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# NEW HORIZONS



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Papers may be written in English with abstracts. The manuscript should be typewritten (double-spaced, with ample margins) on left side of the paper only. Two copies of the manuscripts along with soft copy should be submitted. Authors should organize their papers according to the following scheme, as closely as possible: (a) title of paper, (b) author's name (and affiliation written at the bottom of the first page), (c) abstract, (d) introduction, (e) material and methods, (f) results, (g) discussion, (h) conclusion (i) acknowledgement (j) literature cited (arranged alphabetically), using the following illustrated format:

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However, in case of short papers and communications, results and discussion could be combined in one section.

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## Editor's Note

Access to energy is fundamental for socio-economic development and for poverty alleviation. Greenwich University took the initiative to create awareness among the masses to adopt possible measures needed to conserve energy at all levels, and use all available indigenous sources, such as, hydel, coal, waste, wind, and solar power, as well as other alternate and renewable energy sources, besides nuclear power plants for production of energy. Renewable energy technology is a promising solution to the energy crisis in Pakistan. Massive electricity load shedding round the clock takes place which is unjust and uncalled-for, making the country suffer enormously on account of shutdown of industry, business, commercial and social activities. People are subject to extreme physical and mental torture due to non-availability of essentials. In order to address these issues, a forum had been set up for an Online International Conference (held on June 7-8, 2011) where academicians and experts joined hands to analyze the issue of energy crisis and proposed practicable remedies to manage energy crisis not only in Pakistan but also to oil the wheel of global economy. This was done by contributing papers, writing research articles, intellectual discourse, and healthy discussion with the panelists and moderators.

The journal includes selected articles on the use of alternative energy and its production. The journal presents analytical research on a variety of aspects of this phenomenon and it is hoped that they will be conducive to a thought provoking discussion. Some of the topics on which papers were contributed and have been included in this journal are:

The first article "*Energy Crisis in Pakistan: Thar Coal as an Alternative Solution*" has been authored by Faiz Muhammad Sheikh et al. The article introduces Thar Coal as an alternative solution to eliminate the energy crisis from Pakistan.

The second article on "*Design & Fabrication of Single Phase Equivalent of STATCOM that can Absorb or Generate Reactive Power Viz Improve Power Transmission Efficiency*" has been contributed by Mr Isfandyar Hassan Khan. He has given a review of the work done to design and fabricate a single phase equivalent of a STATCOM.

The third article on "*Energy Crisis Management*" by Dr Qazi Ahmed Kamal discusses the facts regarding energy crisis and also suggests methods, ways and means to reduce the impact of these crisis.



# Energy Crisis in Pakistan: Thar Coal as an Alternative Solution

*Faiz Muhammad Shaikh\**

*Dr. Muneer Ali Shah\*\**

*Dr. Anwar Ali Shah\*\*\**

## ***Abstract***

*This research discusses Thar Coal as an alternative solution for the energy crisis in Pakistan. Data were collected from various secondary sources and analyzed by using GTAP software. It was revealed that crude oil price is expected to remain high due to the policy followed by OPEC. Since Pakistan has no other alternative except to make use of coal obligatory by process industries, the GoP must announce a comprehensive Coal Policy immediately on the basis of the report prepared by the Experts Advisory Cell. It was further revealed that coal is the alternative for the energy crisis in Pakistan.*

**Key words:** *Coal, Thar, Energy, Crisis*

---

*\*Assistant Professor, SZABAC, Dokri, Sindh, Pakistan*

*\*\*Dean, Faculty of Management Sciences and Information Studies, Greenwich University, Karachi, Pakistan*

*\*\*\*Dean, Faculty of Commerce & Business, University of Sindh, Jamshoro, Pakistan*

# Design and Fabrication of Single Phase Equivalent of STATCOM that can Absorb or Generate Reactive Power Viz. Improve Power Transmission Efficiency

Isfandyar Hassan Khan\*

## **Abstract**

*This paper reviews the work done to design and fabricate a single phase equivalent of a STATCOM. In recent years, the power transmission networks have been subjected to greater demands owing to the ever increasing population and the setting up of new industries every day. In addition, difficulty in acquiring new rights-of-way, environmental pollution, lack of long term planning, and cost problems delay the construction of both generation facilities and new transmission lines. The existing system in place thus becomes less secure and quality of the power supplied is reduced as they tend to be operated at their full capacities. Best solution would be to increase the capacity of existing lines and improve the stability and quality of the power systems. FACTS technology opens up new opportunities for controlling power and enhancing the usable capacity of present lines.*

*The Static Synchronous Compensator (STATCOM) is a shunt device of the Flexible AC Transmission Systems (FACTS) family which uses power electronics to control power flow and improve stability of power systems. It regulates voltage at its terminal by controlling the amount of reactive power injected into or absorbed from the power system. Our work presents a single phase equivalent of such a controller with simplified control circuitry, the aim of which is to demonstrate a model that can be set up in a laboratory to regulate a voltage across a single phase load. A single phase full-wave bridge voltage source converter using IGBT based inverter has been used which synthesizes a sinusoidal waveform from a DC voltage using Sinusoidal PWM. Automatic voltage regulation is performed by sensing the voltage across the load using a potential transformer and based on that the output voltage of VSC is made to increase or decrease from the system voltage by changing the modulation index of SPWM. The basic synchronization with the system voltage is implemented using a PLL. The display consists of a console which shows the direction and magnitude of reactive power being exchanged between STATCOM and the system. Moreover a single phase  $\pi$ -equivalent model of transmission line with a non-linear load of variable parameters has been developed so that the performance of this single phase model can be demonstrated.*

**Key Words:** Power Electronics Equipment, Flexible AC Transmission Systems (FACTS), Power

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\*Field Service Section Wartsila Pakistan Ltd.

*System Operation and Control, STATCOM, reactive power, Voltage Source Converter (VSC), voltage regulation, transmission line*

# Energy Crisis Management

Dr Qazi Ahmad Kamal\*

## **Abstract:**

*Effort has been made to present methods, ways and means to reduce the impact of energy crisis. The problems that we face are related to power generation, rate of growth in demand of power, exploring gas resources, furnace oil dilemma, the debt fiasco and government subsidy. These issues have been discussed in detail in the paper.*

---

\*Chairman, Public Utilities and Gas Sub-Committee (KCCI)

# Harnessing Alternative Resources for Generation of Bio Gas Energy

Lubna Ahsan\*

## ***Abstract:***

*Biogas can be derived from nature such as wood from forests, left over material from agriculture and forestry and organic industrial, human and animal wastes. Biogas converts into useful energy at a fast rate. Human, plant and animal wastes are effective in harnessing biogas sources of energy. Biogas wastes can also be transformed into useful energy and fuel using technology. Therefore, we should tap up our resources to produce bio gas for eliminating the energy crisis.*

---

\*Assistant Professor, & Coordinator, Department of Humanities, Greenwich University

# Energy & its Relationship with Economics Today

Muhammad Ali Saeed\*

## ***Abstract:***

*This event, has its intrinsic inspirational value, it reiterates a serious concern on the association of domestic academia with practical aspects and crises that Pakistani's face on a routine basis, we can clearly witness a disconnect between the two.*

*Albert, Einstein once said that “A problem fully understood is half solved”, the every growing need to recognize this crisis is at the epicenter of the issue, this brings me even more ostentation to be part of a select few at Greenwich University in conceiving this issue which continues to haunt that country impacting on every facet of progress and economic development. This is definitely a pioneering step in the right direction.*

*As always today's choices will shape tomorrow's reality. What has been described as the “awful obligation of decisions” confronts us all from time to time and such a time for Pakistan is now.*

*My subject is the choices facing Pakistan in the field of energy, from alternatives to unconventional forms of energy conception.*

---

\*Lecturer, Greenwich University

# Energy Crisis Management – A Holistic Approach

Moinuddin Ghauri\*  
Usama Awan\*\*  
Tariq Bashir\*\*\*

## **Abstract**

*Escalations of living standards are integrally bound with energy consumption. Sustainable supply demands have become difficult to afford in conventional mode of use. Smart approach is inevitable and demands sensitive response to jump out of the scenario in a holistic approach and save our resources for further betterment and civic civilization. Corporate practices on energy management have developed smart benchmarks and earned fortune. Current study is to extract a holistic approach and facilitate learning upon lessons for integrated benefits of developing countries like Pakistan in particular and the world in general by managing energy crisis.*

**Key words:** *Energy crisis management, energy benchmarks, sustainable energy, renewable energy*

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\*Director, COMSATS, Vehari Campus

\*\*Student, COMSATS, Vehari Campus

\*\*\*Student, COMSATS, Vehari Campus

# Energy Crisis: Finding Indigenous Solutions

Dr. Parvaiz Naim\*

## ***Abstract:***

*Both Sindh and Baluchistan have high potential for generating electricity. Electricity generated by harnessing renewable natural resources varies with varying availability of natural resources like wind, water, sunlight etc. On the other hand thermal power stations, burning fossil fuels like oil, gas, coal and nuclear fuel are generally more reliable sources of electricity.*

---

\*Country Advisor to KfW, Islamabad

# Grameen Shakti: An Exemplary Micro-Renewable Energy Program

Dr Muhammad Asif\*

## ***Abstract***

*Grameen Shakti is a micro-generation renewable energy program that aims to meet energy requirements of the people of Bangladesh in a cost effective and environmentally friendly manner. It is one of the largest and fastest growing programs of its type in the world. Presently, Grameen Shakti deals with three technologies: solar home systems (SHS), biogas systems and improved cooking stoves (ICS). By exploring the prominent features of this program the article reflects upon the lessons that countries like Pakistan can learn from Grameen Shakti.*

---

\*Lecturer, School of the Built and Natural Environment, Glasgow Caledonian University, UK

# Conserving Energy through LED Lights

Dr. Najiya Amanat Khan\*

## **Abstract:**

*Everywhere we go today in Pakistan, we hear people complaining about load shedding as power shuts down not for hours but for days to even weeks. To the developed countries, such talks are unheard of as they have well developed energy infrastructure with provision of electricity 24-7. People have been forced to go out on the roads to make their cries heard. The news is filled with talks on demonstrations in various cities and power crisis in Pakistan. However, here I must say the fault is not only in the infrastructure, power companies, or the government. One neglected problem is that people are unaware of the concept of conserving energy. Therefore, we don't think of what we can do to get our country out of this energy crisis.*

---

\*Director, Gulf Lighting Solutions

# Harnessing Ocean Wave Energy in Pakistan

Sarosh Siddiqui\*  
Dr. Shafiq R. Qureshi\*

## **Abstract**

*Global increased need for energy, reduction of conventional fossil-fuel, and critical environmental concerns are navigating the researchers towards renewable energy sources. Energy sources such as oil, coal, and gas are being quickly exhausted or have scarce reserves for future demands. Since the world today is experiencing a great shortage of energy, it should be captured, stored, conditioned, and utilized by alternative techniques. Ocean energy is one of these promising energy resources. The renewable energy source of ocean mainly is contained in waves, ocean current and offshore solar energy. The advantage of using this source is the availability of forecast for waves, which can help in designing the right elements. Moreover, improved computational techniques for modelling and simulation have made the studies of wave climatology and ocean energy converters more promising in future. A considerable research and execution of various projects has already been undertaken globally in this field. Many countries which include UK, Scotland, Ireland, USA, China, Portugal and India have launched various Wave Energy Conversion (WEC) models/projects and rapidly progressing towards cost effective solutions. Pakistan, with its geographical location has a great potential of extracting various energy resources, remains undersupplied and currently facing crisis with energy management. The most important factors are the slow progress towards research and adaptation to renewable energy resources in the country. Though, amongst renewable energy resources, the technology for Wind and Solar energy has generally been focused and has come a long way. In Pakistan, with a 170 km available creek system of Indus delta, ocean wave energy harnessing can play a vital role in eradicating the energy crisis. However, very fewer efforts have been made to harness this reliable and predictable resource in Pakistan. This paper at first, presents the analysis of various Wave Energy Conversion techniques currently available and their advantages/disadvantages. In addition, major WEC models being employed globally by various companies, have been discussed in detail. Further, investigation of two novel concepts of on-shore and near shore wave energy extraction method, which are introduced by National University of Science and Technology, are also reviewed. In light of the existing*

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\*Mechanical Engineer, NUST

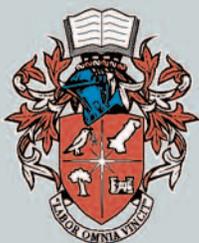
\*\*Free Lancer, Wave Energy Project, Pakistan

*energy crisis, the financial and technical restrictions in Pakistan, these methods are considered to be a cost effective solution and could turn into a viable project for adaptation by rural sector of Pakistan i.e. along the Sindh and Baluchistan coastlines. These concepts are designed for on-shore or near-shore application and are based upon total energy conservation, which utilizes both potential and kinetic energy of the waves.*

## FOR INFORMATION

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