. The criteria for efficiency, safety, power quality of the converter and its protection system must be taken into account when selecting a converter connected to the network.

٤-٤-٥-٢- Storage device

The storage of the photovoltaic system is usually battery type. The battery system may include all or some of the following:

١. Battery compartment

٢. Battery charge controller

٣. Separate side panels for critical load circuits

In the battery compartment, the energy storage is in the form of a battery, and if there are sub-sections of the critical circuit, the critical load circuits work when consumed. In this case, when the global grid is powered, the solar unit is separated from the main grid and only the predetermined sensitive loads are fed by the unit. Sensitive load circuits are wired from a sub-circuit that is separate from the rest of the electrical circuits. If power outages occur during daylight hours, the photovoltaic array can supply the battery with the help of batteries. If a power failure occurs at night, it will supply the required battery life. Lead-acid, nickel-cadmium, nickel-hydroxide and lithium batteries are available today, with lead-acid batteries consuming more.

The most important factor in selecting a battery for photovoltaic systems is the ability to discharge and charge excessively at various times without causing any damage to the battery. Batteries can be serialized or paralleled to achieve higher capacities.

The battery is used in both separate and grid-connected systems and stores surplus energy when the photovoltaic system output is over load. When the sunlight is unavailable or the solar power output is less than the load, the battery enters the circuit and compensates for the lack of energy. Therefore, the battery must be capable of being recharged and recharged repeatedly.

١-١-٤-٤-٥-٢- Follower of maximum power

The voltage curve of a sample solar panel is shown in Figure ٤-٤. As can be seen, for every point on the curve there is a voltage and a corresponding current that is not necessarily the maximum current or maximum voltage. For example, at point E the voltage is maximum but the current corresponding to zero or for point B is maximum, but the voltage is not maximum. For optimum use of the energy generated by the photovoltaic panel, a point must be selected that has the highest current and voltage. Achieving the optimum point by the maximum power follower is the point where the highest voltage and current is generated. For example, in the figure below, point C is the point where the maximum voltage and current is generated.

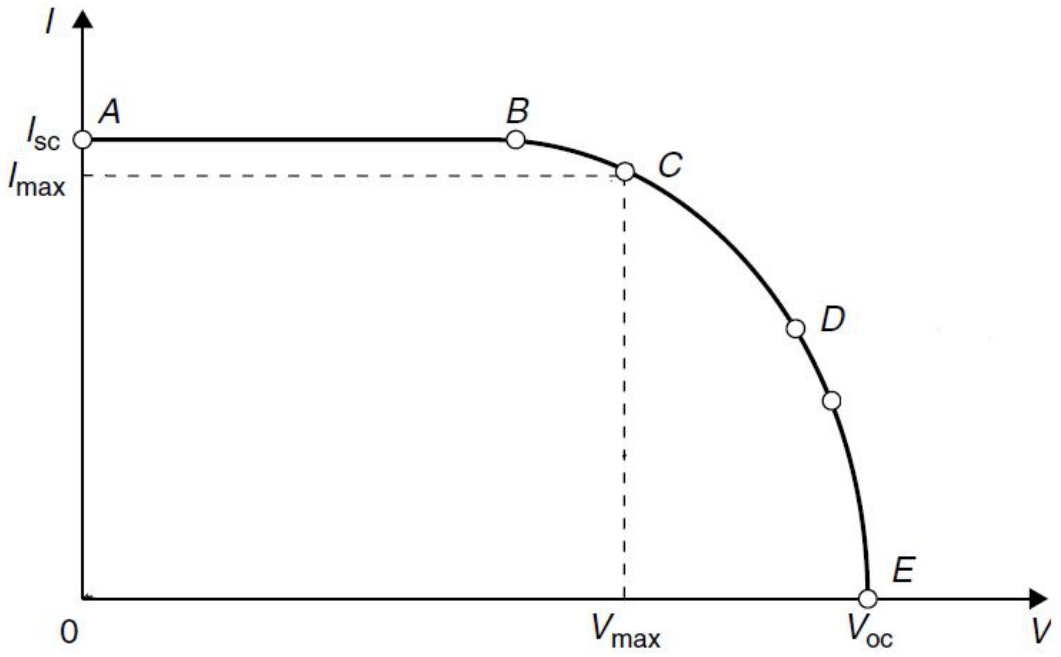


Figure (٤-٢): Current-voltage curve of a solar panel

In Fig. ٥-٢ the voltage output is shown in terms of voltage for a photovoltaic panel.

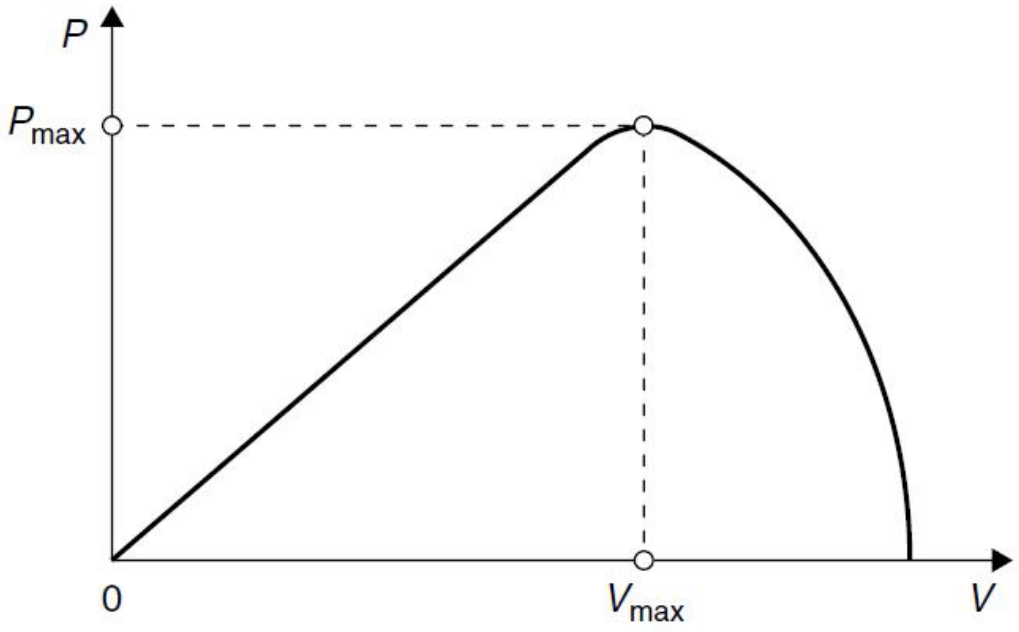


Figure (٢-٥): Power-voltage curve of a solar panel

The maximum power follower is actually a high efficiency DC-DC converter that adjusts its output voltage to an optimum value to obtain maximum power. The pursuit of maximum power in the cloudy, cold days or when the battery is used can play a very effective role. However, the cost and complexity of the maximum power must be taken into account when selecting a follower. In cases where photovoltaic units are equipped with maximum power requirements. The output of the photovoltaic system is directly related to the converter and the follower of maximum power.

٥-٤-٥-٢- Other equipment

Other components of the photovoltaic system are referred to as BOS. The equipment includes wiring and mounting systems to allow photovoltaic modules to be used in the electrical system. In addition to BOS, there are other equipment such as control devices, metering devices, etc. that are not part of the main equipment.

٥-٥-٢- Advantages and Disadvantages of the Photovoltaic System

١-٥-٥-٢- Advantages of Photovoltaic System

The major advantages of photovoltaic systems can be summarized as follows:

- Does not require fuel
- No environmental pollution
- High reliability
- Easy portability
- Quick installation and removal
- Very low service and maintenance needs
- Long life (more than ٢٠ years)
- Direct energy conversion without any mechanical rotation and no damping

Low maintenance costs, no need for intermittent servicing, and the ability to quickly install and dismantle are things that make the photovoltaic system even higher than other renewable energies. The aforementioned advantages give the photovoltaic system special capabilities, which in many cases make it economically feasible in comparison with other conventional systems (grid power, diesel generators, etc.).

٢-٥-٥-٢- Disadvantages of photovoltaic system

The major disadvantages of photovoltaic systems can be summarized as follows:

- ✓ High cost of initial investment
- ✓ Low efficiency of photovoltaic panels
- ✓ Dependence on sunlight to give energy
- ✓ In certain applications, there is a need for a power saver (generally a battery) to work during off hours or fluctuations in radiation.

Chapter ٣:

Investment and technical justification of the plan

۱-۳- Fixed costs

Table (۱-۳): The land

All numbers are in million rials								
Row	Description	Unit	Ownership type	Value	Unit price	Total price	The final cost	Cost to Euro
۱	Land	$M^۲$	Assignment	۲۰۰۰۰	۰	۰	۰	۰
Total							۰	۰

Table (۲-۳): Landscaping

	All numbers are in million rials							Cost(Euro)
Row	Description	Value	Unit	Unit price(Rials)	Total price	Done	Required	
۱	Excavation and leveling	۲۰،۰۰۰	$M^۳$	٤۲٦۰۰	۸٥۲	۰	۸٥۲	۳،۰۷۷
۲	Tabulation and sidewalk construction	۸۰۰	$M^۲$	٦۳۸۷٥۰	٥۱۱	۰	٥۱۱	۱،۸٤٦
۳	Lighting	٦	Mercury	۲۸۳۰۰۰۰	۱۷	۰	۱۷	٦۰
٤	Road construction and access roads	٦۰۰	M in length	۱۳۸٥۰۰۰	۸۳۱	۰	۸۳۱	۳،۰۰۰
٥	green space	۲	Number	۱۰٥۰۰۰۰۰	۲۱	۰	۲۱	۷۷
٦	Door	۱	$M^۲$	٤۳۰۰۰۰۰۰	٤۳	۰	٤۳	۱٥٤
۷	fencing	۱،۲۰۰	Number	۷٤٥٥۰۰۰	۸۹٤٦	۰	۸۹٤٦	۳۲،۳۰۸
Total						۰	۱۱۲۲۱	٤۰،٥۲۲

Table (۳-۳): Building

	All numbers are in million rials							Cost(Euro)
Row	Description	Value	Unit	Unit price(Rials)	Total price	Done	Required	
۱	Office	۳۰	$M^۳$	۳۸	۱۱٥۰	۰	۱۱٥۰	٤،۱٥٤
۲	Security	۲٥	$M^۳$	۳٤	۸٥۲	۰	۸٥۲	۳،۰۷۷
۳	Store	۲٥	$M^۳$	۳۰	۷٤٥	۰	۷٤٥	۲،٦۹۲
٤	W.C	۱۰	$M^۳$	۳٤	۳٤۱	۰	۳٤۱	۱،۲۳۱
Total						۰	۳۰۸۹	۱۱،۱٥٤

Table (٤-٣): Installations

	All numbers are in million rials							Cost(Euro)
Row	Description	Value	Unit	Unit price(Rials)	Total price	Done	Required	
١	CCTV	١	Device	٥٣٠٠٠٠٠٠	٥٣	٠	٥٣	١٩٢
٢	Fire Extinguishing System	٣	Device	٧٣٠٠٠٠٠	٢٢	٠	٢٢	٨١
٣	Cooling Heating System	٢	Device	٩٦٠٠٠٠٠٠	١٩٢	٠	١٩٢	٦٩٢
٤	Water storage tank	١	Device	١٨٠٠٠٠٠٠	١٨	٠	١٨	٦٥
٥	Fuel storage tank	١	Device	١١٠٠٠٠٠٠	١١	٠	١١	٣٨
Total							**٢٩٦**	**١٠٦٩**

Table (٥-٣): equipment and machinery

All numbers are in million rials					
Row	Description	Total price	Done	Required	Cost(Euro)
Photovoltaic Panel					
١	the frame	١٦٩٠٧	٠	١٦٩٠٧	٦١،٠٥٦
٢	Glass	٢٠٢٧٩	٠	٢٠٢٧٩	٧٣،٢٣١
٣	EVA sheet	١٨٥٨٠	٠	١٨٥٨٠	٦٧،٠٩٨
٤	Back sheet	١٨٥٨٠	٠	١٨٥٨٠	٦٧،٠٩٨
٥	Junction box	١٣٥١١		١٣٥١١	٤٨،٧٩٠
٦	TB	٣٣٧٨٩	٠	٣٣٧٨٩	١٢٢،٠٢١
٧	Ribbon tape	٨٤٤١	٠	٨٤٤١	٣٠،٤٨٢
٨	PV adhesive	٨٤٤١	٠	٨٤٤١	٣٠،٤٨٢
٩	DC cable	١٢٦٧٤	٠	١٢٦٧٤	٤٥،٧٦٩
Solar inverter					
١٠	Electronics	٤٧٣٢٥	٠	٤٧٣٢٥	١٧٠،٩٠٢
١١	Boxes and metal parts	١٦٩٠٧	٠	١٦٩٠٧	٦١،٠٥٦
Other equipment					
١٢	Structure	٢٥٣٤٨	٠	٢٥٣٤٨	٩١،٥٣٨
١٣	Solar Detector	١٢٦٧٤	٠	١٢٦٧٤	٤٥،٧٦٩
١٤	Installation and execution	١٥٢٠٧	٠	١٥٢٠٧	٥٤،٩١٨
Total			٠	٢٦٨٦٦٣	٩٧٠،٢١١

Table (٦-٣): vehicles

All numbers are in million rials								Cost(Euro)
Row	Description	Value	Unit	Unit price(Rials)	Total price	Done	Required	
١	Automobile	١	Device	١٧٠٠٠٠٠٠٠٠	١٧٠٠	٠	١٧٠٠	١٧٠٠٠٠٠٠٠٠
Total						٠	١٧٠٠	٦،١٥٤

Table (٧-٣): Furniture and office supplies and workshops

	All numbers are in million rials							Cost(Euro)
Row	Description	Value	Unit	Unit price(Rials)	Total price	Done	Required	
١	Computers & Accessories	١	Device	٧٤٠٠٠٠٠٠	٧٤	٠	٧٤	٢٦٩
٢	Table and chairs	٢	Complete set	٧٦٥٠٠٠٠٠	١٥٣	٠	١٥٣	٥٥٤
٣	chairs	١٠	number	٥٣٠٠٠٠٠	٥٣	٠	٥٣	١٩٢
٤	Refrigerator	١	Device	٣٢٠٠٠٠٠٠	٣٢	٠	٣٢	١١٥
٥	Oven	١	Device	٣٢٠٠٠٠٠٠	٣٢	٠	٣٢	١١٥
٦	Cooling and heating appliances	١	Device	٢١٠٠٠٠٠٠	٢١	٠	٢١	٧٧
٧	Kitchenware	١	Collection	٢١٠٠٠٠٠٠	٢١	٠	٢١	٧٧
Total						٠	٣٨٨	١،٤٠٠

Table (٨-٣): Cost before operation

All numbers are in million rials				
Row	Description	Total price	Done	Required
١	Cost before operation (٢٪ fixed capital)	٢٨٥٤	٠	٢٨٥٤
Total(Euro)			٠	١٠،٣٠٥

۲-۳- Plan investment

Table (۹-۳): Working capital

All numbers are in million rials											
Year											
Description	Period	First year	Second year	Third year	Forth year	Fifth year	Sixth year	Seventh year	Eightieth year	Ninth year	Tenth year
Expected capacity percentage											
		۱۰۰٪	۱۰۰٪	۱۰۰٪	۱۰۰٪	۱۰۰٪	۱۰۰٪	۱۰۰٪	۱۰۰٪	۱۰۰٪	۱۰۰٪
Cost of raw materials	٤٥	۱٦۰	۱٦۰	۱٦۰	۱٦۰	۱٦۰	۱٦۰	۱٦۰	۱٦۰	۱٦۰	۱٦۰
Inventory of manufactured products	۱٥	٥۷۹	٥۷۹	٥۷۹	٥۷۹	٥۷۹	٥۷۹	٥۷۹	٥۷۹	٥۷۹	٥۷۹
Product in production	۱٥	٥۷۹	٥۷۹	٥۷۹	٥۷۹	٥۷۹	٥۷۹	٥۷۹	٥۷۹	٥۷۹	٥۷۹
Accounts Received	۳۰	۱۱٥۹	۱۱٥۹	۱۱٥۹	۱۱٥۹	۱۱٥۹	۱۱٥۹	۱۱٥۹	۱۱٥۹	۱۱٥۹	۱۱٥۹
Deducted: Payment Accounts	۳۰	۱۱٥	۱۱٥	۱۱٥	۱۱٥	۱۱٥	۱۱٥	۱۱٥	۱۱٥	۱۱٥	۱۱٥
Cash (salary)	۳۰	۲۲٦	۲۲٦	۲۲٦	۲۲٦	۲۲٦	۲۲٦	۲۲٦	۲۲٦	۲۲٦	۲۲٦
Total working capital required		۲٥۸۸	۲٥۸۸	۲٥۸۸	۲٥۸۸	۲٥۸۸	۲٥۸۸	۲٥۸۸	۲٥۸۸	۲٥۸۸	۲٥۸۸
Annual increase in working capital		۲٥۸۸	۰	۰	۰	۰	۰	۰	۰	۰	۰
Total working capital required (EUR)		۹۳٤٤	۹۳٤٤	۹۳٤٤	۹۳٤٤	۹۳٤٤	۹۳٤٤	۹۳٤٤	۹۳٤٤	۹۳٤٤	۹۳٤٤

Table (۱۰-۳): Summary investment plan

All numbers are in million rials					Cost(Euro)
Year					
Row	Description	Price	Done	Required	
۱	land	۰	۰	۰	۰
۲	Landscaping	۱۱۲۲۱	۰	۱۱۲۲۱	٤۰،٥۲۲
۳	Building	۳۰۸۹	۰	۳۰۸۹	۱۱،۱٥٤
٤	Installations	۲۹٦	۰	۲۹٦	۱،۰٦۹
٥	Luggage and office supplies	۳۸۸	۰	۳۸۸	۱،٤۰۰
٦	equipment and machinery	۲٦۸٦٦۳	۰	۲٦۸٦٦۳	۹۷۰،۲۱۱
۷	Vehicle	۱۷۰٤	۰	۱۷۰٤	٦،۱٥٤
۸	Costs before operation	۲۸٥٤	۰	۲۸٥٤	۱۰،۳۰٥
۹	Unforeseen costs	٥۷٦٤	۰	٥۷٦٤	۲۰،۸۱٦
Total fixed investment costs		۲۹۳۹۷۸	۰	۲۹۳۹۷۸	۱،۰٦۱،٦۳۰
Capital in the first year's turnover		۲٥۸۷	۰	۲٥۸۷	۹،۳٤٤
Total investment of the plan		۲۹٦٥٦٦	۰	۲۹٦٥٦٦	۱،۰۷۰،۹۷٤

Table (۱۱-۳): How to get funding to complete the project

All numbers are in million rials			
Description	Build time	Operation time	total
Total Financial source	۲۹۳۹۷۸	۲۵۸۷	۲۹۶۵۶۶
Total Financial source(Euro)	۱،۰۶۱،۶۳۰	۹،۳۴۴	۱،۰۷۰،۹۷۴

۳-۳- Plan variable costs

Table (۱۲-۳): Main material cost

All numbers are in million rials					Cost(Euro)
Row	Description	Total price	Done	Required	
۱	Food and Catering	۱۲۷۸	۰	۱۲۷۸	۴،۶۱۵
Total			۰	۱۲۷۸	**۴،۶۱۵**

Table (۱۳-۳): Fuel and energy costs

All numbers are in million rials								Cost(Euro)
Row	Description	annual consumption	Unit	Unit price(rials)	Total price	Done	Required	
۱	consuming water	۱۰،۰۰۰	$M^۳$	۵۳۰۰	۵۳	۰	۵۳	۱۹۲
۲	Kerosene	۲،۰۰۰	Liter	۱۰۵۰۰	۲۱	۰	۲۱	۷۷
۳	gas capsule	۲۰۰	Number	۱۷۰۰۰۰	۳۴	۰	۳۴	۱۲۳
Total						۰	۱۰۸	۳۹۲

Table (۱۴-۳): salary

All numbers are in million rials						
Row	Description	Number	Monthly salary for each person (thousand Rials)	Monthly salary(thousand Rials)	yearly salary	Cost(Euro)
۱	technical manager	۲	۴۲۶۰۰	۸۵۲۰۰	۱۰۲۲	۳،۶۹۲
yearly salary					۱۰۲۲	۳،۶۹۲
Employer share insurance equals ۲۳٪ of annual salaries and benefits					۲۳۵	۸۴۹
Total salaries and benefits of production personnel					۱۲۵۸	۴،۵۴۲
۲	Project Manager	۱	۵۳۰۰۰	۵۳۰۰۰	۳۰۰	۲،۳۰۸
۳	Guard	۱	۳۸۰۰۰	۳۸۰۰۰	۲۱۶	۱،۶۶۲
yearly salary					۱۰۹۹	۳،۹۶۹
Employer share insurance equals ۲۳٪ of annual salaries and benefits					۲۵۳	۹۱۳
Total salaries and benefits of production personnel					۱۳۵۲	۴،۸۸۲
Total salaries and benefits for all personnel					۲۶۱۰	۹،۴۲۴

Table (۱۵-۳): maintenance cost

All numbers are in million rials					
Row	Description	Asset value	Rate (%)	Cost	Cost(Euro)
۱	Landscaping	۱۱۲۱۵	۰/۰۲	۲۲٤	۸۱۰
۲	Building	۳۰۸۸	۰/۰۲	٦۲	۲۲۳
۳	Installations	۲۹٤	۰/۰۵	۱۵	۵۳
٤	equipment and machinery	۲٦۸٦٦۰	۰/۰۱	۲٦۸۷	۹،۷۰۲
۵	Office Supplies	۳۸۸	۰/۰۵	۱۹	۷۰
٦	vehicles	۱۷۰۳	۰/۱۰	۱۷۰	٦۱۵
Total		۲۸۵۳٤۷	-	۳۱۷۷	۱۱،٤۷٤

Table (۱٦-۳): Cost of depreciation

	All numbers are in million rials				
Row	Description	Asset value	Rate (%)	Cost	Cost(Euro)
۱	Landscaping	۱۱۲۲۰	۰/۱۰	۱۱۲۲	٤،۰۵۲
۲	Building	۳۰۸۸	۰/۱۰	۳۰۹	۱،۱۱۵
۳	Installations	۲۹٦	۰/۱۰	۳۰	۱۰۷
٤	equipment and machinery	۲٦۸٦٦۰	۰/۰۱	۲٦۸۷	۹،۷۰۲
۵	Office Supplies	۳۸۸	۰/۱۰	۳۹	۱٤۰
٦	vehicles	۱۷۰٤	۰/۲۰	۳٤۱	۱،۲۳۱
۷	Unforeseen costs	۵۷٦۵	۰/۱۰	۵۷۷	۲،۰۸۲
Cost of depreciation of fixed assets		۲۹۱۱۲۲	-	۵۱۰۳	۱۸،٤۲۹
Cost before operation		۲۸۵۵	۰/۱۰	۲۸۵	۱،۰۳۱
Total		۲۹۳۹۷۷	-	۵۳۸۸	۱۹،٤۵۹

Table (۱۷-۳): The cost of sales and insurance

All numbers are in million rials			Cost(Euro)
Row	Description	Total cost	
۱	Product sales costs (۱٪ sales)	۸۱٤	۲،۹٤۰
۲	Administrative and organizational costs (۱۵٪ sales)	٤۰۷	۱،٤۷۰
۳	Fixed asset insurance (۲ per thousand asset value)	۵۸۸	۲،۱۲۳
Total		۱۸۰۹	٦،۵۳۳

٤-٣- Total cost

Table (١٨-٣): Product cost (direct production costs)

All numbers are in million rials										
Year	First year	Second year	Third year	Fourth year	Fifth year	Sixth year	Seventh year	Eightieth year	Ninth year	Tenth year
Expected Capacity	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪
Raw material costs	١٢٧٨	١٢٧٨	١٢٧٨	١٢٧٨	١٢٧٨	١٢٧٨	١٢٧٨	١٢٧٨	١٢٧٨	١٢٧٨
Salary of production personnel	١٢٥٧	١٢٥٧	١٢٥٧	١٢٥٧	١٢٥٧	١٢٥٧	١٢٥٧	١٢٥٧	١٢٥٧	١٢٥٧
Repair and maintenance	٣١٧٨	٣١٧٨	٣١٧٨	٣١٧٨	٣١٧٨	٣١٧٨	٣١٧٨	٣١٧٨	٣١٧٨	٣١٧٨
Fuel and energy	١٠٩	١٠٩	١٠٩	١٠٩	١٠٩	١٠٩	١٠٩	١٠٩	١٠٩	١٠٩
Unpredicted (٥٪ of the above items)	١١٧	١١٧	١١٧	١١٧	١١٧	١١٧	١١٧	١١٧	١١٧	١١٧
Fixed asset depreciation cost	٥١٠٤	٥١٠٤	٥١٠٤	٥١٠٤	٥١٠٤	٥١٠٤	٥١٠٤	٥١٠٤	٥١٠٤	٥١٠٤
Total cost of product	١١٠٤٢	١١٠٤٢	١١٠٤٢	١١٠٤٢	١١٠٤٢	١١٠٤٢	١١٠٤٢	١١٠٤٢	١١٠٤٢	١١٠٤٢
Total cost of the product (Euro	٣٩٨٧٣	٣٩٨٧٣	٣٩٨٧٣	٣٩٨٧٣	٣٩٨٧٣	٣٩٨٧٣	٣٩٨٧٣	٣٩٨٧٣	٣٩٨٧٣	٣٩٨٧٣

Table (١٩-٣): Operating costs

All numbers are in million rials										
Year	First year	Second year	Third year	Fourth year	Fifth year	Sixth year	Seventh year	Eightieth year	Ninth year	Tenth year
Expected Capacity	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪
The salary of the administrative staff	١٣٥٣	١٣٥٣	١٣٥٣	١٣٥٣	١٣٥٣	١٣٥٣	١٣٥٣	١٣٥٣	١٣٥٣	١٣٥٣
Costs of product sales	٨١٤	٨١٤	٨١٤	٨١٤	٨١٤	٨١٤	٨١٤	٨١٤	٨١٤	٨١٤
Administrative and organizational	٤٠٧	٤٠٧	٤٠٧	٤٠٧	٤٠٧	٤٠٧	٤٠٧	٤٠٧	٤٠٧	٤٠٧
Depreciation of costs before operation	٢٨٥	٢٨٥	٢٨٥	٢٨٥	٢٨٥	٢٨٥	٢٨٥	٢٨٥	٢٨٥	٢٨٥
Total Operating Costs	٢٨٥٩	٢٨٥٩	٢٨٥٩	٢٨٥٩	٢٨٥٩	٢٨٥٩	٢٨٥٩	٢٨٥٩	٢٨٥٩	٢٨٥٩
Total Operating Costs (Euro)	١٠٣٢٣	١٠٣٢٣	١٠٣٢٣	١٠٣٢٣	١٠٣٢٣	١٠٣٢٣	١٠٣٢٣	١٠٣٢٣	١٠٣٢٣	١٠٣٢٣

Table (٣-٢٠): Non-operating costs

All numbers are in million rials										
Year	First year	Second year	Third year	Fourth year	Fifth year	Sixth year	Seventh year	Eightieth year	Ninth year	Tenth year
Expected Capacity	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪
Fixed asset insurance (٠,٠٢٪ fixed asset)	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨
Total non-operational costs	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨
Total non-operational costs(Euro)	٢١٢٣	٢١٢٣	٢١٢٣	٢١٢٣	٢١٢٣	٢١٢٣	٢١٢٣	٢١٢٣	٢١٢٣	٢١٢٣

Table (٣-٢١): Breakdown of fixed and variable costs

Breakdown of fixed and variable costs						
Row	Description	Total cost	Fixed costs		Variable costs	
		Amount	Amount	Percent	Amount	Percent
Direct production costs (sales cost)						
١	Raw material cost	١٢٧٨	٠	٪٠	١٢٧٨	٪١٠٠
٢	Salaries and benefits of production personnel	٦٩٢	١٣٧	٪٦٥	٢٤٢	٪٣٥
٣	repair and maintenance	٣١٧٨	١٤٩٢	٪١٠٠	٠	٪٠
٤	Fuel and energy	١٠٩	٢	٪٢٠	٨٧	٪٨٠
٥	Miscellaneous and unpredictable (٥٪ of the above items)	١٠٤	١٣	٪٥٠	٥٢	٪٥٠
٦	Cost of depreciation of fixed assets	٥١٠٤	٢٣٩٦	٪١٠٠	٠	٪٠
Total direct production costs (sales cost)		١٠٤٦٥	٣٤٧٣	٪٨٤	١٦٧٤	٪١٦
Operating Costs						
٧	Salary of administrative personnel	٨١٤	٥٧٠	٪٧٠	٢٤٤	٪٣٠
٨	Distribution and sales (٠,٠٠٥٪ sales)	٤٠٧	٠	٪٠	٤٠٧	٪١٠٠
٩	Administrative & Organizational (١٪ Sales)	٨١٤	٨١٤	٪١٠٠	٠	٪٠
Total Operating Costs		٢٥٧٣	١٣٦٤	٪٥٣	١٢٠٩	٪٤٧
Non-operating costs						
١٠	Fixed Assets (٠,٠٠٢ Fixed Assets)	٥٨٨	٥٨٨	٪١٠٠	٠	٪٠
١١	Depreciation of costs before operation	٢٨٥	٢٨٥	٪١٠٠	٠	٪٠
Total Non-Operating Costs		٨٧٣	٨٧٣	٪١٠٠	٠	٪٠
Total		١٣٩١١	١٠٩٩٠	٧٩%	٢٩٢١	٢١%
Total(Euro)		٥٠٢٣٧	٣٩٨٣٨	٧٩%	١٠٣٩٩	٢١%

٥-٣- production schedule

Table (٢٢-٣): Production and sales plan

All numbers are in million rials										
Sunny hours throughout the year	Sunny hours throughout the year			Sunny hours throughout the year			Sunny hours throughout the year		Sunny hours throughout the year	
٣٠٠٠	٢٠٠٠			٦٠٠٠٠٠٠			٩١٤٨		٥٤٨٨٨	
Year	First year	Second year	Third year	Fourth year	Fifth year	Sixth year	Seventh year	Eightieth year	Ninth year	Tenth year
Percentage of product production capacity	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪
The sum of total production(MWh per year)	٦٠٠٠	٦٠٠٠	٦٠٠٠	٦٠٠٠	٦٠٠٠	٦٠٠٠	٦٠٠٠	٦٠٠٠	٦٠٠٠	٦٠٠٠
Unit selling price (Million Rials / MWh)	٩,١٤٨	٩,١٤٨	٩,١٤٨	٩,١٤٨	٩,١٤٨	٩,١٤٨	٩,١٤٨	٩,١٤٨	٩,١٤٨	٩,١٤٨
Total(Million Rials)	٥٤٨٨٨	٦٥٨٦٦	٧٩٠٣٩	٩٤٨٤٦	١١٣٨١٦	١٣٦٥٧٩	١٦٣٨٩٥	١١٨٠٠٤	١٤١٦٠٥	١٦٩٩٢٦
Total(Euro)	١٩٨٢١٥	٢٣٧٨٥٨	٢٨٥٤٢٩	٣٤٢٥١٥	٤١١٠١٨	٤٩٣٢٢١	٥٩١٨٦٦	٤٢٦١٤٣	٥١١٣٧٢	٦١٣٦٤٦

٦-٣- Economic Schedule

Table (٢٣-٣): Prediction of profit and loss account

All numbers are in million rials										
Description	First year	Second year	Third year	Fourth year	Fifth year	Sixth year	Seventh year	Eightieth year	Ninth year	Tenth year
net sales	٥٤٨٨٨	٦٥٨٦٦	٧٩٠٣٩	٩٤٨٤٦	١١٣٨١٦	١٣٦٥٧٩	١٦٣٨٩٥	١١٨٠٠٤	١٤١٦٠٥	١٦٩٩٢٦
Deducted: the cost of the sold goods	١١٠٤٢	١١٠٤٢	١١٠٤٢	١١٠٤٢	١١٠٤٢	١١٠٤٢	١١٠٤٢	١١٠٤٢	١١٠٤٢	١١٠٤٢
Gross profit	٤٣٨٤٦	٥٤٨٢٤	٦٧٩٩٧	٨٣٨٠٤	١٠٢٧٧٤	١٢٥٥٣٧	١٥٢٨٥٣	١٠٦٩٦٢	١٣٠٥٦٣	١٥٨٨٨٤
Deductions: Operating Costs	٢٨٥٩	٢٨٥٩	٢٨٥٩	٢٨٥٩	٢٨٥٩	٢٨٥٩	٢٨٥٩	٢٨٥٩	٢٨٥٩	٢٨٥٩
Operating profit	٤٠٩٨٧	٥١٩٦٥	٦٥١٣٨	٨٠٩٤٥	٩٩٩١٥	١٢٢٦٧٨	١٤٩٩٩٤	١٠٤١٠٣	١٢٧٧٠٤	١٥٦٠٢٥
Deductible non-operating costs	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨	٥٨٨
Special interest before tax deduction	٤٠٣٩٩	٥١٣٧٧	٦٤٥٥٠	٨٠٣٥٧	٩٩٣٢٧	١٢٢٠٩٠	١٤٩٤٠٦	١٠٣٥١٥	١٢٧١١٦	١٥٥٤٣٧
Deductible tax	٦٦٩٣	٦٦٩٣	٦٦٩٣	٦٦٩٣	٦٦٩٣	٦٦٩٣	٦٦٩٣	٦٦٩٣	٦٦٩٣	٦٦٩٣
Net profit	٣٣٧٠٦	٤٤٦٨٤	٥٧٨٥٧	٧٣٦٦٤	٩٢٦٣٤	١١٥٣٩٧	١٤٢٧١٣	٩٦٨٢٢	١٢٠٤٢٣	١٤٨٧٤٤
Accumulated profit	٣٣٧٠٦	١١٢٠٩٦	١٦٩٩٥٢	٢٤٣٦١٧	٣٣٦٢٥١	٤٥١٦٤٧	٥٩٤٣٦٠	٦٩١١٨٢	٨١١٦٠٥	٩٦٠٣٤٩
Net profit (Euro)	١٢١٧٢١	٤٠٤٨٠٦	٦١٣٧٤١	٨٧٩٧٦٢	١٢١٤٢٨٧	١٦٣١٠١٤	٢١٤٦٣٨٦	٢٤٩٦٠٣٦	٢٩٣٠٩١٤	٣٤٦٨٠٦٧

Table (٢٤-٣): Prediction of projected revenue

All numbers are in million rials										
Description	First year	Second year	Third year	Fourth year	Fifth year	Sixth year	Seventh year	Eightieth year	Ninth year	Tenth year
Special interest before tax deduction	٤٠٣٩٩	٥١٣٧٧	٦٤٥٥٠	٨٠٣٥٧	٩٩٣٢٧	١٢٢٠٩٠	١٤٩٤٠٦	١٠٣٥١٥	١٢٧١١٦	١٥٥٤٣٧
non-movable assets depreciation	٥١٠٤	٥١٠٤	٥١٠٤	٥١٠٤	٥١٠٤	٥١٠٤	٥١٠٤	٥١٠٤	٥١٠٤	٥١٠٤
Depreciation of costs before operation	٢٨٥	٢٨٥	٢٨٥	٢٨٥	٢٨٥	٢٨٥	٢٨٥	٢٨٥	٢٨٥	٢٨٥
Total cash flow plans	٤٥٧٨٨	٥٦٧٦٦	٦٩٩٣٩	٨٥٧٤٦	١٠٤٧١٦	١٢٧٤٧٩	١٥٤٧٩٥	١٠٨٩٠٤	١٣٢٥٠٥	١٦٠٨٢٦
Total cash flow plans(Euro)	١٦٥٣٥٢	٢٠٤٩٩٥	٢٥٢٥٦٧	٣٠٩٦٥٢	٣٧٨١٥٥	٤٦٠٣٥٩	٥٥٩٠٠٣	٣٩٣٢٨١	٤٧٨٥٠٩	٥٨٠٧٨٤
Fixed investment project	٢٩٣٩٧٨			١٠٦١،٦٣٠ (Euro)						
Capital in Circulation Scheme	٢٥٨٧			٩،٣٤٤ (Euro)						
Total investment plan	٢٩٦٥٦٥			١٠٧٠،٩٧٤ (Euro)						
Project return rate(IRR)	٢٠/٦٥ percent									
Return of capital	٤/٤٠ year									

Table (٢٥-٣): Net Present Value (NPV)

			Net Cash(Euro)
Row	Rate (%)	Net Cash	
١	٠	٤٢٦٥٦٤	١٥٤٠٤٣٠
٢	٠/٠٥	٤٠٧٠٦٩	١٤٧٠٠٣٠
٣	٠/١٠	١٤٧٧٦٦	٥٣٣٦٢١
٤	٠/١٥	٨٦٦٣٥	٣١٢٨٦٢
٥	٠/١٨	٦٦٠٤	٢٣٨٥٠
٦	٠/٢٥	-٣٨٣٧٢	١٣٨٥٧١-
٧	٠/٣٠	-٧٣٠٠٧	٢٦٣٦٤٨-
٨	٠/٣٥	-١٠٠٢٣٣	٣٦١٩٦٧-
٩	٠/٤٠	-١٢٢٠٣٣	٤٤٠٦٩٣-
١٠	٠/٥٠	-١٥٤٤٤٨	٥٥٧٧٥٠-
١١	٠/٦٠	-١٧٧١٤٠	٦٣٩٦٩٨-

Table (٢٦-٣): Head-to-head analysis

All numbers are in million rials		Amount	Amount(Euro)
Row	Description		
١	Fixed Production Costs (M.Rial)	١١٠٣٢	٣٩٨٣٨
٢	Variable Production Costs (M.Rial)	٢٨٨٠	١٠٣٩٩
٣	Total fixed and variable production costs (M.Rial)	١٣٩١١	٥٠٢٣٧
٤	Total Production Amount (MWh)	٦٠٠٠	٦٠٠٠
٥	Sale price of each (M. Rial / MWh)	٩	٣٣
٦	Total Sales (M.Rial)	٨١٤١٢	٢٩٤٠٠٠
٧	Total Sales Margin (Total Cost Variable - Total Sales)	٧٨٥٣٣	٢٨٣٦٠١
٨	Margin Ratio (Sales / Margin)	٠/٩٧	٠/٩٧
٩	Head-to-head production value = (MB sales / fixed costs)	٢٣٣	٨٤٣
١٠	Head-to-Head Rial Sales = (Sales Margin / Fixed Cost Ratio)	٥٣٦٩	٤١٢٩٩
١١	Safety margin (Sales total / (Sales per head - Total sales))	٠/٨٦٠	٠/٨٦٠
١٢	Production Capacity at Head-to-Head Point (Safety Margin - ١)	٥،١٧٩	٣٩،٨٣٨
١٣	Head-to-head point * ١٠٠ (Sales margin / Fixed costs	١٤ percent	١٤ percent

Table (٢٦-٣): Description of Value Added

Row	Description	Total cost	Total cost(Euro)
١	Gross Value Added Gross (Production Costs-Sales Costs	٧٨٧٦٨	٢٨٤،٤٥١
٢	Net domestic value added (fixed asset depreciation - gross domestic product)	٧٣٦٦٥	٢٦٦،٠٢٢
٣	Gross Value Added Gross Value	٩٧٪	
٤	Net value added net worth	٩٠٪	

Table (٢٧-٣): Cash Flow Forecast Table

All numbers are in million rials										
Description	year									
	First year	Second year	Third year	Fourth year	Fifth year	Sixth year	Seventh year	Eightieth year	Ninth year	Tenth year
Expected capacity percentage	٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪	١٠٠٪
Cash Flows (Internal Resources)	٠	٤٥٧٨٨	٥٦٧٦٦	٦٩٩٣٩	٨٥٧٤٦	١٠٤٧١٦	١٢٧٤٧٩	١٥٤٧٩٥	١٠٨٩٠٤	١٣٢٥٠٥
External Resources										
Brought to shareholders	٢٩٦٥٦٦	٢٥٨٨	٠	٠	٠	٠	٠	٠	٠	٠
Total external resources	٢٩٦٥٦٦	٢٥٨٨	٠	٠	٠	٠	٠	٠	٠	٠
Internal and external resources	٢٩٦٥٦٦	٤٨٣٧٦	٥٦٧٦٦	٦٩٩٣٩	٨٥٧٤٦	١٠٤٧١٦	١٢٧٤٧٩	١٥٤٧٩٥	١٠٨٩٠٤	١٣٢٥٠٥
Uses										
Fixed investment costs	٢٩٣٧١٥	٠	٠	٠	٠	٠	٠	٠	٠	٠
Cost before operation	٢٨٥٤	٠	٠	٠	٠	٠	٠	٠	٠	٠
capital in circulation	٠	٢٥٨٨	٢٥٨٨	٢٥٨٨	٢٥٨٨	٢٥٨٨	٢٥٨٨	٢٥٨٨	٢٥٨٨	٢٥٨٨
tax	٠	٦٦٩٣	٦٦٩٣	٦٦٩٣	٦٦٩٣	٦٦٩٣	٦٦٩٣	٦٦٩٣	٦٦٩٣	٦٦٩٣
Total use	٢٩٦٥٦٩	٩٢٨١	٩٢٨١	٩٢٨١	٩٢٨١	٩٢٨١	٩٢٨١	٩٢٨١	٩٢٨١	٩٢٨١
Surplus (deficit) of resources	٠	٣٩٠٩٥	٤٧٤٨٥	٦٠٦٥٨	٧٦٤٦٥	٩٥٤٣٥	١١٨١٩٨	١٤٥٥١٤	٩٩٦٢٣	١٢٣٢٢٤
Resource surplus (Euro)	٠	١٤١١٨٢	١٧١٤٧٩	٢١٩٠٥١	٢٧٦١٣٦	٣٤٤٦٣٩	٤٢٦٨٤٣	٥٢٥٤٨٧	٣٥٩٧٦٥	٤٤٤٩٩٣

Chapter ٤:

Schedule

Table (١- :hedule

Row	Stage	Timing of construction of solar power plant					
		The first three months			The second three months		
١	Feasibility studies	■					
٢	Feasibility studies	■	■				
٣	Land preparation		■	■			
٤	Obtain network connection permission		■	■			
٥	Guaranteed purchase contract			■			
٦	Financing		■	■			
٧	Supply of equipment			■	■	■	
٨	Construction				■	■	
٩	Test and pre-launch						■

Chapter ٥:
Appendix

Appendix (Number One)

Linear parabolic power plant





Central Receiving Power Plant





Plate power plant





Solar Farm





Solar Panel



فروشـگاه آنلایـن اَوِستـا مـــارکت
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