**Saturday, October 22, 2016 2:00PM – 5:00PM**

**Session E; Energy Production, Storage, Transmission, Conservation, Environmental, Safety & Health Aspects of Nano Materials, Crystal Hall B**

**Session Chair: Sammia Shahid, University of Management and Technology.**

**2:00PM E.01 Faisal Ur Rahman Awan, Dawood U of Engineering and Technology Karachi, Pakistan, *Optimizing Gas Reserves From A Water - Drive Gas Reservoir - A Simulation Study* –** Water drive gas reservoir (WDGR) have recovery factors ranging from 45 to 70 percent when produced under conventional restricted approach. This is due to the fact that water encroaches into gas zone and traps the gas. Residual gas is a direct function of reservoir pressure. The lower the reservoir pressure, at the time when water invades in the gas zone, the better will be the recovery factor. Higher the abandonment pressures for WDGR, recoveries are lower. In this paper, three production strategies are worked upon i.e. conventional approach, blow-down approach and coproduction approach on a heterogeneous reservoir. Among these three techniques, the co-production technique yielded the maximum recovery factor. The co-production not only showed the maximum recovery factor but it is also feasible as far as the economics are concerned. The result show that co-production technique produces the maximum of reserves, followed by blowdown technique and the least reserves are produced by the conventional restricted technique. The coproduction strategy result in URF enhancement of 9.95% from that of blowdown, and 12.11% from that of conventional restricted approach. Economically a difference 9.27% enhanced NPV of co-production case then blowdown, and 20.22% more NPV than conventional restricted approach.

**2:12PM E.02 Beenish Mujahid, Farah Jamil, University of Management and Technology Lahore, Pakistan, *Energy Conservation Potential of Building Envelope:* *A simulation based comparative analysis for Residential Buildings* –** Pakistan is facing severe energy crisis like other developing countries of the world. Among different energy consumers, residential sector consumes about 50.6 % of total energy. The aim of this paper is to design a smart building envelope for reducing the energy demand. So, a prototypical detached family house is modeled as a case study in Autodesk BIM software, Rivet 2014. In order to quantify the impact of different energy efficient techniques, cooling load analysis is done for different building envelopes with modifications in walls, roofs and windows. This research attempts to fill the gap in the field of building energy performance through energy analysis, modeling and simulations of energy use in buildings. It has been concluded that the building envelope has a significant potential in reducing the energy demand for a residential building.

**2:24PM E.03 Sumaira Yaseen, Muhammad Arfin Khan Lodhi, Tania Rao, U of Management and Technology Lahore, Pakistan, Texas Tech U Lubbock USA, *Suppressing of air pollution in metropolitan cities by solar chimney using Helio-aero-gravity principle* –** Air pollution can be purified using solar chimney in a metropolitan city. Reduction of carbon dioxide (CO2) and Sulphur dioxide (SO2) from the atmosphere play an important role in these purification. In this study a chimney is proposed to be constructed in the heart of the town, where the most polluted air needs to be cleaned. The water is sprayed on the top of the chimney that makes the air cool and denser. The cooled denser air descends to the bottom of the chimney where air turbines are placed. This air starts the turbine to produce electricity. The air is then passed through the filters which capture the particulate. To remove the undesirable gases the appropriate chemical reagents placed at the bottom. Various routes of capturing CO2 and SO2 from the air are discussed physically and thermodynamically feasible. It is explained how large scale collection of these gases can be made using different reagents such as (NaOH, KOH, K2CO3 and Ca (OH)2 as possible sorbent. The cost estimate and energy producers are briefly discussed. Other quantities involved during this process as gas uptake, liquid flow rate, air flow rate, air pressure drops are discussed. This technique, in particular, is applied to Lahore to clean its air. For that purpose the environmental data for Lahore metropolitan area has been collected and analyzed.

**2:36PM E.04 Kishan Chand Mukwana, Saleem Raza Samo, Abdul Qayoom Baloch, Muhammad Mureed Tunio, Quaid e Awam U of Engineering, Science & Technology, Pakistan, *State of Ambient Air Pollutants’ levels in Karachi and their Impacts* –** Anthropogenic sources are causing air pollution in urban areas in particular. The build-up of carbon compounds particularly carbon dioxide and carbon monoxide is causing greenhouse effect. With industrialization and increased vehicular emissions, the carbon dioxide has shown significant increase from 280ppm in the middle of eighteen century to 400ppm in the beginning of the twenty first century. This shows an increase of about 41% in the carbon dioxide concentration in the atmosphere in the short span of time. The situation is more or less same with carbon monoxide. This research focuses on status of particulate substances as well as carbon concentrations in one of the major cities of the world i.e. Karachi, Pakistan. The open air software was used for the appraisal of the air pollutants and future predictions. At Al Asif Square location the current P.M2.5 concentration is 80.50Âµg/m3 while the predicted concentration of year 2050 is 122.51Âµg/m3. In case of P.M10 the current concentration is 325.56Âµg/m3 and the predicted concentration of year 2050 is 495.48Âµg/m3. The current CO2 concentration is 423.13ppm and the predicted concentration of year 2050 is 794.47ppm. Whereas the current CO concentration is 10.91ppm and the predicted concentration is 17.80ppm. This shows that measured results as well as the predicted results are considerably higher than the NEQS adopted by the respective air quality standards as well as the world health organization(WHO) guidelines.

**2:48PM E.05 Siraj Ahmed, U of Management and Technology Lahore, Pakistan, *Energy and wastewater treatment process* –** Researchers must Rely Wastewater Treatment Process to confirm that it arranges with complete good guidelines. The main aim of Wastewater treatment process is to reuse of various constituents of polluting load and used these polluting materials to produce energy to generate electricity from energy cells like micro fuel cells by using these waste materials like organic materials these fuel cells are good source of energy to generate electricity which is beneficial for whole mankind from the waste water treatment process the polluting materials which are used in waste water treatment process are followings: solids, organic carbon, nutrients, inorganic salts, metals, pathogens etc. Effect of Wastewater collection and treatment process has great importance for the point of view of both, Environmental energy and also Public health. There are various methods are used in Wastewater treatment process for the sake of reduce to its water and organic content and finally the main aim of Wastewater management is to reproduce energy protect to environment, with public health and social economic concerns in different countries specially the developing countries.

**3:00PM E.06 Atiq-ur-Rehman, Pakistan Institute of Development Economics, Islamabad, *Portable Domestic Biogas Plants: A Solution for Energy and Environment* –** Experts from India and China have designed smart and handy portable biogas plants which could be installed in any house. These plants run on the kitchen waste and produce biogas by usual anaerobic digestion process. Using kitchen waste as input for biogas has several advantages. Using animal dung for biogas can provide only a part of energy present in the primary source of vegetation. On the other hand, the kitchen waste which is usually composed of virgin biofuel and has more energy contents. Some estimates show that four days kitchen waste can fuel the cooking for one day. The resulting 25% decrease in fuel demand could be a huge relief to the household and a significant decrease in overall energy demand. On the other hand, anaerobic digestion process produces odorless slurry which can serve as organic fertilizer. Safe disposal of kitchen waste can reduce the amount of solid waste and could help avoiding open air fermentation. If decomposable waste is treated this way, the non-decomposable waste like plastic would be relatively cleaner and more feasible for recycling. This paper surveys the portable biogas plant technology and discusses its feasibility for Pakistan.

**3:12PM E.07 Faiza Sharif, Anmol Tabassum, Myra Toor, Naghman Khan, Government College U Lahore, Pakistan, *Domestic Energy Use and Lighting Patterns in a Rural Community of Gujranwala, A Case Study of Nanghray Bhatti* -** Energy is considered to be the lifeline of economic development. It is required for lighting, cooking, heating and for other household activities. The aim of the present survey was to find the domestic energy use and the impacts of energy and lighting on overall development of the selected rural community i.e. Nangray Bhatti. A survey of 151 households was carried out for data collection through questionnaires and observational study. The questionnaire had three dimensions i.e. demographic and socio-economic conditions of respondents, energy consumption and lighting patterns of the households. Results from the survey showed that the average income of the households was Rs. 20,300 and the average electricity bill was Rs. 1284. In summers the respondents faced a power cutoff of 15-20 hours while in winters it was 10-15 hours. Most power cutoff occurred between 7 pm to 7am which was the time when electricity was required the most. Majority of the households (78.8%) did not have any alternative source of energy. The average light intensity in the rooms was found to be 26.47 lx. Monthly electricity bill was positively correlated with a number of factors with strongest correlation with number of electric appliances, total number of lights in house and average monthly income. The regression model showed that if all the households shift totally to energy savers then their average monthly electricity bill will decrease by 26.7%. The study also explored the potential of biogas production as an alternative source of energy production for the selected community. The study concludes that off-grid production of energy using renewable energy resources like biogas can provide a solution to meet the current energy crisis of Pakistan to move the community on the path of sustainable rural development.

**3:24PM E.08 Faiza Sharif, Waqas Ahmad Khan, Talha Mushtaq, Naghman Khan, Government College U Lahore, Pakistan, *Energy Consumption and Lighting Trends in Urban Community of Lahore City –*** Energy is one of the most important parts of human life all over the world required for lighting, cooking, heating and all of their household activities. The present study was aimed at analyzing the availability, sources and utilization of energy and find out its effects on living status of people, accessing the source of light, availability and problems related to light deficiency and effect of light on working efficiency and behaviour of people in Lahore city. Questionnaires and observational study were used for data collection and a sample size of 160 household was selected. The questionnaire had three dimensions i.e. demographic and socio-economic conditions of respondents, energy consumption patterns and lighting devices being used. Results showed that the income of households ranged from Rs.15, 000 to 200,000. Majority of the respondents (66%) had monthly energy expenditure up to Rs. 10,000. The respondents face a power cutoff for 10-15 hours daily. Respondents (40%) also claim about inconsistent, fluctuating and non-reliable electricity supply. Most power cutoff occurs between 6 pm to 11 pm due to high energy demand during these timings. Energy savers were commonly used by the respondents while use of LEDs was negligible. UPS and batteries were mostly used while there is also trend of using generator and solar power in high income areas. The average natural sunlight intensity in the living room was 127 lux. Average monthly bill was significantly and negatively correlated with use of sunlight hours as the use of sunlight for 7 hours daily reduced the electricity bill by 30.3%. Number of electrical appliances in household and type of lights used in the households significantly affected the average monthly electricity bill. Alternative energy source in case of power cut off significantly affected the average monthly energy expenditure that increased with the use of generators. There is not much trend of using more energy efficient lights as LEDs and renewable energy sources like solar due to their high initial cost. There is a need to switch over to efficient energy conservation and management strategies at both individual and national levels.

**3:36PM E.09 Muhammad Irfan, U of Management and Technology Lahore, Pakistan, *Remarkable gap between production and utilization of energy* -** This paper highlights the two factors, how to lessen the gap between production and utilization of energy, First to analyses the control and improvement of manufacturing efficiency of energy equipment & secondly the solution availability and implementation in industry for energy production.

**3:48PM E.10 Imtiaz Ahmad, Ehsan Ellahi Khawaja, U of Management and Technology, Lahore, Pakistan, *Passive cooling of surfaces* –** Radiative cooling of surfaces without applying an energy source has been suggested in the literature. The basis for radiative cooling is the infrared transmittance of the atmosphere. The spectral transparency (i.e. low absorption) of the atmosphere in the wavelength range of 8 to 13 Âµm is generally termed the atmospheric window. If the humidity and cloudiness are low, then the downward thermal radiation from the atmosphere in the spectral region of the atmospheric window are expected to be low. A temperature between 150C and 25 0C below ambient temperature has been achieved as a result of radiative cooling. Spectrally selective radiating material, which is defined as a material with high emittance in the spectral region of the atmospheric window and high reflectance in the rest of the spectral range, can be used as the essential material in a sky radiator for passive cooling of the material. Silicon monoxide film on highly reflective substrate (aluminum coated glass) was used in the present work. It was found that temperature of thin film surface was about 120C lower than that of ambient temperature under suitable condition of radiating cooling.

**4:00PM E.11 Hafiz Muhammad Husnain Jawed, Muhammad Usman Talib, Muhammad Numan Talib, GIK Institute, Pakistan, *Voltage regulation using Fixed voltage capacitance of renewable standalone power system* –** This paper presents steady state voltage regulation of three phase self-excited squirrel cage induction generator. A fixed VAR compensator with artificial intelligence regression algorithm is used to make it cost effective rather than other methods. The FVC is composed of a fixed excitation capacitor (FC) and triac switched capacitor (TSC). Critical minimum and maximum capacitance required for excitation is calculated from magnetization curve. A model of machine is presented in Matlab/Simulink. To ensure the self-excitation of the generator, it is important to interface the capacitors in parallel with the motor, while it is being driven at synchronous speed. In this way, a LC resonating circuit has been achieved, made up of the static capacitors and inductance of motors. Reactive power in the LC circuit due the applied capacitor bank nullifies the effect external inductive load on the power factor, through this both the power factor and the voltage regulation is achieved and power losses are reduced. The included experimental results were investigated and found to be in close agreement with theoretical and simulation results. This technique of voltage regulation with the help of regression algorithm is developed and tested while ensuring its suitable use in power generation particularly through renewable sources Micro-hydro Power, Wind, Index Terms ANN, Fixed VAR Compensator Regression Algorithm, SEIG.

**4:12PM E.12 Faryal Idrees, Farwa Idrees, Fazal-e-Aleem, The University of Lahore, Pakistan, *Optical, Hydrogen Storage and Efficient Photocatalytic Response of Nb2O5 3D-Hollow Hierarchical Structures* –** Keeping in view the growing importance of hollow and hierarchical structures for various applications we have prepared 3D-hollow hierarchical (3D-HH) structures of niobium pentoxide (Nb2O5). A novel surfactant, template free and facile two steps route is developed for growth of Nb2O5 intriguing structures. The optical bandgap of 3.1 eV was estimated, which was found favorable for photocatalysis under UV-light. The bandgap is reduced by using H2O2 as a co-catalyst for photocatalysis under visible light. The properties of Nb2O5 3D-hollow hierarchical show its potential for UV optoelectronic devices and photocatalytic H2 production materials. First ever measurements for hydrogen storage were also performed for 3D-HH structures.

**4:24PM E.13 Muhammad Usman Qadri, U Of Lahore, Pakistan, *Synthesis and characterization of WO3 nano-crystals using sol-gel modified pechini method for optical gas sensing* -** Tungsten Oxide (TO) has been of great interest in the last few years due to its promising electrical and optical properties for gas sensing. The optical properties studied in the literature such as band gap, spectral transmittance and absorption or change of refractive index suggests that TO is a good material for photonic devices and especially for optical gas sensing devices. Its functional properties may be significantly enhanced by lowering the feature size to the nanoscale. The objective of the present work is to provide the novel synthesis, optical and structural characterization of this material and provide efficient way to synthesize TO nanocrystals for optical gas sensing. The experimental variables were optimized as a function of the desired material to synthesize. The structural characterization of nanocrystals was investigated by a number of techniques, the most common being X-ray powder diffraction and electron diffraction. The morphology, the average particle size and the particle size distributions were carried out using electronic microscopy.

**4:36PM E.14 Muhammad Shafiq, Firdaus-e-Bareen, Aisha Nazir, Sajid Rashid Ahmad, U of the Punjab, Pakistan, *Sustainability Prospects Of Defects Linking Of Decentralized Municipal Solid Waste Management (Msw) With Urban Sprawl* -** The ever broadening city limits of Lahore over short span of time create multiple issues and limited opportunities for sustainable urbanization. One of the basic issues is conventional MSW management in the latest era; being neither in accordance with the needs of local circumstances nor does it meets the minimum requirements of environmental sustainability. The current study predicts environmental sustainability aspects of making decentralized MSW management an essential part of the pre-approval process of the proposed real estate development plan and forming ratifiable for currently established/functional residential schemes in the sparse suburbs and exurbs over of Lahore. The predicted evaluations indicate that making decentralized MSW management an essential part of latest episodes of urban sprawl around Lahore would create more opportunities of environmental sustainability through i) making it economical equitable by significant lowering (= 45 %) of MSW collection and handling cost than the current practice, ii) making environmentally viable by creating more urban green spaces providing safer foods through community participated urban agriculture, enabling shareholders of the residential plan earn carbon credits, and iii) making socially adaptable as having great potential to intimidate policy makers coerce state developers for a conjoint approach towards environmental prosperity.

**4:48PM E.15 Munawar Iqbal, U of the Punjab, Pakistan, *High energy radiations efficiency for the detoxification of industrial effluents* –** Degradation and detoxification of petroleum refinery wastewater (PRW) was carried out by advanced oxidation processes based on high energy radiations i.e., gamma radiation and UV radiation. Response surface methodology (RSM) was used to optimize the independent variables effects on water quality parameters and toxicity. The cytotoxicity was evaluated using Allium cepa, brime shrimp and haemolytic assays; whereas mutagenicity was tested by Ames tests (TA98 and TA100 strains). Maximum reductions in COD and BOD were recorded as 78% and 87% for UV/TiO2/H2O2 and 77% and 86% for gamma ray/H2O2, respectively. Treatments with both methods at optimized conditions reduced the cytotoxicity and mutagenicity of PRW, however, UV/TiO2/H2O2 system was found slightly efficient as compared to gamma ray/H2O2. From the results it can be concluded that AOPâ€™s can successfully be utilized for the degradation of toxic compounds in petroleum refinery waste water. Moreover, the bioassays used in this study offered a good reliability for monitoring the detoxification of wastewater.