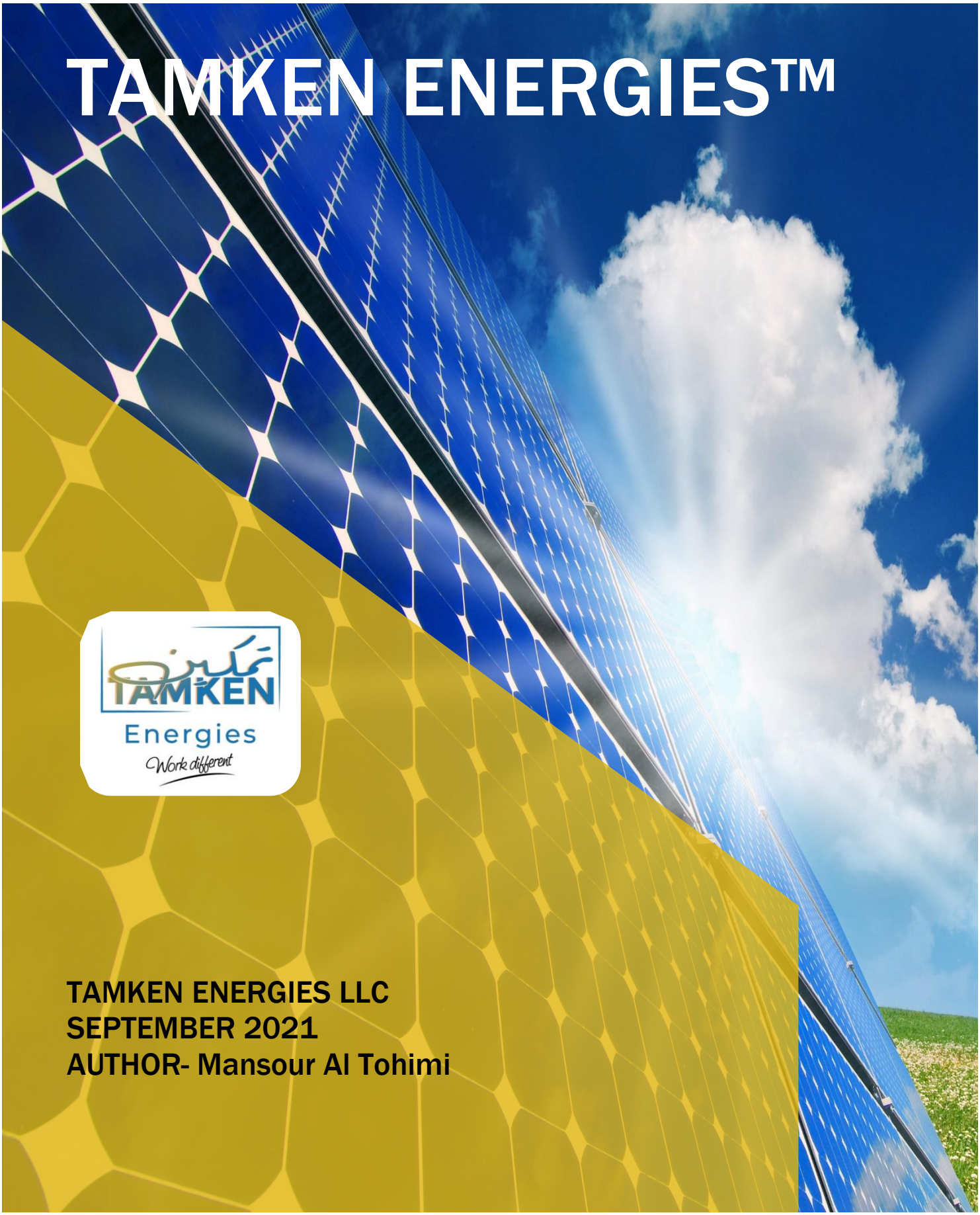
TAMKEN ENERGIES™



TAMKEN ENERGIES LLC
SEPTEMBER 2021
AUTHOR- Mansour Al Tohimi

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EXECUTIVE SUMMARY

The Kingdom of Saudi Arabia's long-term dependence on oil has become a major pain in the past few years as oil prices keep falling steeply and countries are adapting to other forms of energy such as renewable energy which is in abundance, environmentally friendly, and much cheaper than oil. Such forms of energy include Solar Power, Wind Power, Electricity, etc. Consequently, the national government has largely shifted its focus on diversifying the economy under its 'Saudi Vision 2030' and encourage the use of renewable energy to meet the growing demand for power in the country. Despite the growing demand, the market for renewables remain undersupplied in the KSA and is characterized by the presence of only a few manufacturers and suppliers. There is a need to promote this sector and fill the gap between demand and supply to meet the energy needs of the public. Therefore, as per experts, KSA's renewable energy sector and especially Solar Power is bound to grow tremendously and become more competitive in the foreseeable future.

In light of the aforementioned, Tamken Energies is a startup company based in Riyadh, KSA, that seeks to manufacture and distribute Solar PV Panels to customers in the country. The company will establish its manufacturing facility in the Industrial City of Modon. The company will sell as well as install solar panels on customer's property, delivering a readymade solution. Furthermore, the company plans to provide consultancy in the field of energy and solar power and offer complete survey of the customer's site to determine, the type of solar energy solution suitable as per the property type, customer's power requirements and budget.

The company being a startup is seeking seed level funding in the amount of SAR 10 to 15 million from private investors. The funds will be needed for setting up business operations, the plant and the company as planned.

PRODUCTS AND SERVICES

COMPANY SUMMARY

Company Profile	Details
Company Name	Tamken Energies LLC
Brand Name	Tamken Energies
Company Location	Riyadh, KSA
Year of Foundation	2020
Founder(s)	Mansour Al Tohimi, Talal M. Alsubhi
Company Type	Manufacturing and Distributing
Products	Solar PV Panels
Company Status	Early-Stage Startup (Pre-revenue)

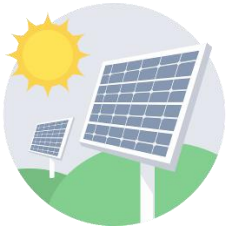
Fig 2.1. Company Profile

'Tamken Energies' is a brand owned and operated by Tamken Energies LLC, a limited liability corporation registered and located in the Kingdom of Saudi Arabia (KSA). The company was founded in the year 2020 and it is an early-stage startup which seeks to provide solar energy solutions such as solar PV panels to customers mainly in the KSA but also in the GCC region. The company is founded by Mansour Al Tohimi, who will lead the company as the Chairman and Talal M. Alsubhi who will lead the company as the CEO, both of them come from diverse and skilled backgrounds that will enable them to steer the company in the right direction. Tamken Energies is now prospecting to raise seed funds in order to secure property and construct its manufacturing plant, buy capital assets along with other core expenses.

THE PROBLEM

A major problem in the KSA is the dependence on oil but the times are changing and new technologies such as solar power, which will reduce or completely remove dependence on oil, are being developed, the prices of oil are falling and, in a few years, the prices are going to hit rock bottom

Secondly, oil as an energy source is not clean and it contributes to air pollution, that's another reason why environmentally conscious customers look for alternative energy sources such as solar energy that is much cleaner and cheaper.



Despite the situation described above, the KSA is undersupplied in terms of renewable energy including Solar Energy as there are only a limited number of players in the market that manufacture solar panels. Furthermore, there are import restrictions on importing

THE OPPORTUNITY

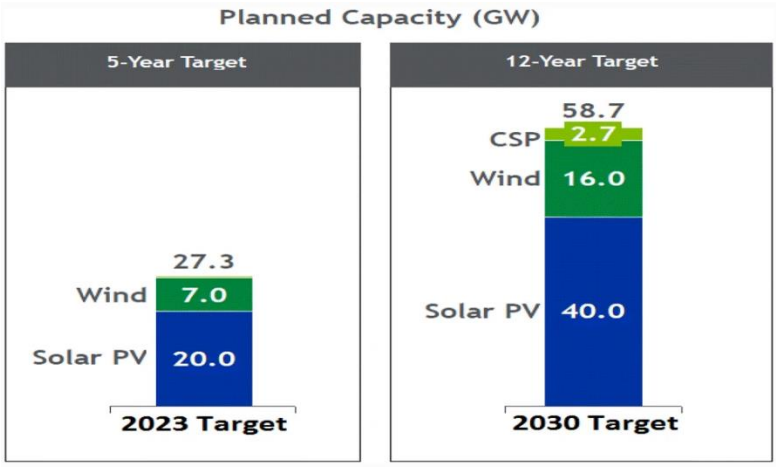
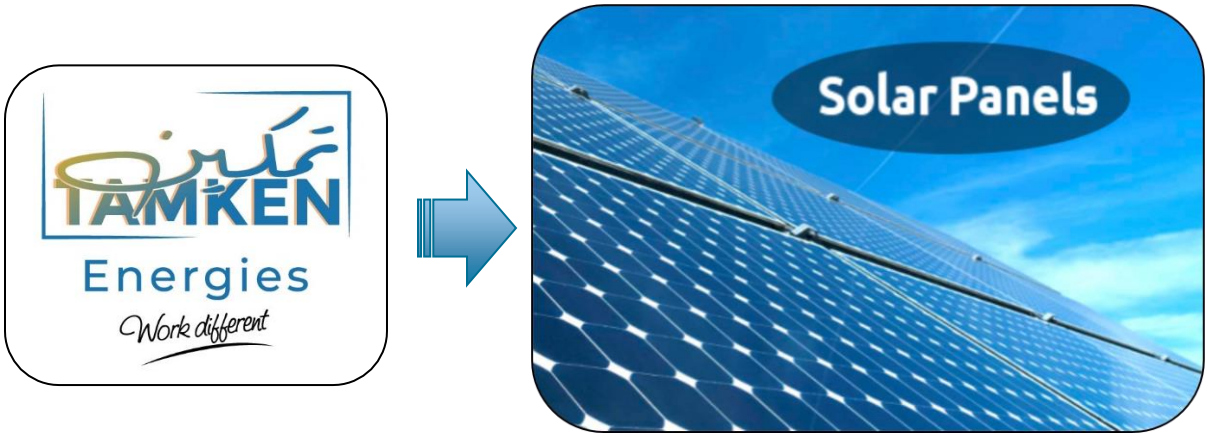


Fig 2.2. Renewable Energy Targets for the KSA Over the Next 5–12 Years

Saudi Arabia has developed Saudi Vision 2030, an ambitious plan to reduce the country's dependence on oil by supporting promising private energy organizations and by developing opportunities that contributes to the national economy. In the manufacturing sector, the government is encouraging technology transfers in the renewable energy industries. It is expected to result in the localization of significant parts of the renewable energy value chain in Saudi Arabia.

Fig 2.2. shows the renewable energy plans and targets in the KSA, which include some recent modifications following the development of Saudi Vision 2030, which has increased the focus on, including renewable resources in the national energy mix. Solar energy is the most abundant renewable energy resource in the kingdom. Several solar photovoltaic (PV) projects have recently been announced with the aim of supplying electricity with very competitive costs. This is good news for existing as well as new entrants in the manufacturing sector for Solar Energy such as producing and distributing Solar PV Panels.[1]

THE SOLUTION



[1] https://link.springer.com/article/10.1007/s41825-019-00020-y#Fig1

The solution to the above-mentioned problem is Tamken Energies, which is a company that seeks to manufacture and distribute Solar PV Panels to customers such as households, farmland owners, businesses, government agencies, etc. The company's goal is to address the gap between demand and supply of solar energy solutions in the country and provide its customers a cleaner, cheaper and longer lasting alternative to oil as an energy source.

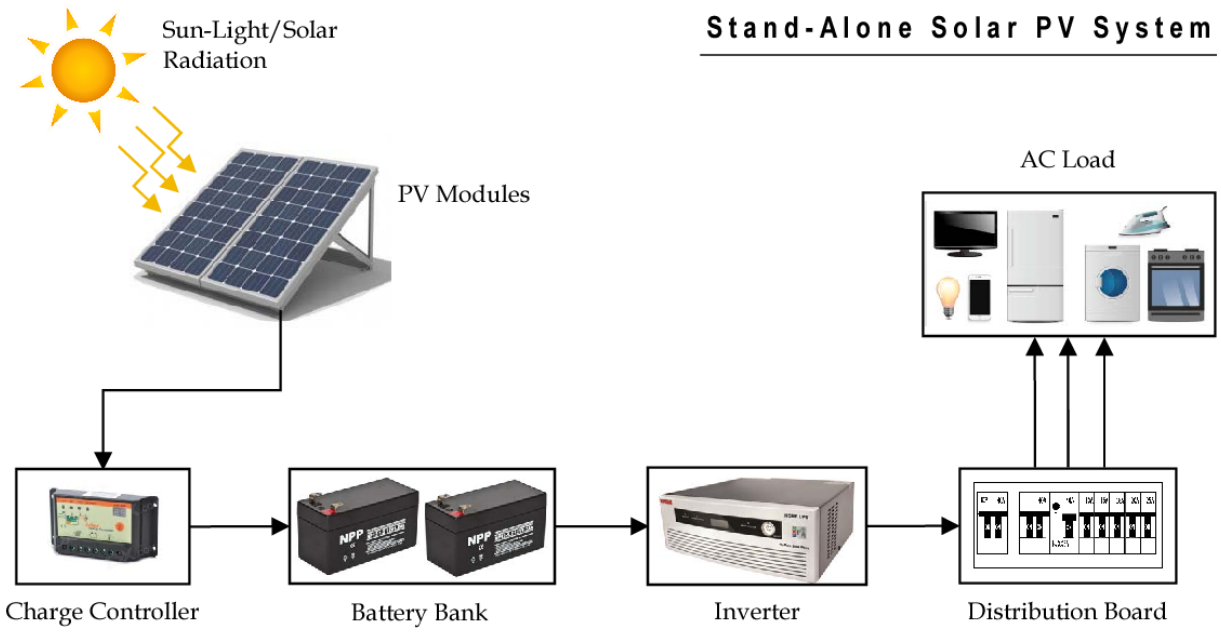


Fig 2.3. Solar PV System Architecture

Tamken Energies for the purpose of the same, will partner up with a technical partner and a supplier (Sabic), the technical partner will provide the know-how and technological assistance while the supplier will provide all necessary input materials to manufacture the PV panels. A solar panel, or photo-voltaic (PV) module, is an assembly of photo-voltaic cells mounted in a framework for installation. Solar panels use sunlight as a source of energy to generate direct current electricity. A collection of PV modules is called a PV panel, and a system of PV panels is called an array. Arrays of a photovoltaic system supply solar electricity to electrical equipment.

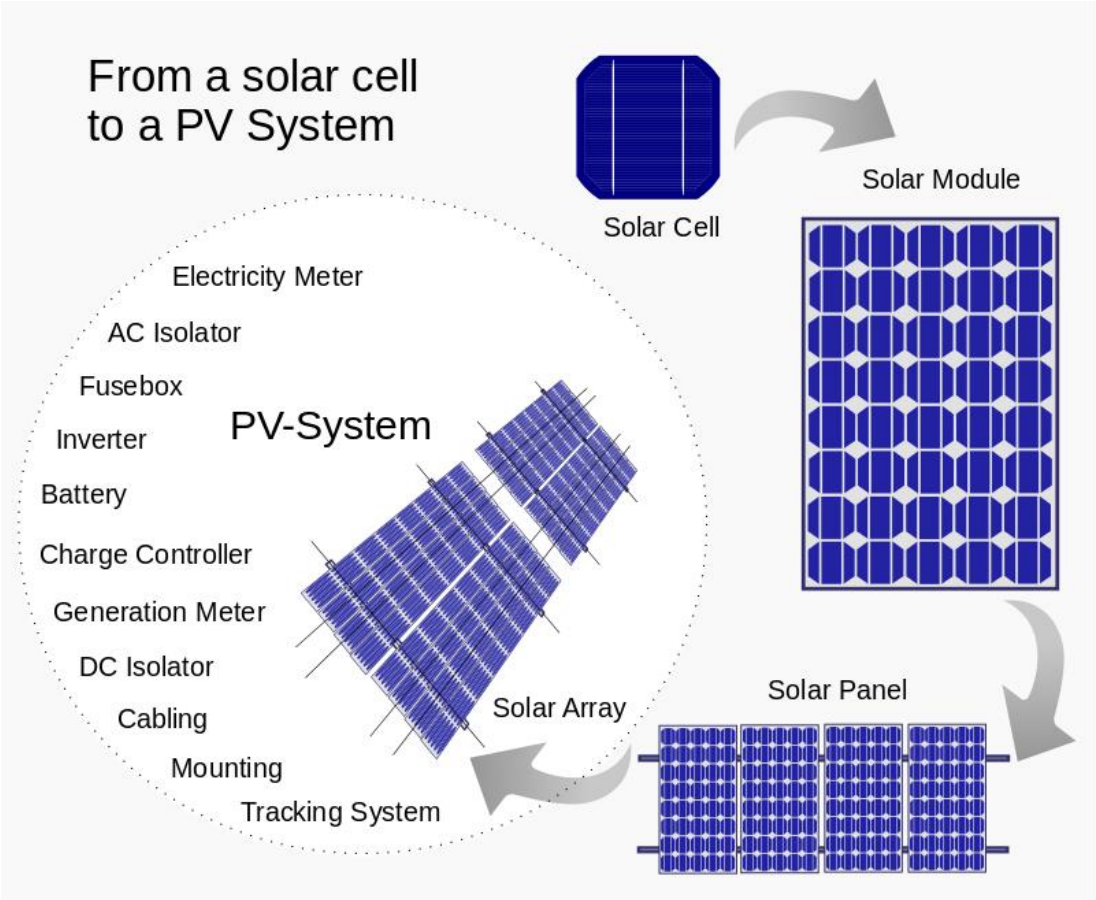


Fig 2.4. PV System Architecture

Tamken Energies is seeking property in the industrial city of Modon. Since its establishment in 2001, Modon has been undertaking the development and supervision of industrial lands and integrated infrastructure. Today, it oversees 36 existing and under development industrial cities across the Kingdom, in addition to private industrial cities and complexes. Once the property is leased/rented, Tamken Energies will establish its manufacturing facility on the property equipped with capital assets to function on a daily basis to produce PV panels. Once set up, the facility will go live and start distribution of PV panels through its own channels in Riyadh and the rest of the KSA.

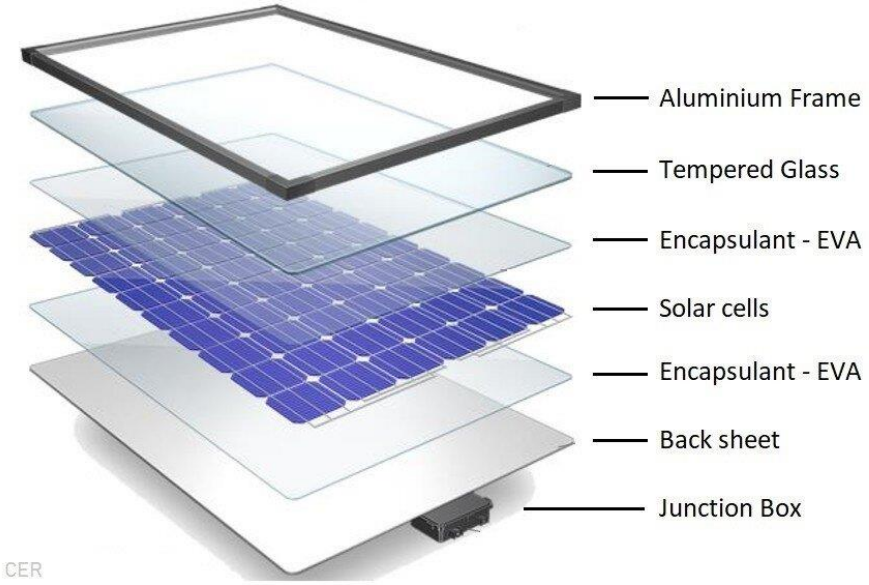


Fig 2.5. Solar PV Panels Manufacturing Components

Apart from the product, the company will also provide consultancy and full site assessment services, where it will send its engineers and technicians to survey the area, the customer wants to install the PV panels in. These experts will come up with a way for maximum utilization of the space to provide enough electricity to the customer. Therefore, the overall process will consist of the following key steps as given in the infographic below.

PRODUCT SPECIFICATION

Maximum power voltage:4.0V Maximum power current: 100.0mA Dimension: 70*65*3.2mm

Outline Dimensions	
L	70±0.2mm
W	65±0.2mm
H	3.2±0.3mm

Description of Goods	Technical Spec.
Open Circuit Voltage (VoC)	4.6V±8%
Short Circuit Current (Isc)	105mA±8%
Maximum Power Voltage (Vmp)	4.0V±8%
Maximum Power Current (Imp)	100.0mA±8%
Maximum Power (Ppm)	0.4W±8%

Mechanical Characteristics

① Monocrystalline Silicon solar cells

② Encapsulated: PC film lamination

BUSINESS PROCESS

Given above are the technical specifications of the product that will be sold by Tamken Energies.[2]

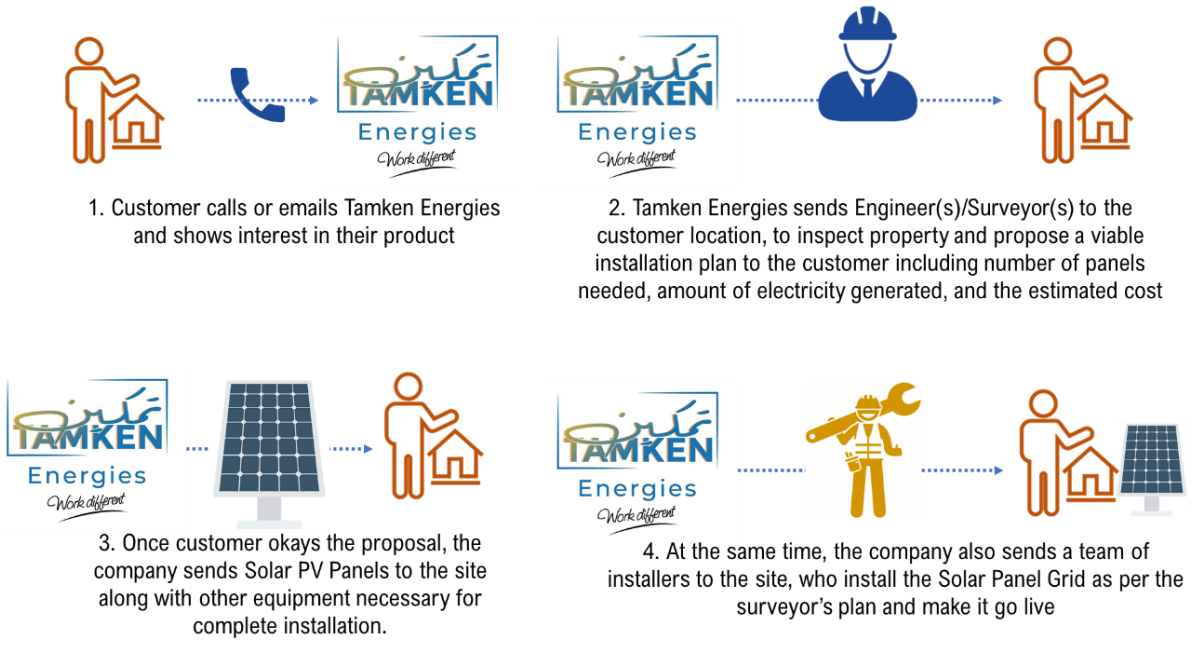


Fig 2.6. Tamken Energies Sales Process

[2] https://docs.rs-online.com/3cee/0900766b81407439.pdf

As seen in fig 2.6. the overall process is quite simple and needs only a few steps to install the solar power solution on customer's property to their utmost satisfaction.

MISSION AND VISION

- **Mission-** Tamken Energies' key mission is to provide its customers with a cheaper, cleaner and a more sustainable energy solution and remove the dependence on oil, which is not only more expensive but also non-renewable and a pollutant.

- **Vision-** Tamken Energies' key vision is to emerge as a major manufacturer and supplier of Solar PV Panels in the KSA with customers from all over the country as well as internationally such as other GCC countries. The dream is mass adoption of Solar Energy for a cleaner environment and cost saving.

Fig 2.7. Future Target Market

KEYS TO SUCCESS

Raising the required amount of funds to execute the business plan and set up business operations as envisioned.

Aim for 100% satisfaction of all customers to increase sales and acquire organic growth through word-of-mouth promotion.

Establish robust and long-term contracts with key suppliers and technology partner to create a sustainable and profitable business.

Flush sales in the first 12 to 18 months of the business to gain early traction and establish a customer base.

Communicate its value proposition to the target audience effectively through proper channels to raise brand awareness and increase sales.

COMPETITIVE ADVANTAGES

There are two types of competitive advantages- Cost Advantage and Product Differentiation. Tamken Energies will be a local manufacturer and distributor of Solar PV Panels in the KSA. The main competitive advantage will lie in its product differentiation, where it will supply high quality PV panels to the customers at a cheaper price. These panels will last for years and sustain all weather conditions and provide enough energy as needed by the customers. Furthermore, the company covers both B2C and B2B customers and will serve both segments in the country.

MARKET OVERIEW

SEGMENTATION

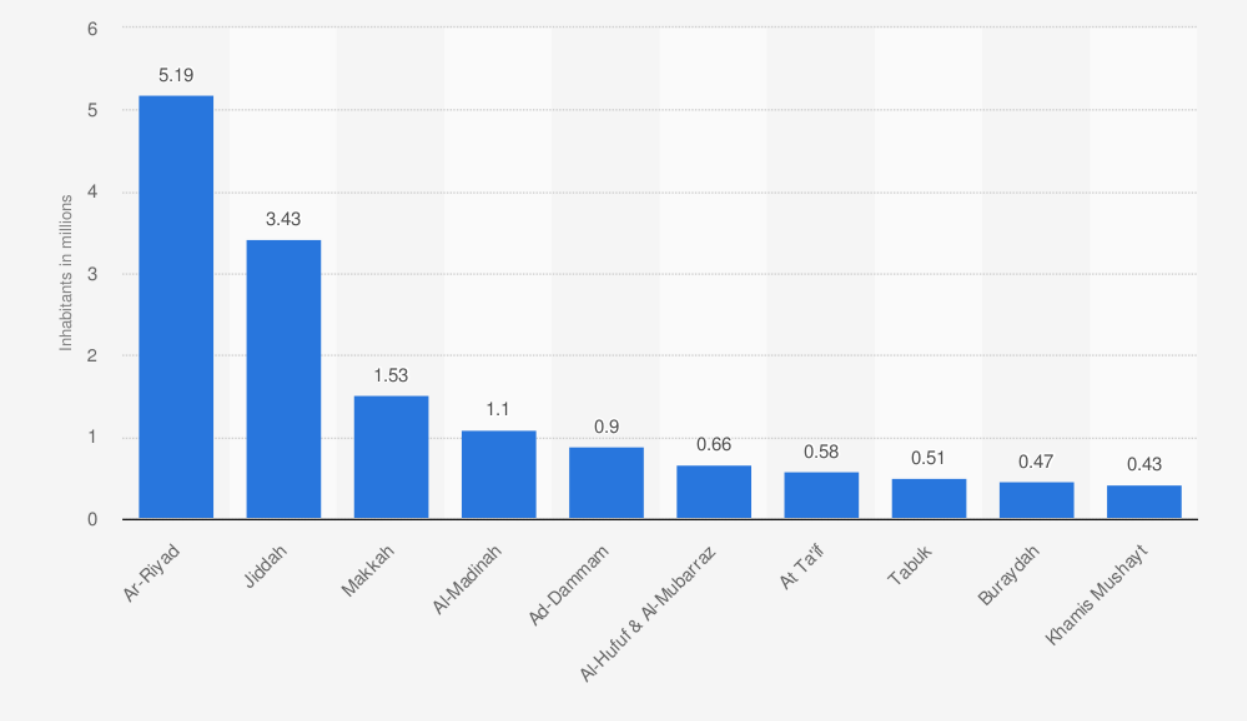
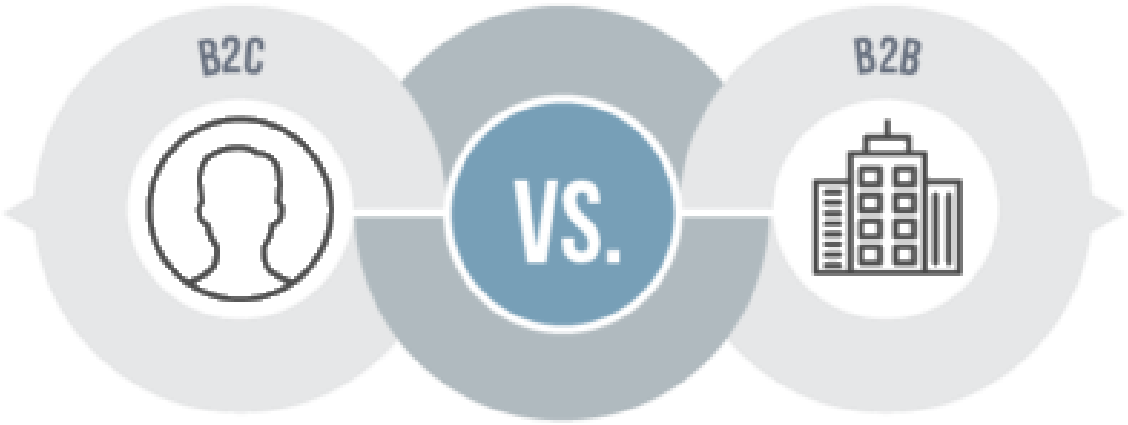


Fig 3.1. Ten Largest Cities in KSA (in millions)

- **Geographic Segmentation-** Geographically, the company will stay focussed on the market in the KSA for the first three to five years. Thereafter, the company may penetrate other regions in the GCC and MENA region such as UAE, Qatar, Kuwait, etc. Furthermore, the company's focus will be on tier 1 and tier 2 cities as it's in such cities, the awareness and demand of such products is the greatest for instance, the ten largest cities in the KSA as given in fig 3.1 would be ideal for the company to target in the beginning.

- **Demographic Segmentation-** Demographically, the company will mainly serve both B2C and B2B segments.



The main segment, Business to Customer (B2C), will include customers such as households and property owners, then comes the Business to Business (B2B) segment, which consists of businesses (such as other manufacturing facilities) that may want to install the Solar PV Panels to limit their dependence on paid electricity and oil. Lastly, the company might also serve the government segment (B2G), where certain government agencies might want to use the company's products and services to opt for an alternative and cheaper source of energy.

As aforementioned, the company will mainly focus on B2C customers that will majorly consist of households residing in detached homes/stand-alone houses. A stand-alone house (also called a single-detached dwelling, detached residence or detached house) is a free-standing residential building. It is sometimes referred to as a single-family home, as opposed to a multi-family residential dwelling. Detached (house, home, or dwelling) means that the building does not share wall with other houses.

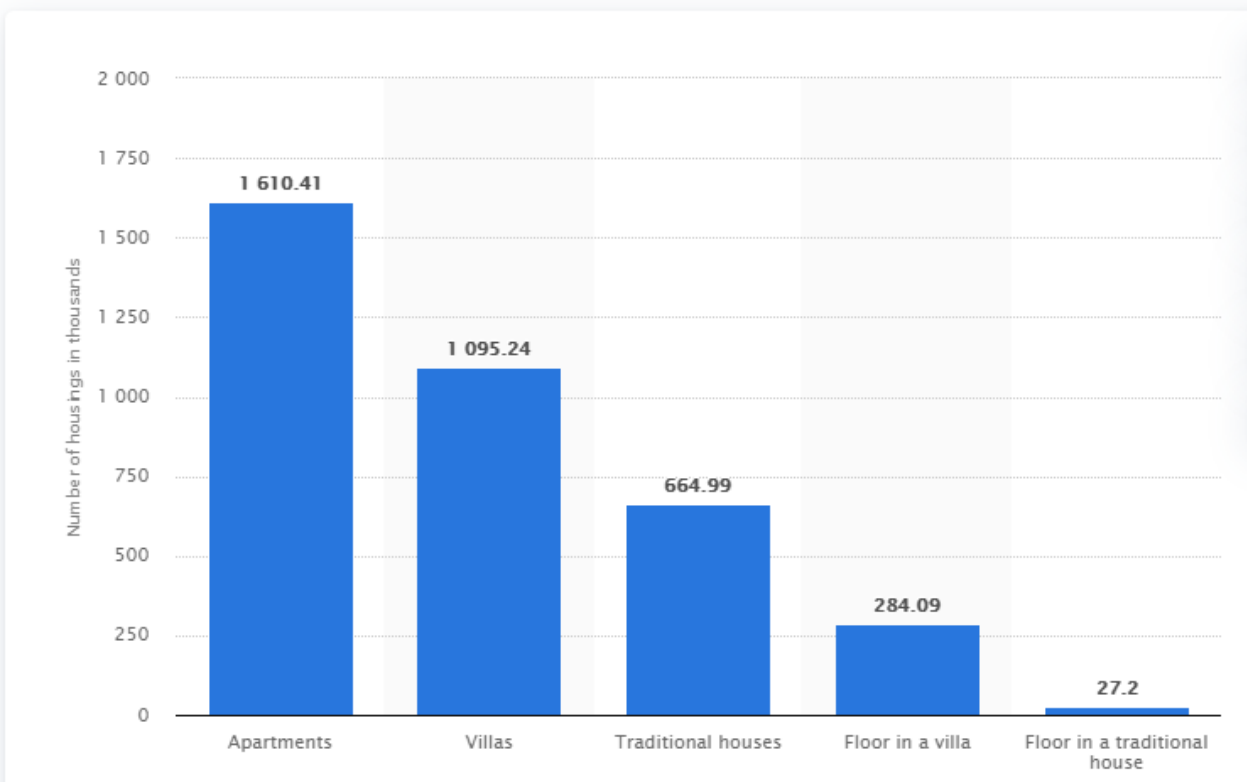


Fig 3.2. Number of Dwellings in KSA in 2019 by Building Type (in 1,000s)

As seen in fig 3.2. the number of detached homes come in two main forms- villas and traditional houses. In total there were 1.7 million detached housing units in the KSA in 2019.[3] We can expect an increase of 10% to that number in 2021 to be around 2 million units or households that represent the total available market for Tamken Energies, this combined with business and government clients represents a very lucrative and sustainable market, where Tamken Energies can emerge as a market leader and emerge as a multi-million-dollar enterprise.

[3] https://www.statista.com/statistics/999658/saudi-arabia-number-of-housing-units-by-type/

MARKET LANDSCAPE

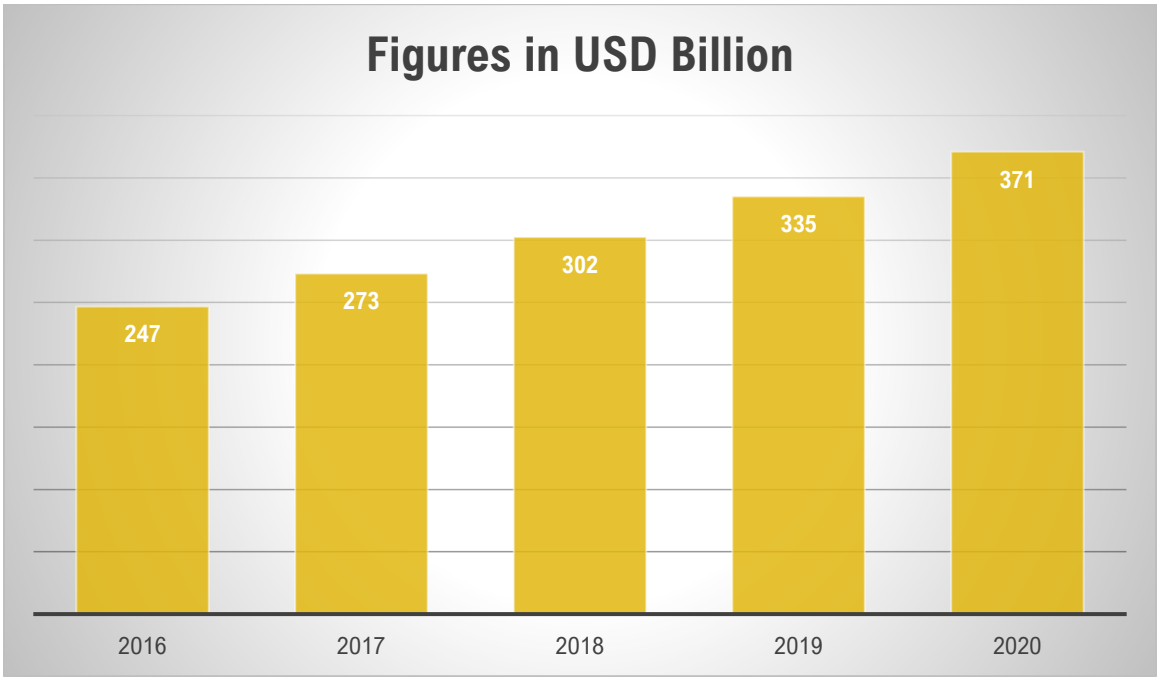


Fig 3.3. Market Value of Global Renewable Energy Production

As seen in fig 3.3. renewable energy still attracts a growing share of investment in new electricity generation capacity. Some US$370 billion is forecast worldwide in 2020, up 50 percent on 2016. Little of this investment is currently slated for the Gulf Cooperation Council (GCC) states. The GCC is falling behind developed countries such as Germany, and developing economies such as Chile, Mexico, Morocco, and South Africa.

Although structural and institutional challenges for renewables have led to underinvestment, the GCC has several factors that make rapid deployment of renewables an attractive opportunity. These include plentiful, high-yield renewable resources; a natural gas shortage; and an established independent power plant (IPP) model, which makes cheap, long-term project finance available and can attract the necessary private and foreign investors.

The exact market size of renewables and solar energy in the KSA is quite difficult to measure as the industry is not consolidated and quite fragmented. However, the Saudi Arabia renewable energy market including that of Solar Energy is expected to grow approximately at a CAGR of over 24.2% till 2026.

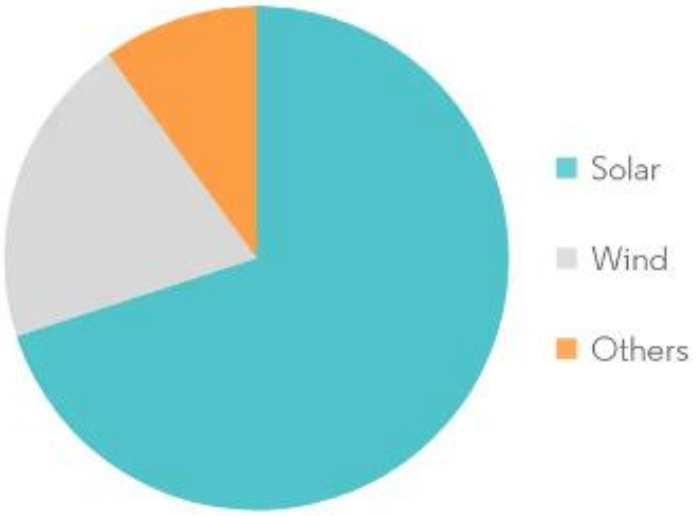


Fig 3.4. Share of Renewable Energy Sources by Type in the KSA

As seen in fig 3.4. solar power as a renewable energy is expected to be the largest segment, owing to revised targets of Saudi Arabia government for increasing the renewables share in its energy mix by installing 40 GW of solar PV by 2030.

Saudi Arabia does not have a domestic power generation company with expertise in the renewable energy sector, while having very large potential for solar power generation. The privatization of the power industry has allowed the foreign companies, particularly from China and Europe, who have substantial experience with solar energy to develop the solar power plants, hence creating ample opportunities for the market players. The country's plan

to diminish the reliance on oil for power generation, and to diversify the revenue streams is further expected to drive the market during the forecast period.[4]

Power Demand and Supply in KSA

Power generation in the KSA are almost achieved through the use of fossil fuels with only a marginal share of renewables such as Solar Energy. Some of the goals set by the Government plan and related to renewables are but not limited to:

- Achieving significant growth of renewable energy generation capacity: 3.45 GW in 2020 and 9.5 GW in 2023, representing 4 and 10 percent of domestic generation capacity, respectively.

- Raising the share of non-oil exports in non-oil GDP from 16 to 50 percent.

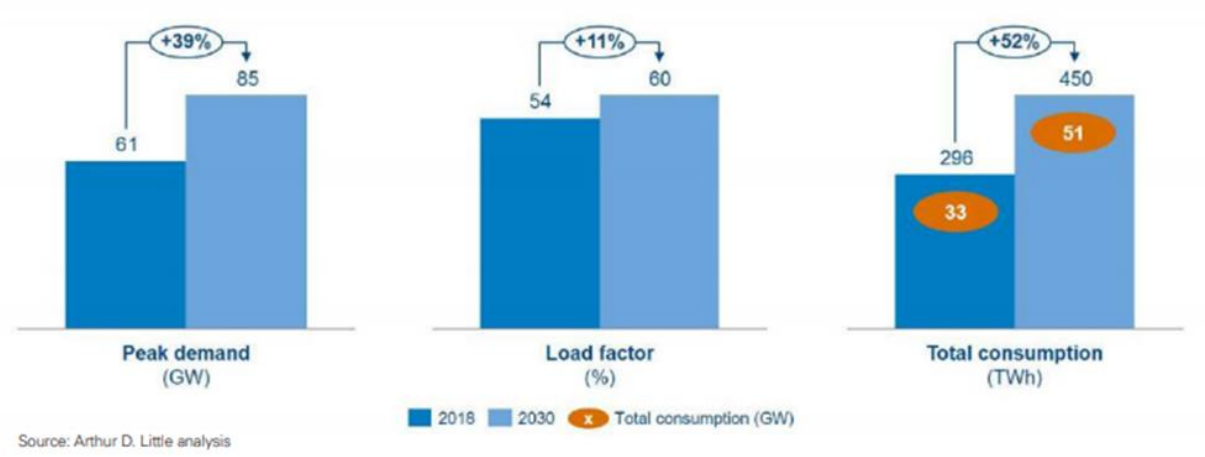


Fig 3.5. Projected Demand for Power in the KSA

KSA registered a peak load demand of 61 GW in June of 2017. The vision, as it stands, assumes peak load demand will hit just below 120 GW in 2030, as KSA plans to increase

[4] https://www.mordorintelligence.com/industry-reports/saudi-arabia-renewable-energy-market

electricity generation capacity to 120 GW by 2032. Currently the system has a load factor (ratio of average demand to peak demand) of 54 percent. Assuming the continuity of this load factor to 2030, this would imply peak demand of 113 GW based on a pre-efficiency installed average power demand of 534 TWh. The same energy efficiency programs are predicted to allow for a 30 percent reduction in peak demand to 85 GW, leading to an increase in load factor to 60 percent.[5]

Policy and Legal Landscape

Give below are some of the latest policies that KSA has planned to roll out in due time in relation to energy and power generation currently and in the future.[6]

Category	Policy Name	Energy Type	Value Committed
Clean	Producing 50% of electricity from renewables by 2030	Multiple Renewable	Unquantified
Fossil	Subsidized fuel prices halved against the backdrop of international oil price plunge	Oil and oil products	Unquantified
Fossil	Additional electricity subsidies as a relief measure for commercial, industrial and agricultural sector	Oil and gas	USD 240 Mn
Fossil	Saudi Aramco investment in unconventional Jafurah natural gas field	Gas and gas products	USD 3.5 Bn
Fossil	Hawiyah Unayzah underground gas storage site	Gas and gas products	USD 1.85 Bn

[5] https://www.adlittle.com/sites/default/files/viewpoints/adl_ksa_solarpower.compressed.pdf
[6] https://www.energypolicytracker.org/country/saudi-arabia/

As far licensing in KSA is concerned, all industrial projects owned by foreign or national capital or by joint ventures whose fixed capital exceeds SR1 million (excluding the value of land and holdings) must be licensed by the Ministry of Industry and Electricity. Investors planning to start an industrial project should submit an application to the Evaluation and Licensing of Industrial Projects Department stating the product and the production capacity, approximate capital, and proposed location.[7]

KEY TRENDS

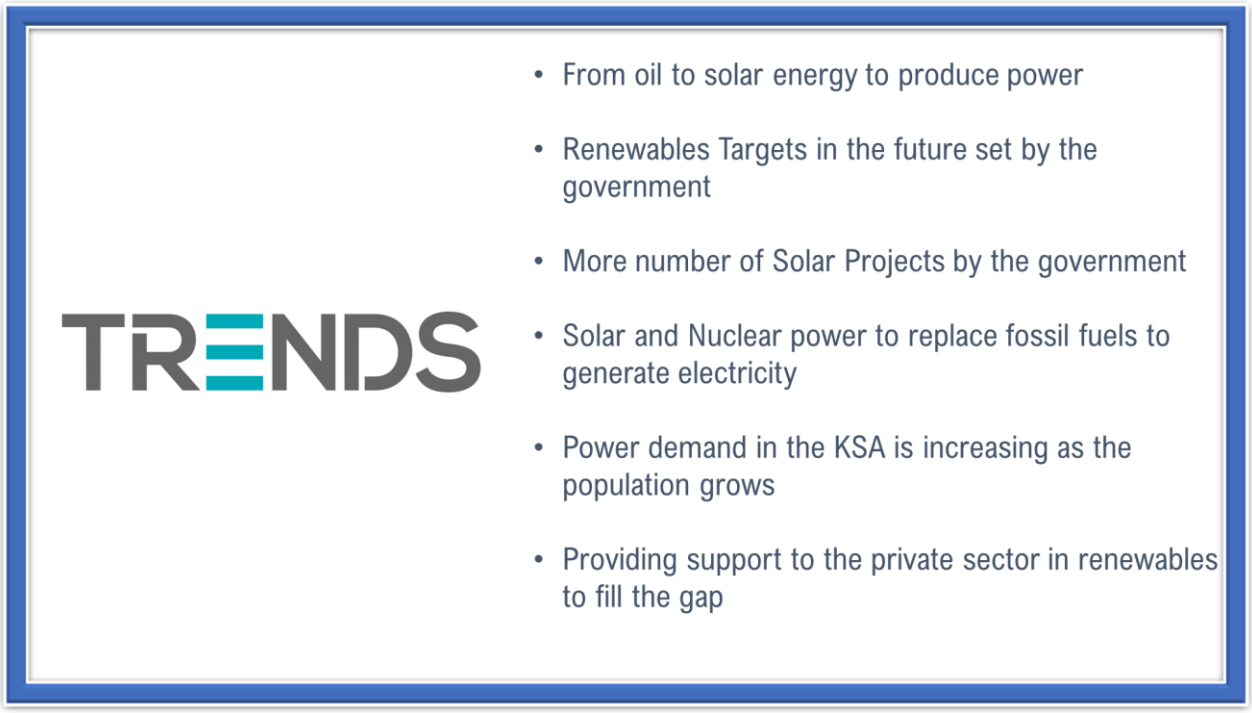


Fig 3.6. Emerging Trends in the Power Sector

- Saudi Arabia government plans to decrease the heavy reliance of oil in power generation and produce one-third of the nation's electricity from solar. This is expected to drive the demand for solar energy and in turn for renewable in the

[7] http://the-saudi.net/business-center/regulation-industrial-licensing.htm

country, hence amounting for the highest share in 2019 amongst other renewable energy types.

- In January 2019, Saudi Arabia had set a new renewable target of developing and installing 58.7 GW of clean power sources over the next decade. The 2030 target will involve the development of 40 GW of photovoltaic (PV) solar capacity and 2.7 GW of concentrated solar power (CSP) capacity.

- As of early 2020, Saudi Arabia launched the third round of its renewable energy programme, which is to add a total of 1.2 gigawatt of solar photovoltaic power capacity to the grid, and open bidding for six solar energy projects with a combined capacity of 1.2 GW.

- Hence, with increased investment and upcoming projects for solar PV in Saudi Arabia, the renewable energy market is expected to increase during the forecast period.

- Electricity generation in Saudi Arabia is dominated by fossil fuels; oil accounting for around 40%. The country is planning to diversify fuels used for power generation to free up oil for export, which witnessed a decline in 2017. The power industry is witnessing a transformation with the inclusion of solar, wind and nuclear power in the power sector, along with increasing natural gas share in the energy mix.

- The electricity generation from renewable sources in 2016 and the past was negligible but is expected to play a significant role to meet the growing demand and diversification of electricity generation. The government is planning to increase electricity generation from renewable sources to 3.45 GW by 2020 and 9.5 GW by 2023.

- Saudi Arabia's power demand is also growing at a substantial rate. In order to increase the share of renewables, reduce the consumption of oil and meet the growing power demands simultaneously, the power industry in Saudi Arabia is expected to attract significant reforms and in turn large investments. However, crude oil production in Saudi Arabia has been on an increase

  Hence, to reduce the over-dependence on hydrocarbons for power production, the aim is for renewables, supported by nuclear energy, to meet the future demand for power, which is further expected to promulgate the renewable energy market in Saudi Arabia.

COMPETITIVE LANDSCAPE

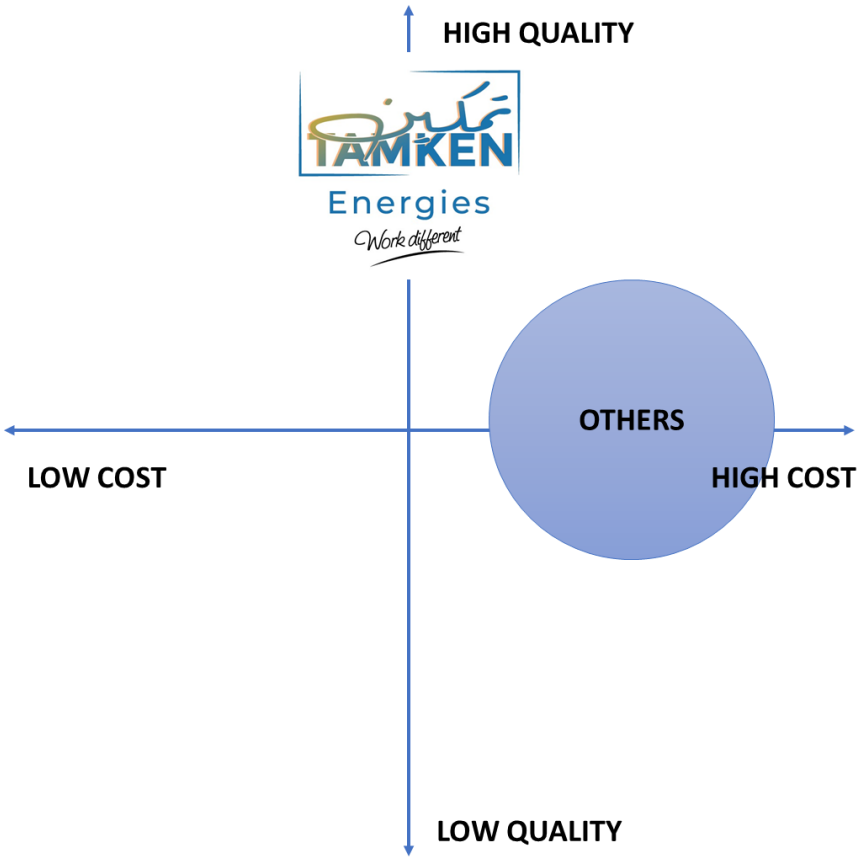


Fig 3.3. Competitive Mapping

As aforementioned the overall market for renewables in the KSA in not consolidated yet and is divided between a number of companies that manufacture and supply products such as Solar PV Panel on a limited scale. Therefore, there is no dominant competitor in the market yet, which is good news for a startup such as Tamken Energies as direct competition will not be that fierce. Some of the main competitors that may compete with Tamken Energies include- Eshraq Solar, Masdar & Nesma, Gtek Solar, Tesla Power, Solar Land Energy, and Alrushaid & Optimum Tracker. However, as seen in fig 3.3. most of these players are mid quality manufacturers who are priced high whereas Tamken Energies in partnership with its Technical Partner will focus on delivering higher quality at a more economic price.

With time as the market research suggests, the overall renewable energy market in the GCC and the KSA will undergo substantial transformation and expansion, giving rise to more competition in the private energy sector including solar energy. The company will need to develop sustainable competitive advantages to combat such competition such as higher quality of products, higher quality of consulting and survey services, better customer support, etc.

SWOT ANALYSIS

Fig 4.1. SWOT Canvas

- **Strengths-** The company is headed by a skilled top management with domain expertise in the renewables segment. This will help the company gain the right direction of growth and profitability.

  The company as a startup is going to establish strong and long-term contracts with key suppliers and technical partner. This will ensure that the operations run smoothly without any hindrance.

  The company's manufacturing facility is going to be a top-notch modern facility with automation of manufacturing wherever possible to reduce labour cost and the chances of human error. This will once again ensure that the company is able to produce high quality products.

Tamken Energies will serve multiple segments at the same time including B2C, B2B and B2G. However, the priority will be given to the B2C segment as most of the customers will arise from this segment.

- **Weaknesses-** As a startup, the company will have to invest in multiple areas of business including capital assets, marketing and promotion, payroll, etc. This will bring the customer acquisition cost quite high in the beginning. However, with time, as the company gains reputation, it will gain organic growth and the overall customer acquisition cost will come down considerably.

  Once again, being a startup, the company does not have any brand equity in the market yet, making it challenging to acquire customers at the initial stage. However, due to company's targeted marketing and promotion efforts, the company will start acquiring customers and its brand reputation will strengthen in the market with time.

- **Opportunities-** The overall demand for renewables such as solar energy is increasing in the region as the consumer and the government wants to limit its dependence on oil and opt for a cleaner, cheaper and more sustainable alternative to power.

  The government of the KSA has rolled out many initiatives to promote the renewable sector and limit dependence on oil. One of such initiatives will be providing support to local manufacturers such as Tamken Energies and increasing privatization of the energy sector.

  The population of the KSA is increasing at a stable rate and so is the overall disposable income of households. Therefore, in the foreseeable future there will be more households to serve.

There are multiple partnership opportunities for a company such as Tamken Energies in the market and the overall external environment such as partnership with marketing companies to improve the company's brand image, third-party logistics providers to transport input materials and/or finished goods, government agencies to win tenders for installation of solar PV panels on a larger scale, etc.

- **Threats-** The competition in the renewables sector in the KSA is limited as of now but in the foreseeable future it is going to be a highly competitive market as demand for renewables such as solar energy is increasing in the region. This will be characterized by entry of multiple new startups as well as foreign companies. Therefore, Tamken Energies should keep a close eye on the emerging competition and prepare itself for oncoming adversity.

  The impact of COVID-19 cannot be ignored as it has almost brought the world to a standstill, impacting almost all industries negatively including and especially manufacturing. For now, the situation seems to be under control but due to highly contagious nature of the virus, another wave of infection can once again damage the industry. Not to mentioned, the resulting recession it will bring due to company's shutting down and people losing jobs.

OPERATIONS SUMMARY

VALUE CHAIN ANALYSIS

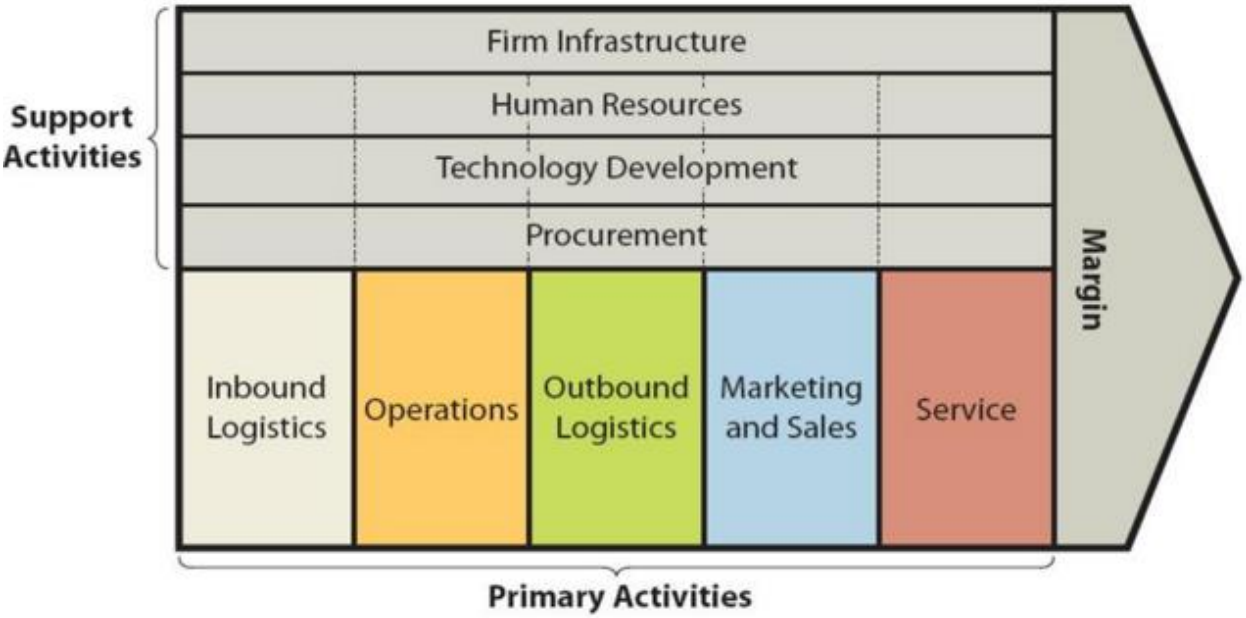


Fig 5.1. Value Chain Analysis

Given below is the description of the primary activities that explains the value chain of Tamken Energies.

- **Inbound Logistics-** Tamken Energies will partner up with suppliers such as Sabic and others, who will help the company procure the input materials. This will form the inbound logistics part of the value chain, where material will be transported to the company's manufacturing location by the suppliers directly.

- **Operations-** Tamken Energies' manufacturing facility in the Industrial City of Modon will store all raw and input materials warehoused at the manufacturing location itself, where it will be processed in the plant to manufacture and produce solar PV panels.

The finished goods will be then warehoused at the same location to be distributed to customers.

- **Outbound Logistics-** Once the company gets orders for PV panels installation by customers, the company will use the services of a third-party logistics provider to transport the panels to the customer's location and then a team from the company will install the PV grid as planned, whether on the roof or the ground.

- **Marketing and Sales-** Tamken will have a dedicated marketing and promotion department in the company, which will take care of all major marketing and promotional activities of the company through digital as well as offline channels. A team of sales personnel will be assembled to liaise with prospective clients in person and bring them onboard as paying customers.

- **Service-** Tamken Energies will go for 100% customer satisfaction and that includes quality customer support and after sales services. The company will have a dedicated department, which will deal with customers and resolve their issues amicably to their utmost satisfaction.

MANUFACTURING WORKFLOW

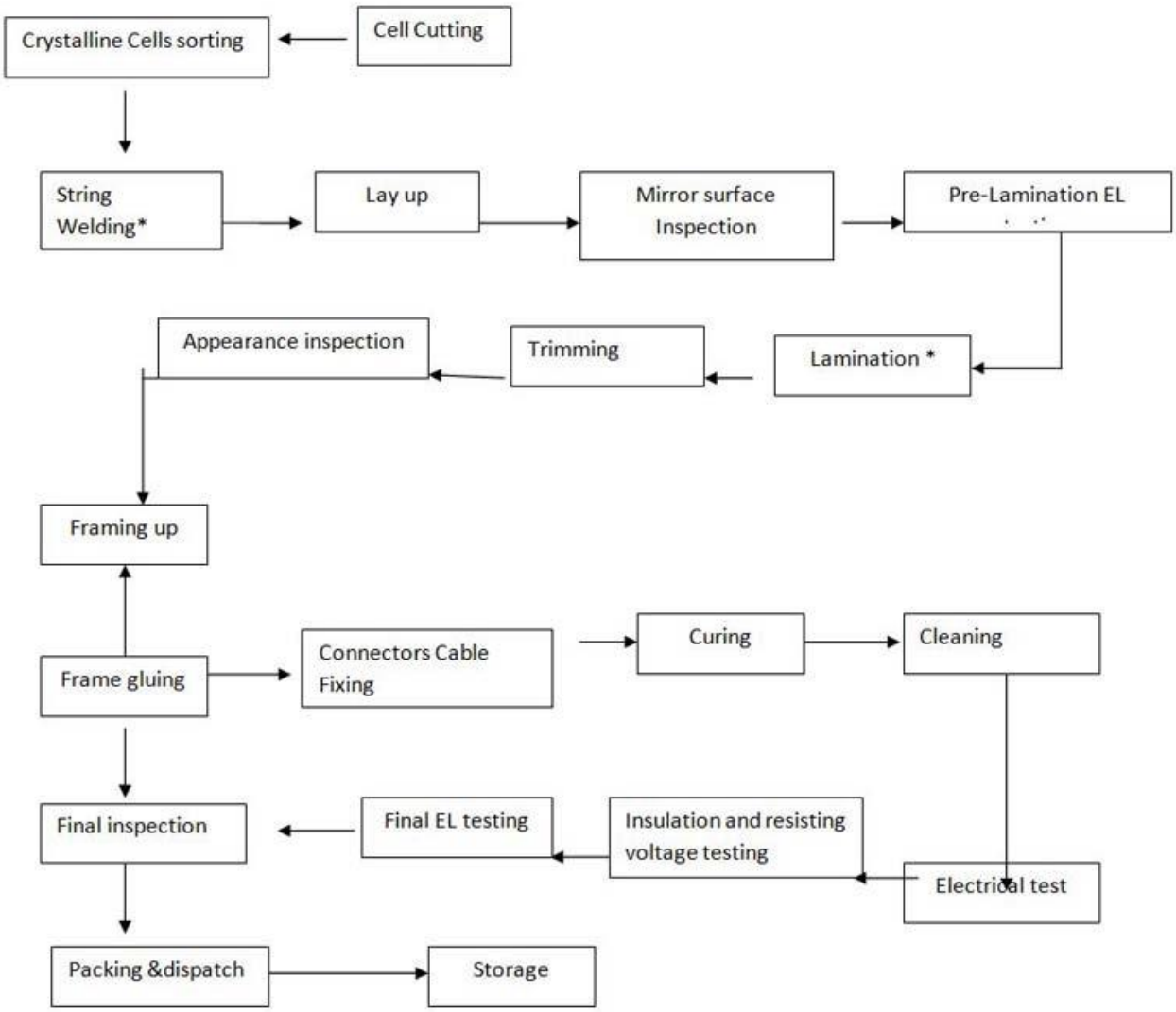


Fig 5.2. Solar Panel Manufacturing Workflow

Fig 5.2. illustrates the overall workflow for the manufacturing of the Solar PV Panel manufacturing. The process can be automated to an extent only and human input will be needed to furnish the finished product such as laminating, gluing, cleaning, etc.

QUALITY MANAGEMENT PROCESS

Solar module quality assurance involves testing and evaluating solar cells and Solar Panels to ensure the quality requirements of them are met. Solar modules (or panels) are expected to have a long service life between 20 and 40 years. They should continually and reliably convey and deliver the power anticipated. modules presented to a wide exhibit of climate conditions alongside use in various temperatures. Solar modules can be tested through a combination of physical tests, laboratory studies, and numerical analyses. Furthermore, solar modules need to be assessed throughout the different stages of their life cycle. Given below are the different phases of testing that Tamken Energies will implement.

Conceptual phase

The first stage can involve design verification where the expected output of the module is tested through computer simulation. Further, the modules' ability to withstand natural environment conditions such as temperature, rain, hail, snow, corrosion, dust, lightning, horizon and near-shadow effects is tested.

Manufacturing phase

Inspecting during manufacturing can also be done by a Quality Testing Engineer. The inspection can include assembly checks, material testing supervision and Non-Destructive Testing (NDT).

Transportation and installation phase

Inspections include pre-dispatch inspection, dimensional control, visual control, and damage control. Documentation and certificates should also be reviewed.

SOLAR PANEL PRODUCTION PLAN

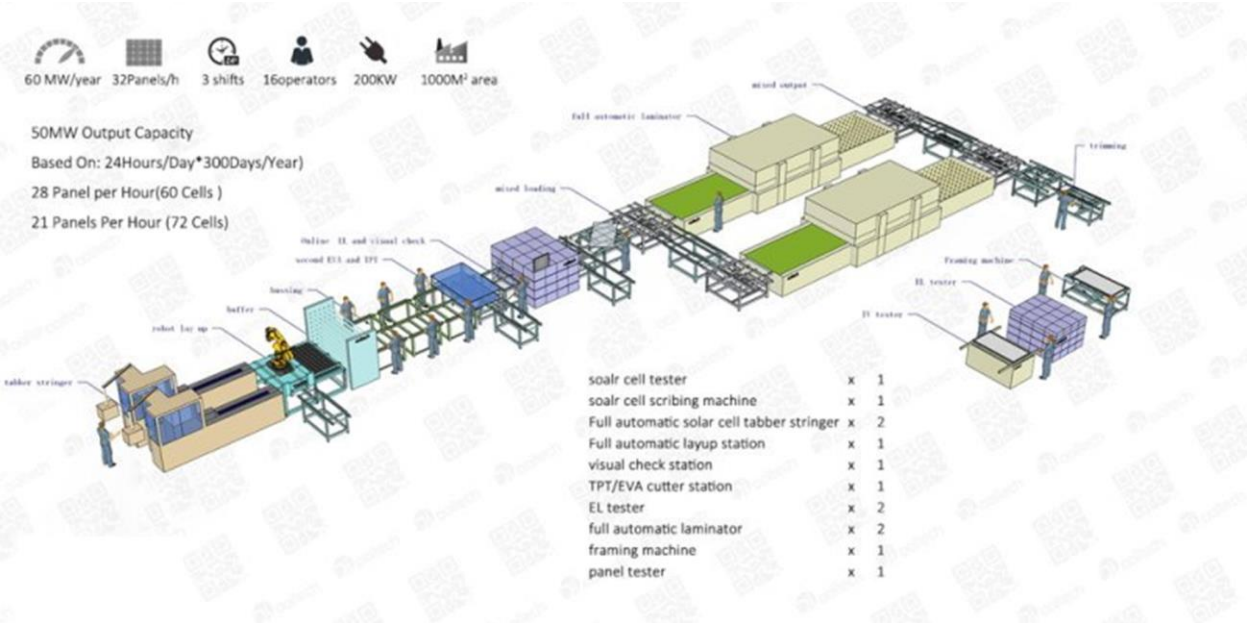


Fig 5.3. Sample Layout of Fully Auto Solar Panel Production Line

Fig 5.3. illustrates a sample layout for a fully auto solar panel production line in a 1,000M^2 area. After the automation, around 16 operators will still be required for manual input where needed. This production line can produce around 21 to 28 panels per hour. Assuming that the facility runs 12 hours a day and 300 days a year that's approx. 75K solar panels a year of full capacity of the plant. Given below are the key machines and equipment that the company will need to buy to assemble a fully auto production line with minimal human input.

Machines and Equipment	Cost (SAR)
· Solar Panel PV Tester	19,000
· Solar Cell Laser Cutting Machine (Damage Free)	40,000
· Solar Cell Stringer Machine	450,000
· Solar String Lay Up Machine	150,000

· Interconnection Soldering Machine	20,000
· Solar EL Defect Tester with Visual Inspecting Function	38,000
· Solar Panel Laminating Machine	38,000
· Solar Module Framing Machine	170,000
· Solar Panel IV Tester	5,000

Fig 5.4. Major Machinery and Equipment Cost

Fig 5.4. illustrates the main machinery and equipment required for the fully automatic production line. As aforementioned, the production line will be fully auto, however, human input will be required for certain steps in manufacturing and operating the machines and equipment. For the sake of the financial plan, the useful life of these machines is considered to be 7 approx. years.

Talking about COGS, the industry average is approx. 75% of sales revenue, that means 25% remains as gross profit. All these numbers suggest, the solar panel manufacturing is a low margin high volume industry.[8]

As far as warehousing goes, a 600M^2 warehouse space will be enough to store the finished and packaged solar panels. Therefore, 1,000M^2 for production plant and 600M^2 for warehousing and another additional 400M^2 for future expansion, parking, etc. A 2,000M^2 site in the industrial city of Modon will cost SAR 5 per square meter, therefore the monthly rent will be approx. SAR 10,000.[9] The manufacturing cost of the plant, warehouse and other structures will cost approx. SAR 500,000.

[8] https://www.lg.com/global/investor-relations-reports
[9] https://modon.gov.sa/en/Systems/Pages/IndustryCost.aspx

HUMAN RESOURCE PLAN

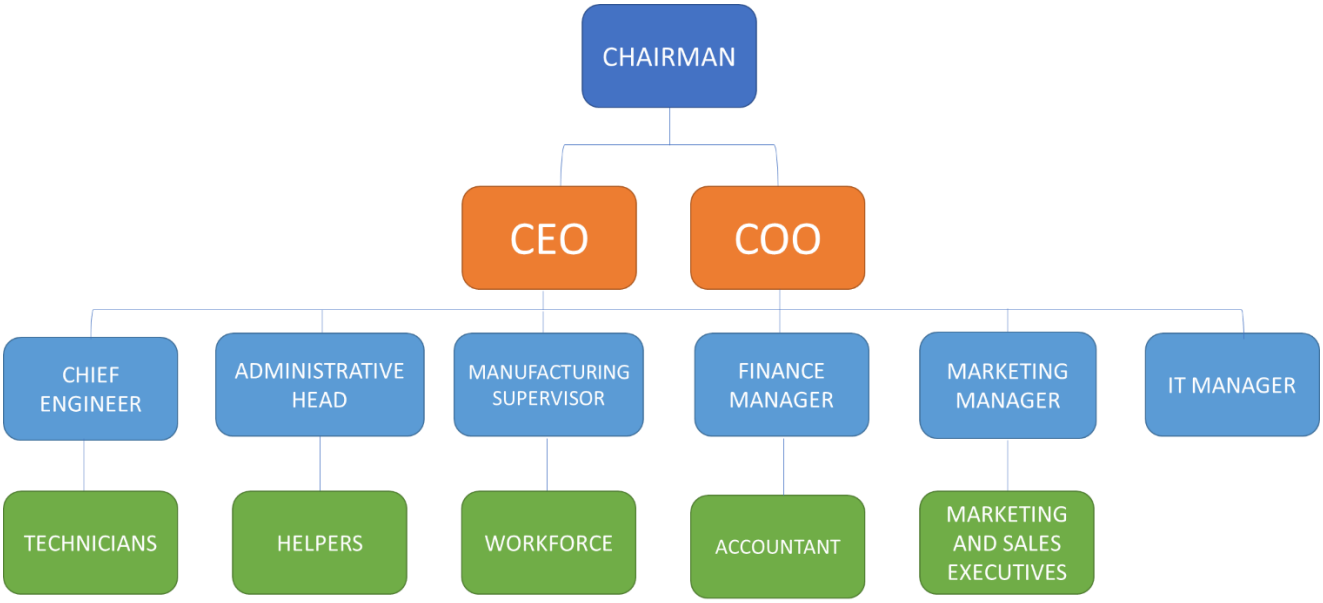


Fig 5.4. Organizational Chart

An organizational structure defines how activities such as task allocation, coordination, and supervision are directed toward the achievement of organizational aims such as the one given above in fig 5.4. for Tamken Energies, which is hierarchical structure.

Organizational structure affects organizational action and provides the foundation on which standard operating procedures and routines rest. It determines which individuals get to participate in which decision-making processes, and thus to what extent their views shape the organization's actions. Organizational structure can also be considered as the viewing glass or perspective through which individuals see their organization and its environment.

An organization can be structured in many different ways, depending on its objectives. Organizational structure allows the expressed allocation of responsibilities for different functions and processes to different entities such as the branch, department, workgroup, and individual.

Organizations need to be efficient, flexible, innovative and caring in order to achieve a sustainable competitive advantage.

Personnel Plan	Year 1	Year 2	Year 3	Year 4	Year 5
Mgmt Team Payroll Structure (Monthly CTC)					
Chairman	41,667	45,833	50,417	55,458	61,004
CEO	33,333	36,667	40,333	44,367	48,803
COO	29,167	32,083	35,292	38,821	42,703
Mgmt Team Payroll					
Chairman	500,000	550,000	605,000	665,500	732,050
CEO	400,000	440,000	484,000	532,400	585,640
COO	350,000	385,000	423,500	465,850	512,435
Mgmt Team Total Payroll	**SAR 1,250,000**	**SAR 1,375,000**	**SAR 1,512,500**	**SAR 1,663,750**	**SAR 1,830,125**
Personnel Team Size					
Chief Engineer	1	1	1	1	1
Administration	2	2	2	2	2
Technicians	2	2	2	2	2
Helpers	3	3	3	3	3
Manufacturing Supervisor	1	1	1	1	1
Assembly Workforce	10	10	10	10	10
Finance Manager	1	1	1	1	1
Accountant	1	1	1	1	1
Marketing Manager	1	1	1	1	1
Marketing Executives	3	3	3	3	3
Sales Executives	5	5	5	5	5
IT Manager	1	1	1	1	1
Customer Support	1	1	1	1	1
Misc.	2	2	2	2	2
Total No. Of Personnel	34	34	34	34	34
Personnel Team Payroll Structure (Monthly CTC)					
Chief Engineer	15,000	16,500	18,150	19,965	21,962
Administration	7,500	8,250	9,075	9,983	10,981
Technicians	7,000	7,700	8,470	9,317	10,249
Helpers	5,000	5,500	6,050	6,655	7,321
Manufacturing Supervisor	6,000	6,600	7,260	7,986	8,785
Assembly Workforce	4,000	4,400	4,840	5,324	5,856
Finance Manager	16,000	17,600	19,360	21,296	23,426
Accountant	5,000	5,500	6,050	6,655	7,321
Marketing Manager	14,000	15,400	16,940	18,634	20,497
Marketing Executives	6,000	6,600	7,260	7,986	8,785
Sales Executives	6,000	6,600	7,260	7,986	8,785
IT Manager	10,000	11,000	12,100	13,310	14,641
Customer Support	4,000	4,400	4,840	5,324	5,856
Misc.	4,000	4,400	4,840	5,324	5,856
Personnel Team Payroll					
Chief Engineer	180,000	198,000	217,800	239,580	263,538
Administration	180,000	198,000	217,800	239,580	263,538
Technicians	168,000	184,800	203,280	223,608	245,969
Helpers	180,000	198,000	217,800	239,580	263,538
Manufacturing Supervisor	72,000	79,200	87,120	95,832	105,415
Assembly Workforce	480,000	528,000	580,800	638,880	702,768
Finance Manager	192,000	211,200	232,320	255,552	281,107
Accountant	60,000	66,000	72,600	79,860	87,846
Marketing Manager	168,000	184,800	203,280	223,608	245,969
Marketing Executives	216,000	237,600	261,360	287,496	316,246
Sales Executives	360,000	396,000	435,600	479,160	527,076
IT Manager	120,000	132,000	145,200	159,720	175,692
Customer Support	48,000	52,800	58,080	63,888	70,277
Misc.	96,000	105,600	116,160	127,776	140,554
Personnel Staff Total Payroll	**SAR 2,520,000**	**SAR 2,772,000**	**SAR 3,049,200**	**SAR 3,354,120**	**SAR 3,689,532**
Company Subtotal Payroll	**SAR 3,770,000**	**SAR 4,147,000**	**SAR 4,561,700**	**SAR 5,017,870**	**SAR 5,519,657**

Fig 5.2. Hiring Plan and Projected Payroll

RISK MANAGEMENT

Risk Category	Risk Type	Mitigation
Internal Risks	Cash Flow Low operating cash flow and liquidity might hamper ongoing performance	The company will maintain a permanent contingency fund. In addition, there will be special arrangements with the investors to aid crucial cash-related contingencies
	Employee Turnover Sudden or abrupt departure of key employees will cause brain drain and might result in lost competencies and performance issues	Robust employee contracts will prevent key employees from quitting abruptly. Knowledge management systems will be put in place to document best practices and know-how
	Quality Control An unhappy customer could be the bane of a startup and lacklustre quality control will diminish brand reputation and business performance	Dedicated account management and customer service will be put in place to keep customers happy and satisfied. Regular customer feedback and survey system to monitor quality
External Risks	Intellectual Property Lack of IP protection and enforcement may result in passing off and hurt brand equity	All trademark and brand will be registered and protected under IP laws of the KSA as well as international conventions. Unique Internal know-how and best practices will remain trade secrets. Strict legal action will be taken against infringers to set examples
	Law Suits An expensive lawsuit can be the demise of a startup.	An able legal department will liaison and coordinate with other law firms, attorneys and the aggrieved parties to manage and resolve legal disputes amicably
	COVID-19 A wave of mass infection can have an adverse impact on the company due to risk of infection as well as government restrictions such as lockdowns.	The company from its side, will take all measures to ensure that their facility and office remain compliant with the preventive measure such as all employees will be required to put on masks and regularly sanitize their hands.

MARKETING AND SALES

GO-TO-MARKET STRATEGY

Fig 6.1. Go-to-market Strategy Essential

Fig 6.1. illustrates the essential component of an effective go-to-market strategy. Tamken Energies have accomplished and readied all activities and tactics to go live to make the product reach the market in the most efficacious manner.

PHASES	ACTIVITIES
PHASE 1	• Conduct a detailed Market Analysis to measure the market opportunity in collaboration with the technical partner and find out the actual gap between demand and supply • Develop a fully functional company website with all product and service info as well as contact info for customers • Establish partnerships with service providers such as ISPs, third-party logistics provider, installation labour contractor, digital marketing agency, recruitment agency, etc.
PHASE 2	• Rent/lease property in the Industrial City of Modon and start construction of manufacturing facility • Purchase all capital assets including machinery and equipment essential for manufacturing and automation among other tangible assets. • Setup a corporate office near the manufacturing plant in a rented space for management employees.

	• Begin hiring and training of essential staff and deploy them in their respective departments.
PHASE 3	• Procure components from local suppliers such as glass, frame, batteries, etc. and other components from international suppliers such as electrical controllers • Go live and start manufacturing of Solar PV Panels. • Deploy sales team and marketing and promotion team to acquire first set of customers and start selling panels, spare parts, etc. and providing consultation and survey services.

As seen in the table above, the Go-to-market Strategy will involve three major phases during which a lot of capital will be required to make purchases and pay service fees, etc. The company will deploy a Sales Team, which will consist of Field Sales Executives, who will go out in the market and liaise with prospective customers face to face and try to bring them onboard as paying customers. As far as marketing and promotion is concerned, the company will launch the following key activities.

- **Search Engine Marketing-** The company website will be needed to be promoted through search engine marketing using Google AdWords, this will enhance the visibility of the company website on the search engine.

- **Search Engine Optimization-** SEO tactics will further enhance the website's visibility on the search engine and bring organic traffic on the website.

- **Social Media Marketing-** Tamken Energies will setup social media accounts on all major social media platforms such as Facebook, Twitter, Instagram, etc. Thereafter, the company will engage in social media marketing to promote the brand and gain followers to spread the word.

- **Online Press Releases-** The company will write up and publish press releases on online platforms to announce its new business opening as well as the core features and benefits of its products to educate the public.

- **Email Marketing-** Bulk email marketing will be done, where promotional emails and newsletters will be sent to prospective and existing customers to help the company acquire and retain customers.

- **Events and Seminars-** The company will participate in and/or sponsor events such as Energy Seminars and Startup Events to promote the brand.

PRICING STRATEGY

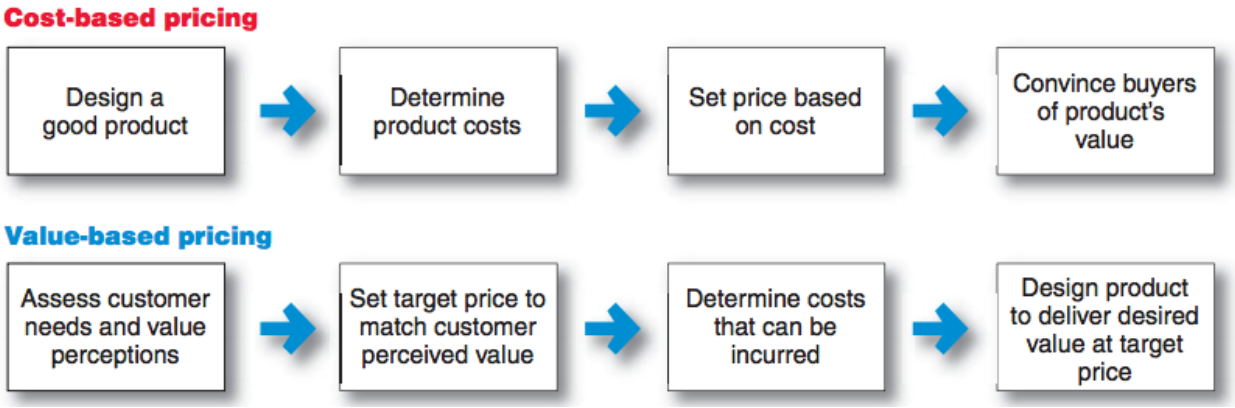


Fig 6.1. Pricing Strategies

Fig 6.1. illustrates the two different pricing strategies that any company can utilize to arrive at a final price for its product. Under cost-based pricing, Tamken Energies will have to calculate the direct cost of manufacturing per unit, which will be the minimum price after that the company will add margin and see how much is the customer willing to pay for their product. However, Tamken Energies will try to promote itself as a high quality and slightly lower-priced product, therefore, as per market research the average cost of installation (including cost of panels and equipment) is close to SAR 45,000 while a smaller installation costs an average of SAR 19,000 and a high end and bigger system would cost around SAR 150,000.[10]

KEY MILESTONES

Given below is a timeline for the next 6 months after receiving the funds. This is what the company has envisioned, however, there might be variances during real time implementation.

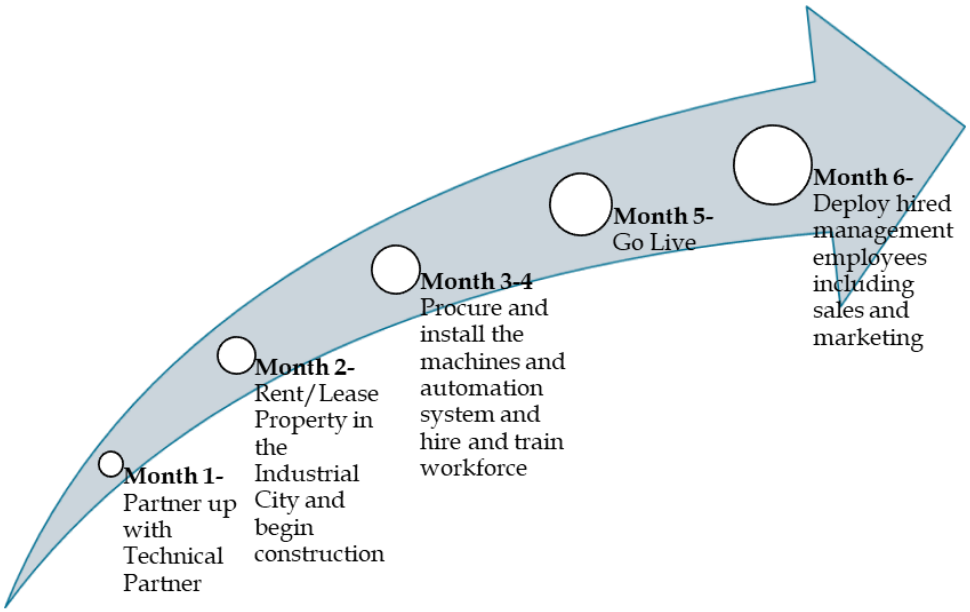


Fig 6.2. 6-Month Timeline

[10] https://www.consumeraffairs.com/solar-energy/how-much-do-solar-panels-cost.html#:~:text=How%20much%20does%20it%20cost,can%20cost%20%2440%2C000%20or%20more.

PRODUCTION PLAN

The maximum capacity of the plant is to produce around 75,000 solar panels annually. The company while raising seed funds will also account for buying inventory for the first quarter. After that inventory for one month will be kept to keep the production running at all time without hurdles. The first year will be slow, and it is anticipated that the company might manufacture and sell around 1,000 solar panels, after that the production will increase by a CAGR of 65% each year.

The company will start prioritizing regions in the KSA starting from Riyadh and then others year by year to increase sales.

PROJECTED REVENUE

The company plans on selling solar panel PV systems to homeowners and secondarily to businesses starting from Riyadh. For the purpose of the same, the product line has been divided into three tiers- 1,2, and 3. Now as per research, the following is the plan.

System Size	No. of Panels Needed	Estimated Annual Production
Tier 3- 4kW	13	6,400 kWh
Tier 2- 8kW	25	12,800 kWh
Tier 1- 12kW	40	19,200 kWh

The cost of solar has dropped significantly in the past several years. A decade ago, an average 6-kilowatt hour residential solar system could cost more than $50,000. Now, the outright cost of a typical home installation ranges from $16,200 to $21,400, which is a 62% average annual decrease.

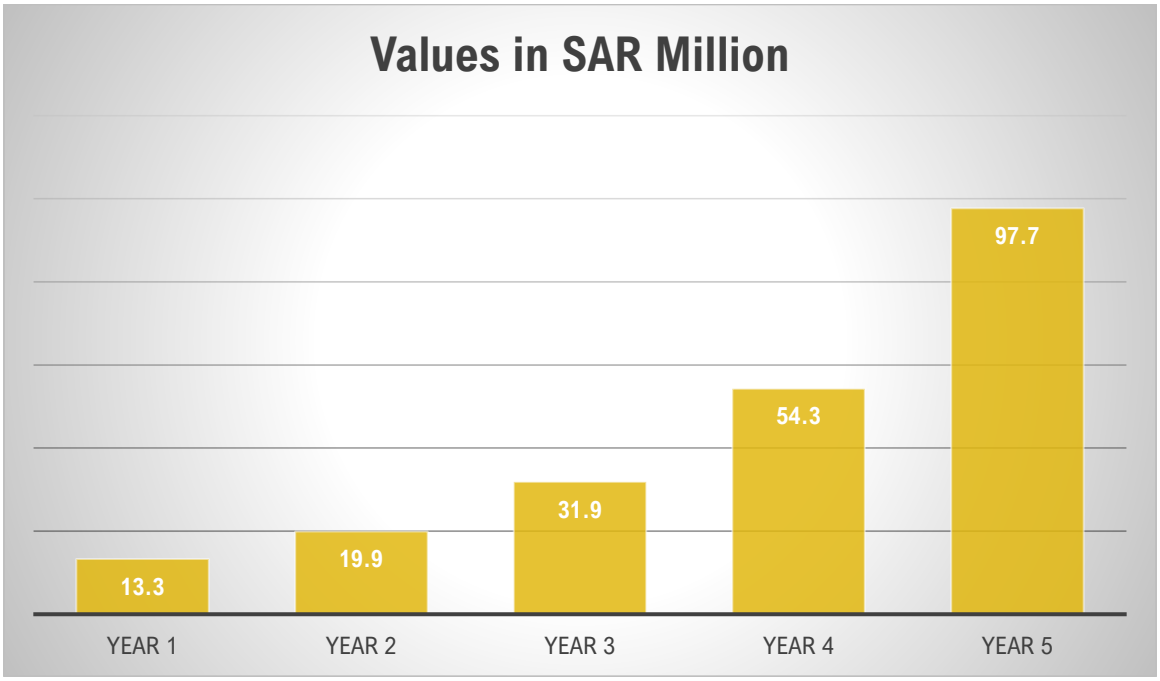


Fig 6.3. Projected Revenue

Projected Revenue	Year 1	Year 2	Year 3	Year 4	Year 5
			Price Per Unit		
Tier 1 System	112,000	112,000	112,000	112,000	112,000
Tier 2 System	57,000	57,000	57,000	57,000	57,000
Tier 3 System	28,500	28,500	28,500	28,500	28,500
			Number of Units Sold Each Month		
Tier 1 System	1	2	2	4	7
Tier 2 System	10	15	24	41	73
Tier 3 System	15	23	36	61	110
			Revenue Generated		
Tier 1 System	1,344,000	2,016,000	3,225,600	5,483,520	9,870,336
Tier 2 System	6,840,000	10,260,000	16,416,000	27,907,200	50,232,960
Tier 3 System	5,130,000	7,695,000	12,312,000	20,930,400	37,674,720
Total Revenue	**SAR 13,314,000**	**SAR 19,971,000**	**SAR 31,953,600**	**SAR 54,321,120**	**SAR 97,778,016**

Fig 6.4. Projected Revenue Statement

Fig 6.4. illustrates the company's projected revenue over the course of five years. The company is expected to grow at a CAGR of 65% till year 5.

FINANCIAL SUMMARY

FUNDING REQUIREMENTS

Seed Funds Required	
Expenses	**Amount**
Inventory	2,496,375
Payroll	3,270,000
Other Benefits	392,400
Chairman Salary	500,000
Capex	1,022,000
Construction Cost	500,000
Marketing and Promotion	1,000,000
Rent	120,000
Utilities	114,000
Legal	37,500
Contingency Fund and Other Expenses	945,228
Total	**SAR 10,397,503**

Fig 7.1. Funding Requirements and Allocation

Fig 7.1. illustrates the startup's seed fund requirements which is close to SAR 10.3 million. As seen in the table, the funds will be appropriated in meeting all major expenses of year 1 and helping the company set up its business operations as planned. The company is projected to become self-sustainable from the second year in terms of funding, which is represented in the cash flow statement given below.

PROJECTED INCOME STATEMENT

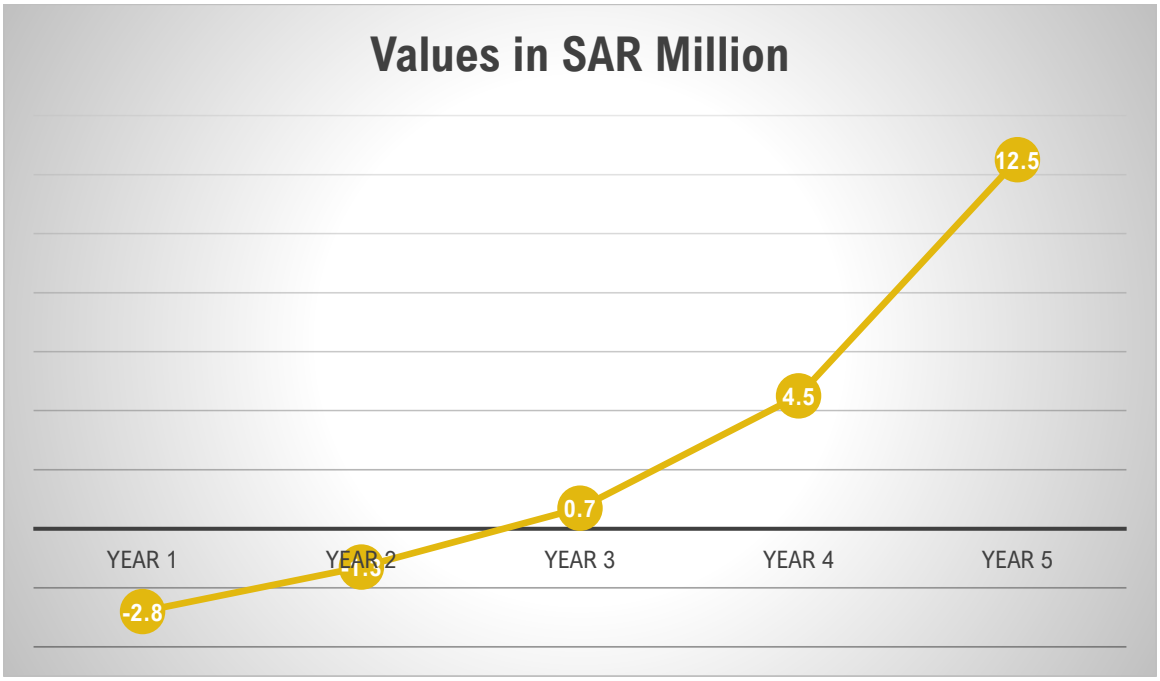


Fig 7.2. Projected Income

Projected Income Statement	Year 1	Year 2	Year 3	Year 4	Year 5
Sales	13,314,000	19,971,000	31,953,600	54,321,120	97,778,016
COGS	9,985,500	14,978,250	23,965,200	40,740,840	73,333,512
Gross Profit	3,328,500	4,992,750	7,988,400	13,580,280	24,444,504
Gross Margin	25.00%	25.00%	25.00%	25.00%	25.00%
Operational Expenses					
Payroll	3,270,000	3,597,000	3,956,700	4,352,370	4,787,607
Other Benefits	392,400	431,640	474,804	522,284	574,513
Chairman Salary	500,000	550,000	605,000	665,500	732,050
Depriciation (Manufacturing)	132,857	132,857	132,857	132,857	132,857
Depriciation (Office Furnishing)	17,511	17,511	17,511	17,511	17,511
Construction Cost	500,000	0	0	0	0
Marketing and Promotion	1,000,000	1,200,000	1,440,000	1,728,000	2,073,600
Rent	120,000	132,000	145,200	159,720	175,692
Utilities	114,000	125,400	137,940	151,734	166,907
Legal	37,500	41,250	45,375	49,913	54,904
Licensing Cost	2,000	0	0	0	0
Insurance	3,750	3,750	3,750	3,750	3,750
Maintenance & Repair	37,500	37,500	37,500	37,500	37,500
Misc	37,500	37,500	37,500	37,500	37,500
Total Operating Expenses	**SAR 6,165,019**	**SAR 6,306,409**	**SAR 7,034,138**	**SAR 7,858,639**	**SAR 8,794,392**
Profit Before Interest & Taxes	**-SAR 2,836,519**	**-SAR 1,313,659**	**SAR 954,262**	**SAR 5,721,641**	**SAR 15,650,112**
Interest Expense	0	0	0	0	0
Taxes Incurred	0	0	190,852	1,144,328	3,130,022
Net Profit	**-SAR 2,836,519**	**-SAR 1,313,659**	**SAR 763,410**	**SAR 4,577,312**	**SAR 12,520,090**
Net Margin%	**-21.30%**	**-6.58%**	**2.39%**	**8.43%**	**12.80%**

Fig 7.3. Projected Income Statement

Fig 7.3. shows the income performance, the company will bear loss in the first two years, by year 3 the company is projected to break even and be profitable from thereon.

PROJECTED CASH FLOW STATEMENT

Projected Cash Flow Statement		Year 1	Year 2	Year 3	Year 4	Year 5
Operations						
Cash Receipts from						
	Sales	13,314,000	19,971,000	31,953,600	54,321,120	97,778,016
Cash Paid for						
	COGS	9,985,500	14,978,250	23,965,200	40,740,840	73,333,512
	Payroll	3,270,000	3,597,000	3,956,700	4,352,370	4,787,607
	Other Benefits	392,400	431,640	474,804	522,284	574,513
	Chairman Salary	500,000	550,000	605,000	665,500	732,050
	Construction Cost	500,000	0	0	0	0
	Marketing and Promotion	1,000,000	1,200,000	1,440,000	1,728,000	2,073,600
	Rent	120,000	132,000	145,200	159,720	175,692
	Utilities	114,000	125,400	137,940	151,734	166,907
	Legal	37,500	41,250	45,375	49,913	54,904
	Licensing Cost	2,000	0	0	0	0
	Insurance	3,750	3,750	3,750	3,750	3,750
	Maintenance & Repair	37,500	37,500	37,500	37,500	37,500
	Misc	37,500	37,500	37,500	37,500	37,500
	Interest	0	0	0	0	0
	Tax	0	0	190,852	1,144,328	3,130,022
Net Cash Flow from Operations		**-SAR 2,686,150**	**-SAR 1,163,290**	**SAR 913,779**	**SAR 4,727,681**	**SAR 12,670,459**
Investing Activities						
Cash Receipts from						
	Sale of Property and Equipment	0	0	0	0	0
	Collection of Principal on Loans	0	0	0	0	0
	Sales of Investment Securities	0	0	0	0	0
Cash Paid for						
	Purchase of Property and Equipment	1,022,000	0	0	0	0
	Making Loans to Other Entities	0	0	0	0	0
	Purchase of Investment Securities	0	0	0	0	0
Net Cash Flow from Investing Activities		**-SAR 1,022,000**	**SAR 0**	**SAR 0**	**SAR 0**	**SAR 0**
Financing Activities						
Cash Receipts from						
	Issuance of Stock	10,397,503	0	0	0	0
	Borrowing	0	0	0	0	0
Cash Paid for						
	Repurchase of Stock	0	0	0	0	0
	Repayment of Loans	0	0	0	0	0
	Dividends	0	0	0	0	0
Net Cash Flow from Financing Activities		**SAR 10,397,503**	**SAR 0**	**SAR 0**	**SAR 0**	**SAR 0**
Net Increase in Cash		**SAR 6,689,353**	**-SAR 1,163,290**	**SAR 913,779**	**SAR 4,727,681**	**SAR 12,670,459**
Cash at the Beginning of the Year		**SAR 0**	**SAR 6,689,353**	**SAR 5,526,063**	**SAR 6,439,841**	**SAR 11,167,522**
Cash Balance		**SAR 6,689,353**	**SAR 5,526,063**	**SAR 6,439,841**	**SAR 11,167,522**	**SAR 23,837,981**

Fig 7.4. Projected Cash Flow Statement

Fig 7.4. shows the projected cash position of the company. The table shows constant increase in company's cash balance each year.

PROJECTED BALANCE SHEET

Projected Balance Sheet	Year 1	Year 2	Year 3	Year 4	Year 5
Assets					
Current Assets					
Cash	6,689,353	5,526,063	6,439,841	11,167,522	23,837,981
Other Current Assets	0	0	0	0	0
Total Current Assets	**SAR 6,689,353**	**SAR 5,526,063**	**SAR 6,439,841**	**SAR 11,167,522**	**SAR 23,837,981**
Long-term Assets					
Long-term Assets	1,022,000	1,022,000	1,022,000	1,022,000	1,022,000
Accumulated Depriciation	150,369	300,737	451,106	601,474	751,843
Total Long-term Assets	**SAR 871,631**	**SAR 721,263**	**SAR 570,894**	**SAR 420,526**	**SAR 270,157**
Total Assets	**SAR 7,560,984**	**SAR 6,247,325**	**SAR 7,010,735**	**SAR 11,588,048**	**SAR 24,108,138**
Liabilities & Capital					
Current Liabilities					
Account Payable	0	0	0	0	0
Current Borrowing	0	0	0	0	0
Other Current Liabilities	0	0	0	0	0
Total Current Liabilities	0	0	0	0	0
Long-term Liabilities	0	0	0	0	0
Total Liabilities	0	0	0	0	0
Paid-in Capital	10,397,503	10,397,503	10,397,503	10,397,503	10,397,503
Retained Earnings	0	-2,836,519	-4,150,177	-3,386,767	1,190,545
Earnings	-2,836,519	-1,313,659	763,410	4,577,312	12,520,090
Total Capital	**SAR 7,560,984**	**SAR 6,247,325**	**SAR 7,010,735**	**SAR 11,588,048**	**SAR 24,108,138**
Total Liabilities & Capital	**SAR 7,560,984**	**SAR 6,247,325**	**SAR 7,010,735**	**SAR 11,588,048**	**SAR 24,108,138**
Net Worth	**SAR 7,560,984**	**SAR 6,247,325**	**SAR 7,010,735**	**SAR 11,588,048**	**SAR 24,108,138**

Fig 7.5. Projected Balance Sheet

Fig 7.5. shows the balance sheet based on the five-year projections.