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ID# M.48 Agata Matarazzo. ROUGH SET APPROACH APPLIED TO AIR POLLUTION TO MANAGE HIGH RISK RATE INDUSTRIAL AREAS (details, TMREES16_paper_48)

Abstract. This study presents a Rough Set Analysis (RSA) application, partially based on dominance in relation to air micro-pollution management in an industrial place with a high environmental risk rate, such as the industrial area of Siracusa, located in the South of Italy. This new data analysis instrument has been applied to different decisional problems in various fields with considerable success. Therefore, it is believed that, it could also be used for the environmental issue related to multi-attribute sorting, considering both qualitative and quantitative attributes and criteria, such as sulphur oxides (SO_x), nitrogen oxides (NO_x), Methane (CH₄), non methane hydrocarbons (NMCH) and some meteorological variables, such as air temperature and the relative humidity index. After outlining some basic concepts of the RSA theory, The most significant results obtained from the RSA specific application are presented and discussed particularly examples of decisional rules, attribute relevance and some other methodological features are offered to improve understanding and advantages of the approach. The decisional rules obtained can also be usefully implemented in order to explain and manage the risk of air pollution.

ID# M.65 M. Benaouadj, A. Aboubou and M.Y. Ayad. Fuel Cells, Batteries and Supercapacitors Stand-Alone Power Systems Management using Optimal/Flatness Based-Control (details, TMREES16_paper_65)

Abstract. In this work, an optimal control (under constraints) based on the Pontryagin's maximum principle is used to optimally manage energy flows in a basic PEM (Proton Exchange Membrane) fuel cells system associated to lithium-ion batteries and supercapacitors through a common DC bus having a voltage to stabilize using the differential flatness approach. The adaptation of voltage levels between different sources and load is ensured by use of three DC-DC converters, one boost connected to the PEM fuel cells, while the two others are buck/boost and connected to the lithium-ion batteries and supercapacitors. The aim of this paper is to develop an energy management strategy that is able to satisfy the following objectives: - Impose the power requested by a habitat (representing the load) according to a proposed daily consumption profile, - Keep fuel cells working at optimal power delivery conditions, - Maintain constant voltage across the common DC bus, - Stabilize the batteries voltage and stored quantity of charge at desired values given by the optimal control. Results obtained under MATLAB/Simulink environment prove that the cited objectives are satisfied, validating then, effectiveness and complementarity between the optimal and flatness concepts proposed for energy management. Note that this study is currently in experimentally validation within MSE Laboratory

ID# M.62 Abdelkader Hadidi, Boualem Remini, Habi Mohamed and Djamel Saba. THE OASIS OF TIOUT SOUTHWEST OF ALGERIA): WATER RESOURCES AND SUSTAINABLE DEVELOPMENT (details, TMREES16_paper_62)

Abstract. In the oasis areas where climate and hydrological context is more sensitive because of irregularities in water availability in time and space, water management is of vital importance. Natural resources in the oases of southwestern Algeria are now in a phase of exploitation of groundwater. Indeed, the weather and the lack of a strategy for the protection and conservation of palm have produced severe damage at the same time touching the water, the palm and the local landscape. In the oases overexploitation of water resources now pose the problem of sustainability of these resources in a context marked by the scarcity of the resource, lower rates of surface water due to climate hazards. Also add





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other causes include the introduction of new techniques such exploitation by pumping resulting in heavy drawdown of groundwater particularly in agriculture (through powerful pumps). Our article is a comprehensive summary on the management of water sources in the study area to study the impact of the contribution of modern technology on ancestral techniques.

ID# M.45 Burak Kadem, Aseel Hassan and Wayne Cranton. The effects of organic solvents and their co-solvents on the optical, structural, morphological of P3HT:PCBM organic solar cells (details, TMREES16_paper_45)

Abstract. The effect of different solvents on the optical, structural, morphology and solar cell performance of P3HT:PCBM based devices were carried out using UV-visible absorption spectroscopy, XRD, AFM, SEM, electrical conductivity as well as current density-voltage (J-V) measurements in dark and under illumination. Chloroform (CF), chlorobenzene (CB), di-chlorobenzene (DCB), and their mixtures (DCB:CB, DCB:CF and CF:CB) in the ratio 1:1 were used as solvents to produce active layers of P3HT:PCBM heterojunctions. UV-visible absorption spectra have demonstrated different absorption intensities subject to the used solvents as well as a decrease in the optical bandgap from around 1.9eV to 1.8eV. AFM and SEM images gave an indication on the films' morphological properties, which have exhibited different topographies due to the used solvent. The electrical conductivity as well as the dark J-V characteristics were analysed using Richardson-Schottky model as well as space charge limited conduction theory to evaluate the diode properties of the produced solar cells. The electrical conductivity were found to vary from 9.7-77.7 mS.cm⁻¹ and the higher values were associated with using CB:CF co-solvents based devices while the series resistance decreased from 33.3K Ω to 0.54K Ω using the same co-solvents. This was associated with an increase in the charge carriers' mobility that reached 6.69x10⁻⁶ cm²V⁻¹s⁻¹ in CB:CF based device. OSC devices produced using CB:CF co-solvents has exhibited the highest performance with PCE=2.73%, FF=53% and Jsc=8.3mA.cm⁻² while Voc remained unchanged.

ID# M.110 Mohamad Ramadan, Mahmoud Khaled, Hassan Jaber and Thierry Lemenand. Short Review on Heat Recovery from Exhaust Gas (details, TMREES16_paper_110)

Abstract. The increasing growth of energy demand leads to propose new efficient solutions. Heat recovery consists the most promising solution especially in regions where renewable energy resources are not available. That is why the domain of heat recovery has shown a tremendous improvement during the recent years. On the other hand few works have been dedicated to review heat recovery from exhaust gas. This paper presents a review on heat recovery from exhaust gas. The authors propose to classify exhaust gas heat recovery systems within three different classifications that are exhaust gas temperature, utilized equipment and recovery purposes.

ID# M.42 Titi Benrabah Samia, Attoui Badra and Mani Hannouche. APPROACH TO THE GROUND WATER CHARACTERIZATION OF KHANCHELA REGION (eastern Algeria) (details, TMREES16_paper_42)

Abstract. The vulnerability of surface and groundwater in eastern Algeria including watersheds of Khenchela region depends on agricultural and urban context. Despite a relative abundance of water resources, high urban and agricultural growth has led to a considerable increase in water needs and therefore a high degree of pollution. This study aims to determine the overall quality of groundwater oriented to the drinking water supply in the wilaya of Khenchela, particularly the concentration of mineral salts in order to assess their spatial and temporal variability. This area has been the subject of several





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previous studies, given the importance of its watershed. Some of these studies have focused on hydrology, geology and geomorphology of the watershed, this one was interested in the determination of physicochemical parameters, organic, revealing the vulnerability of waters of the North and North West part of watershed in strong mineralization, which requires a priority during term monitoring and the use of other means of evaluation for the protection of its quality.

ID# M.79 Zouina Haouli, Amina Sassane, Kherici Nacer, Derdous Oussama and Boughrira Nabil. IMPACT OF MINING RESIDUES ON SURFACE AND GROUNDWATER QUALITY CASE OF AZZABA MINING SECTOR IN THE NORTH-EAST OF ALGERIA. (details, TMREES16_paper_79)

Abstract. Azzaba region contains a mining sector that was created in 1971 and operated until 2006, during this period huge quantities of mining residues were released in nature without any environmental rehabilitation plan which certainly deteriorated surface and groundwater quality by trace metals menacing the people's health as well as the aquatic ecosystems in this zone. The purpose of this study is to illustrate and to assess the surface and groundwater pollution toward heavy metals at the vicinity of the abandoned mining site. The primary analysis aimed to evaluate the pollution due to mercury in the region after many years of the closure of the mining industry to compare it with evaluations made during its operational period. In addition, further analyses of water pollution toward heavy metals usually used in the mercury industry (iron, zinc and copper) and probably released in the Fendek Wadi were conducted. These analyses allowed characterizing the ecological state of the studied environment by highlighting the concentrations of trace elements (mercury, iron, zinc, copper). According to the analyses, most of these concentrations meet the World Health Organization (WHO) standards; in fact only iron concentration exceeds them at the stations P7 and P8. Finally, the study results were compared by those obtained by previous studies; it was found that the mercury concentration has decreased with time which means that the contamination danger is disappearing.

ID# M.92 Bekkouch Mohamed Fouzi and Benhamza Moussa. Hydrochemical Characteristics Of The Thermal Sources From The Extreme Northeastern Of Algeria (details, TMREES16_paper_92)

Abstract. The present study will make possible the characterization of hydro chemical of thermal sources in the far North east of Algeria. The thermal sources emerge following big tectonic accidents, according to the neo tectonic on the thermal band of Annaba and Constantine. According to stabler's graphic representation, the results of chemical analyses show four chemical facets: bicarbonate sodium, chloride sodium, sulfated sodium and sulfated calcium. The basic exchanges index study show a relationship between the cristal origin of the thermal sources and the hyper thermal temperatures, whereas the sedimentary origin corresponds to the ortho thermal temperatures of the sources emergence. The study of the saturation index has succeeded in the highlighting elements responsible for both over under saturation, this causing either their precipitation or dissolution in thermal water.

ID# M.89 Ala Eddine Tifrani and Imed Eddine Nezli. Quality And Management Of Hot Water Of Intercalary Continental, Northern Sahara Of Algeria (details, TMREES16_paper_89)

Abstract. . The Algerian Sahara is the biggest desert in the world, and it is known by that the main climatic characters which are the high temperature and the low precipitations. The northern Sahara is a part of this big area, located on the south-east of Algeria. Due to the rarely and insufficient precipitations (1 to 180 mm per year) the need for water is a rising problem, so the main source are the ground water. There





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are three ground water aquifers in the area, the phreatic table, the terminal complex and the intercalary continental, our study is focused on the intercalary continental which is the biggest non recharged aquifer in the world, many studies national and international estimated the reserve of the water around 6 million m³. Existing between 1000 and 2000 m depth, this depth gives the water a lot of characterization which need to be noted and updated for example the temperature (around 50°C), and the high mineralization, because of the vast area and the difference in depths between wells, which is a reason of variety, the main goal is the determination of chemical and physical setting of this water.

ID# M.5Zainab Jameel, Adawiya Haider, Samar Taha, Shubhra Gangopadhyay and Sangho Bok. Evaluation of Hybrid Sol-gel Incorporated with Nanoparticles as Nano Paint (details, TMREES16_paper_5)

Abstract. A coating with self-cleaning characteristics has been developed using a TiO₂/SiO₂ hybrid sol-gel, TiO₂ nanoparticles and organosilicate nanoparticles (OSNP). A patented technology of the hybrid sol-gel and OSNP was combined with TiO₂ nanoparticles to create the surface chemistry for self-cleaning. Two synthesis methods have been developed to prepare TiO₂ nanoparticles (NPs), resulting in the enhancement of local paint by the addition of anatase and rutile TiO₂ phases. The NPs size as determined by Dynamic Light Scattering (DLS) ranges within of (3-4) and (20-42) nm, which was also confirmed by Scanning Electron Microscopy (SEM). The nanoparticles showed surface charge (zeta-potential, ζ) of +35 and +25.62 mV for the methods, respectively, and ζ values of +41.31 and 34.02 mV for anatase and rutile phases, respectively. The NPs were mixed with the coating solution (i.e., hybrid sol-gel and OSNP) in different concentrations and thin films were prepared by spin coating. Self-cleaning tests were performed using Rhodamine B (RhB) as a pollution indicator. The effect of UV-irradiation on the films was also studied. Anatase and rutile incorporated as a mixture with different ratios in local paint and washability as well as a contrast ratio tests were performed. It was found that the addition of TiO₂ NPs in combination with irradiation show a great enhancement of RhB degradation (1%) wt. with a decrease in contact angle and improved washability.

ID# M.26 Nabila Bouabdallah, Houda M'Sellem and Djamel Alkama. Biomimicry as an Approach for Sustainable Architecture -Case of Arid Regions with Hot and Dry climate- (details, TMREES16_paper_26)

Abstract. This paper aims to study the problem of thermal comfort inside buildings located in hot and arid climates. The principal idea behind this research is using concepts based on the potential of nature as an instrument that helps creating appropriate facades with the environment "building skin". The biomimetic architecture imitates nature through the study of form, function, behaviour and ecosystems of biological organisms. This research aims to clarify the possibilities that can be offered by biomimicry architecture to develop architectural bio-inspired building's design that can help to enhance indoor thermal ambiance in buildings located in hot and dry climate which helps to achieve thermal comfort for users.

ID# M.138 Benamara, Kherici-Bousnoubra and Bouguerra. PHYSICO-CHEMICAL CHARACTERIZATION OF THERMO MINERAL SPRINGS: CASE OF HAMMAM MESKOUTINE (NORTH-EAST ALGERIA). (details, TMREES16_paper_138)

Abstract. Thermo mineral waters have their specific characteristics that depend on the depth crossed or leached lithology. Therefore, they have characteristics on which rocks geochemistry is based. For this, we seek to identify Guelma region (North-east Algeria) thermo mineral springs. An analysis campaign on all springs (06), made in 2013 has tracked the bacteriological and physico-chemical parameters (Ca ++, Mg





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++, Na +, K +, Cl⁻, SO⁻⁴, HCO⁻³, T, EC, pH). Data processing by principal component analysis (PCA) and PHREEQC software determined water physicochemical characteristics and showed the salt saturation rate (halite, calcite, dolomite, aragonite ...). The projection on the Piper diagram has identified some chemical facies. The bacteriological water shows a good bacteriological quality.

ID# M.29 Lynda Beddek, Meriem Messaoudi and Samira Guitouni. The influence of some doping on the PbS thin films properties deposited by CBD (details, TMREES16_paper_29)

Abstract. This electronic document is a "live" template and already defines the Chemical bath deposition (CBD) was used to prepare PbS thin films. These latter were grown on ordinary glass substrates. The precursor aqueous bath contained 1mole of lead acetate, 1mole of Thiourea and complexing agents (triethanolamine (TEA) and NaOH). Bath temperature and deposition time were fixed at 60°C and 3 hours, respectively. However, small rate (2%) of doping has been added in the reactive bath: Au nanoparticles, copper Cu and zinc Zn. Structural properties of the free deposited film were characterized by X-ray diffraction. The PbS crystal structure was confirmed. AFM microscopy was used to study free sample morphology. Optical studies showed that films thickness was strongly affected by doping nature, it varied between 380nm for Cu doped PbS films and 840nm for Au doped PbS films. The behavior of films growth has been studied. Energy band gap values have been calculated and found to take values in the range 0.66-0.96 eV. The used element in doping was revealed to enlarge the optical band gap and increase the disorder E_u . The variation of refractive index n and absorption coefficient α has been investigated. The properties of PbS make this material an excellent candidate in several fields as solar energy conversion near the infrared ray or IR detection.

ID# M.24 Mahmoud Khaled, Mohamad Ramadan and Hicham El Hage. Heating Residential Water Using Parabolic Trough Concentrators – Theoretical Calculations and Analysis (details, TMREES16_paper_24)

Abstract. Parabolic trough concentrators are usually combined with Rankine Cycle to generate electricity and flat plate collectors are systems that heat water in residence with both based on solar irradiation. The present work concerns a theoretical and case studies related to a new design of residential water heating using parabolic trough. To proceed, the thermal modeling of parabolic trough concentration and flat plate heat collection is drawn. Then, the case of Beirut city is considered to compare the performance of three different configurations of heating water: Flat plate, parabolic trough, and parabolic trough with tracking. It was shown that the enhancement of water heating using parabolic trough with respect to flat plate collector depends on the criterion of comparison. Particularly for the same volume occupied on the roof, the use of parabolic trough has shown to decrease the time of heating water to 70 °C by 22.4 % without tracking and 33 % with tracking.

ID# M.52 Abdelkader Aissat. Modeling and simulation of InGaN/GaN quantum dots solar cell (details, TMREES16_paper_52)

Abstract. Currently, quantum dots have attracted attention in the field of optoelectronics, and are used to overcome the limits of a conventional solar cell. Here, an In_{0.25}Ga_{0.75}N/GaN Quantum Dots Solar Cell has been modeled and simulated using Silvaco Atlas. Our results show that the short circuit current increases with the insertion of the InGaN quantum dots inside the intrinsic region of a GaN pin solar cell. In contrary, the open circuit voltage decreases. A relative optimization of the conversion efficiency of





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54.77% was achieved comparing a 5-layers $\text{In}_{0.25}\text{Ga}_{0.75}\text{N}/\text{GaN}$ quantum dots with pin solar cell. The conversion efficiency begins to decline beyond 5-layers quantum dots introduced. Indium composition of 10 % improves relatively the efficiency about 42.58% and a temperature of 285 K gives better conversion efficiency of 13.14%.

ID# M.125 Zheng Zhang and Shuhong Li. Performance simulation of hybrid photovoltaic solar assisted heat pump/loop heat pipe system (details, TMREES16_paper_125)

Abstract. A numerical model for hybrid photovoltaic solar-assisted heat pump/loop heat pipe (PVSA-HP/LHP) water heater system was established. The performances of independent heat pump mode (HP) and loop heat pipe - heat pump switchover mode (LHP-HP) were simulated. On the basis of least power consumption, the effect on optimal switchover of LHP-HP mode was analyzed in various solar radiation and ambient temperature, and the all-year round operation status was also calculated. The results showed that during heating 150L tank from 15 oC to 50 oC on typical sunny days in spring or autumn, the averaged thermal efficiency and electrical efficiency of LHP-HP mode were separately 37% and 6.88% lower than independent HP mode, while using the LHP-HP mode could save 40.6% power consumption than the later. With increasing solar radiation and ambient temperature, the optimal switching water temperature of LHP-HP increased and the compressor power consumption decreased. On sunny days during March to November, LHP-HP mode should have top-priority to be utilized to save electricity. HP mode should be used in winter or low solar radiation and ambient temperature conditions.

ID# M.60 A. Boucetta, M. Bahri and M.Y. Ayad. A Review on the Performance and Modelling of Proton Exchange Membrane Fuel Cells (details, TMREES16_paper_60)

Abstract. Proton Exchange Membrane Fuel Cells (PEMFC), are energy efficient and environmentally friendly alternatives to conventional energy conversion for various applications in stationary power plants, portable power device, and vehicles. PEM fuel cells provide low operating temperatures and high-energy efficiency with near zero emissions. A PEM fuel cell is a multiple distinct parts device and a series of mass, energy transport through gas channels, electric current transport through membrane electrode assembly and electrochemical reactions at the triple-phase boundaries. These processes play a decisive role in determining the performance of the cells, so that studies on the phenomena of gas flows and the performance modelling were made deeply. This review gives a comprehensive overview of the state of the art on the Study of the phenomena of gas flow and performance modelling of PEMFC.

ID# M.82 Louai Nabila and Khaldi Fouad. Economic and technical study for hybrid power system in the north east of Algeria (details, TMREES16_paper_82)

Abstract. In this paper, the case of meeting a household's electrical energy demand with hybrid systems has been examined. The objective is to study technological feasibility and economic viability of the electrification project by a hybrid system (PV/ wind) of a residential home located in Batna-Algeria and to reduce the emissions from traditional power by using renewable energy. An autonomous hybrid wind/photovoltaic (PV)/battery power system and a PV/Wind grid connected system, has been carried out using Hybrid Optimization Model for Electric Renewable (HOMER) simulation software. As a result, it has been found that electricity from the grid can be supplied at a lower price than electricity from renewable energy at this moment.





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ID# M.123 Arbaoui Mohammed Ali and Hacini Messaoud. Study the development (Evolution) of process of hydraulic fracturing « the study of the well-bore ONM 543». (details, TMREES16_paper_123)

Abstract. The natural exploitation of an oil deposit, means reducing the hydrocarbons to the surface with favorable conditions, with its natural depletion. When this energy does not meet the constraints of production, and the reserves in place are important, new recovery techniques are introduced to improve the characteristics and the potential of well. Among the techniques commonly used, was the stimulation either by acidification (acid job) or by creating artificial transmissibility (bypass) it's hydraulic fracturing. Hydraulic fracturing is a technique that allows you to create, with an artificial manner a permeable drain by the injection of fluid carrying proppant into the reservoir. In this work we has tried to define everything that bound with hydraulic fracturing like the damage and the concept of skin as the main constraints exerted on the rock and mechanical and petrophysical properties of some reservoir rocks, the development, implementation, test mini frac and the propagation of different models and we gave a general information for frac fluids, proppants and the application of the method of NOLTE for the analysis pressure declines, Finally we has studied the well ONM 543 and the results confirmed the success of the operation with a gain of flow rates of 7.4 m³ / h, if we take the price of barrel is \$ 40 the payback period is 21 days

ID# M.97 Bouchafaa Farid and Hamzaoui lhssen. Energy optimization for a wind DFIG with flywheel energy storage (details, TMREES16_paper_97)

Abstract. The type of distributed generation unit that is the subject of this paper relates to renewable energy sources, especially wind power. The wind generator used is based on a double fed induction Generator (DFIG). The stator of the DFIG is connected directly to the network and the rotor is connected to the network through the power converter with three levels. The objective of this work is to study the association a Flywheel Energy Storage System (FESS) in wind generator. This system is used to improve the quality of electricity provided by wind generator. It is composed of a flywheel; an induction machine (IM) and a power electronic converter. A maximum power tracking technique «Maximum Power Point Tracking» (MPPT) and a strategy for controlling the pitch angle is presented in this paper to optimization energy for wind turbine of DFIG with flywheel energy storage system. The model of the complete system is developed in Matlab/Simulink environment / to analyze the results from simulation the integration of wind chain to networks.

ID# M.109 Asma Bedia, Fatima Zohra Bedia, Michel Aillerie and Nabila Maloufi. Influence of Precursor Solution Volume on the Optical Properties of Spray Deposited ZnO Films (details, TMREES16_paper_109)

Abstract. In this contribution, we present the optical properties of ZnO films prepared by spray pyrolysis on glass substrate growth at 350°C with various precursor solution volumes. Optical characterization of ZnO films was carried out by transmittance measurement. The optical transmittance spectrum for the film deposited at low precursor solution volume exhibits high transparency with a decrease when the precursor solution volume increases. It is found that the optical band gap decreases from 3.30 to 3.27 eV and the optical constants increase with the increase of the thickness of the films attributed to the increase in lattice defects.





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ID# M.34 Hocine Belahya and Abde El Ghani Boubekri. A comparative study about the energetic impact of dry land residential buildings with the integration of photovoltaic system (details, TMREES16_paper_34)

Abstract. Nowadays, Energy consumption among the residential sector ranks first. In Algeria, 42% of global consumption could grow because of the continued population increase and the simultaneous changing requirements of users to maintain their comfort. Thus in summer, buildings face problems of discomfort which are; the phenomenon of overheating and the facades exposure to solar radiation. These lead to a large amount of electricity consuming through using air conditioning. We shed the light in this study on the seasonal consumption of air conditioning system that varies according to the degree of comfort and air-conditioned area. In the city of Ouargla, the cooling system in the building counts more than 63% of the total energy consumption per year. This shows that the envelope of the buildings is extremely important in the arid climate. Finally we will integrate PV system to optimise energy consumption.

ID# M.81 Chamekh Khemissi, Baali Fethi and Kerboub Djawher. Hydrogeological setting of the karstic aquifer in a semi arid region: case Cheria plain, Eastern Algeria (details, TMREES16_paper_81)

Abstract. The purpose of this study was to identification the Karst cavities in the Cheria syncline, are widespread in the Eocene forming the upper formation under the Quaternary cover. The movement of karst groundwater, especially through solution channels and cavities. Karst hydrogeology research consists mainly of research as well as special geophysical methods, hydrochemical and environmental isotope studies, using stable isotope analysis data, show that all water are meteoric in origin. Karstification depends on various conditions, including geological, chemical, and climatological factors, rock properties, the permeability of the ground, and tectonic movements. The basin is affected by many different tectonic phases and neotectonic movement. These data compared with observations of some subsurface karstic phenomena (karstified fractures) makes it possible to propose a diagram for the evolution of the preferential directions of karstifications (orientations N40 and N140 principally). In other words, if we will give a hydrogeological meaning to the geological, hydrochemical, geomorphological and climatic factors, if we will examine their influence on the groundwater flow field, then we have translate them into conditions and hydraulic properties of the karstic aquifer in the Cheria syncline.

ID# M.47 Guitouni Samira, Khammar Messaouda and Beddek Lynda. Effect of Substrate Temperature on The Optical Properties of CZTS Thin Films Deposited by Spray Pyrolysis (details, TMREES16_paper_47)

Abstract. Cu_2ZnSnS_4 (CZTS) has attracted much attention recently as an absorber layer material since CZTS has an optimum band gap for solar cells and has high absorption coefficient in the visible region. In addition, the earth abundance and the nontoxic nature of the elements eliminate environmental concerns. The energy conversion efficiency of CZTS based solar cells has increased from 0.66% in 1996 to close to 9% recently. Cu_2ZnSnS_4 (CZTS) has been prepared by a successive deposition of CZTS thin film on glass substrates by spray pyrolysis technique. The substrate temperature has been varied in order to investigate its influence on device properties. The optical band gap of films deposited at various substrate temperatures is found to lie between 1.90 and 0.91 eV.

ID# M.56 Myriam Marie El Fergougui and Djamel Boutaoutou. Abacus to determine the groundwater evaporation in arid areas case of the region of Ouargla (details, TMREES16_paper_56)





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Abstract. MEQ One of the possible remedies to control the inputs of salts toward the surface would be by diminishing the groundwater; because areas set on values in arid zones of the region of Ouargla are based upon excessively mineralized groundwater whose level is near the ground surface (0 to 1.5 m). The improvement and stabilization of yields of any cultural practices in these areas can only take place if the salty groundwater is maintained (drained) to a depth of 1.6m. The results of work carried on the determination of the groundwater evaporation in Ouargla show that the evaporation essentially depends on: The climate that reigns above the ground of the groundwater situated on the band from 0 to 0.6 m. The climate and soil texture according the groundwater located in the layer from 0.6 to 1.6 m. The depth of the groundwater when this latter is located beyond 1.6 m.

ID# M.43 Dib Djalel, Ghoudelbourk Sihem, Omeiri Ammar and Samir Ladaci. Control Powers Structure of DFIG Based on Fractional Regulator Fed by Multilevel Inverters DC Bus Voltages of a PV system (details, TMREES16_paper_43)

Abstract. This paper shows that we can improve the performance of the auto-adjustable electric machines if a fractional dynamic is considered in the algorithm of the controlling order. This structure is particularly interested in the separate control of active and reactive power of the double-fed induction generator (DFIG) of wind power conversion chain. Fractional regulators are used in the regulation of chain of powers. Knowing that, usually, the source of DFIG is provided by converters through controlled rectifiers, all this system makes the currents of lines strongly polluted that can have a harmful effect for the connected loads and sensitive equipment nearby. The solution to overcome these problems is to replace the power of the rotor DFIG by multilevel inverters supplied by PV which improve the THD. The structure of the adopted adjustment is tested using Matlab/Simulink and the results are presented and analyzed for a variable wind.

ID# M.122 Mohammed Moustafa Bouzaki, Meriem Chadel, Boumediene Benyoucef, Pierre Petit and Michel Aillerie. Simulation of the outdoor energy efficiency of an autonomous solar kit based on meteorological data for a site in Central Europa (details, TMREES16_paper_122)

Abstract. This contribution analyzes the energy provided by a solar kit dedicated to autonomous usage and installed in Central Europa (Longitude 6.10°; Latitude 49.21° and Altitude 160 m) by using the simulation software PVSYST. We focused the analysis on the effect of temperature and solar irradiation on the I-V characteristic of a trade PV panel. We also mainly consider in this study the influence of charging and discharging cycles of the battery on the generator efficiency. Meteorological data are integrated into the simulation software. As expected, the solar kit provides an energy varying all along the year with a minimum in December. In the proposed approach, we consider this minimum as the lowest acceptable energy level to satisfy the use. Thus for the other months, a lost in the available renewable energy exists if no storage system is associated.

ID# M.90 Mida Dris and Ben Attous Djilani. Modeling and Simulation of a hybrid system " wind - Photovoltaic " for producing electrical energy with Grid Connected (details, TMREES16_paper_90)

Abstract. Renewables energy have the potential to generate electricity cleanly without pollution and a lesser dependence of resources for this production of electric power by these systems sources such as solar, wind, hydro, geothermal and biomass instead anti-environmental conventional systems such as gas, coal and oil is a remarkable idea but not frequent in Algeria. Our research comes as a benefit and





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contribution to this idea in our country that seems delayed in this area today especially hydro, solar and wind become competitive in terms of production costs, as well as components power electronics that provides good control for such source. And as a single renewable source cannot solve the energy problem because random characters environmental conditions, a hybrid system combining several sources is needed. This research presents a modelling and simulation of " Wind-Photovoltaic" Hybrid Electric Power System interconnected to the electrical grid. The MATLAB/SIMULINK is used to conduct simulation, Photovoltaic /Wind System taking into account all radiation, temperature, wind speeds and variation of the load demand during the day. all quantities of Hybrid System such as phase voltage of the inverter leg and current in each IGBT's has been simulated. AC output current of the inverter that injected to the load/grid, load current, grid current, power output from Hybrid System, power delivered to or from grid has also simulated

ID# M.120 Touhami Zine Eddine Ternifi, Lotfi Atik, Ghalem Bachir, Ahmed Wahid Belarbi, Pierre Petit and Michel Aillerie. Quality improvement of the ac electrical energy produced by a modular inverter dedicated to photovoltaic applications (details, TMREES16_paper_120)

Abstract. This paper presents a parallel topology of a modular photovoltaic inverter, allowing a marked improvement in the quality of the output energy signal. This is a feature of much interest in practical applications, as it will produce an output signal with very low harmonic distortions. In this contribution, we describe the inverter, then the bipolar pulse width modulation (PWM) strategy validating by simulation. Finally, some experimental results are exposed to illustrate our work.

ID# M.31 Mohammed Sadok, Boumediene Benyoucef, Mourad Othmani and Ahmed Mehdaui. Performances and Failure of Field-Aged PV Modules Operating in Saharan Region of Algeria (details, TMREES16_paper_31)

Abstract. This article deals with behaviour of PV modules, of different technologies and manufacturers, exposed for long periods in Saharan region of Algeria. These modules are exposed in Adrar in the southwestern part of Algeria. The study uses experimental I-V curves of PV modules for determining their performances. The datasheet information of modules will be useful in determination of degradation rates of the modules. Three types of modules have been tested: Photowatt (PWX 500), UDT5-50 and Isofoton (I-75 and I-100 serials). Results showed that Isofoton I-100 modules present the highest degradation rate while the lowest degradation rate was reached with I-75 serial. However, these rates tallies with other studies. The visual inspection of the modules has revealed various kinds of failures and defects responsible of performances drop (EVA browning, delamination, burn marks,...).

ID# M.80 Chamekh Khemissi, Chamekh Khemissi and Yahiaoui Abde El Wahab. Underground karst cavities simulated by geomechanical and hydraulic parameters of the fractured rock in Cheria area, NE Algerea (details, TMREES16_paper_80)

Abstract. The main goal of this study is to analyze the surface part of the karst and some underground characteristics of Eocene karst system. The Karst cavities are widespread in the Eocene forming the upper formation under the Quaternary cover in the Cheria syncline. The Eocene limestone aquifer is intensively fractured and karstified. Major sub surface karst cavities is located nourthen and centre part of Cheria syncline. Hence, cavity roof thickness are varied with geometrical and geomchanical parameters on the fractured rock. The depth of the karstified zones depends on the geomechanical parameters, which is





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controlled by the fracture aperture distribution (Renshaw. DOI: 10.1029/ 95 JB 02159. ISSN: 0148-0227.1995). Therefore, the karstified zone requires new methods for estimating average depth of the karst cavities from structural, geometrical, and mechanical properties of fractured rock. In that way, statistical methods is very efficient for describing in detail the shallow part of karst cavities, when Eocene limestone outcrops at the surface in the center and northern of the basin. A stochastic analysis is carried out to evaluate the influence of correlations between relevant distributions on the simulated RMR values, also to simulate the cavity depth. The model is also used in Monte Carlo simulations. The statistical analysis showed that Rock Mass Rating (RMR) depends on the hydraulically and geomechanical parameters. Naturally it is always possible to simulate a cavity depth (PKR) by several hydraulically and geometrical parameters of fractures (uniaxial compressive strength (RC), Rock Quality Designation (RQD), Spacing fracture (EJ), inflow per 10 tunnel length (D10m.L), friction cording of the angle of the rock mass (CD-I.j), layer depth (Pc), average aperture to each group of the fracture (di), average fracture frequency to each group of the fracture (fi), fracture depth (dfi)), especially in the case of known real fracture geometry. The study of the relations between geomechanical fractured rock and fracture geometry led us to simulate any cavity depth (PRK) in Chera syncline.

ID# M.88 Andrea G Capodaglio, Daniele Molognoni and Anna Vilajeliu Pons. A MULTI-PERSPECTIVE REVIEW OF MICROBIAL FUEL CELLS FOR WASTEWATER TREATMENT: BIOELECTROCHEMICAL, MICROBIOLOGIC AND MODELLING ASPECTS (details, TMREES16_paper_88)

Abstract. Microbial Fuel Cells (MFCs) represent a still novel technology for the recovery of energy and resources through wastewater treatment. Although the technology is quite appealing, due its potential benefits, its practical application is still hampered by several drawbacks, such as systems instability (especially when attempting to scale-up reactors from laboratory prototype), internally competing microbial reactions, and limited power generation. This paper is an attempt to address several of the operational issues related to MFCs application to wastewater treatment, in particular when dealing with simultaneous organic matter and nitrogen pollution control. Reactor configuration, operational schemes, electrochemical and microbiological characterization, optimization methods and modelling strategies are reviewed and discussed with a multidisciplinary, multi-perspective approach. The conclusions drawn herein can be of practical interest for all MFC researchers dealing with domestic or industrial wastewater treatment.

ID# M.102 Nassim Baba Ahmed and Abderrahim Benmoussat. Effect of GEMPEHD thermal properties on the propagation of heat in a solar collector (details, TMREES16_paper_102)

Abstract. Thermal properties of GEMPEHD polymer (high-density polyethylene geomembrane) as an absorber material in a prototype of solar sensor have been investigated in a temperature range from 300 K to 400 K. Results showed a dependency between temperature and its properties. Thus, increasing the power absorbed by the GEMPEHD increases its temperature and the useful power received by the air and then the air temperature. Overall losses increase with the increase of the temperature difference between the GEMPEHD and windows and this increases the efficiency of the solar collector and minimize the entropy of the system. Then the study of thermal aging is dedicated to the interpretation of various analyses on GEMPEHD before and after its use in the solar collector. The thermal aging GEMPEHD in the air is a physical loss and chemical consumption immediately followed by a brutal oxidation of the polymer. The losses would be governed primarily by the chemical consumption of antioxidants.





ID# M.39 Wassim Jerbi, Abderrahmen Guerhazi and Hafedh Trabelsi. A novel approach with energy consumption of routing protocol for wireless sensor network (details, TMREES16_paper_39)

Abstract. The optimum use of coverage and energy consumption in wireless sensor networks (WSNs) is very important in area large scale. The protocols of clustering are based search the nodes CH in a random fashion. The Cluster Head is selected on the basis of maximum number of nodes connected, thus several sensor nodes cannot reach any CH, even though they are in the transmission range. These nodes are called the isolated nodes. To solve this problem, the proposed a sub_cluster protocol, its role is to reduce the sensor nodes which do not belong the cluster. The major novel contribution of the proposed work is the sub_cluster protocol which provides coverage of the whole network with a minimum number of isolated nodes and has a very high connectivity rates. The sub_cluster protocol allows firstly with great cluster can be grouped many sub cluster connected to major CH, each sub cluster, can be connected of the maximum nodes non CH. Second, to minimize the work of CH (Cluster Head) so has not exhausted its total energy. The protocol sub_cluster must be a coverage model in area large scale and the mastery of communication between nodes in application different, in all the fields of work. The synchronization between nodes and energy consumption allows a long lifetime for protocol sub_cluster. The proper functioning of the Application supported therefore requires management of intelligent resources present within each the network sensor. The simulation results show that sub_cluster protocol performs better than LEACH in terms of coverage, connectivity rate, energy and scalability.

ID# M.35 Mohamad Ramadan and Mahmoud Khaled. An experimental study on recovering heat from domestic drain water (details, TMREES16_paper_35)

Abstract. Heat recovery is one most promising solutions to decrease the energy consumption. Its main advantage is that it decreases the energy bill without any effect on the user comfort. That is why the heat recovery domain is being developed in a tremendous speed. This paper presents a study on heat recovery from domestic drain water. The concept consists in using the lost energy contained in the drain water as a preheating source to heat the cold water that supply the house. A coil heat exchanger is utilized to perform the heat exchange between the hot water and the cold water. To test the concept a lab scale prototype is constructed. Several scenarios are simulated experimentally to study the behavior of the system in terms of the different parameters. It has been shown that using such a system may highly increase the cold water supply temperature and thus decreases the energy consumption.

ID# M.95 Mehdi Ouada, Mohamed Salah Meridjet and Djalel Dib. Adaptive Smart Simulator for Characterization and MPPT Construction of PV Array (details, TMREES16_paper_95)

Abstract. Partial shading conditions are among the most important problems in large photovoltaic array. Many works of literature are interested in modeling, control and optimization of photovoltaic conversion of solar energy under partial shading conditions, The aim of this study is to build a software simulator similar to hard simulator and to produce a shading pattern of the proposed photovoltaic array in order to use the delivered information to obtain an optimal configuration of the PV array and construct MPPT algorithm. Graphical user interfaces (Matlab GUI) are built using a developed script, this tool is easy to use, simple, and has a rapid of responsiveness, the simulator supports large array simulations that can be interfaced with MPPT and power electronic converters.





ID# M.78 Adel Oueslati, Ahmed Hamachi and Mohamed Elmaaoui. New pilot for air humidification-Dehumidification Part I: Theoretical basis of the design (details, TMREES16_paper_78)

Abstract. A new facility designed and built for the desalination of water by the humidification and dehumidification technology. This system consists primarily of a packed column, a heat energy source and a source of compressed air. It operates on the principle of an airlift pump. The theoretical basis of selection and design of this new facility, have been established. The enabling conditions transfers of heat and mass were elucidated. This facility can work with multiple sources of energy such as wind power, solar energy, photovoltaic energy, etc.

ID# M.44 Kebaili Nabil. INFLUENCE OF CRUMB RUBBER POWDER ON THE CHARACTERISTICS OF ASPHALT CONCRETE IN SOUTH ALGERIA (details, TMREES16_paper_44)

Abstract. Bituminous concrete (asphalt) currently used consist of a granular skeleton and a bitumen which is the major responsible for the viscoelastic behavior of concrete wearing course, for this purpose, improving the performance of the latter necessarily involves the elevation of intrinsic mechanical properties of the bitumen constituent. The present study aims to enhance crumb rubber surfacing. It is particularly interested in the behavior of two types of asphalt concrete with their bitumen's are modified by addition of two varieties of rubber crumb in different granularities. Concretes, in this study, are made from two types of bitumen grade and different backgrounds for making the wearing of roads and airfields in southern Algeria. Bitumen used in the manufacture of asphalt is modified by incorporating rubber crumb from the crushing of rubber waste and other plastics end of the cycle. They often pose a threat to the environment because of their size and low biodegradability. To this end, the present study aims the study and evaluation of the influence of added performance behavior of road asphalt concretes made on the basis of polymer modified bitumen's. The amendment, made in several formulations, especially designed to track the influence of particle size and dosage powder on the rheological and mechanical performance of concrete through the Marshall Stability test. Apart from the environmental benefits, the tests have shown that the addition of crumb in a certain interval has a significant influence on the mechanical and rheological properties of asphalt concrete including stabilities and creep, and results on a set of interesting correlations..

ID# M.40 Henaoui Mustapha, Sari-Hassoun Zakaria and Aliane Khaled. Numerical Study of a Flat Plate Solar Collector Equipped with Different Models of Baffles (details, TMREES16_paper_40)

Abstract. This paper describes the optimization of a solar air flat plate collector by the introduction of simple baffles and perforated baffles on the absorber and the insulation plate. In this work we present a numerical study of the dynamic and thermal stationary air flow using the k-Epsilon turbulence model. The Navier-Stokes equations and turbulence model are solved numerically by the finite volume method , using the Fluent software. A good orientation of the coolant to the absorber increases the heat exchange in the solar collector Finally, a general conclusion is given at the end of this work to show the contribution of the technique presented in this article.

ID# M.22 Zkaria Sari Hassoun, Khaled Aliane and Hiba Imane Berrezoug. Experimental Study of a solar still (details, TMREES16_paper_22)

Abstract. This work concerns the study of a solar distiller. Particular attention is paid to the different operating characteristics such as: temperature, global and internal efficiency, performance and the





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performance factor during the distillation process. We have also established the overall heat balance in transition. The test results on our device, where a series of tests was carried out during the summer under the sea water to see the evolution of different parameters. The daily output of solar still is 1.8litre / day. All the dissolved solids (TDS), conductivity and pH of the water were measured.

ID# M.116 Fadhila Fodhil, Abderrahmane Hamidat and Omar Nadjemi. Optimal Sizing of Stand-Alone Hybrid PV-Diesel-Battery System Using PSO and the ϵ -Constraint Method. (details, TMREES16_paper_116)

Abstract. The present paper presents a methodology to perform optimal sizing of an autonomous hybrid PV/diesel system. A particle swarm optimization (PSO) and the ϵ -constraint method have been applied to minimize simultaneously the total cost of the system, unmet load, and fuel emission. The case study is the rural village of Ilamane, province of Tamanrasset, the south of Algeria (latitude 23.12oN and longitude 5.27oE), the system is an autonomous hybrid PV/diesel system that includes photovoltaic (PV) panels, diesel generator, and battery bank.

ID# M.131 Pierre Petit, Jean-Paul Sawicki, Frédéric Saint-Eve, Fabrice Maufay and Michel Aillerie. Optimized MPPT Algorithm for boost converters taking into account the environmental variables (details, TMREES16_paper_131)

Abstract. This paper presents a study on the specific behavior of the Boost DC-DC converters generally used for powering conversion of PV panels connected to a HVDC (High Voltage Direct Current) Bus. It follows some works pointing out that converter MPPT (Maximum Power Point Tracker) is severely perturbed by output voltage variations due to physical dependency of parameters as the input voltage, the output voltage and the duty cycle of the PWM switching control of the MPPT. As a direct consequence many converters connected together on a same load perturb each other because of the output voltage variations induced by fluctuations on the HVDC bus essentially due to a not insignificant bus impedance. In this paper we show that it is possible to include an internal computed variable in charge to compensate local and external variations to take into account the environment variables

ID# M.104 Amal Herez, Mohamad Ramadan and Mahmoud Khaled. Short review on solar energy systems (details, TMREES16_paper_104)

Abstract. This paper provides a short review on solar energy systems, according to types of collectors and applications. There are stationary and concentrating collectors. Solar energy is applied in water heating, cooking, drying, space heating, cooling, and refrigeration, electricity production, and photovoltaic. Although a wide range of types and applications are present in the literature, there is still a lot of improvements and work to be done in the domain.

ID# M.108 Anas Boussaa Sabiha, Kheloufi Abdelkrim and Boutarek Zaourar Naima. Characterization of Silica Quartz as raw material in photovoltaic application (details, TMREES16_paper_108)

Abstract. Raw materials are essential for the functioning of modern societies, and access to these raw materials is vital to the world economy. Sustainable development, both globally level, raises important new challenges associated with access and efficient use of raw materials. High purity quartz, is consider as a critical raw material and it is a rare commodity that only forms under geological conditions where a narrow set of chemical and physical parameters is fulfilled. When identified and following special





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beneficiation techniques, high purity quartz obtains very attractive prices and is applied in high technology sectors that currently are under rapid expansion such as photovoltaic solar cells, silicon metal – oxide wafers in the semiconductor industry and long distance optical fibers that are used in communication networks (1). Crystalline silicon remains the principal material for photovoltaic technology. Metallurgical silicon is produced industrially by the reduction of silica with carbon in an electric arc furnace (2) at temperatures higher than 2000 °C in the hottest parts, by a reaction that can be written ideally as: $\text{SiO}_2 + 2\text{C} = \text{Si} + 2\text{CO}$. (3) The aim of this study has been to test experimental methods for investigating the various physical and chemical proprieties of Hoggar quartz with different techniques: X Ray Fluorescence, X rayon diffractometer, Scanning Electron Microscopy, Optic Microscopy Carbon Analyzer and Vickers Hardness. The results show finally that the quartz has got good result in purity but need enrichment for the photovoltaic application.

ID# M.103 Abdelhamid Khabbazi, Abdallah Dadi and Yassine Elhamdouni. Thermal properties of the composite material Clay-Alfa fibers: application to earth brick in northern Morocco (details, TMREES16_paper_103)

Abstract. Alfa fiber and Clay are abounding, natural and renewable materials, they have thermal and acoustical ownership very interesting. In the present job, we studied the thermal behaviour of the different samples of dimensions $10 \times 10 \times 3$ cm³ by blending Clay with different percentages of fibers alfa (0.5 %, 1 %, 2 %, 3 %, 4 %). Then we compare thermal ownership of these new materials (clay + alfa) with the only Clay to valorize the addition of fibers alfa and her use with Clay as insulating material. This comparison of the energy performance of these two materials will enable us to deduce that the new material (clay + alfa) is lighter, its capacity to delay the transmission of warmth is superior to that of the only clay and its use as outside wall should give an economy of energy varies between 27 % and 60 %.

ID# M.99 Abderrezak Guenounou, Michel Aillerie, Ali Malek, Ahcene Tricki, Allaoua Oulebsir, Zoubeyr Smara, Achour Mahrane and Madjid Chikh. Outdoor performances of four photovoltaic technologies under four typical meteorological conditions (details, TMREES16_paper_99)

Abstract. We present a comparative study of the behavior and performance undervarious weather conditions of four PV modules of different technologies recorded in four typical days in summer and winter. The study is based on the simultaneous and continuous testing of PV modules under natural conditions of a site located in a coastal area of southern Mediterranean. We essentially interested to the fill factor, the conversion efficiency and the energy performance. A brief description of the experimental set up and the originally method is given after the introductive paragraph. All obtained graphical results allow, at first, the validation of the approach and at second, point out that the daily evolution curves of the fill factor and the efficiency of the PV modules adopt different paces depending on the PV technology. In addition, the results of the energy study show that the performance ratios of the different technologies are differently influenced by weather environment and seasons.

ID# M.130 Lu Jieming and Du Kai. A study of gasoline vapor condensation recovery technique (details, TMREES16_paper_130)

Abstract. In order to reduce the power consumption of gasoline vapor condensation recovery unit, the phase equilibrium based on several equation of state (EOS) models and the condensation characteristics of gasoline vapor were investigated. The effects of cooling temperature and pressure on the recovery





efficiency and emission concentration were analyzed. An optimized three-stage pressurized condensation process was proposed, whose total power consumption and dehydration efficiency are compared with direct condensation process. The phase equilibrium calculation results are verified by existing experimental data. Results show that Peng-Robinson state equation combined with Vdw mixing rules is most suitable for the accurate calculation of hydrocarbon mixture phase equilibrium, which provides a more accurately prediction of the liquid phase properties. An analysis about the comparison between direct condensation process (DCP) and pressurized condensation process (PCP) was made based on the conclusion, results show that PCP can remarkably reduce the strict cooling temperature requirements of the recovery system. Under the same conditions, the cooling temperature can be increased by 30°C, and the total power consumption of the refrigeration system is reduced by 17%, correspondingly. In addition, the dehydration efficiency is increased by 70%~75%, which is conducive to the stability and efficient operation of the equipment.

ID# M.119 Lotfi Atik, Pierre Petit, Zineddine Touhami Ternifi, Ghalem Bachir and Michel Aillerie. Comparison of Four MPPT Techniques for PV Systems (details, TMREES16_paper_119)

Abstract. The working behavior of a module / PV array is non-linear and highly dependent on working conditions. As a given condition, there is only one point at which the level of available power at its output is maximum. This point varies with time, enlightenment and temperature. To ensure optimum operation, the use of MPPT control allows us to extract the maximum power. This paper presents a comparative study of four widely-adopted MPPT algorithms, such as Perturb and Observe, Incremental Conductance, Measurements of the variation of the open circuit voltage or of the short-circuit current. Their performance is evaluated using, for all these techniques. In particular, this study compares the behaviors of each technique in presence of solar irradiation variations and temperature fluctuations. These MPPT techniques will be compared using the Matlab / Simulink tool.

ID# M.58 Lati Moukhtar, Slimane Boughali, Hamza Bouguettaia, Djamel Mennouche and Djamel Bechki. Experimental Study on Flat Plate Air Solar Collector Using a Thin Sand Layer (details, TMREES16_paper_58)

Abstract. A flat plate air solar collector was constructed in the laboratory of New and Renewable Energy in Arid Zones LENREZA, Ouargla University- South East Algeria. The absorber of the flat plate air solar collector was laminated with a thin layer of local sand. This acted as a thermal storage system (packed bed) with a collecting area of 2.15 m² (0.86 m x 2.5 m). It was noticed that the solar heater integrated with the thermal storage material delivered comparatively higher temperatures; thus, giving a better efficiency than the air heater without the thermal storage system. Poster contribution

ID# M.14 Adawiya J., Amin Thamir, Duha S. and Mohammed R.. Deposition of Silver Nanoparticles on Multiwalled Carbon Nanotubes by chemical reduction process and Their Antimicrobial Effects (details, TMREES16_paper_14)

Abstract. In this paper, the functionalization of raw-MWCNTs involves oxidation reaction using concentrated acid mixture of HNO₃:H₂SO₄ (1:3), via ultrasonic bath (170 W, 50 kHz) to obtain functional groups. Then Ag nanoparticles are decorated the outside over the surface of functionalized MWCNTs using a chemical reduction process resulting in the formation of (Ag/ MWCNTs) hybrid material. The results showed that outer diameter functionalized F-MWCNTs and Ag nanoparticles size was about (11-80) nm





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and (10 to 25) nm, respectively using TEM and HRTEM. The crystallographic structure of MWCNTs using X-ray diffraction (XRD) analysis proved diffraction peaks at 38.1° , 44.3° , 64.7° and 77.4° degrees namely, Ag (111), Ag (200), Ag (220), and Ag (311) of the face-centered cubic lattice of Ag, respectively, excepting the peak at $2\theta = 25.6^\circ$, which correspond to the (0 0 2) reflection of the MWNTs are corresponding to Ag/MWNTs. The antimicrobial activities of Ag/MWCNTs hybrid using plate count method showed that decreasing a large number of bacteria colonies of E. coli and S. aureu with increasing the hybrid concentrations after incubation for 24h in shaker incubator with percentage of inhibition approaching 100%..

Relevance: 75%

ID# M.10 Benmedjahed Miloud and Mouhadjer Samir. Evaluation of wind energy cost and site selection for a wind farm in the south of Algeria (details, TMREES16_paper_10)

Abstract. The aim of this paper is to evaluate the wind resource on five sites situated in Algerian Sahara, namely Adrar , Ain Salah, Bordj Badji Mokhtar, Hassi R'Mel and Tindouf . The hourly data used in this study span a period of last five years. The parameters considered are the wind speed. After the evaluation of wind energy, the economic evaluation was conducted for wind farm (18 MW).We select the best site from the five sites and an appropriate wind turbine from nine wind turbine, according to the lowest possible unity cost of energy. Hassi R'Mel is favorable site for installed wind frame In order to reach the rated power 18 MW of the wind farm; our choice is focused on one row of twelve wind turbines (wgt1.5MW) from East South East (ESE) to West North West (WNW), 320 m of distance between each two turbines.

ID# M.37 Youssef Saad, Rafic Younes, Said Abboudi, Adrian Ilinca and Chadi Nohra. Progress in Energy Generation For Canadian Remote Sites (details, TMREES16_paper_37)

Abstract. Many remote areas around the world are isolated, for various reasons, from electricity networks. They are usually supplied with electricity through diesel generators. The cost of operation and transportation of diesel fuel in addition to its price have led to the procurement of a more efficient and environmentally greener method of supply. Various studies have shown that a wind-diesel hybrid system with compressed air storage (WDCAS) seems to be one of the best solutions, and presents itself as an optimal configuration for the electrification of isolated sites. This system allows significant fuel savings to be made because the stored compressed air is used to supercharge the engine. In order to optimize system performance and minimize fuel consumption, installation of a system for recovering and storing the heat of compression (TES) seems necessary. In addition, the use of hydro-pneumatic energy storage systems that use the same machine as the hydraulic pump and turbine allow us to store energy in tight spaces and, if possible, contribute to power generation. The scrupulous study of this technical approach will be the focus of our research which will validate (or not) the use of such a system for the regulation of frequency of electrical networks. In this article we will skim through the main research that recently examined the wind-diesel hybrid system which addressed topics such as adiabatic compression and hydro-pneumatic storage. Instead, we will offer (based on existing studies) a new ACP-WDCAS (wind-diesel hybrid system with adiabatic air compression and storage at constant pressure), which combines these three concepts in one system for the optimization of wind-diesel hybrid system.

Relevance: 66%





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ID# M.85 Hana Zerfaoui, Djalel Dib, Mohamed Rahmani, Kamel Benyelloul and Chafia Mebarkia. The study by simulation of the antireflection layers: SnO₂ and ZnO in the solar cells n-SiC/p-SiC (details, TMREES16_paper_85)

Abstract. Abstract. Recently, Two technologies of the photovoltaic cells are present today namely the cells crystalline (polycrystalline and monocrystalline) and the cell thin layers. The development of the solar cells requires a technological change of materials used in their manufacturing. The thin layers are parts of these materials and which announced their effectiveness and growth of output of the solar cell. The aim of this paper article is to the study and simulation of photovoltaic cells containing SiC materials. This materials is have important having a part in the development of renewable energies. Based on the SCAPS (a Solar Cell Capacitance Simulator) simulation, the obtained results are V_{co}, J_{sc}, FF and the output energy of conversion of a solar cell n-SiC/p-SiC with different materials for the anti-reflecting layer ZnO and SnO₂. our results were performed after a simulation with the SCAPS (a Solar Cell Capacitance Simulator) computer code in one dimension, the results obtained after optimization

ID# M.146 Ahmed Derrouazin, Michel Aillerie, N Mekkakia-Maaza and Jean Pierre Charles. MIMO-fuzzy versus classical logic controller for residential hybrid solar-wind-storage energy system (details, TMREES16_paper_146)

Abstract. Several researches for management of diverse hybrid energy systems and many techniques have been proposed for robustness, savings and environmental purpose. In this work we aim to make a comparative study between two supervision and control techniques: fuzzy and classic logics to manage the hybrid energy system applied for typical housing fed by solar and wind power, with rack of batteries for storage. The system is assisted by the electric grid during energy drop moments. A hydrogen production device is integrated into the system to retrieve surplus energy production from renewable sources for the household purposes, intending the maximum exploitation of these sources over years. The models have been achieved and generated signals for electronic switches command of proposed both techniques are presented and discussed in this paper.

ID# M.101 Amina Belabbas and Djamel Boutoutaou. SOIL CONTAMINATION BY PETROLEUM PRODUCTS: SOUTH ALGERIAN CASE (details, TMREES16_paper_101)

Abstract. Contamination of soil by petroleum products is a current problem in several countries in the world. In Algeria, this negative phenomenon is highly remarked in Saharan region. Numerous studies at the University of Ouargla that we will review in this paper, have tried to find an effective solution to eliminate the hydrocarbons in the soil. Among techniques of elimination, there are "biodegradation" by the microorganisms (bacteria), which is a natural process. Presence of aboriginal strain Bacillus megaterium has leads to a strong degradation of pollutants. This strain chosen for its generation time of short is performing as seen the best yields of elimination of hydrocarbons assessed at 98.43 % in 28 days of experimentation on sample bioaugmente and biostimule by biosurfactant, 98.22% in 35 days on sample and bioaugmente by urea, and 86.1 % 35 days in the sample and biostimule by nutrient solution. Rate of biodegradation of crude oil by strain Pseudomonas aeruginosa is higher in the presence of biosurfactant(53.03 %) that in his absence (35.27 %). In addition, the rate of hydrocarbons mobilized after washing soil containing 62.70 g of hydrocarbons per kilogram of soil by centrifugation is of 50.21 % and 76.13 %. The aboriginal strain of "Pseudomonas aeruginosa" isolated is therefore capable of producing a





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biosurfactant, which has great capacity in remobilization of hydrocarbons and acceleration of their biodegradation.

ID# M.112 Mohamed Redha Rezoug and Abdelbasset Krama. Control Device for Automatic Orientation of a Solar Panel Based on a Microcontroller (Pic16f628a) (details, TMREES16_paper_112)

Abstract. This work proposes a control device for autonomous solar tracker based on one axis, It consists of two main parts; the control part which is based on “the PIC16f628a”; it has the role of controlling, measuring and plotting responses. The second part is a mechanical device which has the role of making the solar panel follows the day-night change of the sun throughout the year. Both parties are established to improve energy generation of the photovoltaic panels. In this paper, we will explain the main operating principles of our system. Also, we will provide experimental results which demonstrate the good performance and the efficiency of this system. This innovation is different from what has been proposed in previous studies. The important points of this system are maximum output energy and minimum energy consumption of solar tracker, its cost is relatively low with simplicity in implementation. The average power increase produced by using the tracking system for a particular day, is over 30 % compared with the static panel.

ID# M.96 Mohammad Amiri, Ghasem Ghaffari and Hossein Mohammadifard. On eco-efficient technologies to minimize industrial water consumption (details, TMREES16_paper_96)

Abstract. Purpose - Water scarcity will further stress on available water systems and decrease the security of water in many areas. Therefore, innovative methods to minimize industrial water usage and waste production are of paramount importance in the process of extending fresh water resources and happen to be the main life support systems in many arid regions of the world. This paper demonstrates that there are good opportunities for many industries to save water and decrease waste water in softening process by substituting traditional with eco-friendly methods. The patented puffing method is an eco-efficient and viable technology for water saving and waste reduction in lime softening process. Design/methodology/approach – Lime softening process (LSP) is a very sensitive process to chemical reactions. In addition, optimal monitoring not only results in minimizing sludge that must be disposed of but also it reduces the operating costs of water conditioning. Weakness of the current (regular) control of LSP based on chemical analysis has been demonstrated experimentally and compared with the eco-efficient puffing method. Findings - This paper demonstrates that there is a good opportunity for many industries to save water and decrease waste water in softening process by substituting traditional method with puffing method, a patented eco-efficient technology. Originality/value - Details of the required innovative works to minimize industrial water usage and waste production are outlined in this paper. Employing the novel puffing method for monitoring of lime softening process results in saving a considerable amount of water while reducing chemical sludge.

ID# M.128 Kadri Ahmed Yacine and Hamidat Abderahmane. Technico – economic assessment of hybrid Diesel - photovoltaic power plant in the south of ALGERIA (details, TMREES16_paper_128)

Abstract. In Algeria, Electrical energy demand has knew a significant growth in recent years. The important increase in demand is due to the development of industrial and commercial sectors, and the comfort of residents customers by using multiple equipment of household such as the TV, ventilator, especially air-conditioners in the south of Algeria .To address the problem of imbalance between supply and demand,





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it is compulsory to add other units of productions of electricity. These units can be use conventional sources or renewable energy sources. This study focuses on the feasibility of hybridizing diesel power plants supplying the isolated villages in southern Algeria by the introduction of PV systems. The town of Djanet was taken as a case study. The comparison between the different technical and economic parameters allows determining the contribution of the hybridization of conventional resources of production. However, the cost-effectiveness based on the net present cost (NPC) is estimated at 176, \$ 054.208 for the hybrid system and 194, \$ 965.280 for all Diesel system. In terms of the cost per kWh produced by the two systems, the kWh produced by the hybrid system is less expensive than the kWh produced by any conventional diesel system is 0.551\$ / kWh against 0.610\$ / kWh. The results also show that the hybrid system provides coverage of the expected load in the future.

ID# M.133 Rahmani Mohamed, Yakoubi Abdelkader and Zerfaoui Hana. Study of Structural and Electronic Properties of binary alloys Si_{1-y}Cy (details, TMREES16_paper_133)

Abstract. In this work we used the plane wave method increased with linearization (FP-LAPW), to calculate the structural and electronic properties of binary alloys Si_{1-y}Cy. IT is interesting to study the structural and electronic properties of the binary alloy Si_{1-y}Cy seen technological interest that presents it. We'll model the binary alloy Si_{1-y}Cy under the theory of functional density (DFT, Density Functional Theory) by using the linearized augmented plane wave method. This explicitly designed to provide access to the electronic properties of the considered systems. We emerged as a method of choice. We will use a comparison scale for calculations we Perform, the focus will be on the part exchange and correlation energy which determines crucially the quality of the results. structural properties have shown a dependence of the lattice parameter and the bulk modulus, with the concentration of binary .The band structures have shown that the position and character of 2P states of carbon, provide unusual characteristics of these binaries Weak concentration. Thus the purely semiconducteur nature of these binaries is very visible in band structures. We got new results of the ground state properties comprising the constant of the balance network for C, Si and Si_{1-y}Cy for a cell of 8, 16 and 32 atoms. For Si and C calculated network parameters are in good agreement with theoretical calculations but underestimated compared to the experimental results, because of the use of the LDA. For the alloy we found a little downward deflection of the network parameters as compared to those of the linear interpolation, and this in three cells 8, 16 and 32 atoms.

ID# M.36 Boucherit Hafidha, Benabdeli Khéloufi and Benaradj Abdelkrim. Phytocology of the steppe Hammada scoparia in the Saharan Atlas Oranian (Naama- Algeria) (details, TMREES16_paper_36)

Abstract. The steppe Hammada scoparia occupies 3 million hectares representing 15% of the Algerian steppe (20 million ha). The Hammada scoparia is chamaephyte or small bush belongs to the Amaranthaceae family, variable in shape with a height not exceeding 1 m. This species occurs on loamy soils, occupies the foothills south of the Saharan Atlas, glazes and hamadas the northern part of the Sahara. In terms of climate, its northern boundary follows pretty faithfully isohyet 100 to 150 mm in Algeria. The present work has for floristic and ecological characterization of the object in the steppe group Chekika station (south of Naama). We chose a systematic sampling of the type of vegetation on geo physiologically and morphologically homogeneous. The methodology comprises a device consisting of a series of survey distributed in different topographic units of the study site. After an analysis of 30 identified, it was determined 103 taxa belonging to 97 genera grouped in 35 botanical families, which are organized around five groupings: - Grouping Hammada scoparia - Grouping Hammada elegans - Grouping





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Stipa tenacissima and Hammada scoparia - Grouping Olea europaea, Rhus tripartitus and Pistacia atlantica
- Grouping Retama retam.

Relevance: 60%

ID# M.114 Najoua Mekaddem, Samia Ben Ali, Atef Mazioud and Ahmed Hannachi. A Numerical Study of Latent Thermal Energy Storage in a Phase Change Material /Carbon Panel (details, TMREES16_paper_114)

Abstract. To reduce the energetic dependence of building, it has become necessary to explore and develop new materials promoting energy conservation. Because of their high storage capacity, phase change materials (PCMs) are efficient to store thermal energy. In this paper, a 3D model was studied for simulation of energy storing cycles to predict the performances of PCM loaded panels. Carbon was used as supporting material for the PCM. The simulation was based on the enthalpy method using Ansys Fluent software. The panel was exposed to a daily heat flow including the effects of convection and radiation. The results show that the temperature decreased of approximately 2.5°C with a time shift about 2 hours. The steady state was reached after four cycles. Thus, after four cycles the PCM showed its effects on the temperature conditioning.

Relevance: 50%

ID# M.68 Tioua Tahar, Kriker Abdelouahed, Salhi Imed and Gonzalo Barluenga. Effect of hot-dry environment on fiber-reinforced self-compacting concrete (details, TMREES16_paper_68)

Abstract. Drying shrinkage can be a major reason for the deterioration of concrete structures. Variation in ambient temperature and relative humidity cause changes in the properties of hardened concrete which can affect their mechanical and drying shrinkage characteristics. The present study investigated mechanical strength and particularly drying shrinkage properties of self-compacting concretes (SCC) reinforced with date palm fiber exposed to hot and dry environment. In this study a total of nine different fibers reinforced self compacting concrete (FRSCC) mixtures and one mixture without fiber were prepared. The volume fraction and the length of fibers reinforcement were 0.1-0.2-0.3% and 10-20-30 mm. It was observed that drying shrinkage lessened with adding low volumetric fraction and short length of fibers in curing condition ($T = 20\text{ }^{\circ}\text{C}$ and $\text{RH} = 50 \pm 5\%$), but increased in hot and dry environment.

ID# M.143 Amina Sassane, Nacer Kherici and Zouina Haouli. Behavior of some organic pollutants in the waters of Meboudja's plain (North - East Algerian) (details, TMREES16_paper_143)

Abstract. Meboudja's plain is a huge surface and groundwater reservoir in terms of amount and quality. Currently this region is facing various pollution problems, the present study conducted allowed the identification of factors responsible for water resources degradation and assessment of aquifers by organic pollutants, in a contaminated aquifer site, located along the river Meboudja (Annaba, Algeria). Chemical analysis of water (ground and surface) were performed to measure the dissolved oxygen (O_2), and detect the concentration (NO_3) (NO_2) (NH_4) (BOD_5). The intensive use of chemical fertilizers in agriculture as well as disorganized water resources exploitation has worsen the environmental situation. Chemical analyzes on water samples taken were conducted, the results show that: water quality in the study area was considerably deteriorated in recent years due to uncontrolled industrial discharges. The





results confirm what has been written before about the area, now it would be better to approach the part relating to pollution because the situation has reached threshold of no return.

ID# M.8 Mohamed Nabil Metwally, Hamza Ghulman and Mohamed Alhazmi. Study on the benefits of using the date palm trees residuals in Saudi Arabia for development of the non-traditional wooden industry (details, TMREES16_paper_8)

Abstract. -The average world consumption of wood is about 22 million tonnes/year (Faostat, 2013), representing about 50% of the total world raw materials, which represents a great challenge to find out alternative sources, and agricultural residues can share strongly in this field. Important interest was paid to the palm tree residues, such as the "date palm leaves midrib" (DPLM), leaflets, coir and spadix stems, as DPLM after drying, which can be used as an industrial substitute of raw wooden materials particularly for the manufacture of particle boards. The Kingdom of Saudi Arabia has the date palm trees as the third place in the world after Iran and Iraq, (date palms increased from 17.5 million in 1995 to about 32 million in 2014), which may save about 15% of KSA wood imports (about million SR 855/year according to 2014 prices, with 10 pruned & dried DPLMs /tree/year, if it is used for particle board manufacture). - The study includes a survey of the KSA wood imports; the dominant species of palms and their numbers, meteorological conditions in KSA, evaluation of DPLM drying rate in open air under the effect of solar radiation, achieving final moisture content of 8-12% in about 4 weeks. Also measurements of the mechanical properties of the dried Saudi DPLM samples, which approved excellent mechanical properties as well as Beech and Spruce woods, with average bending modulus of elasticity of about 1200 kN/cm², static bending strength of about 13 kN/cm², ultimate compressive strength parallel to grain of about 4.2 kN/cm² and ultimate tensile strength parallel to grain of about 11.4 kN/cm².

ID# M.64 Lavinia Chiara Tagliabue, Enrico De Angelis, Paolo Zecchini and Mattia Milanese. Environmental and Comfort Upgrading through Lean technologies in Informal Settlements: Case study in Nairobi, Kenya and New Delhi, India_ (details, TMREES16_paper_64)

Abstract. Informal settlements, namely slums (or bidonville or favelas) are one of the stronger challenges for urban context in developing countries. The increase of urban population leads to a widespread poverty and critical life conditions for a large segment of population, in particular in Sub-Saharan Africa, where a high percentage of people lives in informal settlements. The problems in slums are multiple: people suffer malnutrition and poor sanitation, flooding or drought, and live in shelters providing no thermal comfort in many days of the year, furthermore scarce and highly polluting energy sources are available. Climate change and an unavoidable heat island effect make these living conditions nearly catastrophic. This paper focuses on the main characters of these slums and on how to promote the improvement of living conditions with a lean, low cost, low impact, feasible upgrading of the housing or more properly shelters. The subject of the analysis is the Mathare 4A Upgrading Programme in the city of Nairobi, Kenya, one of the highest slum-dwellers growing rate. The technological solutions applied in this context have been verified in a different climate condition such as the city of New Delhi, India where the phenomenon of the slums is significantly burdensome. The analysis of the comfort conditions inside a type housing has been carried out using hourly weather data and dynamic heat transfer simulation, without any HVAC system and striving only natural ventilation. Data about internal temperature and relative humidity conditions have been applied to evaluate the comfort hours using the Predicted Mean Vote method, the adaptive thermal comfort principles and the bioclimatic charts for the two climates in Nairobi and New Delhi. The percentage of hours within the comfort range and the amount of degree-hours exceeding comfort values





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showed for different upgrading strategies, how it is possible to deeply influence the living conditions by technological and affordable choices on the envelope of such simple housing. A simplified LCA (Life Cycle Assessment) evaluation on embodied energy in the proposed upgrading materials used for the housing allows assessing the environmental impact of the considered alternatives. The present study aims to find out and to propose lean technological solutions to improve users' comfort levels with simple DIY (do it yourself) modification of shelter's envelopes and basic education for the use of the housing. The paper presents the study of lean technological solutions to improve comfort conditions and durability of informal settlements located in two climate zones in the world where slums are a critical issue in the urban development. The opportunity to improve such conditions can promote an upgrading of health and wealth status in such a critical situation in which millions of people are living today. The lean, affordable and low impact technologies that have been proposed and tested by dynamic simulation could allow a widespread diffusion of the concept without burden on the strongly compromised environment. The weak and fragile areas affected by the slums have pollution problems and a main task is not to worsen them during the life of the shelters/houses.

ID# M.73 Olugbenga Omotosho, Joshua Okeniyi, Cleophas Loto, Abimbola Popoola, Chukwunonso Obi, Oluwatobi Sonoiki, Adeoluwa Oni, Ayomide Alabi and Abisola Olarewaju. Performance of Terminalia catappa on Mild Steel Corrosion in HCl Medium (details, TMREES16_paper_73)

Abstract. This work investigates Terminalia catappa leaf-extract performance on mild steel corrosion in 0.5 M hydrochloric acid (HCl). Electrochemical linear-sweep-voltametry (LSV) and gravimetric techniques were employed for assessing the mild steel corrosion in the HCl test-environment of immersion having different concentrations of the leaf-extract. Results showed that all the concentrations of the Terminalia catappa leaf-extract employed inhibited mild steel corrosion from the electrochemical (potentiodynamic) and the gravimetric considerations. Also, corrosion rate from LSV exhibited excellent correlation ($R = 95.77\%$, Nash-Sutcliffe Efficiency (NSE) = 91.72% and p -value = 0.02383) with linear function of the corrosion rate from gravimetric method, for the leaf-extract concentrations employed. From the experimental model, 6 g/L Terminalia catappa exhibited optimal inhibition efficiency, $\eta = 78.07\%$, while 8 g/L Terminalia catappa was predicted as optimally effective, $\eta = 75.41\%$, by the correlation fitting model, at inhibiting mild steel corrosion in the medium. However, adsorption isotherm modelling showed that the experimental gravimetric, experimental potentiodynamic and predicted potentiodynamic data exhibited agreements in following the Langmuir adsorption isotherm. All the three data models indicated favourable adsorption and identified physisorption as the prevalent adsorption mechanism of Terminalia catappa leaf-extract on mild steel immersed in the 0.5 M HCl medium.

ID# M.6Nasser Saad Al Din, Nabih Hussain and Ndhal Jandow. Structural and Optical Studied of Nano Structured Lead (II) Sulfide Thin Films Prepared by the Chemical Bath Deposition Technique (details, TMREES16_paper_6)

Abstract. Lead (II) Sulfide PbS thin films were deposited on glass substrates at 25° C by chemical bath deposition (CBD) method. The structural properties of the films were studied as a function of the concentration of Thiourea ($CS(NH_2)_2$) as Source of Sulfide and deposition time. The surface morphology of the films was characterized by X-ray diffraction and SEM. The obtained results showed that the as-deposited films Polycrystalline had cubic crystalline phase that belong to S.G: Fm3m. We found that they have preferred orientation [200].Also the thickness of thin films decrease with deposition time after certain value and, it observed free sulfide had orthorhombic phase. Optical properties showed that the





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thin films have high transmission at visible range and low transmission at UV, IR range. The films of PbS have direct band gap (1.68 - 2.32 eV) at 300K the values of band energy decreases with increases thickness of the Lead (II) Sulfide films.

ID# M.20 Khellou Abderrezak and Kriker Abdelouahed. Effect of the Addition of By-Product Ash of Date Palms on the Mechanical Characteristics of Gypsum-Calcareous Materials Used in Road Construction (details, TMREES16_paper_20)

Abstract. The gypsum-calcareous materials, also known by the crusting tuff, are used in the pavement layers of low road traffic and considered as the materials of first choice in the Saharan region of Algeria. The objective of this paper is to study the mechanical characteristics of tuff of Ouargla town that is situated in the Southeast of Algeria, by adding different percentage of ash resulted from the combustion of by-products of date palms, such as 4%, 8% and 12, to the tuff. The results obtained have shown a remarkable improvement of the bearing index in the two cases (immediate and after immersion in water) as well as the compressive strength at different ages. These characteristics of the mixture (tuff + ash) reach their maximum values at the 8% of ash addition.

ID# M.107 Dahmani Saci and Kriker Abdelouahed. Contribution to the Study Physico-Mécanical of Cement CRS Basis of Powder of Dune Sand and other Minerals (details, TMREES16_paper_107)

Abstract. The Portland cements are increasingly used for the manufacture of cement materials (mortar or concrete). Views the increasing demand of the cement in the field of construction, and the wealth of our country of minerals. It is time to value these local materials in construction materials and in the manufacture of cement for the manufacture of a new type of cement or for the improvement of the characteristics of cement for several reasons either technical, either ecological or economic either to improve certain properties to the State fees or hardened. The uses of mineral additions remain associated to disadvantages on the time of solidification and the development of the mechanical resistance at the young age. The objective of our work is to study the effects of the incorporation of additions minerals such the pozzolan (adding active), slag of blast furnace (active addition) and the powder of sand dune (adding inert) on the physico-mechanical properties of compositions of mortar developed according to different binary combinations basis of these additions. This will allow selecting optimal dosages of these combinations the more efficient, as well from the point of view of mechanical resistance. The results from this research work confirm that the rate of 10% of pozzolan, slag or powder of dune sand contributes positively on the development of resistance in the long term, at the time of this proportion there is a decrease in the latter except for the slag (20 - 40%) seems the more effective resistors and physical properties.

ID# M.41 Sedrati Nassima, Djabri Larbi and Chaffai Hicham. Assessment of groundwater vulnerability by combining Drastic and susceptibility index: application to Annaba superficial aquifer (Algeria) (details, TMREES16_paper_41)

Abstract. Groundwater pollution due to anthropogenic activities is one of the major environmental problems in urban and industrial areas. The aim of this work is to propose a new integrated methodology to assess actual and forecasted groundwater vulnerability by combining Drastic and susceptibility index. The contamination susceptibility index (SI) at a given location was calculated by taking the product of the vulnerability DRASTIC index (VI) and the quality index (QI): $SI=VI \times QI$. The superficial aquifer of Annaba





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plain was the study case proposed for the application of this methodology. The study revealed that the area with Very High vulnerability would increase 73 % in this superficial layer. This result can be explained by the susceptibility index map shows both hydrogeological and hydrochemical data related to the contamination problem including areas that should be taken into consideration during water management planning. The index map indicates that the most susceptible groundwater is occupies the majority of the study area. The validity of the DRASTIC and the susceptibility index methods, verified by comparing the distribution of some pollutants (Daouad, 2013) in the groundwater and the different vulnerability classes, shows a high contamination that affect the water quality in study areas.

ID# M.69 Imed Salhi, Abdelouahed Kriker, Tahar Tioua, Youcef Abimiloud and Gonzalo Barluenga. Durability of visitable gallery concrete under the effect of domestic wastewater. (details, TMREES16_paper_69)

Abstract. Abstract The deterioration of recent evacuations wastewater infrastructure, made of reinforced concrete, is a big problem when the lifetime is less than 20 years or less. The aim of this study was to investigate the degradation and the factors responsible for the deterioration of the concrete visitable gallery of sewage from the town of touggourt (south-east of Algeria). Thus, samples from different parts (healthy part will be chosen as a reference. A degraded exposed portion h₂S gas and a part immersed to the wastewater) of the gallery were analyzed using means of investigation to highlight the status of internal and external damage to the gallery as well as chemical and mineralogical changes recorded. These tests are complemented by physical and mechanical characterization. This study clearly demonstrates the strong anisotropy of both internal and external damage.

ID# M.140 Hadjer Abderrezek, Aissa Ameer and M.N Harmas. Non-Linear Controllers Applied To a DC-DC Buck Converter Using PSO (details, TMREES16_paper_140)

Abstract. As inevitable power electronic devices, DC-DC converters are everywhere from desk computers to space vehicle and seem to be always conquering new domains. Several control methods were developed for DCDC converters control mostly with asymptotic convergence. Synergetic control are a proven robust controllers approach and will be used here in a so-called terminal scheme to achieve finite time convergence thus enhancing the already established technique robustness. An adaptive non-singular terminal synergetic control approach to handle uncertainties is provided resulting in enhancing robustness as well as a better transient performance compared to terminal synergetic control. Furthermore, a PSO algorithm will be used to optimize controller's parameters using an ITAE criterion. Simulation of adaptive terminal synergetic control of a DC-DC converter is carried out for different operating conditions and results are compared to synergetic and terminal synergetic controller's performance, that which demonstrate the effectiveness and feasibility of the proposed approach.

ID# M.49 Agata Matarazzo. FOREST CERTIFICATION STANDARDS AS TOOL FOR ENVIRONMENTAL SUSTAINABILITY IN WOOD BUILDING SECTOR (details, TMREES16_paper_49)

Abstract. The use of wood in the building sector is an effective way to fight against the worsening of the effects of green-house gas, in as much as it is the only construction material that, unlike all the others, absorbs harmful carbon dioxide from the air and only returns it after being burning it or being pulped . The proper management of wood lands is essential in the purchasing of products deriving from wood and it is becoming essential to get information about sustainable production so as not to contribute to the





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devastation of the world's forests. The key issue is therefore the sustainable management of the forests themselves, in order to safeguard their productivity, biodiversity and capacity to regenerate. This study aims to highlight the peculiarities of wood and the environmental advantages linked to the use of this natural resource in the building sector, compared to traditional materials used in the construction industry, paying particular attention to the issue of environmental sustainability linked to the forests and to the most widespread certification schemes on the world scale, or rather the Forest Stewardship Council (FSC) and the Programme for Endorsement of Forest Certification Scheme (PEFC). Moreover, for each standard the technical and economic benefits deriving from the implementation of its systems of voluntary certification are underlined.

ID# M.93 Muthana Sirhan, Ahmad Saleh and Ali Ismail. Mercuric Ions (II) Uptake From Aqueous Solutions by Chelating Resin Containing Pendant Multidentate Ligand (details, TMREES16_paper_93)

Abstract. The toxic nature and other adverse of the heavy metals lead to pollution and make it one of the most serious problems that affect certain sides of the environment. There are many heavy metal ions like the mercuric ions detected in industrial wastewaters originating from several factors such as from metal plating, mining activities, paint manufacture, etc. The above-mentioned ions isn't biodegradable and tends to be accumulated in living organisms, causing various diseases and disorders. Therefore, it must be removed from aqueous solution before discharge. In this paper, an experimental work it has been done regarding the optimal conditions of removing Hg (II) ions from water using chelating ion exchange resin namely XAD- & Pendant Multidentate Ligand Resin. The adsorption behavior of mercury ions on XAD-& Pendant Multidentate Ligand Resin was studied as a function of the following variables: contact time, pH solutions, initial concentration of metal ions and resin dosage the adsorbent's maximum total adsorption capacity of for mercuric ions was: 0.82 mmol/g dry resin. The resin low affinity towards alkali and alkaline earth metals shows its use for samples that related to environment. The concluded results state that, XAD- & Pendant Multidentate Ligand Resin holds great potential for the purpose of removing mercuric ions from polluted wastewater.

ID# M.142 Mohamad Ramadan, Mahmoud Khaled, Haitham Ramadan and Mohamed Becherif. Modeling and Sizing of Combined Fuel Cell-Thermal Solar System for Energy Generation (details, TMREES16_paper_142)

Abstract. The energy crisis impact is increasing at all levels, which requires a quick sustainable and robust response. The last two decades have witnessed huge efforts to find solutions that can be classified within two classes that are renewable energy and energy recovery. Abundant researches have been dedicated to find carbon dioxide-free energy sources. Hydrogen energy, one of the most promising solutions, is generated by Fuel Cell (FC) that is fed by hydrogen to generate electricity without any carbon dioxide emissions. The hydrogen is supplied by an electrolyser that requires an electrical current to decompose the water into hydrogen and oxygen. This paper aims at proposing a coupled system of hydrogen and solar energy. The solar thermal system is used as an energy source to supply the electrolyser. The modeling of the FC and the Thermal Solar System (TSS) are comprehensively presented. A case study for a stand-alone system in Beirut City is studied. Through the simulation results, the power all over the year and the relevant number of mirrors needed to cover the power demand are properly calculated.





ID# M.67 Djihed Rezagui, Mustapha Daddi Bouhoun, Djamel Boutoutaou and Afaf Djaghoubi. STUDY OF HYDRO-SALINE CHARACTERISTICS OF SOILS A PALM GROVE IN BASIN OF OUARGLA (NORTHERN ALGERIAN SAHARA) (details, TMREES16_paper_67)

Abstract. Saharan soils are often faced with several problems of development, taking account the hydro-edaphic constraints, mainly of hydric types by water table, mechanical by gypso-calcareous crusts and saline by irrigation waters and upwelling of water table. Our work consists in doing a soil characterization of a palm grove in Ouargla in order to study the constraints hydro-halomorphes. The results show that irrigation water by two plies of Senonian and Mioplène had a high salinity with a value of 2.83 and 5.10 dS.m⁻¹ respectively. The conduct of irrigation is traditional random of submersion type. The palm grove has a poor drainage with a level of water table 156.67±15.71 cm and salinity of 31.37±34.04 dS.m⁻¹. The drains are open type and their maintenance is not regular. This situation of management of irrigation-drainage promotes the upwelling of water table and the waterlogging in soils. The study of soil profiles shows the existence of mechanical obstruction of gypso- calcareous crusts which limit the entrenchment of the date palms and the leaching of salts. Soil salinity is excessive in profiles with a range of 8.98 ± 4.58 dS.m⁻¹. This accumulation of salts is due to the dynamic ascending and descending of salts respectively under the effect of upwelling of water table and leaching by irrigation. The salinization, the upwelling of water table and the presence of gypso- calcareous crusts recorded in Ouargla testify to a degradation hydro-halomorphe and mechanic of soil which constitute the major constraints in the management of system irrigation-drainage and sustainable agricultural development of the palm groves of the basin of Ouargla. Some hydro-agricultural planning are necessary to apply in the oasis to improve the hydro-mechanical properties of soils in order to reduce their degradation.

ID# M.71 Saggai Sofiane, Bachi Oum Elkheir and Saggai Ali. Effect of quality of phreatic aquifer water and water upwelling on constructions: a case study of Ourgla (details, TMREES16_paper_71)

Abstract. In Ouargla's oasis, which is one of urban conglomerations of Algerian Sahara, the exploitation and/or the overexploitation of the deep aquifers of continental intercalary and of complex terminal that contain waters of mediocre quality (salty and hot), and the rejection of waters of drainage, urban residual waters and non-treated industrial waters are responsible, at the same time, of the degradation of the quality of waters of the groundwater and its upwelling. This situation has led to: (i) the deterioration of the environment and (ii) the deterioration of constructions (houses, roads, etc...). The present paper consists in giving in detail the causes of the water upwelling of phreatic aquifers in our regions, the quality of water of this aquifer and the influence of the quality of phreatic aquifer water on environment and constructions in Ouargla town.

ID# M.134 Jean Zaraket, Michel Aillerie and Chafic Salame. Dark and illuminated quantitative characteristics of photovoltaic solar modules under the influence of a dark electrical stresses (details, TMREES16_paper_134)

Abstract. The purpose of this paper is to discuss the effect of electric reverse stress currents on the performance of photovoltaic solar modules. The effect of the reverse stress current induced into the solar cell structure on the IV characteristics and parameters in the dark and illuminated conditions at room temperature for several common periods of time. A digital double exponential model was used to analyze the experimental measurements. The changes in characteristics which are caused from the effect of a reverse current introduced for different stress levels simulated the effect of accumulated extreme reverse





currents that can occur in the solar cells and modules as result of shading and other different reasons. The paper contributes to the research on the adverse effects of reverse currents on the normal functioning of cells and solar modules.

ID# M.127 Moumeni Abdelhamid, Bouchekima Bachir and Lati Moukhtar. A numerical study of a vertical solar air collector with obstacle (details, TMREES16_paper_127)

Abstract. Because of the lack of heat exchange obtained by a solar air between the fluid and the absorber, the introduction of obstacles arranged in rows overlapping in the ducts of these systems improves heat transfer. In this work, a numerical study using the finite volume methods is made to model the dynamic and thermal behavior of air flow in a vertical solar collector with baffles destined for integration in building. We search essentially to compare between three air collectors models with different inclined obstacles angle. The first kind with 90° shows a good performance energetic and turbulent.

ID# M.141 Osi Fayomi, Api Popoola and A. Inegbenebor. Experimental Study and Effect of Particulate Interference on the Microhardness, Wear and Microstructural Properties of Ternary Doped Coating (details, TMREES16_paper_141)

Abstract. This paper studies effects of the composite particle infringement of ZnO/Cr₂O₃ on zinc rich ternary based coating. The corrosion-degradation property in 3.5% NaCl was investigated using polarization technique. The structural characteristics of the multilayer produce coatings were evaluated by scanning electron microscope (SEM) equipped with an energy dispersive spectrometer (EDS). The mechanical response of the coated samples was studied using a diamond base Dura –Scan) micro-hardness tester and a MTR-300 dry abrasive wear tester. The combined effect of the coatings gave highly-improved performance on microhardness, corrosion and wear damage. This also implies that protection of wind-energy structures in marine environments can be achieved by composite strengthening capacity.

ID# M.84 Houssein Al Moussawi, Farouk Fardoun and Hasna Louahlia. Energy and Environmental Evaluation of Solid Oxide Fuel Cell System for Tri-generation in Residential Applications (details, TMREES16_paper_84)

Abstract. This study presents an evaluation of a solid oxide fuel system modeled with its energy balance of plant components in order to recover its exhaust waste heat and develop a combined cooling, heating, and power system. A hydrogen-fueled SOFC is modeled in MATLAB and a 3D drawn building are imported into TRNSYS where system performances are assessed. An optimization approach is employed to find the best system sizing. Energetic and environmental assessments shows better performance as the system size increases which suggests the necessity of an economic study application.

ID# M.87 Joshua Okeniyi, Olugbenga Omotosho, Abimbola Popoola and Cleophas Loto. Phyllanthus muellerianus and C₆H₁₅N₃ Synergistic Effects on 0.5 M H₂SO₄-Immersed Steel-Reinforced Concrete: Implication for Clean Corrosion-Protection of Wind Energy Structures in Industrial Environment (details, TMREES16_paper_87)

Abstract. This paper investigates Phyllanthus muellerianus leaf-extract and C₆H₁₅N₃ (triethanolamine: TEA) synergistic effects on reinforcing-steel corrosion-inhibition and the compressive-strength of steel-reinforced concrete immersed in 0.5 M H₂SO₄. This is to assess suitability of the synergistic admixture usage for wind-energy steel-reinforced concrete structures designed for industrial environments. Steel-





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reinforced concrete specimens were admixed with individual and synergistic designs of *Phyllanthus muellerianus* leaf-extract and C6H15NO3 admixtures and immersed in the 0.5 M H₂SO₄. Electrochemical monitoring of corrosion potential, as per ASTM C876-91 R99, and corrosion current were obtained and statistically analysed, as per ASTM G16-95 R04, for modelling noise resistance. Post-immersion compressive-strength testing then followed, as per ASTM C39/C39M-03, for detailing the admixture effect on load-bearing strength of the steel-reinforced concrete specimens. Results showed that while individual *Phyllanthus muellerianus* leaf-extract concentrations exhibited better inhibition-efficiency performance than C6H15NO₃, synergistic additions of C6H15NO₃ to *Phyllanthus muellerianus* leaf-extract improved steel-rebar corrosion-inhibition. Thus, 6 g *Phyllanthus muellerianus* + 2 g C6H15NO₃ synergistically improved inhibition-efficiency to $\eta = 84.17\%$, from $\eta = 55.28\%$ by the optimal chemical or from $\eta = 74.72\%$ by the optimal plant-extract admixtures. The study also established that improved compressive strength of steel-reinforced concrete with acceptable inhibition of the steel-rebar corrosion could be attained through optimal combination of the *Phyllanthus muellerianus* leaf-extract and C6H15NO₃ admixtures. These foster implications on the use of *Phyllanthus muellerianus* leaf-extract and C6H15NO₃ synergies as a clean corrosion-protection approach for wind-energy steel-reinforced concrete designed for the industrial service-environment that are detailed in the paper.

ID# M.91 Chafia Mebarkia, Djalel Dib, Belghit Rafik and Hana Zerfaoui. the role of buffer layers and double windows layers in a solar cell CZTS performances (details, TMREES16_paper_91)

Abstract. In the overall context of the diversification of the use of natural resources, the use of renewable energy including solar photovoltaic has become increasingly indispensable. As such, the development of a new generation of photovoltaic cells based on CuZnSnS₄ (CZTS) looks promising. Cu₂ZnSnS₄ (CZTS) is a new film absorber, with good physical properties (band gap energy 1.4-1.6 eV with a large absorption coefficient over 10⁴ cm⁻¹). Indeed, the performance of these cells exceeded 30% in recent years. In the present paper, our work based on modeling and numerical simulation, we used SCAPS to study the performance of solar cells based on Cu₂ZnSnS₄ (CZTS) and thus evaluate the electrical efficiency η for typical structures of ZnO / i- ZnO / CdS / CZTS and ITO / ZnO / CdS / CZTS. Furthermore, the influence of the change of CdS by ZnSe and In₂S₃ buffer layer was treated in this paper.

ID# M.98 Salaheddine Bensalem, Khaled Imessad, Abderrahmane Hamidat and Mohamed Missoum. Economic and environmental analysis of a solar thermal heating system for residential buildings in Algeria (details, TMREES16_paper_98)

Abstract. In this work, the economic aspect and environmental impacts of an integrated solar heating system under Algerian climatic conditions have been probed. We considered two types of solar heating installation; the first is a real individual system, which is integrated in a bioclimatic single-family house located in Algiers region. However, the second is a virtual collective system serving to provide hot water and heating for a multi-family building. The equity payback and GHG emissions have been estimated by means of a numerical simulation using the powerful tools of the RETScreen free software program. The obtained results showed that the equity payback is strongly dependent on the fuel type that is used by the auxiliary and the kind of the installation. In the case of the studied real system, where the auxiliary is assured by the gasoil, the equity payback is around the half of the project lifetime. However, from the environmental standpoint, the solar application is entirely advantageous. Furthermore, the natural gas is the most favorable environmental resource as an auxiliary, with a minimum yearly GHG emissions compared with electricity and gasoil for both studied cases.





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ID# M.100 Hocine Hadidane, Hocine Oucief and Mouloud Merzoud. Improving the Behavior of Body Roads By The Use of Gravel-Slag Mixture (details, TMREES16_paper_100)

Abstract. The accumulation of wastes industrial stemming of the iron and steel industry has influenced negatively the environment. The adopted policy had for mission to eliminate these undesirable wastes by recycling them by their utilization in adequate areas. The objective of this work is to study the mechanical behavior of a gravel-slag based on crystallized and granulated slag, activated by lime. One will be interested in the study of resistance to punching and the bearing ratio of this slag through Proctor tests, CBR and by compression, tensile tests, for use in the layers of pavement (Foundation and base layers). The obtained result on gravel-slag show considerable performances, compared with natural aggregates point of resistance and thickness of the layers. Its utilization in the road area has allowed therefore the recycling these industrial wastes, to decrease the pollution, to use a minimum noble product requiring important exploitation energy and an economy on layers of surface realized with costly materials (bituminous concrete).

ID# M.13 Samir Mouhadjer. An Effective Control Strategy To Maximize Power Extraction From Wind Turbines (details, TMREES16_paper_13)

Abstract. Among the various identifiable renewable energies sources, one holds the attention in this study for its important potential in the world; it's about wind energy. Our objective in this present work is to contribute a share to the research solution to the problems of coupling between this energy source and the load; it's about the transfer of the maximum power to the latter which often suffers from a bad matching. In this context, we present a simulation study of a research strategy which makes it possible to optimize the energy transfer; this strategy is based on a digital control (MPPT) by the means of Microcontroller.

ID# M.137 Youssef Errami, Abdellatif Obbadi, Smail Sahnoun, Mohammadi Benhmida, Mohammed Ouassaid and Mohamed Maaroufi. Design of a nonlinear backstepping control strategy of Grid Interconnected Wind Power System based PMSG (details, TMREES16_paper_137)

Abstract. In this paper, a nonlinear control strategy based on the backstepping algorithm is proposed for the grid interconnected Wind Power System (WPS). This system is based on a Permanent Magnet Synchronous Generator (PMSG) with full power back to back converters and connected to utility grid. The generator side converter is used to control the velocity of the synchronous generator with Maximum Power Point Tracking (MPPT) technique. The grid-side converter control is designed to regulate the dc link voltage and to control the power factor at changing wind speed. Pitch control is also provided in the proposed control strategy of WPS. The proposed nonlinear Backstepping approach is used for control of both PMSG and grid-side converters of a WPS. The stability of the regulators is assured by employing Lyapunov analysis. The proposed structure and control methodology are verified through MATLAB simulations under varying wind velocity and the grid fault condition. Also, a comparison of simulation results based on the proposed Backstepping strategy and conventional PI controller is provided.

ID# M.27 Sarah El Himer, Zahra Benmohammadi, Sara El Yahyaoui, Ahaitouf Ali and Abdellah Mechaqrane. Performances analysis and comparison of the CCPC and pyramid shaped solar concentrators for CPV (details, TMREES16_paper_27)





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Abstract. This study presents a comparison of two optical concentrators: A crossed Compound Parabolic Concentrator (CCPC) and a pyramid used as a secondary optical element with and without the primary stage, a Fresnel lens. Results show that the optical efficiency is higher in the case of the pyramid if used alone, and evidently decreases when a primary stage is added. Compared to CCPC, the pyramid as secondary optical element seems to be more efficient. Regarding the size of the elements, it is found that the length and the inlet radius of each optical element decrease when the acceptance angle increases. The CPC presents the larger inlet radius and the longer length for as long as the acceptance angle is less than 45° , beyond this value, the two lengths are equal

ID# M.70 Rdia Hafsi, Lahbassi Ouerdachi, Abed El Ouahd Kriker and Hamouda Boutghane. WATER POLLUTION EVALUATION OF WADI Boudjemaa (ANNABA eastern Algeria) (details, TMREES16_paper_70)

Abstract. the water quality assessment of Oued Boudjemaa Annaba, was the main objective of this work, pollution indices were calculated using physicochemical measurements collected monthly over five sampling points covering the study site during a twelve-month period (Avril 2013 – Mars 2014). Water quality ranges from good to bad ($7.86 < \text{The index From Lisec} < 17.25$). Domestic waste rich in organic matter and agricultural waste rich in nutrients caused the degradation of the water quality from moderate organic pollution to a very strong organic pollution ($1.58 < \text{From Organic Pollution Index} < 3.20$) ($1.54 < \text{The index From The Institute Of Hygiene and Epidemiology} < 3.10$). Using the Ascending Hierarchical Classification, the sampling points were classified into three groups based on similarities in the water quality: low pollution, urban pollution, urban and agricultural pollution.

ID# M.135 Jean Zaraket, Michel Aillerie and Chafic Salame. Dark and illuminated quantitative characteristics of photovoltaic solar modules under the influence of a light electrical stresses (details, TMREES16_paper_135)

Abstract. The main idea is to study the effect of reverse stress current on solar cells under illuminated conditions. More specifically, the characteristics (I-V), and parameters were studied in dark and illuminated conditions at room temperature for several common periods of time. For the numerical analysis of this work, a double exponential model is used. The changes in characteristics, which are caused from the effect of a reverse current introduced for different stress levels, simulated the effect of accumulated extreme reverse currents that can occur in the solar cells and modules as result of shading and other different reasons. The paper originally contributes to the research on the adverse effects of reverse currents on the normal functioning of cells and solar modules.

ID# M.46 Agata Matarazzo. LIFE CYCLE ASSESSMENT APPLIED TO THE MICROELECTRONIC DEVICES SECTOR (details, TMREES16_paper_46)

Abstract. This work is about the application of LCA to the ends of the environmental assessment of pure-silicon wafers production. The input-data quantification is realized studying two microelectronic devices and presenting schematically tables and graphs, to be easily interpreted. This will allow help the reader to individuate, clearly and immediately, the materials flows and the relationships among the different steps of the production process. The material flows, in terms of raw materials use and energy consumption, were studied using the data provided by a firm involved in the microelectronic device production field. The two devices environmental analysis was developed considering potential effects





such as Acidification, Eutrophication, Ozone reduction, Global warming, Ozone photochemical formation, Human Toxicity.

ID# M.118 Raouf Korichi, Mohamed Didi Ould El Hadj and Salahedine Doumandji. Trophic Ecology Of Mantises And Impact Of The Equilibrium In Ghardaïa Region (Algerian Sahara) (details, TMREES16_paper_118)

Abstract. In order to determine the diversity and the characterization of a group of predatory insects which is Mantodea, an inventory of this group took place from beginning of 2011 to September 2014 in Ghardaïa region of southern Algeria. Catches come from several sampling sites corresponding to several habitats (Reg, Oued and palm grove). Twelve species belonging to five families are inventoried of which 2 species are endemic; *Eremiaphila Mzabi* and *Eremiaphila Moreti* not yet reported in Algeria. The palm grove accommodate the largest species richness ($S = 9$ species). Mantidae is the richest family ($S = 4$). The palm grove has a diversity index H' going from 1.42 bit to 1.66 bit and equitability E varies between 0.73 and 0.75. A gradient of vegetation cover reveals stratification in three habitats: palm grove, river and reg. This heterogeneity of landscapes seems to influence mantis diversity which is proportional to that of the vegetation cover, except for the genre *Eremiaphila*. Mantises identified in these habitats can be classified in three groups, a first group strictly related to palm grove, a second subservient to the natural habitat Reg and a third group with no net belonging, being simultaneously present in both habitats. An inter-habitat variability is emphasized and strata preferences can be distinguished for each species of mantis. The feeding activity of Mantodea is estimated by analyzing their faeces. The diet of mantis confirms their strong entomophagy. For *Sphodromantis viridis*, the diet is composed of 42.7% of Hymenoptera followed by 19.7% of Aranea ($H' = 1.68$ bit, $L = 0.22$; $E = 0.38$). For *Amblythespis granulata*, analysis of the content of feces reveals 37.7% of Orthoptera ($H = 1.58$ bits, Simpson index = 0.20 and equitability = 0.42). This potentially gives them an impact on populations of prey species.

ID# M.145 Boumaaraf Abdelaali and Gourmat Laid. FPGA Implementation of High-Frequency Multiple PWM for Variable Voltage Variable Frequency controller (details, TMREES16_paper_145)

Abstract. In this paper, we present the FPGA implementation of the multiple pulse width modulation (MPWM) signal generation with repetition of data segments, applied to the variable frequency variable voltage systems and specially at to the photovoltaic water pumping system, in order to generate a signal command very easily between 10hz to 60 hz with a small frequency and reduce the cost of the control system.

ID# M.54 Saggai Ali, Dadamoussa Belkheir, Djaghoubi Afaf and Bissati Samia. Production of biomass by *Spirulina* at different groundwater type (Case of Ouargla -southeast Algeria-) (details, TMREES16_paper_54)

Abstract. In this paper, *Spirulina platensis* was cultivated to estimate the biomass production with different groundwater type in Ouargla. Growth experiments were undertaken in flasks under shelter in outdoor condition. For this, the temperature, pH and salinity value was recorded between two days of growth. Biomass concentration in the culture media was calculated by measuring the DO625. The combination of the Mioplocen water with the nutriments gave the highest values of biomass concentration with average of 1.78 ± 0.91 g/l. All the three-type water supported the growth of *Spirulina* that appeared as good as a culture media.





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ID# M.132 Amina Bekraoui. Thermal flow sensor used for thermal flow meter (details, TMREES16_paper_132)

Abstract. This work deals with thermal mass flowmeters. Thermal mass flowmeters fabricated by hot wire anemometers technology using the thermal domain for the measurement of fluid flow are discussed. Attention is paid to geometry of the sensors. Thermal anemometer flow sensor may comprise a heater and several temperature sensors. They convert the flow energy over heat transfer into electrical signals. Basic type of thermal flow sensor anemometer is discussed.

ID# M.121 Abderrezek Mahfoud, Mohamed Fathi, Abderrahmane Belghachi and Farid Djahli. Numerical modeling of GaInP/GaAs monolithic tandem solar cells (details, TMREES16_paper_121)

Abstract. In this work, we present simulation of a monolithic tandem GaInP/GaAs solar cell made from a top GaInP cell and a bottom GaAs cell. For this purpose we used one dimensional simulation program tool called SCAPS-1D (Solar Cell Capacitance Simulator in one Dimension), the proposed methodology consists of simulating each cell separately. For enhanced electric characteristics of a tandem solar cell, the current-match condition between the top and bottom cells should be satisfied, which in turn requires careful design of the tandem parameters. To fulfill this condition, the top cell base thickness of (GaInP) is adjusted accordingly. The solar spectrum reaching the lower cell is computed by subtracting the top cell spectrum from the total solar spectrum. The optimal value of the short circuit current density corresponds to a top cell's base thickness equals to 0.7 μm ; this results in an open circuit voltage of 2.397 V, a short circuit current density of 13.87 mA/cm², an efficiency of 29.83 % and a fill factor of 89.74 % under the AM1.5G solar spectrum.

ID# M.106 Nisrine Sinno and Elie Barakat. Intelligent Street Lightning System Using Solar Panels and Piezoelectric Harvesters (details, TMREES16_paper_106)

Abstract. In order to satisfy the rising energy demands of energy consumption, new clean and renewable power sources need to be explored, designed and developed such as the piezoelectric source . A huge amount of electrical power in many municipalities is consumed in street lighting. Our purpose is to design a road lightning control system by creating enough electrically independent power. The paper includes the design of a system that saves energy by lighting on demand not by clock, with an automated adaptation to ambient light level system. Since batteries are the only feeders in an electrically independent system, a Pulse Width Modulation charger is designed that could prolong battery's life. A serial connection between the designed system and computer transfers data from the battery, sources and load, to help municipalities detect faults and burned out lamps.

ID# M.72 Joshua Okeniyi, Elizabeth Okeniyi and Taiwo Owoeye. Bio-characterization of Solanum aethiopicum leaf: Prospect on steel-rebar total-corrosion in chloride-contaminated-environment (details, TMREES16_paper_72)

Abstract. Purpose – The purpose of this paper is to experimentally investigate biochemical, inorganic (heavy metals) and organic, constituents of Solanum aethiopicum leaf. This was carried out for gaining insight into prospect of the extracts from the leaf on total-corrosion reduction of concrete steel-rebar in chloride-contaminated environment. Design/methodology/approach – Atomic Absorption Spectroscopy (AAS) and Fourier Transform Infra Red (FTIR) spectroscopy were used for assessment of inorganic and organic constituents of the leaf of Solanum aethiopicum. Steel-rebar total-corrosion was analyzed, as per





ASTM G109-99a, from macrocell-currents measured by zero-resistance ammeter instrumentation on 3.5% NaCl-immersed steel-reinforced concrete samples. These experimental steel-reinforced concrete samples were admixed during casting with different concentrations of the Solanum aethiopicum leaf-extract. Findings – By the AAS study, Solanum aethiopicum leaf is characterized of inorganic constituents Fe = 4645.50 µg/g, Pb = 74.1138 µg/g, Ni = 43.1162 µg/g, Cd = 6.8425 µg/g, Cu = 0.004581 and Cr = 0.0000 µg/g. By the FTIR investigation, the plant is characterized with S-, N-, O- containing organic hetero-atoms. Also, all the different concentrations of Solanum aethiopicum leaf-extract admixture for the study reduced steel-rebar total-corrosion in the 3.5% NaCl-immersed steel-reinforced concrete specimens relative to blank sample without admixture. Originality/value – The different test-techniques established that Solanum aethiopicum is rich in bio-chemical constituents that are potent at making its leaf-extract suitable for biocompatible/eco-friendly corrosion-protection application for steel-reinforcement in concrete designed for chloride-contaminated-environment.

ID# M.57 Elena Cristina Rada, Agnese Ferrari, Marco Ragazzi, Marco Schiavon and Vincenzo Torretta. PCDD/FS ENVIRONMENTAL IMPACT FROM AN ANAEROBIC DIGESTION TREATMENT (details, TMREES16_paper_57)

Abstract. Purpose - The presence of mechanical-biological treatment (MBT) plants of municipal solid waste (MSW) in a territory could give significant contamination by dioxins and furans (PCDD/Fs) when compared to background values. A preliminary investigation was carried out with reference to the anaerobic digestion (AD) treatment of MSW and the PCDD/F release into the atmosphere. Design/methodology/approach - PCDD/F emission factors were retrieved in the literature. A dispersion model was applied to a hypothetical MBT plant. The anaerobic digestion (AD) process was analyzed in the case of its adoption for the treatment of the undersieve of screened residual MSW, before a post bio-stabilization (BS) step. A comparison with the BS of the oversieve alone was made too. In addition, a conventional biofilter and a regenerative thermal oxidizer (RTO) with a 25-m high stack were compared as emission control solutions. Finding – Thanks to the increased dilution assured by the RTO, lower impacts are expected on the surroundings. In addition, coupling AD with a post BS results in considerably lower PCDD/Fs emissions into the atmosphere with respect to BS alone. Originality/value – This study points out the importance of carrying out a preliminary environmental impact assessment for MBT plants, as currently provided for in the case of a waste-to-energy plant. On the basis of the choices made and on the consequent impacts estimated, restrictions might be applied to some agricultural activities concerning products that have a strong propensity to biomagnification.

ID# M.15 Mekhermeche Abdessalam, Kriker Abdelouahed and Dahmani Saci. Contribution to the study of thermal properties of clay bricks reinforced by date palm fiber (details, TMREES16_paper_15)

Abstract. Saharan region of Algeria country was characterized by a hot and dry summers and cold and dry winter. Building materials commonly used in these regions are concrete or mortars which have poor thermal and mechanical properties. In one cares to the production of a Bio-materials clay bricks product, with good mechanical and thermal properties, this study is launched. This report is the result of experimental work involving two broad areas of applied sciences mechanics and thermal of building. The study is entering in a global objective that interested to the valorization of local natural resources in order to product some bioclimatic constructions. The study was focused on the bricks of earth (clay) chosen as reference material to which we associate sand dune and date palm fiber. The percentage of sand and fibers varies from 0% to 40% and 0% to 3% by mass respectively. A sand dune of Ain El Beida of Ouargla





of Algeria was used. Clay was extracted from BeldetAmer of TouggourtOuarglaAlgérie. The fibers used in this study were vegetable fibers from date palm of OuarglaAlgeria. The results showed that increasing in the mass fraction of sand and of fiber were beneficial for improving thermal properties. As function of increasing the percentage of sand dune and fibres there were: A decrease in: thermal conductivity, specific heat,

ID# M.3 Ahmed Tawfik and Mohamed El-Samadony. Energy production from high strength wastewater industry (details, TMREES16_paper_3)

Abstract. Treatment of starch wastewater was investigated in a 30 l capacity pilot scale anaerobic baffled reactor (ABR) under mesophilic conditions. The reactor was operated at different hydraulic retention times (HRTs) of 72; 48 and 24 h. Corresponding organic loading rates (OLRs) were 8.7; 7.6 and 22 kg COD/m³. d. The results showed that COD and BOD₅ removals exceeded 40 and 50% respectively at OLR of 22 kgCOD/m³.d. The percentage COD recovered as methane in the gas phase was 56.7 and 43% at HRTs of 24 and 72 h, respectively. Methane yield averaged at 0.29 and 0.30 ICH₄ /g COD removed of ABR, at HRTs of 24 and 72 h., respectively, increasing the BOD₅/COD ratio from 0.59 to 0.66 improved the removal efficiency of BOD₅ from 40 to 54% respectively. Methane yield averaged at 0.29 and 0.30 ICH₄ /g COD removed of ABR, respectively. Removal of COD particulate fraction of organics was found to be greater than COD soluble fraction. Sudden drop in pH from 7.8 to 6.7 and generation of volatile fatty acids (VFA) were observed in the first compartment due to acidogenesis and acetogenesis. The pH increased and VFA concentration decreased longitudinally down the reactor.

ID# M.75 Olugbenga Omotosho, Joshua Okeniyi, Adeoluwa Oni, Thomas Makinwa, Omokolade Ajibola, Ekundayo Fademi, Chukwunonso Obi, Cleophas Loto and Abimbola Popoola. Inhibition and Mechanism of Terminalia catappa on Mild-Steel Corrosion in Sulphuric-Acid Environment (details, TMREES16_paper_75)

Abstract. Purpose – This paper investigates inhibition and mechanism of Terminalia catappa leaf-extract on mild-steel corrosion in sulphuric-acid (H₂SO₄) environment for studying suitability of the natural-plant as a green, environmentally-friendly inhibitor of mild-steel corrosion in acidic-sulphate service-environment. Design/methodology/approach – Mild-steel samples were immersed in 0.5 M H₂SO₄ environment design having different concentrations of Terminalia catappa leaf-extract. Corrosion-rate measurements were obtained by potentiodynamic polarization, using linear-sweep-voltamery instrument (LSV), and by gravimetric (weight loss) techniques. These electrochemical and gravimetric test-data were analysed for detailing inhibition and mechanism of Terminalia catappa leaf-extract on mild-steel corrosion in the acidic test-environment. Findings – Analysed results showed that potentiodynamic corrosion rate from the LSV correlated excellently, R = 99.25%, Nash-Sutcliffe Efficiency (NSE) = 98.52% and ANOVA p-value = 0.0222, with function of the gravimetric corrosion rate and the leaf-extract concentration. By the experimental and the correlated results, inhibition effectiveness on mild-steel corrosion increased with increasing leaf-extract concentration up to the 8 g/L Terminalia catappa leaf-extract, which exhibited optimal inhibition efficiency, $\eta = 99.99\%$ (experimental model) or $\eta = 95.45\%$ (correlation prediction). Correlation prediction, potentiodynamic (LSV) and gravimetric data followed the Langmuir adsorption isotherm and indicated favourable adsorption with prevalent physisorption as the adsorption mechanism of Terminalia catappa leaf-extract on mild-steel corrosion-protection in the 0.5 M H₂SO₄ environment. Originality/value – The study established that Terminalia catappa is suitable as a green environmentally-





friendly inhibitor having favourable/prevalent physisorption mechanism on mild-steel corrosion-protection in acidic-sulphate service-environment.

Relevance: 33%

ID# M.61 Laid Mechri, Djamel Boutoutaou, Sofiane Saggai and Mohamed Lakhdar Saker. EFFECT OF REED STALKS ON THE FLOW VELOCITY IN AN RECTANGULAR OPEN CANAL IN THE ARID AREAS (details, TMREES16_paper_61)

Abstract. The water velocity in an open canal is a critical factor in the sizing of drains intended for evacuation of excess water in agricultural soils. The study aims to examine, by experimental way, the effect of roughness that is due to the existence of reed stalks on the characteristics of the flows in a rectangular open canal intended to drain excess water. The tests have been done by varying the flow rate, the diameter of reed stalks and their density. The results of this research allowed taking out relations between the relative velocity and the relative density. These results also showed that, in an herbaceous open canal, the velocity is rather low than no herbaceous canal.

ID# M.21 Mokhtar Karabi, Baelhadj Hamdi Aissa and Salah Zenkhri. Microbial diversity and organic matter fractions under two arid soils in Algerian Sahara (details, TMREES16_paper_21)

Abstract. The Algerian Sahara is characterized by a heterogeneity of edaphic conditions and climatic dissimilarities; however, information on biological indicators of arid soils is weakly documented in this area. The researchers who have studied the biological activities of the soils of the arid regions have underlined their low organic matter content, particularly their very low rates of organic nitrogen; a low humification because seriously inhibited by a significant mineralization. The objective of this work was to study the soil microbial biomass densities and different soil organic matter fractions, under two arid soil in Algerian Sahara. The experiment was conducted in an alluvial soil in traditional palm grove of Guerrara, and in a saline soil in experimental field of university of Ouargla. Composite soil samples (10 subsamples each) were collected aseptically at 0-20 cm depth on two diagonal transects drawn over an area of 12 ha. The following germs densities were determined: Bacteria, Fungi and Actinomycetes. The soil organic matter fractions, the textural fractions, chemical attributes (organic C, total N, total limestone and gypsum) were also determined. The microbial groups count on both soils reveals that the bacterial microflora present a numerical superiority followed by the actinomycetes and finally fungi. The density of the micro-organisms in the two soils except for fungi, showed a prevalence of the bacterial microflora, and actinomycetes the alluvial soil compared to the saline soil. Fractionation of soil organic matter show that all the fractions are better represented in the alluvial soil with the exception of non-extractable organic carbon (NEOC) which are better represented in the saline soil. This confirms that the alluvial soil has a biological activity relatively large in relation to the saline soil and that the process of humification is relatively pronounced by comparing it with the saline soil, which tends to contain little polycondenses humic compounds.

ID# M.53 Houari Zeggane and Djamel Boutoutaou. Quantification and multivariate analysis of water erosion in the Mediterranean region: a case study of the Isser basin. Northern Algeria. (details, TMREES16_paper_53)

Abstract. In the Mediterranean region, the specificity of erosion stems from a particularly contrasted climate, drought, and from summer and autumn severe thunderstorms. The process of erosion generates





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substantial loss of soil and affects any kind of crop. The adopted approach aims to establish regression models in order to highlight the relationship between solid and liquid flows at four measurement stations in the Isser catchment area, northern Algeria. The Power Model seems to explain this relationship. The quantification and temporal analysis of solid matter transport showed that the rates of erosion are high along the study area. The annual mean solid matter transport for the whole basin is about 2 200 t/km².year, of which the main part is recorded in autumn during peak flows. The different factors involved in the process of water erosion are determined in advance in order to establish a model between the predictand variable, which is the specific erosion, and other predictors. Besides, a functional relationship has been highlighted between water erosion and the mean slope, the drainage density and the lithology index.

ID# M.94 Joseph Al Asmar, Nadim Zakhia, Raed Kouta and Maxime Wack. Decision Making for Best Cogeneration Power Integration into a Grid (details, TMREES16_paper_94)

Abstract. Cogeneration systems are known to be efficient power systems for their ability to reduce pollution. Their integration into a grid requires simultaneous consideration of the economic and environmental challenges. Thus, an optimal cogeneration power are adopted to face such challenges. This work presents a novelty in selecting a suitable solution using heuristic optimization method. Its aim is to optimize the cogeneration capacity to be installed according to the economic and environmental concerns. This novelty is based on the sensitivity and data analysis method, namely, Multiple Linear Regression (MLR). This later establishes a compromise between power, economy, and pollution, which leads to find a suitable cogeneration power, and further, to be integrated into a grid. The data exploited were the results of the Genetic Algorithm (GA) multi-objective optimization. Moreover, the impact of the utility's subsidy on the selected power is shown.

ID# M.51 Maggie Khaddaj, Issam Srour and Mario Saab. Energy-Driven Refurbishment of Existing Buildings (details, TMREES16_paper_51)

Abstract. Population growth, rapid economic development, and urbanization have increased the demand for energy worldwide leading to increased levels of CO₂ emissions consequently contributing to global warming. More than 40 percent of this energy is consumed in buildings. Assessing energy performance of existing buildings with the goal of determining an optimal rehabilitation strategy offers a chance to reduce the rising demands for energy. Several studies have advocated and demonstrated the energy savings from energy-driven renovations of existing commercial and residential buildings. This paper builds on these studies by developing a framework for completing renovation projects of existing buildings. The theoretical framework is illustrated in the context of a pharmaceutical plant which was suffering from high energy bills. Implementing the renovation ideas on the case study is expected to lead to significant savings in energy consumption, resulting in both economic and environmental benefits.

ID# M.111 Dieudonné Kidmo Kaoga, Bachirou Bogno, Michel Aillerie, Danwe Raidandi, Serge Doka Yamigno, Oumarou Hamandjoda and Beda Tibi. Assessment of Wind Energy Potential and Cost Estimation of Wind-generated Electricity at Hilltops Surrounding the City of Maroua in Cameroon (details, TMREES16_paper_111)

Abstract. In this work, 28 years of wind data, measured at 10m above ground level (AGL), from Maroua meteorological station is utilized to assess the potential of wind energy at exposed ridges tops of





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mountains surrounding the city of Maroua. The aim of this study is to estimate the cost of wind-generated electricity using six types of wind turbines (50 to 2000 kW). The Weibull distribution function is employed to estimate Weibull shape and scale parameters using the energy pattern factor method. The considered wind shear model to extrapolate Weibull parameters and wind profiles is the empirical power law correlation. The results show that hilltops in the range of 150-350 m AGL in increments of 50, fall under Class 3 or greater of the international system of wind classification and are deemed suitable to outstanding for wind turbine applications. A performance of the selected wind turbines is examined as well as the costs of wind-generated electricity at the considered hilltops. The results establish that the lowest costs per kWh are obtained using YDF-1500-87 (1500 kW) turbine while the highest costs are delivered by P-25-100 (90 kW). The lowest costs (US\$) per kWh of electricity generated are found to vary between a minimum of 0.0294 at hilltops 350 m AGL and a maximum of 0.0366 at hilltops 150 m AGL, with corresponding energy outputs that are 4 931.84 and 6 125.33 MWh, respectively. Additionally, the matching capacity factors values are 38.05% at a hilltop 150 m AGL and 47.26% at a hilltop 350 m AGL. Furthermore, YDF-1500-87 followed by Enercon E82-2000 (2000 kW) wind turbines provide the lowest cost of wind generated electricity and are recommended for use for large communities. Medium wind turbine P-15-50 (50 kW), despite showing the best coefficients factors (39.29 and 48.85 at hilltops 150 and 350 m AGL, in that order), generates electricity at an average higher cost/kWh of US\$ 0.0547 and 0.0440 at hilltops 150 and 350 m AGL, respectively. P-15-50 is deemed a more advantageous option for off-grid electrification of small and remote communities.

Relevance: 25%

ID# M.144 Nagia Dawood. Surface Treatment of PTFE Polymer using RF-Plasma (details, TMREES16_paper_144)

Abstract. The surface of Teflon (poly-tetra-fluoroethylene –PTFE) films were treated by argon g RF-plasma. Scanning electron microscope (SEM), atomic force microscopy (ATM) and X-Ray Diffraction (XRD) measurements was used to investigate and characterize the surface treatment of the polymer used. It is found , that the treatment time was the largest effect on the polymer surface change. The higher treatment time was gave better PTFE polymer treatment. Significant morphological and chemical changes are produced by RF plasma treatment

Relevance: 0%

ID# M.86 Anissa Ghezloun, Nassima Oucher and Hamza Merabet. Contribution of the conferences of the parties and the renewable energy role for the fight against climate change (details, TMREES16_paper_86)

Abstract. Contribution of the conferences of the parties and the renewable energy role for the fight against climate change A. Ghezloun, A. Saidane, N.Oucher, H. Merabet Centre de Développement des Energies Renouvelables, CDER, BP 62 Route de l'Observatoire, Bouzaréah, 16340, Algiers, Algeria Université d'Alger, Algiers, Algeria Abstract The Kyoto Protocol, which entered into force on 16 February 2005, commits developed countries to reduce their emissions of greenhouse gases by 5% in 2012 compared to 1990. Evoke after 2012 allowed to enter the United States and emerging countries in the process and to achieve a common text on Climate Change. The text should recognize first the existence of scientific problem: “the consumption of fossil energy contributes to increase greenhouse gas emissions





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related to the warming of the earth's surface. Therefore, it must slow their production while global energy demand "is expected to increase by 60% during the next quarter century." The common attachment to the Framework Convention of the United Nations on Climate Change should be reaffirmed. It constitutes "the appropriate enclosure for negotiating the future of the multilateral regime on climate change." Industrialized countries also commit to accelerate the deployment of cleaner energy. They promise to work with developing countries to improve private investment and technology transfer, taking into account their own needs and energy priorities Since the entry into force of the Kyoto Protocol, and especially since the publication of the Fourth Evaluation Report of the Intergovernmental Panel on Climate Change (IPCC), the attention to climate negotiations has increased exponentially. A first universal historic agreement and legally binding was adopted after two weeks of intense negotiations by the Parties from 30 November to 12 December 2015, which aims to limit global warming by the end of this century well below 2 ° C while continuing efforts to not exceed 1, 5 ° C. Because, one of the great hopes of the fight against the emission of greenhouse gases is the development of renewable energy, the IPCC (Intergovernmental Panel on Climate Change) report highlights the need to move towards renewable energy sources. It is therefore necessary to develop the only inexhaustible energy, renewable energy, to fight against climate change.

ID# M.115 Elena Cantatore, Fabio Fatiguso and Mariella De Fino. Strategy of energy retrofitting for historical urban districts (details, TMREES16_paper_115)

Abstract. Purpose: The paper is going to discuss and validate a methodological framework for the integrated and coordinated retrofitting of historic urban districts, between conservation of their unique typological and architectural features and improvement of their environmental and energy performances. Methodology: The methodological process will comprise four phases. Particularly, from the investigation of environmental and morphological characteristics of the whole district, energy grids and consumptions of the sub-districts and construction materials and techniques of the buildings, a set of "Minimum Units of Energy Intervention" (MUEI) will be identified, where common opportunity/necessity of transformation might be assessed and common strategies and solutions should be pursued. Findings: The validation of the methodological approach will be based on the "energy zoning" of a representative case study. For that, a specific combination of best practices for envelope insulation and renewable sources exploitation will be developed for each identified MUEI, taking into account the residual performances, the state of conservation and the degree of transformability of the built heritage. Those best practices will provide the intervention guidelines at the macro-scale according to a shared vision. Originality: The paper is going to develop a decision-making support tool for all the stakeholders of the retrofitting process of historic urban districts, including owners, administrators and technicians. That tool should help select compatible, effective and efficient measures, address informed maintenance and management programs, guarantee the overall safeguard and enhancement of the built heritage and, thus, overcome some critical issues of the "Sustainable Energy Action Plan" (SEAP). Article Classification: Research paper.

ID# M.66 Ibrahim Tall, Rawad Nasr, Nour Nachabe and Farid Chaaban. Lebanese Household Carbon Footprint: Measurements, Analysis and Challenges (details, TMREES16_paper_66)

Abstract. The main purpose of this paper is to estimate the carbon footprint of a typical Lebanese household, and compare the results with international standards and trends. The estimation of this footprint will reflect the impact of the daily Lebanese household activities on the environment in terms of carbon dioxide emissions. The method used in estimating the carbon emissions is based on gathering the





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primary footprints from various household activities. Another proposed method that provides more accurate results is the estimation of emissions based on secondary footprint, which reflects the total emissions not only from the regular activities but also from a lifecycle perspective. Practical and feasible solutions were proposed to help reduce the amount of CO₂ emissions per household. This would lead to a better air quality, money savings, greenhouse gases emissions reduction and would ensure the sustainability and prosperity of future generations. A detailed survey was conducted in which the questions were focused mainly on energy, food, and transportation issues. The fourteen questions were addressed to one hundred families in different Lebanese regions coming from different social and economic backgrounds. This diversity would constitute a reflective sample of the actual Lebanese society, allowing us to extrapolate the gathered results on a national level.

ID# M.23 Abimouloud Youcef and Kriker Abdelouhad. Effect of Exposure Delay of Concrete into Aggressive Environment (details, TMREES16_paper_23)

Abstract. Some regions in the world suffered since several years of environmental problems such as underground level water rising. Water table affects durability of concrete implanted in the underground by the ease of luckless chemical element ingress through concrete mainly the foundations of structures such as sulfate, chloride, and acids. For that reason a lot of foundations structures were made with SRPC (sulfate resisting Portland cement). This study is a contribution to assess the effect of exposure delay of concrete into aggressive fields, as a kind of cure witch protect concrete from aggressive factors and allow him to require the needed strength. The study has shown that concrete exposure delay into aggressive environment is not a kind of cure mainly for concrete made with SRPC. Concrete with SRPC immediately exposed to aggressive environment show better mechanical resistance than concrete have known exposure delay.

ID# M.147 Olufunmilayo Joseph, Cleophas Loto, Seetharaman Sivaprasad, John Ajayi and Isaac Fayomi. Comparative Assessment of the Degradation Mechanism of Micro-alloyed steel in E20 and E80 Simulated Fuel Grade Ethanol Environments (details, TMREES16_paper_147)

Abstract. In this study, micro-alloyed steel (MAS) material normally used in the production of auto parts was immersed in gasoline (as a reference), E20 and E80 simulated fuel grade ethanol (SFGE) environment and its degradation mechanism was evaluated. Investigation of corrosion behaviour through mass loss tests and electrochemical measurements showed that no mass loss was recorded for tests in gasoline whereas lowest corrosion rate values were found in E20 and the highest values in E80. Post-corrosion SEM images of the samples after immersion tests showed degradation of MAS in E20 by crevice and pitting corrosion. On the other hand, MAS deteriorated in E80 by uniform corrosion. The presence of water and dissolved chlorides in E20 stimulated pit initiation and growth on MAS. Corrosion degradation of MAS is dependent on ethanol concentration within the tested range of 20 to 80 % ethanol.

ID# M.139 Bekkouch Mohamed Fouzi and Benhamza Moussa. Hydrochemical Characteristics Of The Thermal Sources In The Extreme Northeastern Part Of Algeria (details, TMREES16_paper_139)

Abstract. The present study will make possible the characterization hydrochemical of thermal sources in the far North east of Algeria. The thermal sources emerge following big tectonic accidents, according to the neotectonic on the thermal band of Annaba and Constantine. According to Stabler's graphic representation, the results of chemical analyses show four chemical facets: bicarbonate sodium, chloride





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sodium, sulfated sodium and sulfated calcium. The basic exchanges index study show a relationship between the crystalline origin of the thermal sources and the hyperthermal temperatures, whereas the sedimentary origin corresponds to the orthothermal temperatures of the sources emergence. The study of the saturation index has succeeded in the highlighting elements responsible for both over undersaturation, this causing either their precipitation or dissolution in thermal water.

ID# M.28 Badra Attoui, Samia Benrabah -Titi, Najet Zair, Habiba Majour and Nacer Kherici. Assessment of groundwater vulnerability to pollution using the kherici's method in the Telezza plain (N-E Algéria) (details, TMREES16_paper_28)

Abstract. The intrinsic vulnerability of groundwater aquifers is the sensitivity to contamination from the soil surface irrespective of the nature of the pollutant. In an effort to improve the protection of groundwater, must be reduced the infiltration of contaminants to the reservoir in seeking to determine the factors influencing this phenomenon. There are models that bring together a number of factors that determine a vulnerability index of groundwater all the superficial pollution. The objective of the study is to determine the state of vulnerability and risk of groundwater pollution in the region of Collo with a new method proposed by Kherici (2010). These different methods are presented under the form of numerical quotation systems based on the consideration of the different factors influencing the hydrogeological system (DRASTIC ,GOD;SINTACS...)In this study one considers the combination of two criteria based on natural factors (thickness of the unsaturated zone geological facies, degree of self-purification) and causes of vulnerability of aquifers to pollution (anthropogenic factors) caused by man

ID# M.33 Abdesselam Bougdira, Abdelaziz Ahaitouf and Ismail Akharraz. An Intelligent Traceability System: efficient tool for a Supply Chain Sustainability (details, TMREES16_paper_33)

Abstract. The supply chain sustainability becomes a necessity for a smooth, a rapid and a fluid economic transaction. To reach a sustainable supply chain, we propose to focus attention on products and their lifecycle. So, we consider the traceability as a major success key to ensure the supply chain sustainability. For that, we consider a supply chain design that use an intelligent products traced by an intelligent traceability system. This system identifies, restores history and properties of a product, besides it tracks, in real-time a product. This solution can, also, bring, in the product environment, appropriate adjustments to prevent any risk of threatening qualities for the product. So, it helps supply chain contributors making the sustainable adjustments and the instant benchmark of the supply chain sustainability.

