

## **ENERGY SECURITY AND SUSTAINABILITY TO STRENGTHEN THE GROWTH OF PAKISTAN ECONOMY**

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### **Abstract**

*Pakistan has been facing crucial energy crisis for years. It's high time, when Government should realize how much mental and emotional distress this power shortage has been creating in the rural areas; where the power outages happen for more than 10 hours a day. The entire economic growth of Pakistan has been stalled as more than 50% of the country's population is located in rural areas. Without electricity they are good for nothing. They cannot seek knowledge, they cannot work, and they lag behind in all phases of their life. The sunlight coming to the earth is one of the biggest blessings to the mankind and its surroundings from the Almighty. If this energy can be put to effective use by generating electricity, nothing can be like it. The solar photovoltaic (PV) is the widely used technology for generating electricity out of solar energy. As solar PV is gaining popularity, the cost associated in manufacturing and installing a solar PV system has also declined over the last twenty years. This paper will examines that solar photovoltaic (PV) would be the best to overcome energy crises in rural areas of Pakistan. Energy security and its sustainability play a vital role for developing the economic growth of a country. Study objective is to seek the importance of solar energy for energy security in rural areas of Pakistan and to find the possible ways to implement this worth able strategy as soon as possible with the lowest possible cost associated with the model.*

**Keywords:** Energy Crisis, Power Shortage, Solar Photovoltaic, Solar Photovoltaic, Sustainability

## INTRODUCTION

Energy security and sustainability is the most important factor to foster the economic growth of a country. Now-a-days in Pakistan the issue of energy security is very common and the biggest issue. According to IMF the Pakistan's economic situation is worsening and government urgently needs to address deep problems in its energy sector while enhance growth to meet a rapidly growing population. The objective of this study is to overcome energy crises in rural areas through solar panels or solar energy. The basic aim is to address the energy problems with all its possible outcomes according to the needs of the people of rural areas. The people who lives in rural areas facing this problem since many decades ago and still they are facing the huge crises of energy. Their children's cannot study after sunset due to shortage of electricity. Shopkeepers cannot open their shops for too long due to lack of electricity. Government has to take serious actions because citizens are the essential core for the growth of any country. If citizens live contentedly or they have all their necessary resources of living then they work blissfully, if they work in great so country's employments rate will automatically elevate higher. Due to shortage of electricity 70% people in rural areas are getting into depression. The people who lives in rural areas are also human, they also wants to spend their life significantly. Government must take initiative to solve the energy problems of rural areas as soon as they can.

The purpose of this study is to seek the energy problems of rural areas and through solar panels this energy dilemma can be overcome. This paper defines the strategies that would be best to develop the energy security and its sustainability in rural areas till 2030. Pakistan is ranked number one in the World Bank's 'Ease of Doing Business Index.' in Asia world's 2<sup>nd</sup> largest producer of water, buffalo meat and milk, world's 3<sup>rd</sup> largest producer of cotton, the 4<sup>th</sup> largest goat meat supplier, Pakistan has 5<sup>th</sup> largest Coal and Gold reserves, the 7<sup>th</sup> largest wheat grower. Pakistan has a lot of resources but these resources are not utilizing well that's why Pakistan is facing huge economic crises. The study addresses why solar energy would be best option for the country's economic growth except biomass or hydro power. During the research study found that Bangladesh was the country who were facing economic crises since a decades ago but when they implemented a solar house system on the roof of every house in rural areas then everyone in Bangladesh are free to use electricity easily. Peoples of Bangladesh are very happy because electricity shortage is the main and basic concern, due to which people who were lives in rural areas couldn't work well after sunset. Now Bangladesh uses this strategy of solar energy through which they can easily overcome their energy crises as soon as they can. If Pakistan follows the same Bangladesh model so it will be easier for Pakistan to overcome energy crises in the upcoming years. If Pakistan do all the manufacturing

of solar energy in china, and then make a plant in the land of Baluchistan or where they have a huge land area then it would be easier for Pakistan to meet the demands of energy or to sustain the energy level in a country. China is increasingly becoming a global force in international clean energy investment; china has provided nearly \$40 billion to other countries solar and wind industries over the past decades. In china labor cost and manufacturing cost is inexpensive as compare to other countries.

The picture below tells a true story of a woman lives in Bangladesh who was very happy after using solar house system.



Study focuses on solar power. The question is here what are solar home systems? Solar home system are small photovoltaic systems that transform solar energy into electricity, providing a decentralized power supply for individual users, households, small business and social

institutions. This system normally consists of a photovoltaic panel with a peak capacity of 10 to 130 watts, a battery, a charge controller, and some lightening units. In addition to lightening SHS supply power to small electric appliances such as radios, cassette players, mobile phone chargers and black and white Televisions. For solar power Pakistan needs to make a battery, because without battery it cannot work for too long. The battery is expensive but it expense only one time, in long run Pakistan has an advantage.

Study believes that it would be the utmost challenge for Pakistan but if Bangladesh a smallest state can implement this model and still striving to overcome their energy crises so why not Pakistan. Pakistan has a lot of resources and it's an independent state. Government can itself overcome the energy crises by adopting Bangladesh model.

This paper will find all its possible outcomes which can be best to overcome energy crises and its sustainability through solar power. This paper divided into five sections. Section one will define the historical background of energy security in rural areas, advantages and disadvantages of Solar power, its future growth, comparisons between Bangladesh, china, India and Pakistan, manufacturing process of solar power in china, tariff policies, educational improvement through solar home system, economic prosperity, and employment opportunities. Section two will reviews all its previous studies done on solar power. Section three will define methodology, sources of data, respondents of the study, limitations and scope, budgeting. Section four will define study quantitative and qualitative analysis through SPSS and EVIEWS software, possible results, policy implications, and potential beneficiaries. Section five will give conclusion of the study, recommendations and list of references.

## **Hypothesis**

Does solar energy provides energy security and sustainability in rural areas of Pakistan to strengthen the growth of Pakistan economy?

**H0** (null hypothesis): solar energy doesn't provide energy security and sustainability in rural areas of Pakistan to strengthen the growth of Pakistan economy.

**H1** (alternative hypothesis): solar energy provides energy security and sustainability in rural areas of Pakistan to strengthen the growth of Pakistan economy.

## **Time Horizon**

It will take eleven months to complete this project research probably from July 2015- July 2016

## LITERATURE REVIEW

Zeeshan Alam Nayyar (2014) in his research article of “assessment of present conventional and non-conventional energy scenario of Pakistan” concluded that Pakistan facing worst energy crises due to which social economic development is declining day-by-day, sustainability becoming critical and tolerance of the people becoming less. He stated that industrial activities declining every day due to long electricity shut-down. He carried out reviews between assess the demography of the country versus energy sectors, energy suppliers and consumptions, status of fossil fuel resources(oil, gas,& coal) conventional 2001-2011. During his research he found that conventional resources are not enough to meet the growing demand. He found that renewable energy resources are encouraging in Pakistan but not implement to any satisfaction. He also whispered that mismanagement, lack of sincerity, half-hearted consideration to energy issues, financially self-oriented cross cutting interest and no efforts on long term energy projects are the main causes of energy crises in Pakistan.

M.J.S Zuberi, S.Z Hasany, M.A Tariq (2013)in their research article of “assessment of biomass energy resources potential in Pakistan for power generations” stated that Pakistan is facing serious energy crises and there is a huge gap between energy demand and energy supply. Demand is increasing exponentially and expected to increase more than 66000 MW by 2030 where supply remains constant over the last few years due to frozen capacity except using alternate energy resources. During their study they found that electricity shortfall has reached up to 6000MW. They found that energy mostly produced from fossil fuels which are not only finite and expensive to attract but also contribute towards environmental pollutions. In their opinion renewable resources are attractive. Biomass energy can serve as a viable alternative to meet the hiking demands of electricity in rural areas of Pakistan. Biomass power is decentralized and resources are available all over the country. If these resources are utilize by their full extent for power productions, can provide a sharp up to 42% in the total electric power generation in current scenario.

Muhammad Alam Hussain Mondal (2010) in his one of his paper “potential and viability of grid-connected solar PV system in Bangladesh” stated that annual electricity generation of the purposed solar PV system varies between a minimum of 1653 MW/year at Barisal and a minimum of 1844 MW/year at Dinajpur. He found that per unit electricity production cost varied from 13.25 to 17.78 BDT which was cost competitive with grid connected fuel-oil based power generation which was around 15-18 BDT. He concluded that if clean development mechanism, carbon tax, oil prices are considered to be increase, then unit cost would be lower than the grid connected fuel-oil based power generation. During his research he found some favorable condition which based on all economic indicators for the development of the purposed 1MW grid

connected solar power PV system in Bangladesh. He also said that the minimum of 1423 tons of greenhouse gas emission can be avoided annually by utilizing the proposed solar Photovoltaic system at any part of the country.

Mohammad Rofiqul Islam (2006) in his article of “renewable resources and technology practices in Bangladesh” considered energy crises was a serious crises in Bangladesh in rural areas. He found that Bangladesh endowed with vast renewable energy resources such as biomass and solar insolation. Many NGO’s and government sectors had tried their best to comprehend and to address the crises of energy. The development had funded so far by donor agencies in collaboration with government and NGO’s. He concluded that 60% of total energy demand of the country is supplied by indigenous biomass based fuels. Activities on development and promotion of biomass technologies have been going for one decade. He also said that solar radiation availability is as high as 1700Kwh/m<sup>2</sup>. More than 61500 solar photovoltaic of a total capacity around 3MW and 260 hot box cookers have been installed all over the country mainly rural areas due to solar system energy crises would be overcome in upcoming years soon.

## **RESEARCH METHODOLOGY**

### **Technical Approach to the Research**

Different economic and financial indicators will be taken into account; internal rate of return, net present value, cost of energy production, benefit cost ratio and simple payback. A number of areas will be inspected to check the feasibility of the development of solar system based on PV in the rural areas of Pakistan. Study will be analyzing the amount of reduction in greenhouse gas emissions which will be obtained by deploying PV solar systems in some parts of the country.

### **Research Design**

Research will be qualitative and quantitative in nature. The main purpose of choosing both styles is to dig out the reasons and issues behind this act. Different surveys will be conducted to find out the main cause and its effect in rural areas of Pakistan.

### **Research Instrument**

The instruments for this research would be substantial surveys of the companies who are working on solar energy by asking how they feel after adopting solar energy process. Do the environment changes or not? Does solar energy provides energy security to the country in huge quantity or not? Does this system reliable or not and much more. Different case studies

previously done on solar panels would be taken into consideration. The tools for this research for collecting information would be: Questionnaire for primary data. For secondary data; survey of china & Bangladesh, Survey of different energy companies, Survey of rural areas, Newspaper, Research articles of different scholars

### **Populations and Sample**

The study would be focusing on population of rural areas of *Pakistan*. The sample size of this study would be (N=150), including those companies who is actively taking part on solar energy processes.

### **Sources of Data**

It should be noted that this paper has to investigate the research questions based on available primary and secondary data with a view to contribute to available literature. Therefore, the secondary sources of data consulted include Survey of china & Bangladesh, Survey of different energy companies, Survey of rural areas, Newspapers, Research articles of different scholar's textbooks, academic and scholarly journals, academic hypothesis, magazine, internet articles and Pakistan government economic report.

## **ANALYSIS AND FINDINGS**

### **Respondent's Demographics**

The demographics of the respondents are classified into name, age, gender, profession and monthly income. Male are 43.7% and female are 56.2%. The major age group of the respondents is between 18-29 years old (53.1%). This is followed by the age groups of 30-49 years old (31.2%) and 50-69 years old (12.5%). The least age group of the respondents is 70 and above which is accounted for 3.1%. A large majority of the respondents are students (46.8%). About 21.8% are teachers, 9.3% are businessmen, 6.2% are housewives and 3.1% comprises of architect, owner design studio, shopkeepers, doctors and farmers. The majority of the monthly income of the respondents is 30,000 or more which accounted for 43.7%. This is followed by the income less than 10,000 (31.2%) and income less than or equal to 20,000 which comprised of 25%.

### **Findings**

- The energy and capacity losses while distributing the energy gets reduced because the electric generators are placed near the electric load.
- The maintenance cost is low for such solar PV systems.

- No additional natural resource (like water, coal etc.) is required to run the proposed system.
- The inhabitants of the rural area will be saving on the cost associated with the roof tiles as these are not required when solar PV gets installed at homes.
- Once the initial investment is made solar power is free. There are no monthly bills for its use. It will not increase in price.
  - ❖ No noisy generators are required.
  - ❖ No turbines spin to produce it.
  - ❖ Although solar power has highest capital costs, it has lowest operating costs comparing with coal-fixed power, natural gas power or nuclear power.
  - ❖ Rate of improvement of energy efficiency will enhance.
  - ❖ It is helping to reduce carbon emissions from avoided use of kerosene & diesel for lightening.
  - ❖ It offers tremendous potential for alleviating energy poverty.
  - ❖ Pakistan would be less dependent or no more dependent on hydro-power or nuclear power.
  - ❖ Depression rate would be decreased in rural areas.
  - ❖ Employment rate would be increased which results in economic development & growth.
  - ❖ GDP would be increased and inflation rate would be decreased.

## CONCLUSION

It can be concluded that from the results and findings that energy security and its sustainability play a vital role for enhancing the development of a country. Moreover, Pakistan is rich of resources and it's an independent state. Government can itself overcome the energy crises by adopting Bangladesh model and its implications in the right direction. It is high time that Government should take measures for the implementation of the policies so that each member of rural areas could get facilitated from the electricity. It is also recommended that Government should be focused towards solar energy that would be best option for the progress of the economy as a whole. It can come up with the technologies likewise solar refrigerators thus facilitating the citizens of rural areas.

## POLICY IMPLICATIONS

Policies promoting stronger growth in Solar house system deployment affect the economy as a whole. The impact of these policies is not restricted to the energy sector. All economic agents and sectors are directly or indirectly affected. This means that households, industry and services as well as external relationships are influenced by promoting SHS deployment. The



main effects are changes in prices and demand which in turn have an impact on the output and employment of the economy. The main economic mechanisms are:

- Increased confidence in the economic impacts of SHS
- The high current economic benefits of the solar sector will continue to grow in the future
- The benefits of SHS regarding the security of supply and mitigating climate change can go hand in hand with economic benefits
- Changes in direct demand for investment as well as operation and maintenance in the solar and conventional energy sector. The extent of the impact on employment also depends on the productivity of the corresponding sectors.
- Changes in the price of energy for household's leads to a relative change in income and consumption patterns (budget and substitution effect) and affects demand for consumption goods, thereby activating a multiplier effect.
- Change in prices for energy in industry and services affects the delivery of intermediate inputs from the energy sector to industry and service sectors and thus end-user prices of goods and services as well as value added by the industry and service sectors.
- Changes in the export and import trade pattern for fuels and technologies: The extent of changes in export or market shares also depends on the first-mover advantage potential of the technologies and sectors involved.
- Furthermore, promoting new technologies should create an advantage in qualitative competitiveness.

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