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**DEPARTMENT OF ECONOMICS, MANAGEMENT AND HUMANITIES**

**MASTER THESIS**

# **BUSINESS PLAN FOR PHOTOVOLTAIC COMPANY TO ENTER TURKISH MARKET**

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- business plan for entering Turkish market
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## **DECLARATION**

I hereby declare that this master's thesis is the product of my own independent work and that I have clearly stated all information sources used in the thesis according to Methodological Instruction No. 1/2009 – "On maintaining ethical principles when working on a university final project, CTU in Prague".

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## **ABSTRACT**

Renewable energy sources are getting more popular, and they are getting obligatory applications for many entities, besides. Solar energy is one of the most promising renewable energy sources, for heating, cooling and producing electricity. The purpose of this thesis is to analyze current situation of photovoltaic market in Turkey which is expected to be a market with unique opportunities for solar energy firms in following decade. As case study, a business plan is prepared for a photovoltaic company to enter Turkish market and economic forecasts and evaluations are made.

## **ABSTRAKT**

Obnovitelné zdroje energie se stávají stále populárnějšími a v mnoha případech i nenahraditelnými. Solární energie je jedním z nejslibnějších obnovitelných zdrojů pro ohřev a výrobu elektřiny. Cílem této diplomové práce je analyzovat současnou situaci trhu s fotovoltaikou v Turecku, kde lze v příštím desetiletí očekávat jedinečné příležitosti pro firmy zabývajícími se solární energií. Za účelem vstupu na turecký trh jsem pro takovou firmu jako případovou studii vypracoval obchodní plán a ekonomickou prognózu a vyhodnocení.

**Keywords:** Business plan, Solar energy, Photovoltaic

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## ABBREVIATIONS

|                  | TR   | EN  |
|------------------|--|---|
| <b>AC</b>        |  | Alternating Current                               |
| <b>BO</b>        |  | Build, Operate                                    |
| <b>BOT</b>       |  | Build, Operate, Transfer                          |
| <b>CCTV</b>      |  | Closed Circuit Television                         |
| <b>CIF</b>       |  | Cost, Insurance and Freight                       |
| <b>DC</b>        |  | Direct Current                                    |
| <b>DDP</b>       |  | Delivery Duty Paid                                |
| <b>EPC</b>       |  | Engineering, Procurement, Construction            |
| <b>EPDK/EMRA</b> | Enerji Piyasası Denetleme Kurulu                   | Energy Market Regulatory Authority                |
| <b>EUR</b>       |  | Euro (Currency)                                   |
| <b>EÜAŞ</b>      | Elektrik Üretim Anonim Şirketi                     | Electricity Generation Company                    |
| <b>EXW</b>       |  | Ex-works  |
| <b>GATT</b>      |  | General Agreement on Tariffs and Trade            |
| <b>GDP</b>       |  | Gross Domestic Product                            |
| <b>kr</b>        | Kuruş  | Piastre   |
| <b>kW</b>        |  | Kilowatt  |
| <b>MPP</b>       |  | Maximum Power Point                               |
| <b>MW</b>        |  | Megawatt  |
| <b>PV</b>        |  | Photovoltaic                                      |
| <b>Si</b>        |  | Silicon   |
| <b>SWOT</b>      |  | Strengths, Weaknesses, Opportunities, Threats     |
| <b>TEAŞ</b>      | Türkiye Elektrik Anonim Şirketi                    | Turkish Electricity Company                       |
| <b>TEDAŞ</b>     | Türkiye Elektrik Dağıtım Anonim Şirketi            | Turkish Electricity Distribution Company          |
| <b>TEİAŞ</b>     | Türkiye Elektrik İletim Anonim Şirketi             | Turkish Electricity Transmission Company          |
| <b>TEK</b>       | Türkiye Elektrik Kurumu                            | Turkish Electricity Administration                |
| <b>TETAŞ</b>     | Türkiye Elektrik Ticaret ve Taahhüt Anonim Şirketi | Turkish Electricity Trade and Contracting Company |

|                |   |   |
|----------------|---|---|
| <b>TOR</b>     |   | Transfer of Operating Rights                                |
| <b>TTGV</b>    | Türkiye Teknoloji Geliştirme Vakfı              | Technology Development Foundation of Turkey                 |
| <b>TÜBİTAK</b> | Türkiye Bilimsel ve Teknolojik Araştırma Kurumu | The Scientific and Technological Research Council of Turkey |
| <b>TÜV</b>     |   | Technical Inspections Organizations                         |
| <b>USD</b>     |   | United States Dollar  |
| <b>VAT</b>     |   | Value-Added Tax   |
| <b>Wp</b>      |   | Wattpeak  |
| <b>YEGM</b>    | Yenilenebilir Enerji Genel Müdürlüğü            | General Directorate of Renewable Energy                     |

## **1. INTRODUCTION**

### **1.1. Background**

As in last ten years in Europe and United States, renewable energy trend has started to increase in Turkey recently. Although this increasing has not turned into a market boom, it is expected to be so in following two or three years, perhaps until 2023. Due to the fact that Turkish industry is not ready to manufacture components needed for solar systems, importing these items is required for a long period. Therefore foreign manufacturers, wholesalers and distributors would not miss this chance.

On the other hand, Turkey's political, economic and social situations are very unpredictable unlike its geographical location. Solar irradiation can be measured and be stable for years, however, this is not enough information to foresee possible profits and losses in the market as in other businesses and markets. Preparing a business plan can help corporations to understand and analyze market situations and their eligibility and competence to achieve set goals from a broader perspective.

Solarity is a wholesaler of photovoltaic components. Company operates mainly in Central Europe and Eastern Europe. Development and upcoming projects in Turkey in solar industry also attracted the Solarity. Therefore it is required to prepare a business plan for entering Turkish market for Solarity.

### **1.2. Purpose**

In the first part of the thesis, Turkey is analyzed from the point of view of economic, political and social situation, energy needs, market situation of electricity and solar industry and finally business environment. Besides, general information about business plan structure and its content are given.

In the second part of the thesis, which is my case study, business plan for Solarity is written. In business plan, I tried to give information about company itself, provided products, company analysis in comparison to competitors, marketing and sales

strategies, organizational structure in the company for Turkish market and finally financial predictions of activities.

### **1.3. Limitations**

Since Turkish photovoltaic market is not developed, competitor analysis do not include market shares and sales. Moreover, same problem applies to prediction of sales volumes of Solarity. In such small market, it is not reliable to determine forecasted market share.

Furthermore, Turkish solar market is growing, therefore, numbers, laws, legislation, which are mentioned in this study, may not match the current situation.

Last but not least, since the company and the project, which business plan is written for, are actual, financial data has been kept simple as requested by top management.

## **2. SOLAR ENERGY AND PHOTOVOLTAICS**

### **2.1. Solar Energy**

Finding and developing alternative energy sources has gained speed as a result of the fact that current energy sources became inadequate against increasing need of energy of humanity. Classical methods, especially using fossil sources, causes irreparable defects on the environment. This is responsibility of mankind. Therefore, seeking for renewable and sustainable energy sources, which don't damage environment, has become an inevitable ending.

In core of the sun, 650 tons hydrogen atoms turn into 646 tons helium in every second, which creates solar energy as an output. Out of atmosphere, intensity of solar energy is approximately  $1370 \text{ W/m}^2$ . The energy which arrives to earth is between  $0-1100 \text{ W/m}^2$  because of the energy kept in atmosphere and the energy reflected back from atmosphere to the space. 30% of incoming sunlight is reflected to the space and 20% of it is kept in atmosphere and clouds. The energy comes from the sun equals to twenty thousand times the energy used on the earth [1].

Solar energy can be popularized easily among the other renewable sources, due to its potential, ease of use, cleanliness. However, it has some disadvantages such as high installation costs, low efficiency and low capacity factor. If these factors are overcome, solar energy will be more attractive for people in future. For example, increasing energy prices create grid parity in few countries using solar energy which means that using solar energy for producing electricity costs same as buying electricity from distributors. Moreover, by suitable planning and projecting, initial setup costs can be reduced.

Solar energy systems are used for heating, cooling and producing electricity. Despite the fact that cooling by solar energy is expensive, it is still applicable. Moreover, thanks to solar energy, which is delivered to us mainly in two forms, heat and light, heating water by collectors and producing electricity by photovoltaics have become very popular in last decade and trends show that it will spread to the world.

Advantages of solar energy can be stated as follows:

- Solar energy comes from an unlimited source.
- It is clean. It doesn't have harmful outputs such as gas, smoke and dust.
- It is available everywhere in the world. Therefore, energy dependency on other countries will decrease sufficiently.
- Solar energy supply doesn't depend on human factor.
- Solar systems are easy to install and have very low maintenance costs.

On the other hand, there are disadvantages of solar energy:

- Energy, converted from solar energy, should be charged. However, it requires large amount of storages.
- Energy needs increase in winter, where solar energy decreases.
- When producing electricity, as temperature rises, efficiency of panels decreases.
- Systems have low efficiencies so far. Hopefully, they will increase soon.
- Despite it is available everywhere, it is not available every time we need.

## **2.2. Photovoltaics**

Photovoltaics is a compound of the Greek word for light, photos, and the name of electrical engineering pioneer, Alessandro Volta. The term for a unit of electric potential, volt, was also named after this Italian scientist. If you put both words together, you get photovoltaics, light being transformed into electricity [2].

Working principle of photovoltaics is similar to photoelectric effect. Sunlight comes to the surface. Electrons get agitated by this energy and leave their valance band to reach the energy that is required by conduction band. Thus, electrons move to the other surface. This causes a potential difference and electromotive force. Finally, electricity flows through circuit. Electricity, produced by photovoltaic module, is in DC mode. By the help of inverters, DC current is converted to AC current to feed the grid.

Electricity production is done by cells. One cell, however, can produce 0.5-0.6 V voltage. This amount of voltage is too low to be used in real appliances. To increase the voltage,

cells are connected together and compose module, modules are connected together and compose arrays. In this way, approximately 30 V voltage can be produced by a 60 cells module [3]. By all means, these values depend on different types of components used.

Besides, the most important factor for a photovoltaic system is efficiency. Average efficiency of a photovoltaic system in market is approximately 18%. This means that solar system can use 18% of the sunlight comes on its surface to produce electricity. Losses are mainly caused by used materials, connections, shadows and environmental obstacles such as temperature, dust.

Furthermore, photovoltaics have brought many advantages to humanity in terms of usage, environment and sustainability. Here are the most important ones [3]:

- Photovoltaic technology is substantial, durable and reliable, has no moving parts and requires minimum maintenance besides.
- No fuel or fuel supply chain needed.
- Photovoltaic systems are easy and quick to install, especially grid-tied systems.
- Photovoltaic system components are durable, resistant to environmental conditions such as temperature, rain, snow, wind.
- They can be in many size, from calculator to megawatts of power plants.
- For stand-alone systems, it is possible to produce electricity anywhere on the earth.
- Since there is no fuel burned, photovoltaics reduces emission and greenhouse effect. It is totally clean technology.
- Photovoltaic technology helps us to save limited sources on the earth.
- Due to the fact that photovoltaic modules contain cells, glass and aluminum, they are recyclable.
- Photovoltaics promote energy awareness. For example, grid-tied system users are more likely to use low energy consuming appliances.
- Buildings and facilities are worth more in case of owning photovoltaic systems.

- Photovoltaic is getting popular all over the world day by day, which makes it one of the most promising business areas. It already has huge amount of market shares on the world.

Research studies are being held about development of photovoltaics. Photovoltaic system's efficiency seems as the biggest concern of these studies. The best photovoltaic modules on the market have average efficiency of 18%. By increasing the level of efficiency and production amount, photovoltaic market will be unique in several years.

## **2.3. Photovoltaic Components**

### **2.3.1. Photovoltaic Cells and Modules**

As it is mentioned in previous chapter, photovoltaic cells turns sunlight into electricity. However, amount of energy produced by one cell is not sufficient for applications. Therefore, the need for connecting cells in series created photovoltaic modules. Modules are used not only for output power but also for protection of cells.

Since modules consist of cells, it is possible to produce different sizes for different power needs. For instance, in the market, there are modules with 60 cells for average power outputs and modules with 92 cells for high amount of power output.

In order to compare the performance of different panels, the nominal power output in units of Watt peak (Wp) is given. This is the power at exact given conditions; the energy density of radiation  $1000 \text{ W/m}^2$ , at  $25 \text{ }^\circ\text{C}$  and a light spectrum of radiation corresponding to a clear sky [4]. This is the peak performance in nearly ideal conditions. It is not possible to assume that a panel will have such performance throughout its normal operation.

On the other hand, the performance of a panel is largely influenced by temperature. With increasing temperature, performance decreases. Areas with lower temperature therefore seem more appropriate for installation, but these areas typically have less sunlight. The more sunlight module gets, the higher output power it provides. It may

sound strange that photovoltaic modules' efficiencies decrease when temperature increases. Hence, it is vital concern to remain modules in low temperature. Air circulation around photovoltaic modules provides lower cell temperature and higher performance.

Furthermore, due to the fact that mass production of photovoltaic modules is increasing, prices of modules are decreasing. They still require high amount of initial investment however. Photovoltaic modules have no moving parts which makes this technology have low maintenance, reparation and replacement parts costs.

In addition, photovoltaic modules have long guaranteed lifetime. In most cases, photovoltaic module manufacturers give guarantee that modules will be working at 90% efficiency at the end of first 10 years, and will be working at 80% efficiency at the end of 20 years [5].

In production of photovoltaic cells, Silicon (Si) is mainly used. Silicon is an abundant material in the earth's crust and relatively easy to obtain and refine. Silicon is the most available element on nature after oxygen [6].

However, for the production of photovoltaic cells, silicon must be very pure and this purification is the most demanding and expensive process. From extra-pure silicon bars, very fine discs are cut which are subsequently polished and then treated with acid. Another method consists in covering a glass plate with silicon atoms by means of cathode spraying (amorphous silicon). Another process takes the name of doping. This consists in the programmed addition of impurities to the silicon discs in the form of foreign atoms. A disc can already be called a photovoltaic cell following this treatment because in this state it has semiconductor properties and the principle can already work [7].

There are mainly 2 types of modules are used in photovoltaic systems, crystalline and thin-film.

### **2.3.1.1. Crystalline Modules**

Crystalline modules are preferred to be used in photovoltaic systems due to the fact that they have higher efficiency in comparison to thin-film modules. However, it is slightly expensive technology and efficiency may cause high temperature inside module which lowers the efficiency.

- **Monocrystalline modules**

Monocrystalline modules are the most efficient module type used in photovoltaic systems. For manufacturing monocrystalline cells, highly pure molten silicon is cut into thin layers which have 0.2 mm thickness [8]. They can be cut in several shapes including round, semi-round and square. Round shaped cells are cheaper than the square shaped cells due to less material wasting, they have less efficiency however.

Monocrystalline modules have efficiencies between 14%-21%. On the other hand, production cost is more than other types and more complicated. Lastly, monocrystalline modules can be recognized by their dark blue or black color [9].

- **Polycrystalline Modules**

Polycrystalline modules' production process is cheaper and simpler in comparison to monocrystalline since silicon goes through less filtration. After obtaining molten silicon, it is cut into 0.3 mm thick layers. The typical blue color of these cells is due to the application of anti-reflective layer [10].

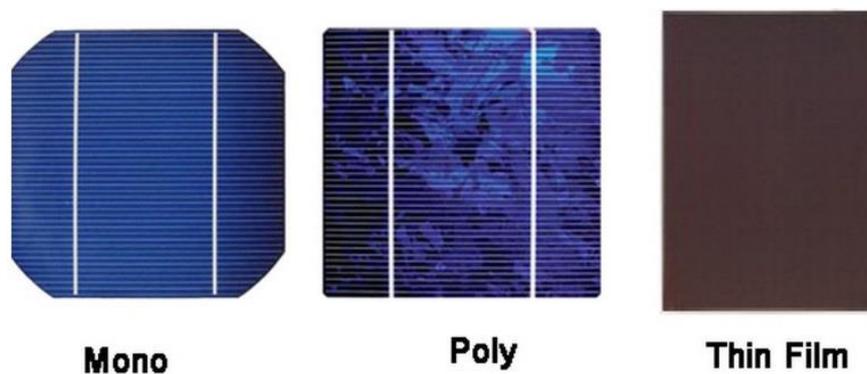
Furthermore, polycrystalline modules have efficiency between 13%-16% [11]. Mass production can be achieved for polycrystalline modules. Due to mentioned advantages, polycrystalline modules are the most preferred type in house applications and industrial photovoltaic power plants.

### **2.3.1.2. Thin-film Modules**

As an alternative to crystalline modules, thin-film modules are manufactured. In production of thin-film modules, less material and less energy is consumed. Therefore,

they are cheaper than crystalline modules. Amorphous silicon, Copper Indium diselenide and Cadmium Telluride are used in thin-film modules as semiconductor. They have thickness approximately twenty times less than crystalline cells [12].

Despite their low efficiency, thin-film modules can perform better than crystalline modules in low light conditions. In addition, thin-film modules have lower operating temperatures, so it is not needed to provide extra air circulation.



**Figure 1:** Types of cells [13]

### **2.3.2. Inverters**

Inverters are the essential parts of photovoltaic power plants. Electricity produced by a photovoltaic module is DC. Therefore, it can be used in limited applications such as battery charging, lighting. For the appliances which are built to connect to AC power or electricity supplied to the network, it is necessary to convert direct current into alternating current of the corresponding frequency which is 50 or 60 Hz in many countries. For this purpose, we use an inverter. It is important to choose the inverter with the most optimum power capacity. Using too small or too large inverters can cause unnecessary losses. Moreover, inverters can contain transformers which protects the system against electrical damages. However, usage of transformer decreases the efficiency of inverter. Today, the efficiency of inverters is between 95-98%. They have warranty period of 5, 10 or 12 years [14].

In addition, some inverters contains Maximum Power Point trackers (MPP), which provides to obtain optimum power of each module connected to system, regardless to their orientations.

Inverters can be categorized in different divisions as stated below [15]:

- Division by system type
  - On-grid inverters
  - Off-grid inverters
- Division by electrical power
  - Microinverters: Single inverters for 1-2 modules
  - String: Single inverters for a group of modules. It is the most common way.
  - Central: Single inverter for hundreds of kW to MW.
- Division by including transformer
  - TL- Without transformer
  - TR- With transformer
- Division by phase
  - Single-phase
  - Two-phase
  - Three-phase

#### **2.3.4. Charge Controllers**

Most of the 12V modules have output of 16V-20V since it is not guaranteed that modules will work in full efficiency. However, these amount of voltages can damage batteries. In off-grid systems, which will be explained later in this chapter, charge controller are used for protection from overcharging of batteries [16].

### **2.3.5. Batteries**

Batteries are also used in stand-alone (off-grid) systems to store energy produced by modules. Energy stored by batteries are then converted into AC current or amplified DC power to be consumed in system.

### **2.3.6. Mounting Systems**

For photovoltaic power plants, construction of mounting systems play essential role. The design of mounting systems can be stationary (fixed) or mobile (tracker). For each type of surface which can be flat roof, pitched roof, ground, façade, there are different structures for mounting. The location and purpose of the installation determines the chosen slope design (e.g. 30°-35°) and orientation (e.g. towards south) [3].

To maximize the amount of incident sunlight a tracker can be used. It is a movable structure, which follows the movement of the sun. Trackers may pivot relative to one or both of their axes. They adapt to the season of the year or orientation relative to the time of day. Maximum sunshine and energy reach the module when it is perpendicular to the sun's rays, thus they are mostly oriented towards the south. This type of installation is more complicated and expensive than conventional stationary design.

### **2.3.7. Accessories**

Accessories include cables, connectors, some monitoring devices and sensors. Cables and connectors provide connection between components and protection from environmental defects such as humidity, wind, rain, overheating. Monitoring devices and sensors provide wider information about power plant and devices via screen on them or via wireless communication technologies such as Wi-Fi, GPRS.

## **2.4. Types of Photovoltaic Systems**

### **2.4.1. Off-Grid**

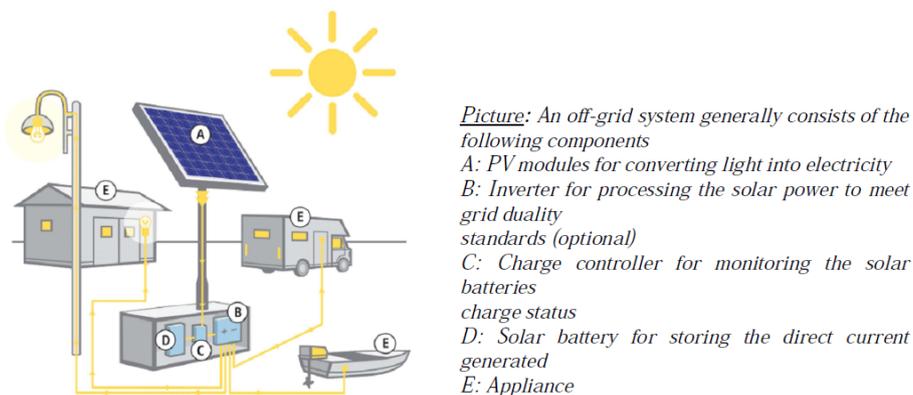
Off-Grid systems, so called stand-alone systems, are not connected to public electricity grid. They are mostly used in the areas where there is no access to grid such as rural

areas, villages, where electricity is expensive or where electricity is needed for small applications. Off-grid systems can be used in following areas [3]:

- **Homes:** Light, radio, television, computer, small refrigerators
- **Security:** Communications, lighting, alarms, CCTV
- **Office, work:** Lighting, computers, communications, ventilation
- **Water pumping:** Mainly for human consumption and livestock watering

Moreover, in off-grid systems, electricity is produced by photovoltaic modules, stored in batteries under control of charge controllers. When needed, electricity is supplied from batteries. If DC appliances are to be powered by the system, they are usually connected to the battery via appropriate-sized fusing, although some charge controllers also provide limited appliance current. If AC mains voltage appliances are to be powered, this process is done via an inverter connected directly to the batteries [17].

On the other hand, these systems should not be installed for larger systems. In that case, savings on investment ratio would be really low due to expensive technology.



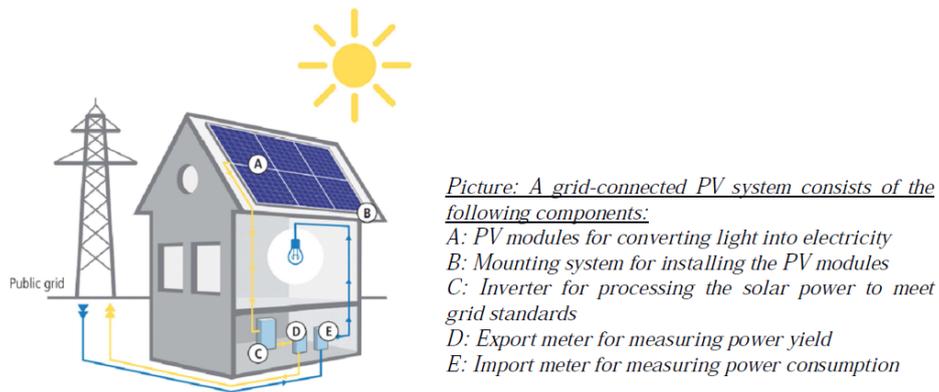
**Figure 2:** Off-grid system [18]

#### 2.4.2. On-Grid

On-grid systems, so called grid-tied systems, are connected to public electricity grid. This provides the availability of using electricity from grid when it is not possible to use from photovoltaics, for example at night or in case of malfunction. Furthermore, on-

grid systems are much larger than off-grid systems and there is more market share for on-grid systems.

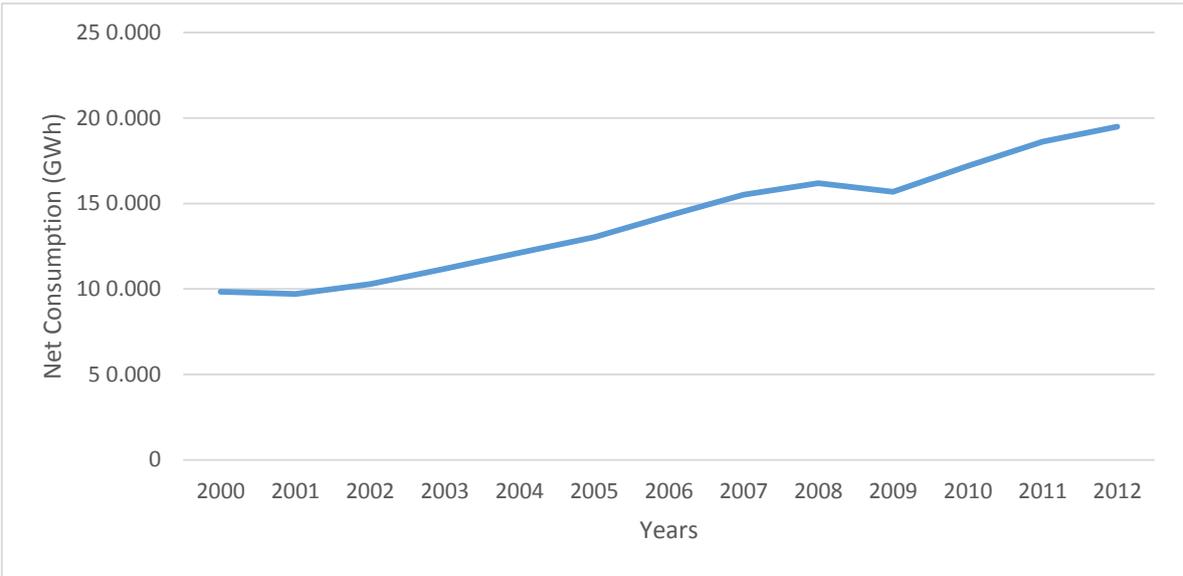
In on-grid systems, electricity is produced by modules, is sent to junction box and then is sent to inverter to be converted into AC. Converted electricity can be consumed directly by owner or can be fed to the grid. Moreover, electricity, which is fed to the grid and is taken from the grid, is counted by an import-export meter. Depending on incentive schemes, owners can get paid for the electricity fed into the grid.



**Figure 3:** On-grid system [19]

### 3. ELECTRICITY MARKET IN TURKEY

Turkey’s annual electricity consumption per capita is approximately 3,500 kWh. This value is relatively low in comparison to USA, European Union, Japan, South Korea, however, is increasing year by year due to increasing needs and GDP. Electricity market follows this trend and develops rapidly.



**Figure 4:** Electricity consumption by years [Based on data in [20]]

Turkey’s economic situation, import and export activities show that it has been a consumption economy for last decades. To change this position, with the support of the government, many sectors are in developing progress such as automotive industry, textile industry, mining industry and construction sector. Thanks to developments in these areas, the need for electricity, therefore, electricity sector is expanding.

**Table 1:** Distribution of net electricity consumption by sectors [Based on data in [21]]

| Household (%) | Commercial | Government | Industrial | Illumination | Other |
|---------------|------------|------------|------------|--------------|-------|
| 23.3          | 16.3       | 4.5        | 47.4       | 2.0          | 6.5   |

On the other hand, development in electricity industry requires large amount of investments and it is not possible to manage it only with public resources. Foreign investments play an important role at this point and for this purpose, market must be transparent, reliable and attractive for investors.

For the mentioned reasons, in last 15 years, government made essential changes in electricity market. Mentioned arrangements and implementations are done due to liberalization in Turkish economy, participation of private sector and unbundling purposes required by European Union harmonization process. The purpose was, obviously, to create competition in electricity sector.

Before 1990s, electricity generation, transmission and distribution had been monopolized by state. Between 1970 and 1994, the main electricity company was Turkish Electricity Administration (TEK) which was a state-owned vertically integrated company. In 1994, government separated Turkish Electricity Administration into two companies, Turkish Electricity Distribution Corporation (TEDAŞ) and Turkish Electricity Generation and Transmission Corporation (TEAŞ) [22].

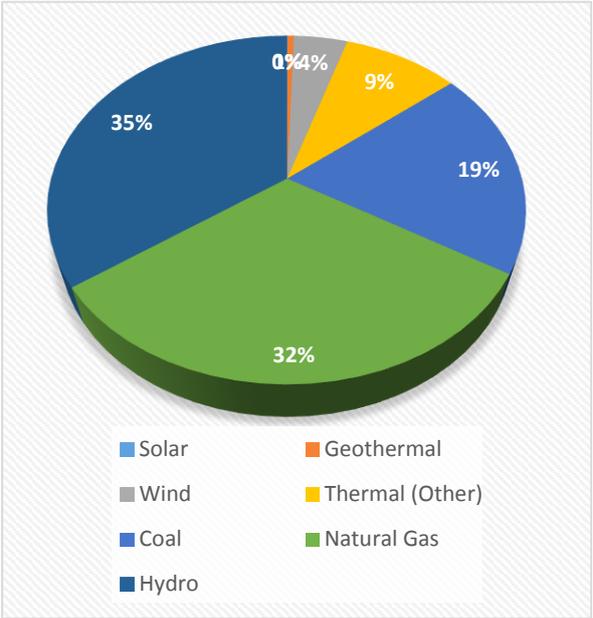
In 2001, the government enacted the Electricity Market Law to set up a comprehensive electricity reform program. Electricity Generation And Transmission Corporation was separated into three companies, Turkish Electricity Transmission Corporation (TEİAŞ), Electricity Generation Corporation (EÜAŞ), Turkish Electricity Trade and Contracting Corporation (TETAŞ). In 2004, as a result of privatization law, TEDAŞ sold electricity distribution rights to 21 private corporation [23].

Furthermore, the Electricity Market Law created the Energy Market Regulatory Authority (EMRA/EPDK) as the regulator of the electricity market. EMRA's task is to issue licenses for all market activities related to the electricity market, to determine and to approve regulated tariffs and to set the eligibility limit for market opening. In addition, it is involved in drafting legislation affecting electricity markets, resolving disputes, and applying penalties [24].

Installed capacity of electricity in Turkey by the end of 2013 is 64GW. Distribution of sources is shown below:

**Table 2:** Electricity generation and shares by energy resources [Based on data in [25]]

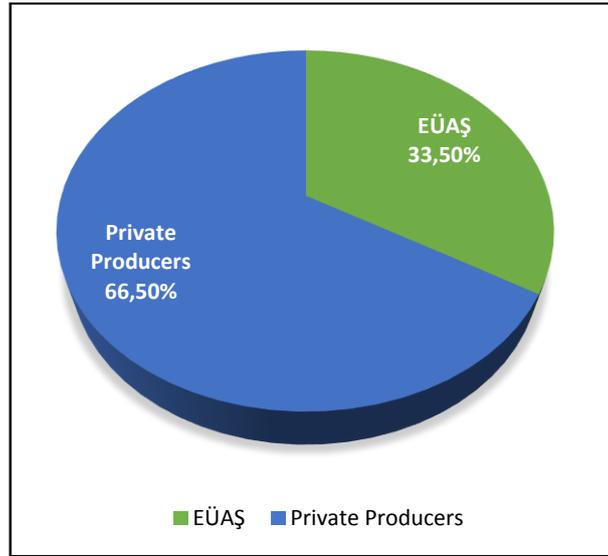
| Source          | Installed (MW) | Power |
|-----------------|----------------|-------|
| Solar           | 14             |       |
| Geothermal      | 334            |       |
| Wind            | 2759           |       |
| Thermal (Other) | 5974           |       |
| Coal            | 12427          |       |
| Natural Gas     | 20253          |       |
| Hydro           | 22289          |       |
| <i>Total</i>    | 64050          |       |



Turkey imported 8000 GWh electricity and exported 1200 GWh in 2013. Main export markets and import sources are Iran, Greece, Bulgaria, Iraq, Syria, Azerbaijan, Georgia. By considering imported electricity values, it might be said that Turkey has no import dependency for electricity. However, Turkey imports 95% of its natural gas every year and approximately 45% of imported natural gas is used for electricity generation [26]. Thus, electricity generation from renewable sources play vital role for Turkish economy.

**3.1. Generation, Transmission and Distribution**

In Turkey, electricity generation is done by the Electricity Generation Corporation and other private producers. Private producers include BOT, BO, TOR and mobile producers. Expected electricity generation by the end of 2014 is approximately 290,000 GWh [27].



**Figure 5:** Electricity Generators [Based on data in [28]]

Electricity transmission in Turkey is done by TEİAŞ. TEİAŞ took over all transmission facilities owned by the state and was named responsible for transmission system operations and maintenance, developing transmission investment plans for new facilities and also for operating the market balancing and settlement center [29].

In 2004, government enacted a privatization law and the main distribution company, TEDAŞ, segmented Turkey in 21 regions and sold distribution rights to 21 private companies.



**Figure 6:** Distribution companies [30]

### 3.2. Prices

In Turkey, electricity prices are uniform which means that price doesn't vary by different regions. There are two types of tariffs that consumers can decide between. The first one is single-time tariff. It is the tariff where only one rate is applied to the consumed power for all times of the day. The second tariff is multi-time tariff. It is the tariff where different rates are applied for the consumption at defined time zones during the day. The bills of the subscribers under this tariff are arranged by considering their consumptions at the defined time zones and the rates for these time zones. The time zones in the multi-time tariff have been specified as daytime zone between 06:00-17:00, peak zone between 17:00-22:00 and night zone between 22:00-06:00. As long as you shift your daily consumption into the time zone 22: 00-06:00 where the rates are lower, the invoices will be lower [31].

**Table 3:** Electricity prices [Based on data in [31]]

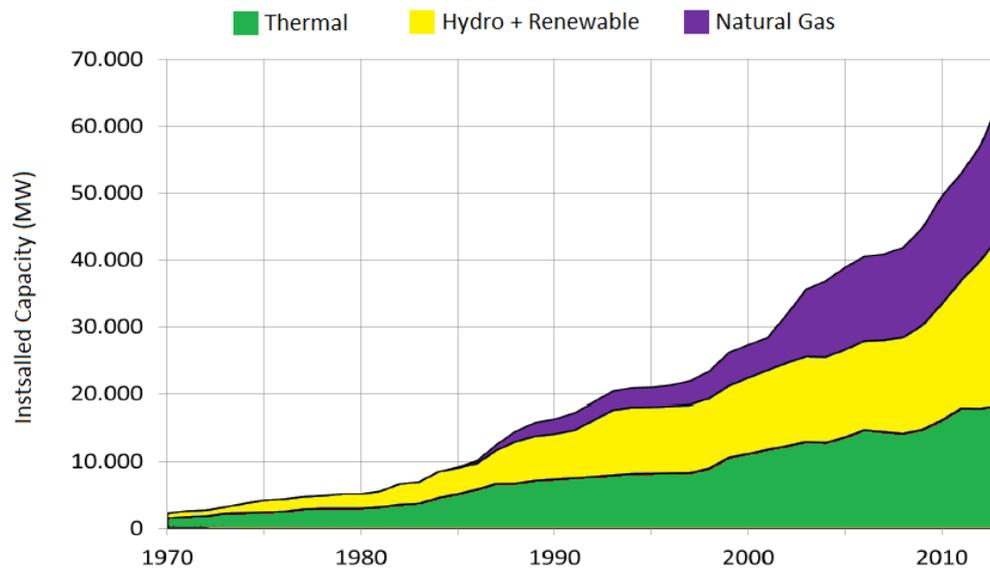
| <i>kr/kWh</i>                 | Single-time  | Multi-time   |              |              |
|-------------------------------|--------------|--------------|--------------|--------------|
|                               | -            | Daytime      | Peak         | Night        |
| <b>Industry (Low Voltage)</b> | <b>27.23</b> | <b>27.11</b> | <b>42.06</b> | <b>16.32</b> |
| <b>Commercial</b>             | <b>31.31</b> | <b>29.42</b> | <b>44.79</b> | <b>17.86</b> |
| <b>Household</b>              | <b>31.04</b> | <b>29.30</b> | <b>45.46</b> | <b>17.64</b> |

### 3.3. Expectations

Turkish government set a target year for its projects to be done. That is the year 2023 which is the 100<sup>th</sup> anniversary of foundation of Republic of Turkey. Hence, energy investments and developments are also set for the targeted year.

Approximately 500,000 GWh electricity consumption is forecasted for the year 2023 which means total capacity of power plants must be doubled. For 2023, government and Ministry of Energy and Natural Resources aim that 2 nuclear power plant will be constructed with 9 GW power and 30% of used electricity will be generated by renewable sources. Targeted values are stated below [32]:

- Hydro 42 GW (23 GW currently)
- Wind 20 GW (3 GW currently)
- Geothermal 600 MW (320 MW currently)
- PV 5 GW (50 MW currently)



**Figure 7:** Distribution of electricity sources and their evolution by years [33]

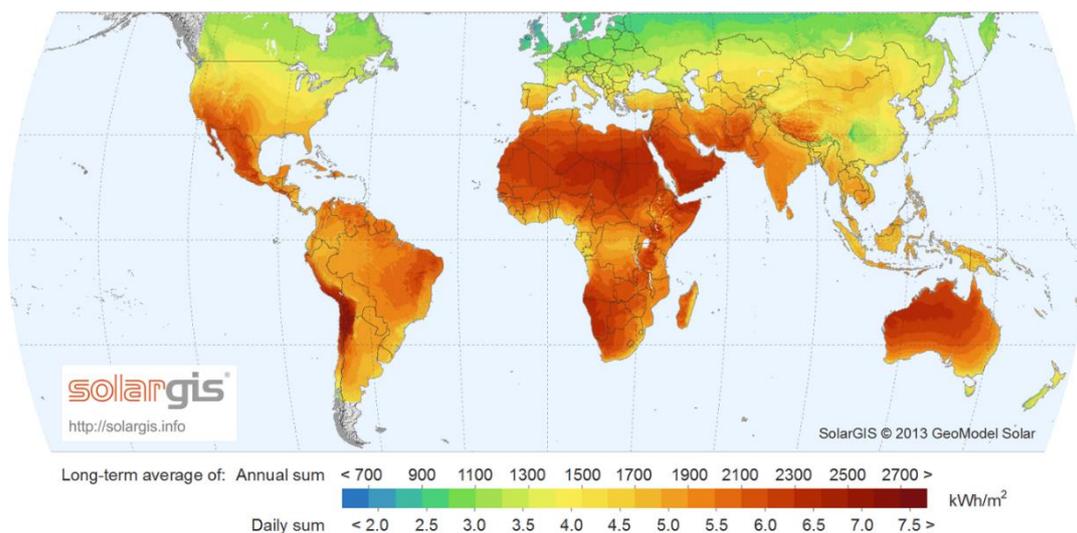
## 4. PV MARKET IN TURKEY

As it is mentioned in Turkey's electricity market chapter, Turkey's need of electricity energy is growing day by day due to developments in industry. However, as the rest of the world, Turkey is also running out of fossil sources. This forces to country to find sustainable electricity sources.

Moreover, when we consider that Turkey imports 95% of its natural gas and spend almost 45% of it for producing electricity, renewable energy sources are becoming more and more important for Turkey's energy needs.

### 4.1. PV Potential of Turkey

Turkey has a geographical location which makes it very attractive for photovoltaic industry. In developed countries such as Germany and United Kingdom, although there is much less potential for solar energy, their markets have been already penetrated. At the end of 2014, Turkey has only 50 MW of installed solar power plant. Total of 55 GWh electricity can be produced by this capacity.



**Figure 8:** Solar irradiation map [34]

According to the Renewable Energy General Directorate and the State Meteorology Affairs General Directorate, Turkey's average annual total sunshine duration is 2640 hours; a total of 7.2 hours per day, with an average total radiation intensity of 1,311 kWh/m<sup>2</sup> per year, daily total 3.6kWh/m<sup>2</sup>. Turkey has the incredible potential to produce an average of 1,100kWh per square meter, if the necessary investments are made on solar energy plants. This makes Turkey the 2nd best country in Europe after Spain in terms of solar power investment potential [35].



**Figure 9:** Solar potential of Turkey [36]

#### 4.2. Regulations and Support Schemes

Furthermore, two types of power plants can be installed in Turkey, licensed and unlicensed. If there is no grid connection, there is no limit for installed capacity and these power plants are not subject to having license. If there is grid connection, power plants which don't exceed 1 MW capacity can be installed without license.

Steps for unlicensed projects are stated below [37]:

- Users can be company or a person and should have electricity subscription.
- Application to distribution company with required documents which are about the place power plant will be installed
- Acceptance of application by distribution company
- Projection of power plant

- Approval of project by distribution company
- Construction of power plant

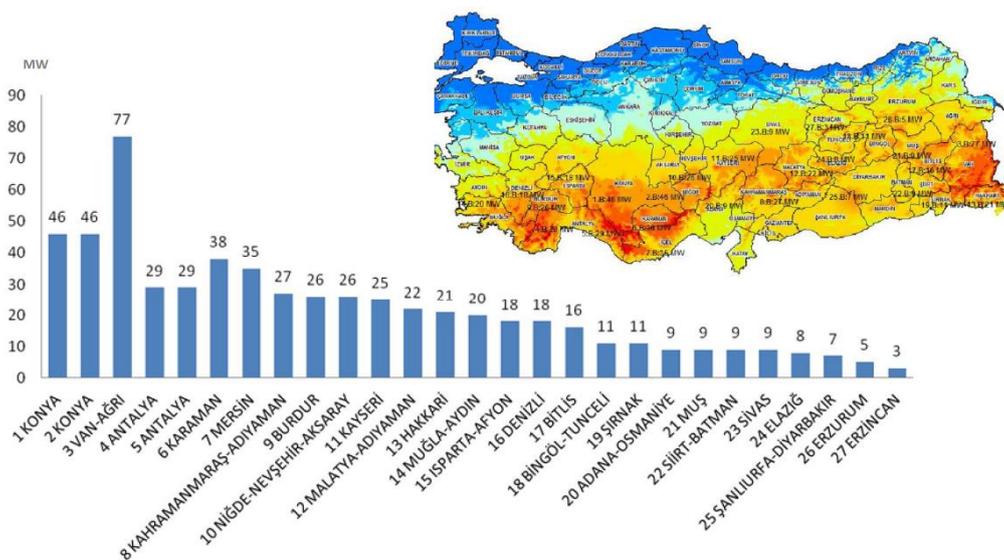
On the other hand, for power plants which are over 1 MW and are connected to grid, licensing is obligatory. Until the end of 2014, there has not been any licensed photovoltaic power plant in Turkey due to complex licensing bureaucracy. Moreover, there are restrictions for the fields which can be suitable for installing licensed power plant. Fields cannot be forest, meadow and agricultural land, archeological site or mine site. Besides, power plants cannot be installed public places where there are road or pipeline projects [38].

To license a project, following steps should be done [39]:

- Power plant must be installed by a company. Therefore establishing a company is the first step,
- Installing solar measurement stations,
- Accreditation of measurement station by General Directorate of Meteorology or any other accreditation institution,
- Sending measurement results of 1 year to General Directorate of Meteorology
- Approval of results
- Preparing required documents by EMRA
- Application for pre-license
- Preliminary survey by EMRA
- Technical survey by YEGM
- Results of technical survey are sent to EMRA by YEGM
- Competition, held by TEİAŞ, for the projects which are planned for the same plants
- Announcement of the company which bids higher price for 1 MW
- Pre-license is given to company by EMRA
- Preparing construction plan and gathering required permissions for installing power plant

- License is given to company by EMRA
- Approval of project by Ministry of Energy and Natural Resources
- Construction of power plant
- Approval of power plant by Ministry of Energy and Natural Resources

Despite the complexity of procedures, government wanted to push investors for licensed large projects. Therefore, in June 2013, EMRA started to get applications for licenses. Government has set 600 MW limit and determined 121 locations for installation until the end of 2015. However, 496 license applications were made covering 8 GW projects. For giving license, competitions and auctions will be held. EMRA also announced that the new license applications will be accepted in April 2015 for solar and wind power plants [40].



**Figure 10:** Locations for licensed power plants with total power of 600 MW [41]

To make the market more attractive, government set support schemes for photovoltaic system users. There are two support schemes currently:

#### 4.2.1. Feed-in Tariff

In January 2011, feed-in tariffs were introduced in Turkey. By this tariff, in grid connected systems (on-grid), users can get 0.133 USD per 1 kWh energy which they supply to the public grid. This incentives are provided for 10 years after power plant

begins service. In addition, government has set additional incentives to increase manufacturing and usage of local components. Thanks to these extra incentives, total amount of incentives can reach 0.2 USD per 1 kWh. Additional incentives are provided to users for 5 years of operation [42].

| Manufacturing Made in Country                                     | Additional Incentive (\$ Cent/kWh) |
|---|------------------------------------|
| PV Panel integration and production of solar structural mechanics | 0.8                                |
| PV modules  | 1.3                                |
| Cells   | 3.5                                |
| Inverter  | 0.6                                |
| Equipment focusing the sunlight on module                         | 0.5                                |

**Table 4:** Additional incentives in case of local product usage [Based on data in [42]]

**4.2.2. Net Metering**

Net metering is a billing mechanism that credits solar energy system owners for the electricity they add to the grid. For example, if a residential customer has a PV system on the home's rooftop, it may generate more electricity than the home uses during daylight hours. If the home is net-metered, the electricity meter will run backwards to provide a credit against what electricity is consumed at night or other periods where the home's electricity use exceeds the system's output. Customers are only billed for their net energy use. On average, only 20-40% of a solar energy system's output ever goes into the grid. Exported solar electricity serves nearby customers' loads [43].

## **5. BUSINESS ENVIRONMENT IN TURKEY**

Since 1980s, Turkey's growth rate has increased thanks to applied liberalization processes. After the economic crisis in 2001, Turkish economy keep growing significantly despite the global crisis occurred in 2009 while bigger economies suffered. Restructuring of the banking sector, monetary discipline based on independence of the Central Bank and a floating exchange rate regime, tight fiscal policy, public administration reform, and the EU accession process with reform packages enacted by the Parliament all contributed to the transformation of the country after the 2001 crisis [44].

In addition to economy, Turkey attracts investors by its geographical location that makes country act as bridge between Asia, Europe and Middle-East. Moreover, country is surrounded on three sides by sea. Therefore, Turkey has important commercial ports, strategic straits and unique touristic facilities.

Furthermore, due to the fact that Turkey has joined customs union with European Union and incentives are provided to foreign investors as they are provided to domestic companies, foreign investments were raised significantly. These incentives include customs and VAT exemptions on various imported or locally delivered goods, including machinery and equipment, as well as priority regions offering incentives such as free land and energy support. Investors are also able to benefit from research and development support and market research with the aim of encouraging exports and increasing the competitiveness of firms in international markets [45].

The capital domestic industries can be stated as:

- Construction
- Agriculture
- Energy
- Tourism
- Textile
- Automotive

## 5.1. Foreign Trade

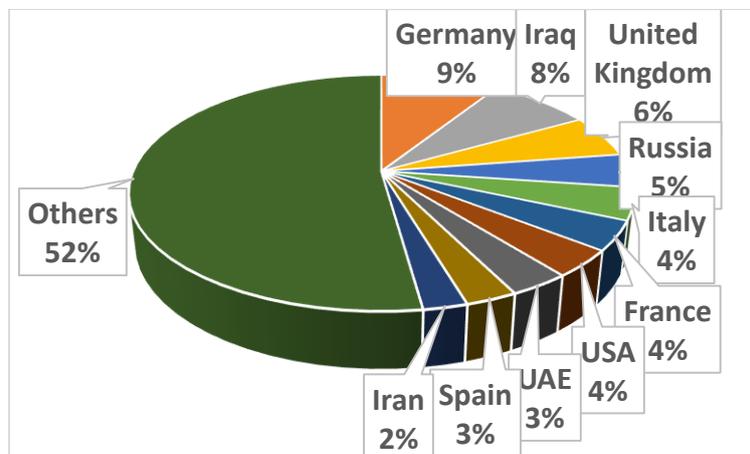
### 5.1.1. Import

Import regime of Turkey highlights the liberalization of Turkish imports in line with its commitment to complete the Customs Union with the European Union, its relationship with countries which Turkey has signed Free Trade Agreements with such as Switzerland, Lichtenstein, Norway, Israel, Iceland, Macedonia, Georgia, Bosnia-Herzegovina, Morocco, Tunisia, and its obligations under the World Trade Organization. Turkey has placed special emphasis on its commitment to reduce customs duties in order to align itself with the Common Customs Tariff. Turkey has made some necessary modifications to its import regime, and by January 1, 1996 the Customs Union with the EU became effective [46].

The basic aims of Turkey's import policy since the early 1980s can be summarized as follows [47]:

- To reduce protectionist measures in conformity with the new GATT rules
- To reduce bureaucratic procedures
- To secure a supply of raw materials and intermediary goods at suitable prices with certain quality standards

In year 2013, 152 billion \$ export and 251 billion \$ import were made. Distribution of the main import sources can be seen in figure below.

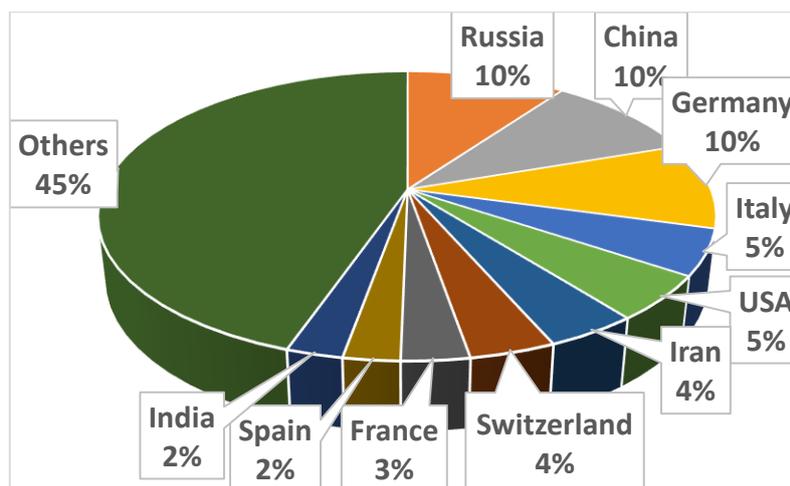


**Figure 11:** Import sources of Turkey [Based on data in [48]]

### 5.1.2. Export

In line with the policies implemented as part of the export-led development model followed since 1980, exportation has become important to Turkey in both qualitative and quantitative terms. Starting in particular in 1980 and continuing up to the mid-1990s, significant developments have been observed in the market share held by labor-intensive industrial products such as textiles and clothing, iron and steel, and foodstuffs. In 1996, following the establishment of a Customs Union with the European Union, Turkey's exports entered a new structural transformation process. Developments in recent years show that production and exportation have increased substantially in high-technology sectors, where goods include electrical and electronic machinery and equipment, as well as in the automotive industry. In this respect, it can also be observed that the export market share of manufactured industrial products has increased [49].

In year 2013, 152 billion \$ export were made. Distribution of the main export markets can be seen in figure below.



**Figure 12:** Export markets of Turkey [Based on data in [50]]

## 5.2. PEST Analysis

### 5.2.1. Brief Information

Turkey, officially called Republic of Turkey, was founded in 1923 after the 1<sup>st</sup> World War. Therefore, it is a young republic. Despite its age, Turkey, people of Turkey and its lands have unique background, culture and history. Due to the fact that it is located between Europe and Asia continents, Turkey has great geostrategic importance, mixture of cultures as well as troubles. Turkey has the geographic coordinates of 39°00'N latitude and 35°00'E longitude [51]. Hot summers and cold winters characterizes Turkey's annual weather. Furthermore, Turkey has eight neighboring country on its borders which are Bulgaria and Greece to the northwest, Georgia and Armenia to the northeast, Nakhichevan and Iran to the east and Iraq and Syria to the southwest. Country is surrounded by Black Sea, Aegean Sea and Mediterranean Sea.

In Turkey, 77,323,892 citizens live on 783,577 km<sup>2</sup> wide lands [52] [53]. Turkey is member of Council of Europe, North Atlantic Treaty Organization (NATO), Organization for Economic Co-operation and Development (OECD), Organization for Security and Co-operation in Europe (OSCE) and G-20. It is said that Turkey is taking serious steps to be regional power. Turkey became an associate member of the EEC in 1963, joined the EU Customs Union in 1995 and started full membership negotiations with the European Union in 2005 [54].



**Figure 13:** Location of Turkey [55]

### 5.2.2. Political Factors

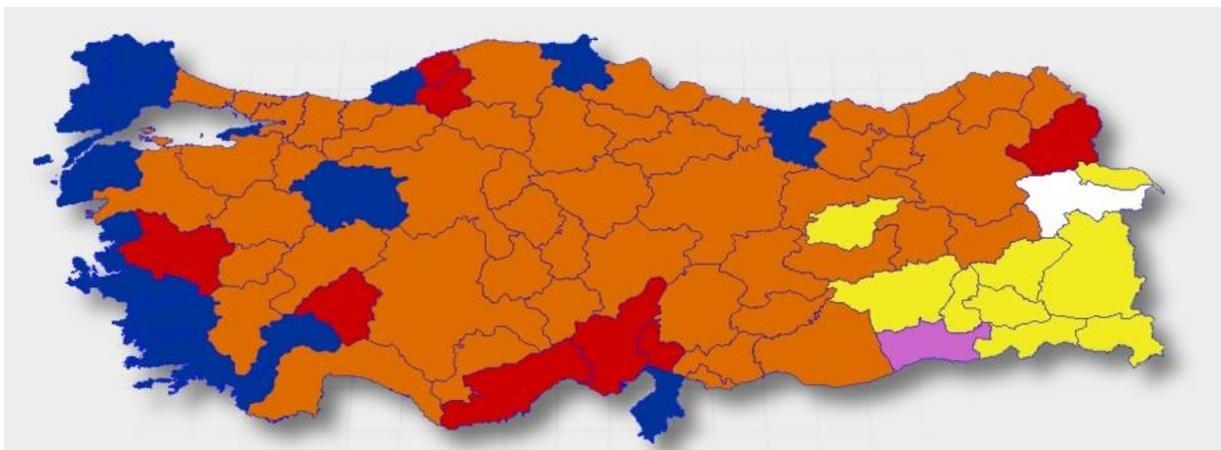
Republic of Turkey has parliamentary democracy. Furthermore, Turkey's political environment consist of four main groups:

- Social Conservatives
- Social Democrats
- Nationalists
- Kurdish Minority

Social Conservatives which are supporters of Justice and Development Party play biggest role in Turkish Economy. Prime minister and president, therefore government have huge impact on police and justice system. From the social conservatives' point of view, country has stable political situation in economy, development and human rights. On the other hand, from the other communities' point of view, situation is totally opposite.

Turkey has principal of separation of powers which stated below [93]:

- **Legislature** is exercised by the Grand National Assembly of Turkey
- **Judiciary is** exercised by independent courts and high judicial organs
- **Executive** is exercised by President and Council of Ministers



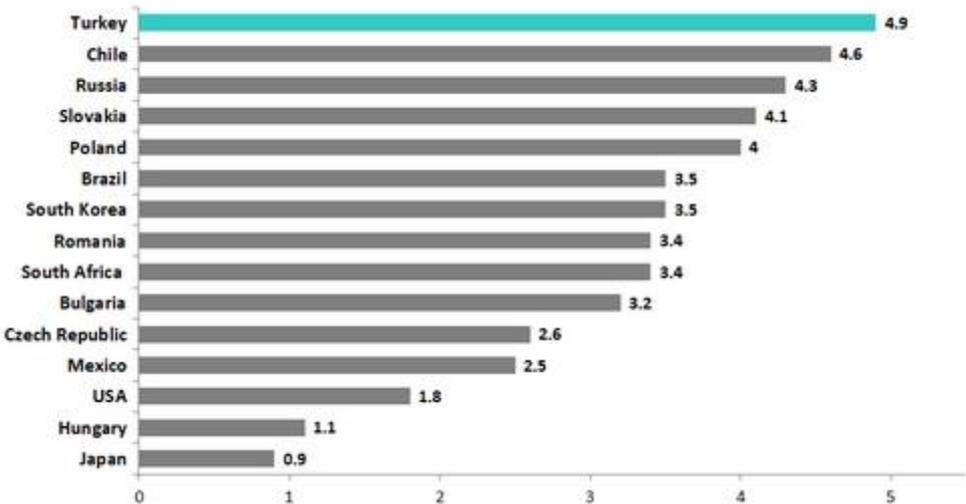
**Figure 14:** Results of 30th March 2014 Elections [56]

### 5.2.3. Economic Factors

In 2002, after severe economic crisis in 2001, Turkish government which consist of the majority by Justice and Development Party, made radical reforms such as privatizations, fiscal discipline to make Turkish economy stand on its own feet. Thanks to these reforms, Turkish economy has become one of the fastest growing economies in the world. In 2013, Turkey took 16<sup>th</sup> place in the list of largest economies in the world and 6<sup>th</sup> in comparison to the European Union countries. By the help of mentioned development, since 2003, country's credit rating by Fitch has never been decreased and was raised to BBB- which means investable [57].

Between 2002 and 2013 [58]:

- GDP increased by 180 percent, reaching 820 billion \$
- GDP per Capita reached 10,782 \$
- Annual average real GDP grew by 4.9 percent
- Export increased to 152 billion\$ from 47 billion \$
- 135 billion \$ direct investment was made by foreign investors



**Figure 15:** Average annual real GDP growth between the years 2003-2013 [59]

Some economists claim that over the next decade, Turkey's growth will match or exceed that of any country except China and India. Others predict it could become the world's 10th biggest economy by 2050 [60].

In Turkey, the inflation rate measures a broad rise or fall in prices that consumers pay for a standard basket of goods. Turkey's inflation rate was recorded 8.86% in September 2014 which increased at the rate of 1.1% since the end of 2013 [61].

Turkish government provides opportunities to foreign investors the same as those which are provided to domestic investors such as VAT exemption customs exemption for importing machinery and materials from outside of the country.

#### **5.2.4. Social Factors**

In 1927, almost 80% of Turkey's population used to live in countryside and the rest used to live in cities. Currently, the boot is on the other foot and the reason is simple, industrialization. Agriculture had 40% share of Turkish economy and today it is only 9% [62]. In addition, the migration to big cities brought many problems with it such as unplanned urbanization, infrastructure problems and unbalanced economical distribution.

Until the year of 2006, Turkey used to have young population with an increasing rate. However, as years went on, country has got an increasing old population. 65+ age group's ratio has reached to 8.2% from 6.7% in 7 years. Moreover, ratio of 0-14 age group has decreased to 23.6% from 27% [63].

Under this circumstances, government approved legislated an abortion law and started new trend to recommend married couples to make at least three children without offering any incentive.

Unemployment rate in Turkey is 9.1%. Employment rate, which stands for the number of employed citizens over the number of people who are over 15 years old, is 46.7%. Last but not least, Turkey offers an accessible, skilled and cost-effective workforce,

providing the fourth largest labor force amongst EU members and accession countries [64].

The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions. Turkey has 0.722 HDI which makes the country take the 90<sup>th</sup> place among 186 countries in the world [65]. Turkey's literacy rate is 95.78% and poverty rate is 29.4% [66]. 98% of Turkish people are Muslim and 0.4% of population is Christian [67].

### **5.2.5. Technological Factors**

Unlike European countries and USA, Ottoman Empire could not manage to get advantage of industrial revolution. During Turkish War of Independence, country lost great number of young population. Under the light of these facts, in technological and research and development area, Turkey has not been able to catch developed countries. To overcome this obstacle and encourage organizations to invest research and development studies, Turkish government has set laws for incentives to investors in three different categories [68]:

- Research and Development Law
- Support for technology development zones
- TUBITAK (Scientific and Technological Research Council of Turkey) and TTGV (Turkish Technology Development Foundation) both compensate or grant R&D related expenses and capital loans for R&D projects

## 6. BUSINESS PLAN

Starting a new business, entering a new market, financing a new investment are encouraging and exciting statements for an entrepreneur. It is thought that these statements are beginning of a new road. One should not forget that before setting of a long trip, plans should be done for various roads, obstacles and possible junctions. Business plan helps you to forecast possible situations and defines your goals.

First of all, business plan is an introductory document for organizations and individuals to see the situation in the market to which company will enter or will install business and to analyze financial, organizational and strategic situation in the first three to five years in the market.

Business plan cannot be done only for starting business or entering a new market. Due to the fact that consumer behaviors, needs and tendencies change unceasingly, market conditions are changing day by day. Therefore, business plan must be reviewed and be revised in specific intervals. Thus, it makes business plan a dynamic document instead of a static document.

On the other hand, preparing business plan is a time-consuming activity, especially for entrepreneurs who think it is easier to go to market and try to sell because time equals money. Companies must realize that there are cost effective methods of research, especially with the use of the Internet. In addition, they have a plethora of research data in their internal databases and through their distribution network. Professor Andrew Burke, the founding director of the Bettany Centre for Entrepreneurial Performance and Economics at Cranfield School of Management, has done a study about it and he says that [69]:

*"Certainly business planning doesn't come free – it is a time consuming exercise and any business has to weigh up the value that is generated from spending time writing a business plan versus simply going out there and trying to sell. This can be particularly beneficial when a venture is launching a product or service in a very uncertain market, where even after carrying out plenty of analysis, uncertainty still remains.*

*However, what we found was that business plans do indeed add a lot of value to the businesses that choose to write them, including high quality ventures, and these effects are quite dramatic. Growth in the venture is increased by a factor of around 30% as a result of writing business plans. This benefit cannot be ignored. But particularly it is the quality of the business planning process which counts, and this article will look at what singles out a successful business plan."*

As it is mentioned before, business plan shouldn't be a static document. It means that business plan should be used as a managerial tool and guideline. If business plan is not followed, reviewed and revised, your company will be more likely to miss chances in the market.

Finally, business plan has to define the organization, its product or services. In addition, it has to contain a marketing part which describes current market situations, competitors, strong and weak sides of your company, possible opportunities and threats and strategies to penetrate the market. These points show the fact that business plan is an internal and external information source for either managers or investors and funders.

### **6.1. Internal Usage**

Business plan demonstrates a company's current situation, future goals and objectives. If business plan is prepared for specific intervals, it becomes a measuring item for company. Managers or executives can review the last or older business plan and obtain the information about efficiency of previous activities and strategies. Therefore, they can keep the same strategies or seek for new ones for future.

### **6.2. External Usage**

If you are seeking an investor for your business, especially for a business that does not exist yet, to convince them and demonstrate them how your business will grow and make sufficient return, besides how big potential your product has to achieve these goal in a realistic way, business plan is the one and only document you need.

Bankers have traditionally focused on when and how the principal and interest will be repaid and the availability of collateral to cover any loan losses. As such, loan application packages tended to consist of little more than past and current financial statements. However, bankers are putting more emphasis on how a company would survive possible setbacks. As such many bankers are requiring business plans be included in a loan applicable package. Also, a high quality business plan can help a company stand out favorably in today's intense competition for loan funds [70].

Last but not least, before acquisition of small companies, it is important to assess and evaluate their current state and their possible growth in future. As such, in doing joint business with an unknown company, same story applies. A clear business plan might remove barriers and uncertainties between partners.

### **6.3. Structure of Business Plan**

- Executive Summary
- Company Information
- Product/Service Information
- Market Analysis
- Marketing and Sales Strategies
- Organization & Management
- Financial Projections
- Appendix

### 6.3.1. Executive Summary

Executive summary is introductory part of a business plan. The executive summary is often considered the most important section of a business plan. This section briefly tells your reader where your company is, where you want to take it, and why your business idea will be successful [71]. Although it is the first part of business plan, executive summary must be written in the end. It is the summary that comes first to someone who checks your plan. It gives a general idea about your goals and strategies to reader.

If you are an established business, be sure to include the following information [72]:

- **The Mission Statement:** You must state your business and what you do in executive summary. It should be between several sentences and a paragraph.
- **Company Information:** Executive summary should contain formal information such as founders, the number of employees, location of your company.
- **Growth Highlights:** Include examples of company growth, such as financial or market highlights.
- **Your Products/Services:** Briefly describe the products or services you provide.
- **Financial Information:** If you are seeking financing, include any information about your current bank and investors.
- **Summarize future plans:** Explain where you would like to take your business.

The executive summary should be kept compendious and simple since not everyone reading your executive summary would be interested in spending time on reading clump of pages. Therefore every word you use should be sufficient and understandable.

Venture capital and private equity investors, bankers, and corporate investment officials typically receive many business plans each week, more than could possibly be read from beginning to end. To help determine if the plans are worthy of further review, financiers invariably begin by reading the Executive Summary. If the Executive Summary suggests a promising business for investment or loan funds, then the experts will read further. If not, then they quickly reject the plan. Essential information that is buried in

a later section has no value if the reader never gets that far. The primary objective of the Executive Summary is to entice investors to delve further [73].

Last but not least, if you don't want to share your strategic steps and plans with someone you don't know and someone who is not certainly invest your business, executive summary can be used as draft for them. Therefore, you could protect critical information about your business and company from the others.

### **6.3.2. Company Information**

In this section, company profile should be expressed such as operating area, location, legal structure and ownership, number of employees, the year of foundation, partners, facilities and existing markets in which company operates. Company's missions, goals, previous achievements, place in the market and among competitors are also included in company information part.

Moreover, products or services can be included in this part briefly that can answer "How would your product/service make difference?" question. In product/service information section, there are more detailed analysis for product/service.

### **6.3.3. Product/Service Information**

In product/service information section, benefits over your competitors and needs that are fulfilled by your product/service should be mentioned. Besides, details about product/service must be included. For example, production quality, life cycle and life time of the product, research and development stages. Moreover, current patents and quality marks that company has can be included in this part.

In addition, sketches and specifications of your product, performance analysis and their graphs may be shown to reader. Important point is to keep these information simple about product. In case of stating deep detail of your product, it may not be understood.

On the other hand, if your company is manufacturer, costs of the processes mentioned above, should be included to give a wider idea to investors. It is important to show balance among costs, quality and timing.

#### **6.3.4. Market Analysis**

Market analysis section describes the industry, target market and company's position in the market. It includes the information about your potential market. In this part, firstly, trends in market, needs of your product/service and risks of your business should be described.

Secondly, as an essential step, you should have a good idea of how many potential customers there are. Aside from just counting the customers, you also want to know what they need, what they want, and what makes them buy. The more you know about them, the better. For individuals as customers, you probably want to know their average age, income levels, family size, media preferences, buying patterns, and as much else as you can find out that relates to your business [74]. You should state and analyze your target market in terms of demography, consumer behavior, location, tradition, needs. Not only the current needs, but also the possible future needs should be taken into consideration to establish better marketing strategies. In addition, size of the market and the market share that your company will possibly get are vital points for market analysis. When doing such analysis, using global numbers wouldn't be sufficient. Market analysis must be built on real and suitable data. Also, limiting target market is important to reach and manage.

Moreover, in market analysis part, competition in the market and the main competitors should be described. Competitors' power, locations, potentials, market shares, current financial situations, possible strategies are included in this section.

In addition to market and competitor analysis, company's own analysis should be stated. One of the best way to do it is SWOT analysis where SWOT is acronym for strengths, weaknesses, opportunities and threats. Strengths and weaknesses are called

internal factors, opportunities and threats are called external factors. Examples for SWOT analysis can be given as below:

- **Strengths:** Experienced and talented employees, possessions, loyal customers, developed customer relationship management
- **Weaknesses:** Lack of recognition, powerful competitors, high operating costs
- **Opportunities:** Changing trends, changing regulations
- **Threats:** Possible new competitors in market

Last but not least, not only from the customer or competitors' point of view, but also regulations and laws which may affect your business and industry should be analyzed.

### **6.3.5. Marketing & Sales Strategies**

Marketing and sales are different but related activities. Marketing is analyzing trends, behaviors and then attracting and gaining customers by assuring them for fulfilling their needs. After marketing studies, sales activities must be done to have tangible results. It is the sum of activities to sell your product to attracted customers [75].

Marketing strategies are determined after marketing analysis and choosing your target market. This is the step that you must convince your potential customers to buy your product/service. In this step, questions in customers' head should be answered. Advantages of your product/service, better specifications in comparison to your competitor's product/service can be examples of the questions that should be answered. This method is called product positioning.

Moreover, you should set a price for your product/service. Price generates income for your company when production, placing and promotion are the variable costs. Such decision is made depending on your purpose when starting a business or entering a new market. There are several strategies of pricing [76]:

- **Penetration pricing:** Price is set low to penetrate the market by increasing sales. After having projected market share, price may go up to have more revenue.

- **Skimming pricing:** Price is set high and as time goes on it is getting lower to have wide market.
- **Competition pricing:** Price is set depending on competitors' prices. It can be lower, the same or higher.
- **Product line pricing:** Price is set differently for each product in product line. Differences are the results of different specifications of each product.
- **Bundle pricing:** Price is set for bundle of products such as buy one and get one more for free.
- **Psychological Pricing:** Price is set by considering customers' psychology. Setting price to 99 EUR instead of 100 EUR will make customer satisfied due to buying product/service under 100 EUR.
- **Premium Pricing:** Price is set very high to state that product/service is unique or exclusive.
- **Optional Pricing:** Price is set lower for base product. In addition to basic price, optional specifications or accessories are sold with extra price.
- **Cost Based Pricing:** Price is set depending on fixed and variable costs. In this model, there is additional price to have profit. It is flexible and easy to calculate and to adjust price. On the other hand, customers don't care about costs. Therefore, changes in price may dissatisfy customers.
- **Cost Plus Pricing:** Price is set after calculating cost and adding constant amount of profit margin in percentage.

In addition, promotion is a vital step for marketing strategy. It is the step which you decide how to increase your product/service recognition, how to reach your future customers. There are some methods for promotion stage [77]:

- **Advertising:** Non-personal, mostly paid promotions often using mass media to deliver the message. The types of advertising include; TV, newspaper, magazine, Internet and outdoor advertising. Advertising may not attract the

customers due to the fact that there are lots of advertisements on market. Therefore, it is an expensive way.

- **Public Relations:** Involves developing positive relationships with the organization media public. The art of good public relations is not only to obtain favorable publicity within the media, but it is also involves being able to handle successfully negative attention.
- **Sales Promotion:** Using coupons and buying product/service by special offers and discounts increase sales for short term. In this case, customer may skip other brands and buy your product/service. On the other hand, customer will be expecting discounted price which is not possible.
- **Personal Selling:** In this method, product/service is sold by a company representative to a customer by face to face meeting, phone call or video call.
- **Direct Mail:** It is the easiest and cheapest way to reach the customer. However it is not the most effective way. Because of tens of e-mails we get every day from different users, it is disturbing to check all e-mails.
- **Internet Marketing:** Promotions can be made over websites, banners and random advertisements on applications for electronic devices. It is also an easy way to reach large number of users. However, as fake e-mails, fake banners and ads are also ignored by users day by day.
- **Sponsorships:** It means that company pays to an organization to advertise its brand on specific events. Sponsorship is the most expensive, at the same time is the most effective way to attract customers.

Furthermore, you should describe your sales strategy. Sales strategies deal with how and when to close sales prospects, how to compensate sales people, how to optimize order processing and database management, how to maneuver price, delivery, and conditions. To help differentiate between marketing strategy and sales strategy, think of marketing as the broader effort of generating sales leads on a large scale, and sales as the efforts to bring those sales leads into the system as individual sales transactions.

Marketing might affect image and awareness and propensity to buy, while sales should close the deals and get the order that marketing opens [78].

### **6.3.6. Organization & Management**

Despite the fact that business requires money, equipment or any other possession, the most important factor is obviously human. In business plan, you should describe who will work together to accomplish determined goals.

In this section, information about number of people working in company, managers and founders, organizational structure and responsibilities are given [78]. These information can be described in a chart or in a text.

Moreover, especially for the new companies, gaps in organization should be mentioned in this part. Solution for filling the gaps will answer the questions in reader's head.

### **6.3.7. Financial Projections**

Business plan is a combination of numbers and words. Words and their expression are important for reader of business plan. However, reader cares mostly about numbers, which shows whether your plan and your company is eligible to reach mentioned projections. Therefore, financial projections must be prepared by real and consistent data and prepared in accordance with company's strategies, market situation and historical data. Moreover, it should be understandable by reader. Because, they are the one who will invest to your business.

Financial statements are the main parts of financial projections part. Following statements and analysis can be included in financial projections [78]:

- Projected Profit & Loss
- Projected Cash Flow
- Projected Balance Sheet
- Business Ratios

Financial projections can be prepared for different time intervals. In most of businesses, projections are made for 3 or 5 years. For the first year, projections are made in more detail by making calculation for each month or each quarter of year.

## **7. BUSINESS PLAN OF SOLARITY**

### **7.1. Executive Summary**

Solarity is a limited liability company which is based in Prague, founded in 2011. Company has been operating in photovoltaic sector as a wholesaler and distributor of all photovoltaic system components including modules, inverters, mounting systems, cables, connectors and accessories. After successfully operating in Central and Eastern European market, Solarity has decided to explore and benefit new solar markets with high potential such as Turkish solar market.

Turkey is one of the most attractive countries in Europe for solar energy considering sunshine duration and received energy per day in a year. Not only the solar potential but also the dependence on foreign energy sources gets Turkey to invest on renewable energy utilization. However, total installed power of photovoltaic systems remained 50 MW until the end of 2014. Government tries to take steps for making investments attractive such as feed-in tariff, easing the application procedures. Therefore, it is targeted to reach 5 GW of total photovoltaic power in 2023 which means 600 MW of installation per year for 9 years.

Solarity has focused on small size of systems while operating in Europe due to legislations in those countries and will keep focusing in Turkey. However, in Turkey, most of the planned projects are going to be 1 MW. Therefore, Solarity is going to experience this new segment by the help of its wide range of business partnerships with suppliers. Company's suppliers include world leading component manufacturers with exclusive products as well as economic products.

For better understanding of the market, a Turkish speaker with degree of electrics and electronics engineering will be employed. In the first six or seven months, market will be analyzed, leads will be created and will be contacted. Entry mode is chosen as export. Contact will be made over phone, e-mail and attending events such as solar exhibitions. Therefore recognition of Solarity and its wide range of products will spread. Flexibility will be the key word for Solarity and customers. After eight months, sales are

forecasted to be increased due to realization of projects after application procedures. For the first year, 1 MW module and 1 MW inverter, total 2 MW component sales are predicted. Moreover, for the second and third year 5.5 MW and 9 MW sales are predicted respectively.

## 7.2. Company Information

Solarity is a distributor and wholesaler of photovoltaic system components. Company has been founded as Limited Liability Company in Prague, Czech Republic in 2011. Solarity is managed by photovoltaic professionals with international experience [91]. It offers a complete assortment of both on grid and off grid solutions, including modules, inverters, mounting systems and accessories.

Company has large business area including mainly Central and Eastern Europe countries such as:

- Croatia
- Hungary
- Poland
- Romania
- Bulgaria
- Baltic states

Furthermore, Solarity has headquarter, one main and a few small warehouses in Prague. Business partners of company are small-medium-sized photovoltaic system installers, EPC contractors, resellers, wholesalers, distributors and manufacturers in worldwide photovoltaic market. Solarity's customers are mainly photovoltaic installation companies and system integrators that physically implement complete installations for end users, roof owners and investors.

It is also possible to provide required trainings by Solarity, either in headquarters of manufacturers or directly in country requested. Moreover, not only trainings but also deliveries are arranged by company itself to anywhere in the world by means of giant logistic providers.

Besides, some items are available on request by customers such as warranty extensions, special mounting solutions, transformer stations, Special Island and backup systems.

## **Vision & Mission**

This part of business plan is taken from company's official website and referenced as number [79].

### **Vision**

We want to help PV sources with their expansion, which would utilize the maximum potential of renewable solar energy. We support modern and smart energetics of 21st century independence from traditional sources and systems of electricity distribution. The common goal is to reach grid parity in photovoltaics. Thanks to technological progress and the continuous decrease in the price of PV components, we are making this happen.

### **Mission**

- To provide professional and high quality services
- To use the best products of high technological standard providing secure and profitable investments for our clients
- To offer a flexible approach and individual customer care
- Long-term cooperation with world PV leaders

### **7.3. Product Information**

Solarity's product portfolio consists of whole assortment of photovoltaic system equipment. Products are provided by leader photovoltaic component manufacturers. To be able to serve as supplier to wide range of photovoltaic projects, from the most cost efficient to high end products are involved to product portfolio.

Company's product range can be stated as below:

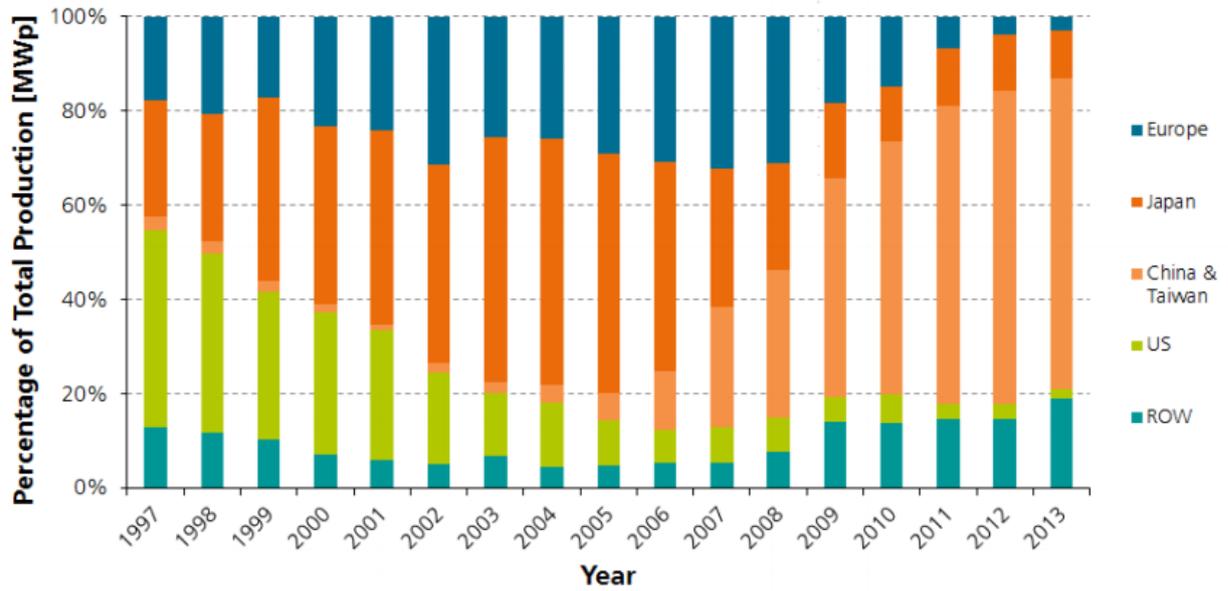
- On-grid and off-grid modules
- On-grid and off-grid inverters
- Charge controllers
- Batteries
- Accessories (connectors, cables, monitoring devices)
- Mounting systems

The exceptions of production list are switch gears for small installations, due to requiring meeting national standards and regulations, small wiring products such as small cables, circuit breakers and terminals which can be bought in a common electrical supply store, electricity energy meters which are usually provided by the local distribution system.

#### **7.3.1. On-grid and Off-grid Modules**

Due to the fact that on-grid usage of photovoltaic systems are more popular than off-grid usage, company's portfolio can offer many types and brands of on-grid modules and only few types and brands of off-grid modules. These modules are provided by world-leading module manufacturers.

Photovoltaic industry is dominated by Chinese manufacturers. Seven of top ten manufacturers are Chinese. Three of them (Kyocera, Sharp, First Solar) are Japanese and one of them (SunPower) is American. Solarity offers top brands with high quality as well as economical options with lower quality [81].



**Figure 16:** Module manufacturing distribution on countries [80]

Offered brands are:

- Renesola
- ET Solar
- Yingli
- Eging PV
- Trina Solar
- Canadian Solar
- Waris
- SunPower
- BenQ
- Kyocera
- Sharp

**Table 5:** Top 10 photovoltaic module suppliers in 2014 [81]

| 2014 Rank | Module Manufacturer | Change From 2013 |
|-----------|---------------------|------------------|
| 1         | Trina Solar         | ↑ 1              |
| 2         | Yingli              | ↓ 1              |
| 3         | Canadian Solar      | 0                |
| 4         | Jinko Solar         | ↑ 1              |
| 5         | JA Solar            | ↑ 4              |
| 6         | Sharp Solar         | ↓ 2              |
| 7         | ReneSola            | ↓ 1              |
| 8         | First Solar         | ↓ 1              |
| 9         | Hanwha SolarOne     | ↓ 1              |
| 10        | SunPower            | ↑ 1              |
| 10        | Kyocera             | 0                |

Bloomberg New Energy Finance has developed a tiering system for PV module makers based on bankability, to create a transparent differentiation between the hundreds of manufacturers of solar modules on the market. This basic categorization has been used as an advertisement by certain manufacturers, but should never replace a proper due diligence process in product selection [82]. General specifications of tiers can be expressed as below [83]:

**Tier 1**

- Top 2% of solar manufacturers
- Vertically integrated
- Invest heavily in R&D
- Advanced robotic processes
- Producing modules for longer than 5 years

**Tier 2**

- Small to medium scale manufacturers
- No or little investment in R&D

- Uses only partial robotic processes, reliant on manual work from human production lines
- Usually manufacturing modules for 2-5 years

### **Tier 3**

- Assemblers (90% of manufacturers)
- No investment in R&D
- Only modules assemblers, doesn't manufacture cells
- Uses human production lines instead of robotic processes
- Assembling modules for 1-2 years

All brands of modules have CE marking. Moreover, all modules passed TÜV Rheinland IEC61215, IEC61730 quality tests. For the re-cycling purposes, manufacturers of modules are member of PV Cycle system [91].

Solarity offers monocrystalline, polycrystalline and thin-film modules. For crystalline modules, output powers are usually 250W, 255W, 260W, 270W, 280W, 335W and 345W. For thin film modules, output powers are usually 105W, 135W, 145W, 170W. If requested, modules with different output power can be provided as well. As it is mentioned in previous chapters, poly crystalline modules are the most used types. The reason is that they are cheaper than monocrystalline and more efficient than thin-film modules.

Provided modules have high efficiencies. The average efficiency is approximately 18% for monocrystalline modules, 14% for polycrystalline modules and 9% for thin-film modules. Modules also have long warranty periods. Warranty periods for the most of the modules are working at 90% efficiency at the end of first 10 years, and will be working at 80% efficiency at the end of 20 years.

### **7.3.2. On-grid and Off-grid Inverters**

Solarity provides inverters from world-leading manufacturers. One-phase, two-phase, three-phase inverters, inverters with transformer for protection and without

transformer are included in portfolio. Moreover, for all sizes of projects, micro inverters for systems with power up to 1 kilowatt, string inverters for systems with power of tens of kilowatts to megawatts and central inverters for systems with power of tens of megawatts to hundreds of megawatts are supplied. They work with efficiency of approximately 98%. Warranty periods are 5-10 years and extended warranty periods are available.

Offered brands are:

- SMA
- Fronius
- Kaco
- ABB
- Kostal
- Solar Edge
- Victron
- Steca

### **7.3.3. Charge Controllers**

Company provides charge controller from a world-leading manufacturer. For off-grid systems, charge controller ensures short circuit protection, open circuit protection, reverse current protection and overload protection with integrated controllers, regulators and indicators. Charge controllers are suitable with all types of off-grid modules and inverters.

Offered brand is Steca.

### **7.3.4. Batteries**

Company provides batteries with high stability, reliability, durability and environment compatibility and various size of capacity.

Offered brands are:

- Narada
- Hoopecke

### **7.3.5. Accessories**

Accessories such as monitoring devices, alarm systems, sensors, GPRS and Wi-Fi for remote access to power plant and cables and connectors for higher reliability and durability of system are involved to company's product portfolio.

Offered brands are:

- Solar-Log
- Draka
- Huber+Suhner
- Multi-Contact

### **7.3.6. Mounting systems**

Company provides mounting systems from K2 Systems. Mounting systems are manufactured for power plants on ground, flat roof and pitched roof.

Offered brand is K2.

### **7.3.7. Logistics**

For delivery of the components, Solarity determined its delivery methods on incoterms. There are three main incoterms that will be used mostly [84]:

- **EXW (Ex-works):** The seller fulfills his obligations by having the goods available for the buyer to pick up at his premises or another named place (i.e. Factory, warehouse, etc.). Buyer bears all risk and costs starting when he picks up the products at the seller's location until the products are delivered to his location. Seller has no obligation to load the goods or clear them for export.
- **DDP (Delivery Duty Paid):** Seller bears all risks and costs associated with delivering the goods to the named place of destination ready for unloading and cleared for import.

- **CIF (Cost, Insurance and Freight):** Seller clears the goods for export and delivers them when they are onboard the vessel at the port of shipment. Seller bears the cost of freight and insurance to the named port of destination. Seller's insurance requirement is only for minimum cover. Buyer is responsible for all costs associated with unloading the goods at the named port of destination and clearing goods for import. Risk passes from seller to buyer once the goods are onboard the vessel at the port of shipment.

Since European Union countries applies anti-dumping to Chinese products, it is not possible to keep Chinese photovoltaic modules in warehouses. Therefore, in case of Chinese module order from customer in Turkey, products will be delivered to a port by means of CIF by vessel either from China port or from European port in containers. If customer requires European modules, it is possible to send it by trucks on euro pallets by means of DDP.

Due to the fact that inverters are manufactured in Europe, there is no restriction for warehousing and inverters can be delivered to customer by trucks on euro pallets by means of DDP. This rule applies to mounting systems, cables, connectors and all accessories. It is also possible for customers to arrange delivery by themselves. In that case, delivery will be done by means of EXW.

Solarity works with world leading logistic companies to keep business safe and sound. Besides, Solarity will work with local logistics companies to deliver components all around Turkey for attractive prices. Some of these Turkish companies have warehouses and offices in Germany from where Solarity provides most of the inverters. There are some of the logistics companies below which Solarity works with:

- Dachser
- DHL
- DSV
- DB Schenker
- Selectra

- Gökboru
- Orkun Nakliyat

#### **7.4. Market Analysis**

As it is mentioned before in this study, Turkey's electrical energy need is increasing day by day due to increasing population, civilization and developing industry. Satisfying this need requires not only traditional sources but also renewable sources. By considering that Turkey's energy needs are mostly satisfied by exported sources from other countries, increasing share of renewable energy among all sources has been must for Turkey.

Turkey gets the most solar irradiation in June, July and August with almost 11 hours of sunshine duration per day. The least solar irradiation is in December and January, where sunshine duration is less than 4 hours [85]. Furthermore, the most attractive regions are southwest, south, south east and east, which is 65% of country. Southwest and south of Turkey is an important tourism centers, not only in Turkey, but also in the world.

Besides, east of Turkey is less developed in comparison to the west part of country. Governments have been working on this problem for decades and have been trying to develop industry in the east. Many industrial areas have been built recent years and civilization is increasing.

These two factors also shows that, energy needs in these regions are very high. Government, private sector and foreign investors wouldn't miss this opportunity. Therefore, for last 3 years have been important step for photovoltaic industry in Turkey.

However, photovoltaic industry couldn't take huge steps as wind energy and hydro energy industry in Turkey in recent years. Although country has great potential which is the 2nd best in Europe after Spain including 2640 hours sunshine duration, until the end of 2014, installed capacity of solar power plants remained 50 MW [35]. To boost solar energy utilization, government set target values for installed capacity. Therefore it is being planned to reach total power of 5 GW of solar power plants until 2023.

Due to the fact that complexity of bureaucratic processes, installing licensed power plant can take long time and effort. Besides, auctioning and competition processes of licensing will take long time. Therefore, it expected that unlicensed projects below 1 MW are going to be preferred by installers.

#### **7.4.1. Market Segmentation**

In photovoltaic sector, there are manufacturers, installers, wholesalers, distributors, financing and consulting corporations and investors. Therefore, in order to define customers with high and low possibilities and to define competitors, company differentiated companies as below:

- Investors
- EPC contractors
- Mid-size installers
- Micro installers
- Wholesalers

##### **7.4.1.1. Investors**

Investor refers to individuals or corporations who invests in power plants and either trade or consume electricity produced by plant. Corporations can be companies which want to decrease electricity costs in long term.

Investors are potential customers only when they purchase products instead of leaving decision to installer companies. Main specifications of this group are:

- People who own area that is not suitable for agriculture
- People who have agricultural lands and want to install irrigation system
- Owner of buildings with large roof, usually businessmen with small and middle size factories
- Companies, working with high amount of machinery
- Some EPC companies can participate in this group

#### **7.4.1.2. EPC Contractors**

EPC contractor refers to the companies which deal with projects larger than 1 MW both licensed and unlicensed. Since it is easier to install unlicensed power plant, some EPC contractors can install more than one 1 MW projects in same area. They deal with turnkey solutions and operation and maintenance of power plants

These companies usually have agreements with manufacturers since it is cheaper to purchase large amount of products from manufacturers.

Main specifications of this segment are:

- They deal with projects larger than 1 MWp
- Number of projects is more than 10-15 annually
- Applications, procurement, construction, operation and maintenance is done by company itself
- Have financial strength and human resources
- The number of employees is more than 15-20
- Have official manufacturer or wholesaler partners
- May operate in other energy fields as well such as hydro, wind

#### **7.4.1.3. Mid-size Installers**

Installer refers to the companies which deal with projects from the smallest ones to the projects smaller than 1 MWp. Installers have 2 or 3 large projects and a few small projects annually. Hence, they usually don't have agreements with manufacturers. For small projects, they depend on wholesalers and distributors.

Main specifications of this group are:

- Deal with projects smaller than 1 MWp
- 10-15 projects which are smaller than 200 kWp annually, mostly roof applications, home applications and irrigation systems
- 2-3 projects which are larger than 200 kWp and smaller than 1 MWp annually

- Have financial stability
- The number of employees is up to 10-15
- Don't have partners, have agreements with different suppliers for each project
- Can be former construction, electric or electronics company or operate in more than one area

#### **7.4.1.4. Micro Installers**

Micro installer refers to the companies which deals mostly with off-grid systems. Main specifications of this group are:

- Deals with projects smaller than 5-10 kWp
- Less than 10 projects annually
- Don't have financial strength
- The number of employees is up to 5
- Supplies components from local wholesalers or from e-shops
- They usually are electric or electronics stores

#### **7.4.1.5. Wholesalers**

Wholesalers are Solarity's main competitors. However, they are also possible customers. Generally wholesalers and distributors cooperate to extent in specific assortment, brands or markets sometimes. Piggybacking of smaller wholesalers on larger distributors enables increasing total purchase volume and thus gaining better purchase conditions from manufacturers. Wholesalers differ in couple scopes. Firstly, assortment and brand representation may differ. This means that one wholesaler has exclusive products with only very limited number of brands such as one or two brands per each product category, while others have many competing brands in portfolio. Secondly, country presence can be different. We can define levels of presence such as local, national, regional, intercontinental level [93].

### **7.4.2. Competitors**

In this section, competitors' information is taken from their official websites. References are stated below:

- Asunim Turkey [86]
- Ekinler-Eurosol [87]
- IBC Solar-Kosifrankensolar [88]
- BŞK Enerji-Krannich Solar [89]
- Liva Solar [90]

#### **7.4.2.1. Manufacturers**

Solarity's competitors consist of wholesalers, distributors and manufacturers with regard to component procurement. However, most of the distributors cannot supply all sort of photovoltaic components. Besides, they are able to offer not more than two brands and works mostly with the EPC companies installing power plants with the power of 1 MW or more. Although this approach is same for manufacturers, selling their products by adding specific value makes them serious threat for Solarity.

#### **7.4.2.2. Asunim Turkey**

Asunim group is established in 2005 to operate in Spain and Portugal. Since there was enormous demand in Europe, company expanded its market, mainly in Greece, Italy and United Kingdom. Including Asunim Turkey, company installed and made procurement for 140 MW capacity. Fields in which company serves are:

- EPC, turnkey solutions
- Project development and consulting
- Wholesaler

Asunim supplies components to customers from their warehouses located in Thessaloniki, Antwerp, Valencia and Faro. Turkey office is located in Ankara.

Asunim Turkey's product portfolio includes following brands:

- **Modules:** CSUN, Hanwha, QCells, REC, Renesola, Trunsun Solar, Yingli Solar
- **Inverters:** Advanced Energy, ABB, Fronius, SMA

#### 7.4.2.3. Ekinler-Eurosol

Ekinler-Eurosol is founded in 2014 by Turkish connector and cable manufacturer Ekinler and German energy company Eurosol. Company serves in following fields:

- EPC, turnkey solutions
- Wholesaler and distributor

Ekinler-Eurosol is authorized distributor of SMA, ABB inverters and Sharp modules. Apart from distribution, company is also wholesaler of brands below:

- **Modules:** BYD, Yingli, SolarField, QCells, CanadianSolar, Renesola, Sharp
- **Inverters:** Fronius, SMA, ABB
- **Mounting systems:** Schletter, Tricon
- **Accessories:** Ege Kablo

#### 7.4.2.4. IBC Solar-Kosifrankensolar

One of the largest wholesaler of Germany, Frankensolar, decided to cooperate with Turkish solar company Kosi to operate in Turkish market and found Kosifrankensolar in 2013. At the end of 2014, Kosifrankensolar has been bought by leading solar module and inverter manufacturer, IBC Solar.

IBC Solar's product portfolio consists of following brands:

- **Modules:** Yingli Solar, CSUN, QCells, CanadianSolar, Suntech, Kaneka
- **Inverter:** Huawei, SMA, Fronius
- **Mounting systems:** Schletter, DegerEnergie, Renusol
- **Accessories:** Solar-Log monitoring systems
- **Batteries:** Hoppecke, Moll

- **Charge controllers:** Steca

#### 7.4.2.5. BŞK Enerji-Krannich Solar

World leading wholesaler from Germany, Krannich Solar, decided to cooperate with Turkish energy company BŞK Enerji in 2014. Company's product portfolio contains following brands:

- **Modules:** Axitec, Luxor, Suntech
- **Inverters:** KACO, Kostal, SMA, SolarEdge
- **Mounting Systems:** K2 Systems

#### 7.4.2.6. Liva Solar

Liva Solar is founded in 2010 in Fethiye, Muğla as subsidiary of Liva Construction Group. Company serves in following fields:

- Consulting
- Wholesaler
- Research & Development

Offered brands are:

- **Modules:** CSUN, Sharp, Yingli, SolarTürk, Bluesun
- **Inverter:** SMA, GoodWe, Cotek, Victron
- **Charge controllers:** Steca
- **Batteries:** Yiğit Akü, İnci Akü

#### 7.4.3. Possible Risks in the Market

As a developing market, Turkish solar industry might be penetrated by manufacturers with low prices for high volumes until grid parity is reached. However, comparing to European market, grid parity falls wide of the mark in Turkey. The only way to reach parity is increasing value of US dollars which can cause severe economic crisis as it happened in 1999.

Besides, new wholesalers and distributors can participate in the market in following years. Although Turkey is 50 MW market, it is not hard to find competitors for Solarity.

Reaching the official target 5 GW until 2023 requires financial solutions which are not clearly identified in Turkey, besides. Investors complain that during loan applications, responsible people are not aware of photovoltaics and required high amount of financial sources. Not only in banks, but also in mass media, topic is not understood. It is possible to face with the news claiming that 1 MW power plant would be constructed for one hundred thousand euros, which is ten times less than actual required money. In addition, US Dollars is gaining value against Euro and Turkish Lira. When considering that Chinese module manufacturers uses US Dollars for sales, module prices are increasing. This also applies to European module manufacturers due to the fact that they purchase photovoltaic cells mainly from Chinese manufacturers. Increasing prices may cause short or long term project delays in the market.

Moreover, Turkish solar module manufacturers are trying to prevent import of Chinese modules into country. In order to achieve that, they applied to General Directory of Import to bring anti-dumping system. They also applied for a new legislation to check electromagnetic compatibility of imported solar modules before crossing borders. When it is taken into account that solar modules doesn't create any electromagnetic field, it can be seem that player of the markets are undermining the development of market.

Furthermore, factors mentioned above bring us to the attitude of Turkish people that may cause troubles and unfair conditions. Competition among component suppliers causes lower prices. However, investors and EPC companies are willing to keep their suppliers as secret and only one regardless to having agreements with them.

Last but not least, government's interest on solar energy industry is below other energy source options such as nuclear energy and hydro energy. Despite the fact that common opinion by public and scientists is against harming nature because of construction of

nuclear and hydro power plants, government has not taken necessary steps for solar power plants.

#### **7.4.4. SWOT analysis**

##### **Strengths**

- Entrance to Turkish market will require low fixed costs due to chosen entry mode which is export, for example no expenses for warehousing
- Whole range of photovoltaic assortment is available including off-grid systems therefore all necessary components can be ordered at once
- Price flexibility due to various brands and models of the components, from the most economic ones to exclusive ones
- Multilingual working environment including Turkish, English, German, Czech, Slovakian, Hungarian, Croatian, Serbian, Russian, Arabian language speakers

##### **Weaknesses**

- Low recognition in the market
- No sales office or representative in Turkey
- Difficulty for stocking due to anti-dumping
- Low customer loyalty due to short term agreements
- Inexperienced sales representative
- Lack of financial strength and working capital

##### **Opportunities**

- Very high possibility of market boom in following years
- Remarkable number of installers which are looking for partners for component supply
- Upcoming legislations about small size systems such as easing the application processes and exemption of fees
- Partnership opportunities with local company in related industry

## **Threats**

- Powerful competitors in the market, mainly manufacturers
- Entrance of new competitors in the market
- Possible changes in laws and legislations in order to support Turkish manufacturers such as anti-dumping, obstruction in customs processes
- Bankruptcy of installer companies
- Economic crisis in the country

## **7.5. Marketing & Sales Strategies**

### **7.5.1. Marketing Strategies**

#### **Promotion**

Marketing strategies are the vital steps for Solarity to gather recognition by potential customers. Due to chosen entry mode, marketing activities will be done by phone calls, direct mailing, video calls, attending trade shows and exhibitions, online activities and last but not least special face to face meetings with installers.

In order to make cheap calls to Turkey, agreement with phone service provider will be extended to Turkey. To express general information about company such as products and services to the customers, website and leaflets will be translated into Turkish language by sales representative. Moreover, cold and determination e-mail and phone call scripts will be prepared in Turkish to use when reaching customers. Besides, video calls will be done over applications such as Skype, Oovoo.

In Istanbul, every year in second week of April, Solarex exhibition is held by participation of world-leading photovoltaic manufacturers, EPC and installation companies, wholesaler and distributors and investors. Attendance to this event will bring recognition and brand trust to potential customers. Besides, InterSolar which is held in Munich every year in June is another great opportunity to hold meetings with Turkish customers.

In addition, Solarbaba.com website and mail group will be used to make free advertisement and gather up to date information and news from Turkey's solar industry. The option of joining solar industry associations in the country will be evaluated after first year of existence in market.

#### **Pricing**

In photovoltaic industry, there are no significant differences in prices among component suppliers. Margins per unit are really low, however, volumes are huge. It is not possible to apply penetration pricing or skimming pricing. It might be applied

during stock clearances and bankruptcy of a supplier which happens rarely. Therefore pricing will be done based on three approach:

- **Competition pricing:** This pricing method will be used for EPC contractors. As it is mentioned in previous chapter, in my segmentation, EPC companies deal with mostly 1 MWp projects and larger. Therefore they may have agreements or partnerships with specific manufacturers or wholesalers. In order to compete with these companies, Solarity will take advantage of wide range of brands in its portfolio and offer higher quality products with little more price, offer same quality products with lower price, offer low quality products with much lower price.
- **Cost based pricing:** Cost based pricing method will be used for mainly mid-size installers. These are the companies dealing with projects mostly with the power of 200 kWp and smaller and few projects with the power between 200 kWp and 1 MWp. These corporations usually don't have agreements with wholesalers or manufacturers. Since they don't order large amount of components, offered price may differ from one supplier to another. Price should be kept to benefit both Solarity and the customer.
- **Cost plus pricing:** For the micro size installers and middle size installers, cost plus pricing will be used for small amount of orders such as 50 kWp or smaller systems, off-grid package systems or single unit orders.

### **7.5.2. Sales Strategies**

In sales plan, lead generation is the first step. Since Solarity's customers are corporations, to generate leads, the internet will be the most essential source. International and local solar servers will help finding leads.

The next step is to get to know them in more detail, such as their projects and goals for short and long terms. This will help to increase relationship with leads and to understand if they are worth to do business with.

Moreover, the most important step find out what leads need and what can be offered as solution. To manage that, filling letter of intent will be asked from leads. In letter of intent, leads will specify brands and models of components, location of projects, possible order date and payment method. Therefore required components and specification can be clearly understood.

In the light of the information from leads, offer will be prepared and will be sent them by e-mail. Depending on feedback from leads, other options with different brands, models or versions of components will be recommended. If it is required, negotiation will be made and deal will be made. Depending on type and volume of product, delivery will be made in 2-4 weeks.

Partner program will also be available for customers. Therefore, more favorable prices and discounts can be made to the partners. To be a partner, following requirements should be met [91]:

- Purchase at least 20% of desired program minimum amount
- List and details of projects of desired program minimum amount for the next period
- Signed Solarity partner program contract (validity 1 year)

## 7.6. Organization and Management

Solarity is operating for three years in mainly Eastern Europe. In such countries, cultural conditions and habits are not identical to Turkey, however, trading and business is common topic for these countries and people. Therefore, for Solarity, only need for extending to Turkish market is a Turkish speaker sales assistant.

Key positions and people can be stated as below:

- **Michal Adrian (Managing Director):** Mr. Adrian has bachelor degree from Czech Technical University in Prague in software engineering field and master's degree from University of Economics in Prague in international management field. He has been participated in different sectors such as information and communication technologies as managing director, responsible for purchasing, logistics, sales and consultancy since 2002. His experiences and relationships with suppliers, customers, business partners and other entities is going to play key role in Solarity's business in Turkey.
- **Marian Klimko (International Sales Manager):** Mr. Klimko has bachelor degree and master's degree from Masaryk University in Brno in international relations and affairs field. He has worked as Project manager in the past. He also has certificate from Fronius and SMA to be authorized service. He is going be responsible for Turkey as well as Middle East and Africa region. His experiences and technical knowledge of photovoltaics will help understanding and suggesting the best solutions for customers.
- **Mert Özelçi (Sales Assistant):** Mr. Özelçi has bachelor degree from Yıldız Technical University in İstanbul in electronics and communications engineering field and currently studies his master's degree in Czech Technical University in Prague in economics and management of electrical engineering field. He has experience in communication area especially on base station subsystems and mobile applications. He is going to be direct contact and representative for the customers and leads in Turkey.

- **Dasa Ottova (Invoicing, Logistics):** Ms. Ottova has master's degree from Technical University of Liberec, Faculty of Economics in field of business economy. She has worked as tax and issue data administrator in the past. In Solarity, she is responsible for crucial processes such as logistics, invoicing, payments, statistical statements as well as human resources.

## 7.7. Financial Analysis

### 7.7.1. Assumptions

In this study, financial assumptions are taken as below. Inflation rate is assumed based on the information from OECD and Czech National Bank inflation rate forecasts combined:

|                       | <b>Year 1</b> | <b>Year 2</b> | <b>Year 3</b> |
|-----------------------|---------------|---------------|---------------|
| <b>Inflation Rate</b> | 3%            | 3%            | 3%            |
| <b>Tax Rate</b>       | 20%           | 20%           | 20%           |

During calculations of revenues, decreasing price trend of solar components and change in Euro-US Dollar parity are taken into account.

### 7.7.2. Personnel Plan

In this part, salaries of responsible personnel for three years are given in the table below. Salaries are shown as specific person's contribution to the total sales volume to Turkey. The reason of three personnel's contributions fall is that company will probably enter new markets other than Turkey in following years.

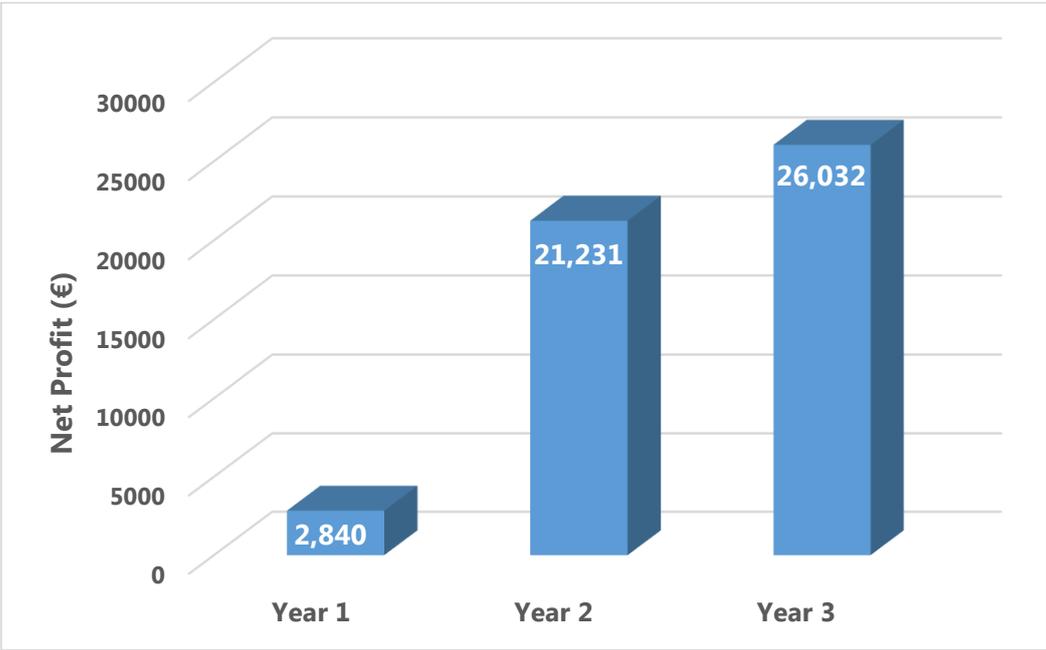
|                      | <b>Year 1</b>  | <b>Year 2</b>   | <b>Year 3</b>   |
|----------------------|----------------|-----------------|-----------------|
| <b>Michal Adrian</b> | € 1,200 (5%)   | € 618 (2,5%)    | € 637 (2,5%)    |
| <b>Marian Klimko</b> | € 4,320 (30%)  | € 2,225 (15%)   | € 2,292 (15%)   |
| <b>Mert Özelçi</b>   | € 5,200 (100%) | € 11,124 (100%) | € 11,458 (100%) |
| <b>Dasa Ottova</b>   | € 480 (5%)     | € 494 (2,5%)    | € 509 (2,5%)    |

**7.7.3. Profit & Loss Statement**

In this section, profit and loss predictions are given for three years. First year’s monthly statement can be found in Appendix 1.

**Table 6:** Profit & Loss predictions for three years

|                           | Year 1    | Year 2      | Year 3      |
|---------------------------|-----------|-------------|-------------|
| <b>Revenue</b>            | € 600,000 | € 1,500,000 | € 2,100,000 |
| <b>Cost of Goods Sold</b> | € 582,250 | € 1,450,000 | € 2,030,000 |
| <b>Gross Margin</b>       | € 17,750  | € 50,000    | € 70,000    |
| <b>Gross Margin (%)</b>   | 2.96      | 3.33        | 3.33        |
| <b>Direct Labor</b>       | € 11,200  | € 14,461    | € 26,460    |
| <b>Marketing Expenses</b> | € 3,000   | € 9,000     | € 11,000    |
| <b>EBITDA</b>             | € 3,550   | € 26,539    | € 32,540    |
| <b>Depreciation</b>       | € 0       | € 0         | € 0         |
| <b>Profit before tax</b>  | € 3,550   | € 26,539    | € 32,540    |
| <b>Taxes</b>              | € 710     | € 5,308     | € 6,508     |
| <b>Net Profit</b>         | € 2,840   | € 21,231    | € 26,032    |



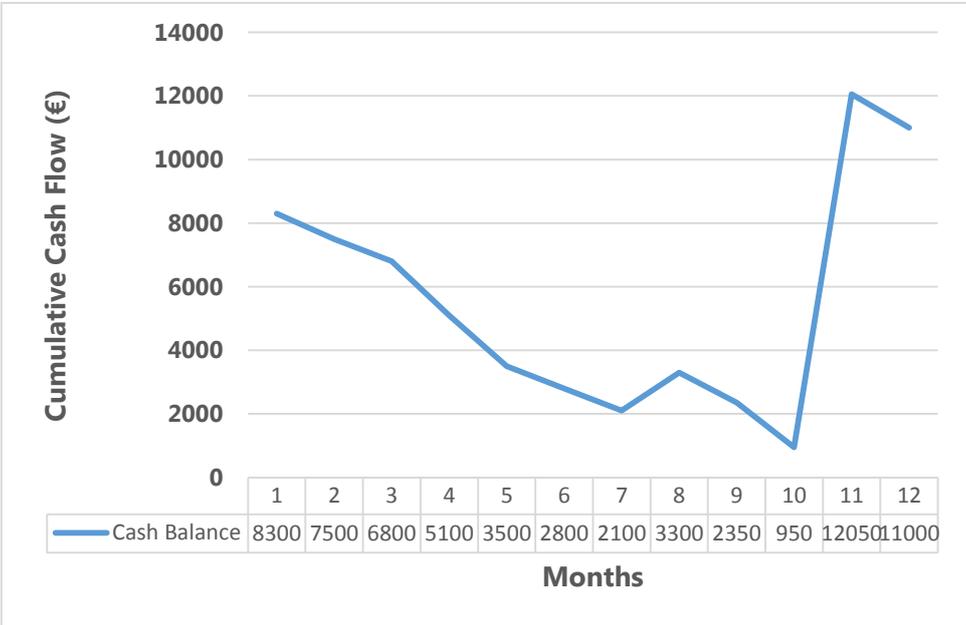
**Figure 17:** Net profit for three years

**7.7.4. Cash Flow Statement**

In the table below, three years of forecasted cash flow can be found. Moreover, monthly cash flow predictions for the first year can be found in Appendix 2.

**Table 7:** Cash Flow predictions for three years

|                      | <b>Year 1</b> | <b>Year 2</b> | <b>Year 3</b> |
|----------------------|---------------|---------------|---------------|
| <b>Cash Inflow</b>   | € 600,000     | € 1,550,000   | € 2,180,000   |
| <b>Cash Outflow</b>  | € 598,000     | € 1,540,000   | € 2,165,000   |
| <b>Net Cash Flow</b> | € 2,000       | € 10,000      | € 15,000      |



**Figure 18:** Cumulative cash flow for the first year

### 7.7.5. Balance Sheet

Balance sheet predictions for three years are given in the table below.

**Table 8:** Balance Sheet predictions for three years

|                                     | Starting Balance | Year 1          | Year 2          | Year 3           |
|-------------------------------------|------------------|-----------------|-----------------|------------------|
| <b>ASSETS</b>                       |                  |                 |                 |                  |
| <b>Current Assets</b>               |                  |                 |                 |                  |
| Inventory                           | € 0              | € 0             | € 50,000        | € 80,000         |
| Cash                                | € 9,000          | € 11,000        | € 21,000        | € 36,000         |
| Accounts Receivable                 | € 0              | € 0             | € 0             | € 0              |
| Short-term Investments              | € 0              | € 0             | € 0             | € 0              |
| <b>Total Current Assets</b>         | € 9,000          | € 11,000        | € 71,000        | € 116,000        |
| <b>Long-term Assets</b>             |                  |                 |                 |                  |
| Acc. Depreciation                   | € 0              | € 0             | € 0             | € 0              |
| Long-term Assets                    | € 0              | € 0             | € 0             | € 0              |
| <b>Total Long-term Assets</b>       | € 0              | € 0             | € 0             | € 0              |
| <b>TOTAL ASSETS</b>                 | <b>€ 9,000</b>   | <b>€ 11,000</b> | <b>€ 71,000</b> | <b>€ 116,000</b> |
| <b>LIABILITIES</b>                  |                  |                 |                 |                  |
| <b>Current Liabilities</b>          |                  |                 |                 |                  |
| Accounts Payable                    | € 0              | € 0             | € 50,000        | € 80,000         |
| Notes Payable                       | € 0              | € 0             | € 0             | € 0              |
| <b>Total Current Liabilities</b>    | € 0              | € 0             | € 50,000        | € 80,000         |
| <b>Long-term Liabilities</b>        |                  |                 |                 |                  |
| Long-term Debt                      | € 0              | € 0             | € 0             | € 0              |
| <b>Total Long-term Liabilities</b>  | € 0              | € 0             | € 0             | € 0              |
| <b>TOTAL LIABILITIES</b>            | € 0              | € 0             | € 50,000        | € 80,000         |
| <b>EQUITY</b>                       |                  |                 |                 |                  |
| Capital                             | € 9,000          | € 9,000         | € 9,000         | € 9,000          |
| Retained Earnings                   | € 0              | € 2,000         | € 12,000        | € 27,000         |
| <b>TOTAL EQUITY</b>                 | € 9,000          | € 11,000        | € 21,000        | € 36,000         |
| <b>TOTAL LIABILITIES AND EQUITY</b> | <b>€ 9,000</b>   | <b>€ 11,000</b> | <b>€ 71,000</b> | <b>€ 116,000</b> |

## **8. CONCLUSION**

The fact is known by everyone, world is running out of traditional sources. For the countries that are dependent on foreign resources dramatically suffer from the situation. Turkey is one of those countries spending its significant amount of budget on energy import. Thus, renewable energy utilization has become serious topic for last 5 years.

In Turkey, wind energy power plants have been developed to 3 GW of total installed power, besides, hydro energy power plants increased to 23 GW of power. However, wind is not stable source and hydro power plants caused protests against deforestation and damaging ecological life in lands nearby. It was then clear to focus on free and unlimited energy source from sun, of which utilization doesn't affect environment as others.

Investors didn't want to miss this opportunity, therefore, auctions and applications for photovoltaic power plants boomed. Licensed and unlicensed, total applications of 15 GW have been made. However, part of these applications are approved by the distribution company. This is either because of slow processes and capacity issues.

It is expected that 100-150 MW power plants will be installed until at the end of 2015. These power plants will be only unlicensed ones. Licensed projects are expected to take 2 years to operate without any legislative troubles. By the distribution company, new capacities for unlicensed projects are announced monthly. Besides, capacity for licensed projects are announced once in a year by Ministry of Energy and Natural Sources.

Solarity desires to be part of this potentially huge market to expand its business, to expand the company itself and to help to reach grid parity for a better world. Although it is a small market, entry to the market without knowing conditions, laws, regulations, competitors and predictions is not reasonable. Many of the companies entering new market in a rush, without a plan went to bankruptcy.

In my thesis, I tried to analyze Turkey from different aspects such as energy needs, politic, economic, social factors and photovoltaic point of view. Under the light of these analysis, I prepared a business plan with all necessary information including product and company information, marketing and sales strategies and finally financial predictions.

The business plan I prepared is used for internal usage. Therefore, it is not used for any request for invest or bank loan. However, it can be used by top management to see market situation and to decide appropriate strategies such as revising entry mode, investing on warehousing or stocks. Last but not least, it can be used as guideline for another employees either responsible for Turkey or any other country.

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## APPENDICES

### Appendix 1: Monthly profit & loss predictions of the first year

|                           | Month 1 | Month 2 | Month 3 | Month 4  | Month 5  | Month 6 | Month 7 | Month 8 | Month 9 | Month 10 | Month 11 | Month 12 |
|---------------------------|---------|---------|---------|----------|----------|---------|---------|---------|---------|----------|----------|----------|
| <b>Revenue</b>            | € 0     | € 0     | € 0     | € 0      | € 0      | € 0     | € 0     | € 20000 | € 10000 | € 0      | € 550000 | € 20000  |
| <b>Cost of Goods Sold</b> | € 0     | € 0     | € 0     | € 0      | € 0      | € 0     | € 0     | € 18100 | € 9050  | € 0      | € 537000 | € 18100  |
| <b>Gross Margin</b>       | € 0     | € 0     | € 0     | € 0      | € 0      | € 0     | € 0     | € 1900  | € 950   | € 0      | € 13000  | € 1900   |
| <b>Gross Margin (%)</b>   | 0       | 0       | 0       | 0        | 0        | 0       | 0       | 9.5     | 9.5     | 0        | 2.4      | 9.5      |
| <b>Direct Labor</b>       | € 700   | € 700   | € 700   | € 700    | € 700    | € 700   | € 700   | € 700   | € 1400  | € 1400   | € 1400   | € 1400   |
| <b>Marketing Expenses</b> | € 0     | € 100   | € 0     | € 1000   | € 900    | € 0     | € 0     | € 0     | € 500   | € 0      | 500      | € 0      |
| <b>EBITDA</b>             | € (700) | € (800) | € (700) | € (1700) | € (1600) | € (700) | € (700) | € 1200  | € (950) | € (1400) | € 11100  | 500      |
| <b>Depreciation</b>       | € 0     | € 0     | € 0     | € 0      | € 0      | € 0     | € 0     | € 0     | € 0     | € 0      | € 0      | € 0      |
| <b>Profit before tax</b>  | € (700) | € (800) | € (700) | € (1700) | € (1600) | € (700) | € (700) | € 1200  | € (950) | € (1400) | € 11100  | € 500    |
| <b>Taxes</b>              | € 0     | € 0     | € 0     | € 0      | € 0      | € 0     | € 0     | € 0     | € 0     | € 0      | € 0      | € (710)  |
| <b>Net Profit</b>         | € (700) | € (800) | € (700) | € (1700) | € (1600) | € (700) | € (700) | € 1200  | € (950) | € (1400) | € 11100  | € (210)  |

### Appendix 2: Monthly cash flow predictions of the first year

|                      | Month 1 | Month 2 | Month 3 | Month 4  | Month 5  | Month 6 | Month 7 | Month 8 | Month 9 | Month 10 | Month 11 | Month 12 |
|----------------------|---------|---------|---------|----------|----------|---------|---------|---------|---------|----------|----------|----------|
| <b>Cash Inflow</b>   | € 0     | € 0     | € 0     | € 0      | € 0      | € 0     | € 0     | € 20000 | € 10000 | € 0      | € 550000 | € 20000  |
| <b>Cash Outflow</b>  | € 700   | € 800   | € 700   | € 1700   | € 1600   | € 700   | € 700   | € 18800 | € 10950 | € 1400   | € 538900 | € 21050  |
| <b>Net Cash Flow</b> | € (700) | € (800) | € (700) | € (1700) | € (1600) | € (700) | € (700) | € 1200  | € (950) | € (1400) | € 11100  | € (1050) |