

RENEWABLE ENERGY

Energy Efficiency, Policy and the Environment

World Renewable Energy Congress V
20–25 September 1998
Florence, Italy

(In Four Parts)

Edited by: **A A M Sayigh**

PART III



Pergamon

UB/TIB Hannover

89

121 271 331



Disclaimer: These proceedings were fully refereed, but any materials in them are the sole responsibility of each author and not necessarily the opinion of the Editor.

PART III

LOW ENERGY ARCHITECTURE

A. Zain-Ahmed, A. A. M. Sayigh, P. N. Surendran and M. Y. Othmann	1285	Regional climate analyses for Subang Jaya, Malaysia
A. Carbonari	1289	Ombre-Urbane-2: a software tool to evaluate shading effects of urban obstructions, from the energetic and daylighting point of view
X.-H. Jiao	1293	Experimental research to improve the optical performance of window materials
L. Gil	1297	New cork based materials for building applications
M. Pucar, M. S. Arch and M. J. Popovic	1300	Regulations as the promotion and limitation factor of energy conservation in buildings and human settlements in Yugoslavia
G. E. Gonzalo and S. L. Ledesma	1304	Education and training in renewable energies at the Environmental Control Institute
M. Petit, F. Cabanes and M. Begue	1308	Thermal performance of a wall made with innovative terracotta bricks
F. E. Ávila, A. Fernández and C. Sandoval	1313	Sustainable architecture laboratory Energy Research Center — National University of Mexico
S. Gologacheva-Peneva	1317	Ecology — a chance for the modern architecture
S. Lorente and E. Massias	1320	Protection against solar overheatings using high aspect ratio opened vertical cavities
A. Malama	1324	Energy implications of new comfort standards in the tropical upland climate
K. Jitkhajornwanich and A. C. Pitts	1328	Transitional spaces as a mitigation feature for thermal environments of buildings in hot and humid tropical regions
N. M. Nahar, P. Sharma and M. M. Purohit	1332	Solar passive techniques for better comfort conditioning in arid regions
J. Harris, H. El Kadi and M. Wigginton	1336	The evaluation of the intelligent skin
Ph. Samyn, P. Wouters, S. Martin and J.-F. Roger-France	1341	The Aula Magna: a 1200-seats multipurpose hall for the Université Catholique de Louvain conceived to save maximum energy

F. Bourbia and H. B. Awbi	1345	The effect of orientation and shading on the inside and outside temperatures of traditional and contemporary housing in the desert of Algeria
P. Ferro, M. Citterio and A. Maccari	1349	Potential cooling loads reduction using non homogeneous external shading devices in the Mediterranean office buildings
M. Sarotto, A. D'Este, A. Maccari, P. Polato, G. Rossi and M. Zinzi	1353	Use of diffusing glazing systems to improve internal comfort in non residential buildings
B. B. Harwood	1357	Energy-efficient, resource efficient affordable housing: a proven design from the southern U.S.
M. M. Santos and M. A. V. Freitas	1361	Architecture and greater efficient in electrical energy use on urban areas of Brazilian Amazon: the case of Manaus City
G. Alvarez, J. J. Flores and P. K. Nair	1365	Thermal analysis of a laminated glass with two solar control thin film interlayers
D. J. Harris and J. McLeod	1370	Night time cooling of a room with large internal heat gains
V. Badescu and E. Zamfir	1374	Adapting the degree-day method to Romania
C. Britto and J. N. y César Bedoya	1378	Experimental project for ecological cover in Madrid
R. N. Shaikh and R. Hanna	1382	Calcium chloride stabilised earth blocks
M. Y. Numan and F. A. Al-Maziad	1386	The impact of architectural design parameters on energy performance of residential buildings in the Gulf region
N. Almaso, J. Rincón, J. González and E. González	1391	Passive cooling performance evaluation using CFD
P. Wood and G. Baird	1395	Modelling of building related embodied properties and processes
J. Neila, C. Bedoya and J. Klainsek	1399	Simplified method to generate the thermal gradient of the ground
M. Gourdache, A. Guezlane, S. S. Nezzar, T. Hasni and A. Abellaoui	1403	Thermal performance of a living room space in the Algerian arid-regions
P. Brunello and F. Peron	1407	Economic optimization of the building envelope
S. A. Rahman, K. S. Kannan and R. A. Hasan	1411	Prediction of indoor air movement of naturally ventilated classrooms in schools in Malaysia
O. D. Corbella and M. A. A. Magalhães	1415	Concepts and differences between bioclimatic architecture for Europe and for the tropics

E. J. Lee, H. F. O. Müller, C. Nolte and T. Pasquay	1419	Double facades - the reduction of cooling energy in summer and the use of solar energy during the winter
M. Filippi and V. Serra	1423	External shading devices: opportunities and performance to control daylight and solar heat gain
L. Albiéri	1427	Rehabilitation with a bio-ecological approach: less energy consumption and healthy buildings — a training experience
S. Sciuto and A. Galatà	1431	Efficient design incorporating fundamental improvements for control and integrated optimisation
H. Skates, B. Norton and P. C. Eames	1435	Advanced glazings and building form
H. Skates, B. Norton and A. Mannis	1439	An affordable sustainable housing design for the Irish context
P. Genta and A. Scaliter	1443	Infrared video-simulation techniques to analyse solar impact with scale models
S. M. Mubarak and F. Shamsheer	1447	Design criteria in Shibam buildings
D. J. Gavrilović	1452	The influence of the most common building materials on the eco-quality of the solar houses heat storages
W. Pohl and CH. Scheiring	1456	Overall characterisation of intelligent window components
J. A. Turégano, C. Monné and M. A. Hernández	1460	Evaluation of the application of normative destined to the energy saving in urbanizations
J. I. P. Calero	1465	Renewable energy and technologies of solar refractive concentrators
M. M. Aboul Naga and S. N. Abdrabboh	1469	Improving night ventilation into low-rise buildings in hot-arid climates exploring a combined wall–roof solar chimney
K. A. Al-Sallal	1473	Comparison between polystyrene and fiberglass roof insulation in warm and cold climates
S. Abdou	1477	The thermal performance of prefabricated buildings in Algeria
L. B. McElroy	1481	Design support for the integration of renewable technologies in the city
A. Calarco, M. R. Giuffrè and D. Tripodi	1485	The lighting thermal method in the sensibility analysis of buildings

N. Cardinale, D. Francese and F. Ruggiero	1489	Properties and performance of materials within a bioclimatic building: measurement and evaluation of the degree of environmental care
F. Lichtblau	1496	Architectural integration of daylight and solar heat in an existing building: a rural example
I. F. Hamdy and M. A. Fikry	1500	New shopping centers in Egypt: energy consumption criteria
S. S. Shebl, G. B. Hanna, M. N. Metwally, K. F. Megalaa and H. I. El-Mously	1504	Experimental investigation of date palm leaves, midribs drying as renewable wooden material
W. Gilijamse, J. C. Römer, R. H. Wassenaar and C. Zydeveld	1508	Energy performance standards and the promotion of renewable energy in buildings: the Dutch case
F. Ligthart and W. van Helden	1512	Energy conservation in office buildings in the Netherlands: an example of "best practice"
C. Gómez Camacho	1516	Exergo-environmental analysis of bioclimatics
G. B. Hanna, M. A. Hassan, M. R. Shaalan, K. Hassan and M. F. El-Refaie	1520	A wind-tunnel investigation of single building model/wind condition for thermal behavior
A. Soler and S. T. Claros	1524	Influence of surface reflectance on lightshelf performance
A. Soler and L. Robledo	1528	Luminous efficacies on vertical surfaces
L. Robledo and A. Soler	1532	Modelling direct illuminance on a horizontal surface at Madrid for applications to low energy architecture
D. Perelló, L. Odicino and A. Fasulo	1536	Analysis of the incidence of the geometry of the openings in the natural illumination of a room
V. Sambou, M. Adj, D. Azilnon, Y. Mandiang, A. Coulibaly and C. Awanto	1540	Influence on the thermal comfort of a slab recuperating solar energy and used as roof
F. Sulaiman, A. H. Mohamad and S. R. M. Ali	1544	Effects of solar radiation on buildings in Malaysia
A. N. M. Zain and F. Sulaiman	1548	Energynet for smart schools in Malaysia
K. H. Beattie and I. C. Ward	1551	Building environmental simulation and low energy architecture
Y. N. Guermia	1555	Effect of solar control on overheating in classrooms in the Constantine region of Algeria
S. Kim	1559	Life-cycle assessment of embodied energy for building materials — focused on high-rise apartments

Y. Bouchahm	1563	Passive evaporative cooling by means of wind tower for summer comfort in Algeria (Constantine)
K. V. O. Fabah, C. O. Mito and T. S. Sathiaraj	1567	Passive solar-energy-efficient building design in Kenya
D. Bigazzi	1571	Building maintenance and ecological compatibility: specifications for the description of works in building maintenance
M. Fsadni and A. A. M. Sayigh	1575	Typical climate conditions in Malta with implications on buildings design
P. Gallo	1579	A methodology of approach in the energy analysis of the existing buildings
S. Medved and P. Novak	1583	Heat transfer through facade element composed with double pane window and ventilated insulation screen
G. Leftheriotis and P. Yianoulis	1587	Assessment of low-e soft coatings for advanced glazing applications
P. Yianoulis, S. Papaefthimiou, G. Leftheriotis, Y. Tripanagnostopoulos and M. Souliotis	1591	Temperature fields for double glazing units under partial shading
V. Jirka, V. Kučeravý, M. Malý, J. Pokorný and E. Řehoř	1595	The architectural use of glass raster lenses
K. Kanny and M. R. Patrascoiu	1599	Comparative study of the collection and distribution of solar light to artificial illuminating of buildings
S. Badger	1604	Encouraging energy efficiency in building by the cost-effective delivery of project specific advice — the UK Energy Design Advice Scheme
M. J. Popović and A. R. Mićanović	1608	Application of passive solar systems in protection of urban and building heritage
D. Petráš	1612	Low temperature heating in low energy buildings
J. Šabíková	1616	Slovak and European approach to the calculation of energy demand for heating
H. F. O. Müller	1620	Holographic light guiding systems
F. Lucas, T. Mara, F. Garde and H. Boyer	1624	A comparison between CODYRUN and TRNSYS simulation models for thermal buildings behaviour
T. Ertle and M. Ertle	1634	Architecture and autarky with the SoliSolar heat engine
C. D. Middleton	1638	How can we get there from here?

M. A. Al Zain	1642	Comfort achieving strategies for the climate of Saudi Arabia
L. C. Nelli	1646	Multifunctional pavillion for natural health care

PHOTOVOLTAIC TECHNOLOGY

A. Hamidat, A. Hadj Arab, F. Chenlo and M. A. Abella	1651	Performance and costs of the centrifugal and displacement pumps
M. Tounkara and E. J. Schiller	1655	Solar water pumping: a reliable water supply alternative for peri-urban areas of developing countries
A. M. Al-Ashwal	1659	Sensitivity analysis of PV-wind generating systems
R. Khalfaoui	1663	Experimentation and simulation of photovoltaic solar refrigerator for medical use
A. A. Nafeh, F. H. Fahmy, O. A. Mahgoub and E. M. Abou El-Zahab	1667	Microprocessor control system for maximum power operation of PV arrays
M. Benganem and A. Maafi	1671	Performance of stand-alone photovoltaic systems in Algiers
T. G. Abdel-Malik, A. S. Riad and N. M. H. Abdel-Aziz	1675	Schottky barrier formation and transport properties in copper phthalocyanine films
R. M. Abdel-Latif and H. A. Motaweh	1679	Dark and photo electric properties of copper phthalocyanine
F. A. S. Soliman	1682	Applications of open circuit voltage decay technique for the characterization of photovoltaic devices
A. J. Novinrooz	1687	Design and installation of 30 kW photovoltaic plant at "SARKAWIR"
M. Sadok, M. Chikh and A. Mouhoub	1691	Performances analysis of power photovoltaic installation
E. A. Sweelem, F. Hosney, M. M. Abd-El Aziz, P. Zacharias and A. Mahmoudi	1696	Modeling and simulation of forced air cooling technique for PV efficient system
K. M. Gambaryan, V. A. Gevorkyan and V. M. Aroutiounian	1701	The growth of graded - gap III-V ternary compound photovoltaic structures by new version of liquid phase electroepitaxy
A. Abete, L. Ferraris and F. Spertino	1705	Improvement of photovoltaic water pumping plants by modules array reconfiguration
V. Acquaviva, M. Muselli, P. Poggi and A. Louche	1709	Simulation of small grid-connected PV systems for residential applications

M. Ružinský, V. Šály and P. Redi	1713	Electrical properties of CdTe thin films for solar cells
A. Sellami, F. Ghodbane, R. Andoulsi and H. Ezzaouia	1717	An electrical performance tester for PV modules
M. Corsi, N. Redi, P. Redi, M. Ruzinsky and V. Saly	1721	PV roof in a building in Catania, Sicily
N. I. Klyui, V. G. Litovchenko, V. G. Popov, B. N. Romanyuk, A. B. Romanyuk, A. A. Zolotovskiy and S. G. Volkov	1724	Stimulated gettering approach for high quality solar cell silicon preparation
A. N. Smyryeva, N. Bishena and A. A. Zolotovskiy	1728	Thin film solar film cell from amorphous silicon
W. Tayati, G. Thompson and P. Kruangpradit	1731	Performance evaluation of a PV/micro-hydro/diesel/battery hybrid system in Thailand
M. Benmoussa, A. Outzourhit, A. Bennouna and E. L. Ameziane	1735	Electrochromic properties of sputtered V ₂ O ₅ thin films
M. Ikisawa, A. Nakano, S. Igari and H. Terashima	1739	Effects of starting month of exposure and heat insulator on performances of amorphous silicon module efficiency
M. M. Soliman, M. Y. Feteha and G. M. Eldallal	1743	Performance simulation of high efficiency bifacial buried emitter silicon solar cells
M. Mattei, C. Cristofari and A. Louche	1747	Performance of a hybrid PV/T collector
B. N. Gupta, C. Shakher and H. Yadav	1751	Use of holographic lenses as solar concentrators for photovoltaic applications
J. Pop-Jordanov, D. Dimitrov, K. Kocov and M. Todorovski	1755	Photovoltaics within the Skopje energy efficiency demonstration zone
M. Boztepe and M. Çolak	1759	Design and test of a PV energised peltier cooling-box
M. Almonacid and J. Aguilera	1763	Fuzzy logic charge regulator
B. Calcagni, P. di Filippo, M. Paroncini and E. Ruffini	1767	Analysis for a photovoltaic system applied to the wholesale vegetables market of Ancona
C. Hamouda, H. Benmoussa, M. Chabane, B. Azoui, S. Merad, H. G. Wagemann, R. Hanitsch, H. Siekmann and G. Duschl	1772	Socio-economic aspects of the use of photovoltaic systems in the Aures Mountains, Algeria
A. Cherif and A. Dhoub	1776	A comparative study between battery storage and less battery storage systems in stand alone PV plants
E. V. Buzaneva	1780	New directions on a photovoltaic technology: engineering of the XXI century

M. Cenek, J. Kazelle, J. Vanek and Z. Rozsivalova	1784	Accumulation of electric energy from renewable resources into accumulator
Y. Tripanagnostopoulos, Th. Nousia and M. Souliotis	1788	Hybrid PV-ICS systems
R. J. Matson, J. E. Granata and S. E. Asher	1792	Effect of quantitative incorporation of Na on device properties, junction formation, and microstructure in CuInSe ₂ photovoltaic devices
M. Alvarez, D. Fernandez, M. Fuentes and R. Pedace	1796	Future scenarios for photovoltaic and wind energies and the rational use of energy in the Argentinean Republica: an exercise of backcasting
A. Guen, H. Guen, B. Bouazza and B. Benyoucef	1800	Mobile telecommunication systems powered by solar energy
J. C. Hernández and G. Almonacid	1804	Improved PV system safety using a real-time monitoring
A. Medina and J. C. Hernández	1808	Analysis of the environmental impact of a photovoltaic solar installation
A. Gómez Gotor, J. García Latorre and M. Perdomo	1812	Optimization of RO desalination systems powered by renewable energies — Project OPRODES
T. Blewett and R. Hill	1816	UK public perception of building integrated photovoltaics
V. M. Aroutiounian, V. M. Arakelyan, G. E. Shahnazaryan and G. M. Stepanyan	1820	An impedance analysis of the doped iron oxide — electrolyte interface
M. M. Soliman, G. M. Eldallal and M. B. Saleh	1824	The crossover phenomena for thin film heterojunction solar cells
M. M. Nejib, A. Mohamed and R. Radoslav	1828	Structure of numerical autopiloting of an online photovoltaic system connected to the electrical network power
B. Garba and A. T. Atiku	1832	Hydrogen production using photovoltaic solar energy in Sokoto — Nigeria: preliminary investigation
N. Cordero, D. Mulcahy, G. T. Wrixon, D. Mayer, K. Badowski, S. Pietruszko, A. Alexandru, I. Buzatu, D. Buzuloiu and A. Ginga	1836	ASHLING 7.0: a software tool for promotion and training in photovoltaic energy using modelling
H. N. Yahya, M. Musa, A. S. Sambo and A. T. Atiku	1840	Photovoltaic water pumping option for community water supply at Kalgo village in Sokoto State

H. Izumiya and N. Ishikawa	1844	A photovoltaic power generation simulation program in consideration of shadow cast by adjacent buildings
G. Sissoko, E. Nanéma, A. Corrêa. P. M. Biteye, M. Adj and A. L. Ndiaye	1848	Silicon solar cell recombination parameters determination using the illuminated I-V characteristic
G. Sissoko, B. Dieng, A. Corrêa, M. Adj and D. Azilnon	1852	Silicon solar cell space charge region width determination by a study in modelling
G. Sissoko, A. Corrêa, E. Nanéma. M. N. Diarra, A. L. Ndiaye and M. Adj	1856	Recombination parameters measurement in silicon double sided surface field solar cell
D. Ibrahim	1860	LED traffic lights and using solar electricity to power these lights
C. S. Anithkumar	1864	A techno-economic study of producing electric energy using solar photovoltaic systems on the roof of railway bogie in India
F. A. Aal and A. B. Kashyout	1868	Economic considerations for PV electrical generating systems in Egypt
P. Favre	1872	Photovoltaic energy in Lausanne (Switzerland)
I. Zulim, I. Zoraja and Z. Matic	1876	Energy distribution in the simple photovoltaic system
I. Zulim and I. Vuknić	1879	Amorphous silicon solar cell: modeling, testing and optimizing
A. G. Ghirardi	1881	Conditions related to the use of photovoltaic systems in rural communities in Bahia
G. Grazzini and A. Rabbi	1885	Hybrid photovoltaic/thermal solar collector working at low temperature

WIND ENERGY GENERATION

M. Kurukulasuriya	1889	Micro power unit (MPU) produces electricity from small hydro, solar and wind energies for rural development
G. Jenkins and N. D. Mortimer	1893	Progress with a 20 kW grid connected wind turbine for the new UK electricity market
A. D. Şahin and Z. Şen	1897	Parametric wind energy calculation formulation
W. Berger	1901	The technical and behavioural potential for solar energy — a case study for the town of Lusk/Ireland
M. C. Torre, P. Poggi, G. Notton and A. Louche	1906	Stochastic study of wind speed in Corsica

R. B. Chedid	1910	Analysis and control of a variable speed wind energy conversion system
C. Labriola and F. Ponta	1914	Wind converters for gust wind
S. M. A. Ibrahim, M. N. El-Kordy, M. A. Badr, K. A. Abed and A.A. El-Mallah	1918	Environmental impact evaluation of wind energy exploitation
F. Van Hulle and B. Rajsekhar	1923	Economic losses of wind farms in India: effect of grid abnormalities
M. Shiono, K. Suzuki and S. Kiho	1927	The characteristics of Darrieuse turbine for the tidal power generation
H. Nfaoui, J. Buret and A. A. M. Sayigh	1931	Wind characteristics and wind energy potential in Morocco
F. Ponta and C. L. Pont	1936	A novel technique for high-power electricity generation in high-speed wind regimes
C. L. Pont, M. Brugnoli and R. Oliva	1940	Wind power development in a liberalised electricity market: Argentina's experience
A. Gómez Gotor, M. Perdomo and J. García Latorre	1944	Analysis, design, and feasibility study of an electricity, heat and water cogeneration plant using fuel cell and reverse osmosis desalination with hydrogen, produced by wind energy, as fuel
E. Parisi	1948	Preliminary analysis and assessment of wind energy potential and its environmental impact
M. Predescu, I. Nita, E. Della Giacomo and M. Vilsan	1952	New approach of stand-alone PV and wind hybrid system design
L. Schleisner and P. S. Nielsen	1956	External effects related to biogas and wind power
D. Yoshimura	1961	Development of control techniques for grouped wind turbines on a small island

BIOMASS CONVERSION

R. K. Malik, D. Singh, I. M. Banat and P. Nigam	1965	Improved biogas production using cattle waste and distillery effluent mixed slurry
H. D. Yang and S. S. Yang	1969	Polyunsaturated fatty acid production with agricultural wastes by solid state fermentation
A. Mlaouhi, S. S. Mlaouhi, S. Zirki and D. Depeyre	1973	Situation of the forest biomass exploitation used for energetic purposes in Tunisia
M. N. Islam and F. N. Ani	1977	Characterisation of bio-oil from palm shell pyrolysis with catalytic upgrading

O. C. Chin, S. Bari and K. M. Siddiqui	1981	Densification and properties of briquetted biowastes
M. D. Berni and S. V. Bajaj	1985	Ethanol production and use in Brazil: an analysis of CO ₂ emissions
S. Ozdogan, D. Uzun, H. Atakul, Y. Erdalli and M. Tiris	1989	Preparation and utilisation of sweet sorghum and sweet sorghum/lignite briquettes
F. Chejne, J. P. Hernández, W. F. Florez, E. Arenas, A. Hill and J. C. Rojas	1992	Modelling and simulation of transient wood combustion processes
A. Walter and R. P. Overend	1996	Feasibility of big-GT systems: perspective analysis vis-à-vis thermal power plants burning natural gas
S. Khabba and A. Lahrouni	2000	Energy balance of maize ear — theoretical study
A. Carlson, A. Roos, B. Hillring and M. Söderström	2004	Conversion of heating systems in the residential sector — the competitiveness of biofuel
B. Ogayar, J. C. Hernández, A. Medina, A. López and P. G. Vidal	2008	Energy analysis of the by-products obtained from the olive-grove
P. P. Bezrukih, D. S. Strebkov and I. I. Tioukhov	2012	Biomass energy conversion in Russia
J. M. Jones, M. Pourkashanian, A. Williams and D. Hainsworth	2016	A comprehensive biomass combustion model
P. Kanniappan, S. Ramasamy, T. Ramachandran and S. Sankaranarayanan	2020	Optimal utilisation of biomass for rural energy needs
W. Ahiataku-Togobo	2024	Generating electricity from biomass: the Ghanaian experience
C. H. W. Schroeder	2028	Low-cost plastic tube biogas digester adapted to fibrous substrates such as banana plant material
B. Garba, A. T. Atiku and M. Aliyu	2032	Preliminary studies on biogas production from human excreta