

# World Renewable Energy Network [WREN] International Conference **Renewable Energy for Sustainable Development in the Asia Pacific Region**

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**Sunday 4 February, 2007**

**Page 1**

**3:30 – 6:00 PM – Film and Public Forum (Millennium Cinema)**

presented by  
Western Australian Sustainable Energy Association Inc [WA-SEA]

3.30pm - Audience Seated

3.45pm – Introductions by Johanna Gastevich, WA SEA Inc.

3.50pm – Welcome by Mayor of Fremantle

3.55pm - Movie Screening 'An Inconvenient Truth'

5.35pm – Climate Change Presentation – How climate change is affecting Western Australia, Dr Ray Wills

5.40pm – Discussion – What you can do in your own home/lives to reduce greenhouse gas emissions (Q&A with audience and panel members)

Panel discussion with feature:

Hon Alannah MacTeirnan, Minister for Planning and Infrastructure

Dr Ray Wills, WA SEA Inc. Chair and Manger – Sustainability Services Snowy Mountains Engineering Corporation (SMEC)

Matt Porter, a lawyer with Minister Ellison who recently completed training with Al Gore.  
Tristy Fairfield, a greenhouse campaigner with the Conservation Council of WA and Australian Conservation Federation.

6.00pm – End

**6:30 – 8:30 PM – Welcome Reception & Registration**

Poolside, Esplanade Hotel, Fremantle

Welcome by

Professor Goen Ho (Chair, Organising Committee)

**8:30 AM – Conference Inauguration (Orion Room)**

MC – Johanna Gastevich, WA SEA Inc.

Introduction – Professor Goen Ho, Murdoch University.

Welcome to Country – Marie Taylor (Aboriginal Noongar Elder)

Welcome – Professor Nick Costa, Chair of Environmental Technology Centre, Murdoch University

**08:50 AM Opening Address (Orion Room)**

**The Hon Alan Carpenter MLA The Premier of Western Australia**

**09:10 AM Conference Keynote Speeches:**

1. Professor Martin Green ‘Advanced Solar Cell Concepts – Hope for the Future’  
Federation Fellow and Scientia Professor at the University of New South Wales and founder of the Photovoltaics Centre of Excellence.

2. Professor Ali Sayigh ‘Worldwide Progress in Renewable Energy’  
Editor in Chief International Journal of Renewable Energy, Director General of World Renewable Energy Network.

**10:00 AM Exhibition Opening and Morning Refreshments (Southern Cross Lobby)**

<b>10:30 AM Common Session 1: (Orion Room)</b>	<b>Page 3</b>
<b>Energy Efficient Housing I + Remote Area Power Systems I</b>	
Chair: Mathew Rosser	
Plenary Speakers	
1. Professor Wasim Saman (Uni SA) 'Energy Rating Tools for Housing, Review & Validation'	
2. Grant Behrendorff (Bushlight, CAT Alice Springs) 'Renewable energy supporting sustainable development in Australia's remote indigenous communities'	

<b>11:15 AM Concurrent Sessions 1</b>		<b>Page 5</b>	
<b>Session 1A Page 5</b> (Orion Room) <b>Energy Efficient Housing</b> Chair: Professor Wasim Saman Rewards for Passive Solar Design in the Building Code of Australia Neville Peterkin Phase Change Material use, and the development of the "Phase Change Chimney," to improve the thermal performance and energy efficiency of lightweight solar housing. Goodfield D., Anda M., Hammond R., and Mathew K. Thermal Performance of Passive Solar Designed Sustainable Demonstration Homes in Perth, Western Australia G.M. James, M, Anda and K. Mathew	<b>Session 1B Page 8</b> (Pleiades Room) <b>Remote Area Power Systems</b> Chair: Grant Behrendorff RAPS in Western Australia: Looking back over 30 years Mark McHenry and Katrina Lyon Technological implementation of renewable energy in rural-isolated areas and small-medium islands in Indonesia: Problem mapping and preliminary surveys of total people participation in a local wind pump water supply Ahmad Taufika, Benefits from a Renewable Energy Village Electrification System Alex Zahnd Dr. Haddix McKay Kimber The Bushlight Energy Management Unit - Bushlight's approach to ensuring equitable distribution of energy within Community Renewable Energy systems Philip Robertson	<b>Session 1C Page 11</b> (Sirius Room) <b>Asia Pacific Focus I</b> Chair: Dr S Tanatvanit Assessment of centralized grid connected wind power cost in coastal area of Pakistan Khanji Harijana, Mohammad Aslam Uqailib, and Mujeenuddin Memonc Better or worse? The role of solar photovoltaic (PV) systems in sustainable development: Case studies of remote atoll communities in Kiribati Kirti Mala, August Schläpfer, Trevor Pryor Renewable Energy: Addressing Environmental Issues in Bangladesh Amzad Hossain, Dora Marinova Renewable Energy Technologies for Water Pumping: An Estimation of Unit Cost of CO2 Emissions Mitigation Atul Kumar and Tara C. Kandpal	<b>Session 1D Page 13</b> (King Sound Room) <b>Related topics</b> Chair: Don Harrison Design and Implementation of P/I-Based MPPT for Wide Temperature Range Operation D.C. Riawan1, C.V. Nayar Modelling of Integrated Renewable Energy System A. K. Akella R. P. Saini M. P. Sharma High Efficiency Pool Filtering Systems Utilising Variable Frequency Drives Z. Hameiri, T. Spooner, A.B. Sproul A Unique Patented System To Solar Heat Houses. Kim Dartnall

**12:30 PM – Lunch (Atrium Garden Restaurant)**

**1:30 – 5:30 PM Technical Tour 1: (From front of Hotel)  
Hydrogen Fuel Cell Bus Tour – Glen Head (DPI)**

**1:30 PM Common Session 2: (Orion Room) Page 16  
Energy Efficient Housing II + Asia Pacific Focus**

Chair: Professor Goen Ho

Plenary Speakers

1. Assoc. Professor Garry Baverstock Western Australia 'The Master Of Science In Environmental Architecture - An Appropriate Response To Reducing Green House Gasses'
2. Dr V Bakthavalsalam (India) 'New and Renewable Energy Policy Statement'

**2:10 PM Concurrent Sessions 2 Page 17**

Session 2A Page 17 (Orion Room)	Session 2B Page 20 (Pleiades Room)	Session 2C Page 22 (Sirius Room)	Session 2D Page 25 (King Sound Room)
<p><b>Energy Efficient Housing II</b> Chair: Assoc Prof Garry Baverstock Monitored and Modelled Thermal Performance of Passive Solar Designed Display Homes in Perth, Western Australia Gary James, Martin Anda</p>	<p><b>Remote Area Power Supply II</b> Chair: Dr Martin Anda Design and cost analysis of low head simple reaction hydro turbine for remote area power supply Abhijit Date</p>	<p><b>Asia Pacific Focus II</b> Chair: Dilawar Singh Can Renewable Energy Technologies, Science And Research Be Critical Factors For Sustainable Development In The South Of Sahara Sub-Region Of Africa? Adoko Sambwa and Thomas Okpo Kimble Audu</p>	<p><b>IOBB Special Session: Bioenergy</b> Chair: Dr Jaya Nair The Effect Of Ketepeng Cina Leaf As A Source Of Anthraquinone On The Cellulolytic Degradation, Volatile Fatty Acids And Methane Production By In Vitro Microbial Rumen Fermentation Lies Mira Yusiatil, Zaenal Bachrudini, Sugiyanto, Kustantinah and Chusnul Haniml</p>
<p>Implementation For Maintaining The Building- Top GVP System Napat Watjanatepin</p>	<p>Variable Speed Diesels for Fuel Efficiency in Remote Area Power Supply Systems M S Dymond, C V Nayar</p>	<p>Maintaining productivity of rural area in Indonesia: A perspective of total customers involvement from design to maintenance of a local wind pump (LWP) application Beny Yudiantoro, Ahmad Taufika,</p>	<p>Biomethanation of herbaceous biomass residues using 3-zone plug-flow like digesters - a case study from India Chanakya HN, BVV Reddy and Jayant Modak</p>
<p>Performance of Lightweight Solar Housing for Peri-Urban Villages Goodfield D, Anda M, Hammond R and Mathew K</p>	<p>Development of small-scale renewable energy systems for off-grid and fringe of grid applications in Western Australia Evan Gray</p>	<p>Issues Related to Rural Electrification using renewable energy in Developing Countries of Asia and the Pacific Tania Urmee, David Harries and August Schlapfer</p>	<p>Discussions on Bioengineering &amp; Biotechnologies</p>

**3:10 PM Afternoon Break (Main Foyer)**

**3:30 PM Common Session 3: (Pleiades Room) Page 28**

**Tidal & Wave Power + Remote III + CASE**

Chair: Professor David Harries (RISE)

Plenary Speakers

1. Dr Laurence Mann (Seapower Pacific Pty Ltd) 'Towards the Generation of Base Load Electricity from Wave Energy - The Australian Perspective Of Ceto'
2. Professor Allan Rodger (Melbourne) 'Cities as Sustainable Ecosystems'

**4:15 PM Concurrent Sessions 3 Page 30**

Session 3A Page 30 (Pleiades Room)	Session 3B Page 33 (Orion Room)	Session 3C Page 36 (King Sound Room)	
<p><b>Remote Area Power Systems III</b> Chair: Katrina Lyon</p> <p>Acceleration Of Rural Industrialization Using Renewable Energy Technolgoy Kamaruddin Abdullah</p> <p>Prospects Of Renewable Energy For Meeting Growing Electricity Demand In Pakistan M.uhammad Aslam Uqaiia, Khanji Harijanb and Mujeebuddin Memonc</p> <p>Renewable Energy for Remote Tourism Facilities on the Ningaloo Outback Coast of Western Australia Barker, C, Anda, M, Jennings, P and Ho G</p> <p>Technologies For Safe Water Supply In Arsenic Affected Villages Of Bangladesh Utilizing A Paddle Pump Wahidul K. Biswas and Greg Leslie</p>	<p><b>Biomass I</b> Chair: Evan Grey</p> <p>Cellulose Ethanol: What About The Rest Of The Plant? Mitch Lever</p> <p>Utilisation of Used Palm Oil as Alternative Fuel in Thailand W. Permchart and S. Tanatvanit</p> <p>Cellulase Production Using Biomass Feed Stock And Its Application In Lignocellulose Saccharification For Bio-Ethanol Production Rajeev K Sukumaran, Reeta Rani Singhania, Gincy Marina Mathew &amp; Ashok Pandey</p>	<p><b>CASE</b> Chair: Professor Allan Rodger</p> <p>Global Warming or Terrorism - which one should we be most concerned about? Michael Waite</p> <p>Cities as Sustainable Ecosystems (CaSE) Isabella Jennings</p> <p>Social, Economical and Environmental Impacts of Renewable Energy Systems A.K. Akella R.P. Saini M.P. Sharma</p>	<p><i>nb There is no session 3D due to Conf Dinner Preparation (Sirius Room)</i></p>

**5:30 PM WREN Meeting (Pleiades Room) Page 37**

Chair: Professor Ali Sayigh

**6:30 PM Conference Dinner** (Sirius Room) **Page 37**

Message by Professor Ali Sayigh, Director General of WREN

Dinner Speaker/s: Hon Tony McRae MLA

Entertainment provided by "Common Ground"

MC: Johanna Gastevich

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**8:30 AM Common Session 4: (Orion Room) Page 38**

**Hydrogen, Transport, Solar & Water + Policy I**

Chair: Dr Ray Wills (WA SEA Chair & Manager - Sustainability Services with SMEC)

Plenary Speakers

1. Colin Cockcroft (Dept of Planning and Infrastructure) 'Perth's Fuel Cell Bus Trial'
2. Denis Smedley (Director, Renewable Energy Technologies, AGO) 'The Australian Government Support for Low Emission Technology'

**9:10 PM Concurrent Sessions 4 Page 40**

<b>Session 4A Page 40</b> (Orion Room)	<b>Session 4B Page 42</b> (Pleiades Room)	<b>Session 4C Page 44</b> (Prince Regent Room)	<b>Session 4D Page 46</b> (King Sound Room)
<b>Hydrogen</b> Chair: Colin Cockcroft Electrochemically Catalyzed Hydrogen Production from Acetate in Microbial Fuel Cells Ka-Yu Cheng, Ralf Cord-Ruwisch and Goen Ho  <b>A worldwide outlook: How Hydrogen and Fuel Cells will interact with Renewable Energies</b> <b>Arno A. Evers FAIR-PR</b>  Hydrogen Fired Regenerative Micro Gas Turbine Model, Efficiency Calculations A. A. Nasr A. O. Gringo A. Y. Bennaser	<b>Policy I Big Issues</b> Chair: Denis Smedley Renewable Energy Betrayed Ken Bartle  The Solar Silicon Problem: An Analysis of an Industry. Phil Livingston  A Review of the Application of Lifecycle Analysis to Renewable Energy Systems Chris Lund and Wahidul Biswas	<b>Transport</b> Chair: Dr Rajiv Sukumaran Renewable Fuel Alternatives For Transport Sector In Pakistan Khanji Harijana, Mujeebuddin Memonb, Mohammad Aslam Uqailic and Khan Mohammad Brohib  Comparative Testing Of Coconut Blended Biofuels For Vehicles And Micro Generation In The Pacific. Don Mardle Associate Professor Shane West	<b>Solar &amp; Water I</b> Chair: Dr Jeff Sturman Time Depending Efficiency of a Photovoltaic Pumping System E. Belhadj Elmehdi* and A. Bettahar  Potential for Solar Energy to Pump Water from Different Depths and Locations Ahmed Hasson  Design, Economic Analysis and Environmental Considerations of Mini-grid Hybrid Power System with Reverse Osmosis Desalination Plant for Remote Areas Ahmad Agus Setiawan, Yu Zhao, Chem. V. Nayar

**10:10 AM Morning Refreshments (Main Foyer)**

**Photovoltaics I + Policy II + Solar**

Chair: Professor CV Nayar (Curtin University)

Plenary Speakers

1. Professor David Harries (RISE, Murdoch University) 'The role of grid-connected PV in meeting peak load'
2. Prof Martin Green (NSW University) 'Technological Developments in the PhotoVoltaic Technology'

**11:15 AM Concurrent Sessions 5**

Session 5A Page 49 (Orion Room)	Session 5B Page 51 (Pleiades Room)	Session 5C Page 54 (Sirius Room)	Session 5D Page 57 (King Sound Room)
<b>Photovoltaics I</b>	<b>Policy II</b>	<b>Solar Applications</b>	<b>Exploiting Solar Efficiencies</b>
Chair: Dr Trevor Prior	Chair: Dr V Bakthavatsalam	Chair: Dr T Kandpal	Chair: Dr A Islam
The Working Characteristics of Photovoltaic Modules in Natural Environment	Hidden biases in Australian Energy Policy	Inkjet Printing for Thin-Film Solar Cell Device Fabrication	Evaluation of MPPT Solar Charge Controller Fed by a-Si & c-Si PV Modules
A. Q. Malik and Mohamad Fauzi Bin Hj Metali	August Schläpfer	E.J. Mitchell, T. Hoch and A.G. Aberle	D.C. Riawan, C.V. Nayar
Transformation in the Photovoltaics Industry in Australia, Germany and Japan: Comparison of Actors, Knowledge, Institutions and Markets	Energy Efficiency And Importance Of Renewable Energy Sources In Latvia	Cookstoves Save80, future Clean Development Mechanism Project for East Nusa Tenggara, Indonesia.	Models of Diffuse Solar Radiation
Antonio Balaguer and Dora Marinova	Inara Skapare, Andris Kreslins	Herliyani Suharta, AAM Sayigh, Dieter Seifert, Kuruvilla Mathew	Barbara Ridley and John Boland
The Outlook For Crystalline Solar Photovoltaic Technology Over The Next Decade	Nuclear Electricity	Recirculation Dryer Using Hybrid Ghe Solar Dryer	A Review of Solar Cooling Technologies
Dilawar Singh Philip Jennings	James Brough	Totok Prasetyo and Kamaruddin Abdullah	Wasim Saman
Six Years Experience With An Urban Photovoltaic System	Renewable Energy Policy and Practice in Western Australia.	Effect of Selection of Water Temperature Range on Second Figure of Merit of Box type Solar Cookers	Roll of Solar Energy for Transformation of organic molecules
Jonathon Thwaites	David Harries and Chacko Thomas	S. C. Mullick and B. K. Chourasia	R.C.Meena

**1:30 PM Common Session 6: (Orion Room) Page 60**

**Wind I, Biofuels + Photovoltaics II + Policy III**

Chair: Professor Philip Jennings

Plenary Speakers

1. Professor C V Nayar (Curtin University) 'Power Electronics for Wind Power Systems'

2. Dan Huxtable (Dept Environment and Conservation) 'State of Development of Oil Mallee for Bioenergy and Value-added Products'

**2:15 PM Concurrent Sessions 6 Page 62**

Session 6A Page 62 (Orion Room)	Session 6B Page 65 (Pleiades Room)	Session 6C Page 67 (Sirius Room)	Session 6D Page 69 (King Sound Room)
<p><b>Wind I</b></p> <p>Chair: Professor CV Nayar</p> <p>An Improved Grid Connected Power Electronic Interface For Small Scale Wind Turbine Generators James Darbyshire</p> <p>Do Wind Turbine Blades Need Redesign? Pat ffyske Howden</p> <p>Assessment Of Wind Home System's Potential In Coastal Areas Of Pakistan Mujeebuddin Memon, Khanji Harijan and Mohammad Aslam Uqaili</p> <p>Environmental Impacts Assessment And Its Influence On Project, Design And Planning Success Tim Sawyer</p>	<p><b>Biofuels</b></p> <p>Chair: Dan Huxtable</p> <p>An Electronic Power Indicator for Testing Microbial Fuel Cells J C L Cornish, H Ashihara and C Mandy</p> <p>Development And Operation Of The Cremasco Biomass Burner To Provide Low-Cost Energy From Unconventional Fuels Used To Heat Communal Swimming Pool Facilities And Water. Goodfield D., Scott, F., Anda M., Hammond R., and Mathew K.</p> <p>Regionalised BioDiesel Manufacturing in Western Australia Jonathon Thwaites,</p>	<p><b>Photovoltaics II</b></p> <p>Chair: Mike Dymond</p> <p>Optimising the Orientation of Photovoltaic Cells for Load Matching John Boland, Zivana Zekanovic</p> <p>System Performance of a 3 phase PV Grid Connected System installed in Thailand : Data Monitored Analysis Chaiyant Boonmee, Boonyang Plangklang, Napat Watjanatepin</p> <p>New Markets for Solar Photovoltaic Power Systems Philip Jennings, Chacko Thomas, Dilawar Singh</p>	<p><b>Policy III</b></p> <p>Chair: Rod Robinson</p> <p>"Raising RISE out of the Ashes of ACRE": Establishing a Vibrant R &amp; D Collaborative Centre for Energy Efficient Lifestyles, Developmental Patterns, Building Technologies and Building Design Strategies: The CRC for Sustainable Energy in the Built Environment Garry Baverstock AM, David Harries, Philip Jennings AM</p> <p>Verve Energy's Renewable Energy Programs Dr Don Harrison</p> <p>Sustainability Victoria's Solar Innovation Program Lisa Crowley</p> <p>Providing Electricity Access to Remote Areas in India: An Approach Towards Identifying Potential Areas for Decentralized Electricity Supply M.R. Nouni, S.C.Mullick and T.C. Kandpal</p>

**3:30 PM Afternoon Break (Main Foyer)**

**Wind II + Other Solar**

Chair: Assoc Professor Garry Baverstock

Plenary Speakers

1. Professor Philip Jennings - (Murdoch University) 'Recent Developments in Renewable Energy Education'
2. Erwin Susanto Sadirsan - (Indonesia) 'Renewable Energy Development Opportunities in Indonesia'

**4:45 PM Concurrent Sessions 7**

Session 7A Page 73 (Orion Room)	Session 7B Page 75 (Pleiades Room)	Session 7C Page 77 (Sirius Room)	Session 7D Page 78 (King Sound Room)
<p><b>Wind II</b> Chair: Dr Erwin Sardisan Island Wind-Powered Mini-Grid In Sri Lanka Rod Robinson, Rohitha Manokanth</p> <p>The Dynamic Modeling Of A Hybrid Wind Pump For Rural Water Supply: A Mathematical Model Of Positive Linear System With Dynamic Inputs And Demand Criteria Ahmad Taufika</p> <p>Design, Construction And Testing Of A Blade Pitch Measurement System For Small Wind Turbines Jonathon Whale</p>	<p><b>Other Solar III (Water Tech)</b> Chair: Dr C Hoysalla Efficiency Analysis Of The Solarflow - An Innovative Solar-Powered Desalination Unit For Treating Brackish Water Stewart Dallas, Sumiyoshi N, Kirk J, Mathew K and Wilmot, N</p> <p>Solar-Powered Desalination: A Modelling and Experimental Study Jimmy LeBlanc and John Andrews</p> <p>Simultaneous Water Desalination And Power Generation Using Solar Energy Yuchun Zhao, Aliakbar Akbarzadeh and John Andrews</p>	<p><b>Seminar of Sustainable Energy Systems in Developing Countries</b> Chair: Prof CV Nayar Speakers: delegates from developing countries: AKM Islam Erwin Sadirsan Rahmat Rozali Somporn Tanatvanit V Bakthavatsalam Rajiv Sukumaran Tara Kanpal Chanakya Hoysall Petrus Klau</p> <p>Participation is encouraged.</p>	<p><b>Education</b> Chair: Professor Phillip Jennings Be Inspired - Do Something to Reduce Global Warming at Your Landfill. Graeme Alford</p> <p>Educating The Nation Kamarulazizi Ibrahim</p> <p>The Integration Of Renewable Energies At The Environmental Technology Centre, Murdoch University - Lessons Learnt And Experience Gained Over The Last 12 Years Stewart Dallas, Anda M, Mathew K and Ho, G</p>

Chair: Professor Ali Sayigh (WREN)

**9:00 AM – 5:00 PM Technical Tour/s & Specialist Workshops**

*more details will be available at each workshop/tour.*

**Workshop 1. Photovoltaics**

Prof Nayar & Mr Mike Dymond

At Environmental Technology Centre (9am – 5pm)

**Workshop 2. Eco-Design**

Prof Garry Baverstock

At Piney Lakes, the City of Melville's Environmental Education Centre (9am – 1pm)

**Workshop 3. Bioworks**

At RISE (9am – 2pm, Lunch included)

**Technical Tour**

(9am – 5pm with lunch)

Bus starts at 9am at Esplanade Hotel, Fremantle

1. Solarhart
2. ETC at Murdoch University
3. RISE at Murdoch University