Renewable Energy 2017

International Conference on
RENEWABLE ENERGY AND RESOURCES
July 24-25, 2017 Vancouver, Canada

Keynote Forum

Day 1

Marc A Rosen, J Fundam Renewable Energy Appl 2017, 7:5 (Suppl)
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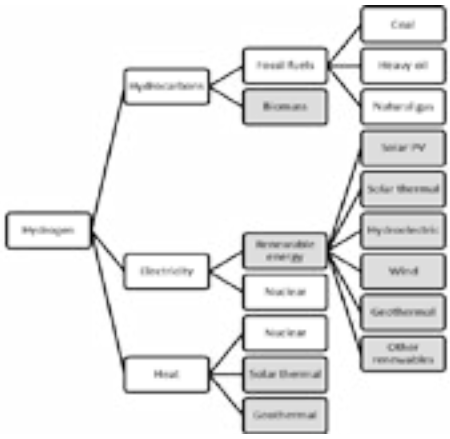
Enhancing renewable energy prospects via hydrogen energy systems

The prospects for renewable energy are enhanced through the use of hydrogen energy systems in which hydrogen is an energy carrier. As easily accessible fossil fuel supplies become scarcer and environmental concerns increase, hydrogen is likely to become an increasingly important chemical energy carrier. As the world's energy sources become less fossil fuel-based, hydrogen and electricity are expected to be the two dominant energy carriers for the provision of end-use services, in a hydrogen economy. Thus, hydrogen energy systems allow greater use of renewable energy resources. In this presentation, the role of hydrogen as an energy carrier and hydrogen energy systems and their economics are described and reviewed. There are many commercial processes for producing hydrogen from fossil fuel and non-fossil fuel sources (including renewables). Technologies for the storage and distribution of hydrogen exist. Technologies are developing for utilizing hydrogen as an energy carrier, especially in transportation. The technologies needed for hydrogen energy systems are undergoing much research and development.



Biography

Marc A Rosen is a Professor at the University of Ontario, Institute of Technology in Oshawa, Canada, where he served as Founding Dean of the Faculty of Engineering and Applied Science. He was the President of the Engineering Institute of Canada. He is a registered Professional Engineer in Ontario and serves as Editor-in-Chief of several journals and Director of Oshawa Power and Utilities Corporation. With over 60 research grants and contracts and 600 publications, he is an active Teacher and Researcher in sustainable energy, environmental impact and energy technology (including renewable energy and efficiency improvement). Much of his research has been carried out for industry and he has written numerous books. He has worked for organizations such as Imatra Power Company in Finland, Argonne National Laboratory near Chicago and the Institute for Hydrogen Systems near Toronto. He has received numerous awards and honors.

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Tin-Tai Chow, J Fundam Renewable Energy Appl 2017, 7:5 (Suppl)
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Tin-Tai Chow

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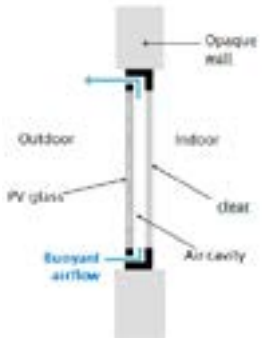
Building integrated active and passive solar design

The interest in zero carbon building developments is increasing year by year. This makes it important to maximize the renewable power outputs and thus favors the use of hybrid generating systems. Combined active and passive solar design is an evolving science in building technology. Traditionally, building facade is one crucial element in architecture. Nowadays, it has escalating importance in services engineering owning to its significant influence on the engineering system performance and energy use. Building integrated solar devices may be installed either at the building facade or on the roof. The system can be designed as invisible, aesthetically appealing or appearing as an architectural concept. Advances in the development of multi-functional photovoltaic/thermal (PV/T) facades may provide an important stimulus for architectural expression. On the other hand, the design of extensively-glazed building is a worldwide architectural trend. At this end, the PV ventilated glazing technology offers substantial energy saving opportunities through air conditioning load reduction, more favorable daylight penetration and solar energy utilization. On the other hand in the liquid-flow window option, a thermosyphon-induced liquid stream flows within the cavity to the heat exchanger for feed water pre-heating. The building integrated active and passive solar designs then ask for the consideration of all building components and services systems at one shot, well at the project commencement stage. In other words, site planning, aesthetic design, system equipment and construction material selection, financing, construction, commissioning and long term operation and maintenance have to be well coordinated. These become alternative challenges to be overcome.



Biography

Tin-Tai Chow has received his PhD from the University of Strathclyde in Scotland. He is currently the Associate Professor and Director of the Building Energy and Environmental Technology Research Unit at the City University of Hong Kong. He has 400 academic publications, including over 130 SCI journal articles and with over 4,000 Scopus citations. His Scopus H-index reaches 35. He has been serving as a Member of many Journal Editorial Boards, such as the *Journal of Building Performance Simulation*. He also contributed many reputable international conferences as committee member and invited speakers. He holds Fellow Membership in many professional institutions, such as FASHRAE and FCIBSE.

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Peter Novak, J Fundam Renewable Energy Appl 2017, 7:5 (Suppl)
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Peter Novak

Institute for High-technologies and Systems, Slovenia

Exergy as measure of sustainability of energy system

Do we need energy or exergy? Amount of exergy in energy carriers is very different and prices include value of quantity and not the quality of energy. Exergy is measure for quality of energy, because the only part of energy available to do work is exergy. For different purposes we need energy with different amount of exergy: For heating and cooling energy mixture between small amount of the exergy and large part energy is needed. Transition to sustainable energy system without GHG emissions, based on RE, open the questions how to evaluate exergy from solar energy. Solar energy in all form (irradiation, water flows, wind and biomass) consists from nearly 100% of exergy. Solar energy is for free, conversion systems are not. To exploit at maximum the present infrastructure, there is common agreement that, we need sustainable energy system with four main energy carriers: Electricity, gaseous, liquid and solid fuels. Our vision is the new Sustainable Energy System (SES) based on the biomass carbon recycling using solar and planetary energy for electricity and hydrogen production. SES is based on the existing infrastructure and known chemical processes. With regards to availability of renewable energy resources (RES) it is unrestricted in comparison to present fossil fuels use. The proposed SES consists of the three main energy carriers: Electricity, synthetic methane (CH_4) and synthetic methanol (CH_3OH).

Biography

Peter Novak was the Professor and Chief of Laboratory for HVAC and Solar Energy at Faculty of Mechanical Engineering, Ljubjana, Dean of Faculty, Dean of High School for Technologies and Systems and Director of the Institute for High-technologies and Systems. He became Honorary Member of IIR in 2003, Fellow and Life Member of ASHRAE in 1999 and Honorary Member of REHVA, SITHOK and SLOSE. He has authored and co-authored more than 430 scientific papers, studies, reviews and he is the owner of 10 patents.

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Day 2

Michael K H Leung, J Fundam Renewable Energy Appl 2017, 7:5 (Suppl)
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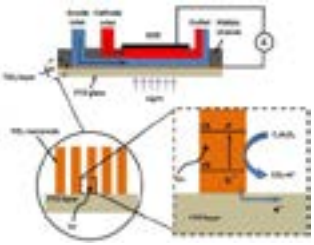
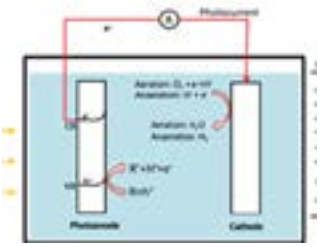
Michael K H Leung

City University of Hong Kong, Hong Kong

Photocatalytic fuel cell for wastewater treatment and recovery of energy resources

Photocatalytic fuel cell (PFC) is primarily a synergistic integration of two emerging technologies, namely, photocatalysis (PC) and fuel cell (FC). Solar PC can decompose organic compounds while FC provides an electrical potential gradient to facilitate transport of electrons. Therefore, PFC can be effectively applied to utilize solar energy for wastewater treatment and recovery of energy chemically stored in wastewater. It is a promising technology for solving both environmental and energy problems. In order to conduct proper research for rapid development of PFC, we need to have good knowledge about the material properties and clearly understand the cell mechanisms of PFC. The Fermi level between the photoanode and the cathode forms interior bias that inhibits recombination of photogenerated electrons and holes, resulting in increase in visible-light activation of PFC. Modification of photoelectrocatalysts and use of microfluidics are effective strategies for improving the PFC performance. The PFC effects can also be manipulated by the system configuration, design and control for specific outputs and reaction rates. The speaker will present the fundamentals, latest development of PFC and upcoming R&D challenges needed for enhancing the PFC technology.





Biography

Michael K H Leung is a Professor and Associate Dean in the School of Energy and Environment at the City University of Hong Kong, Hong Kong. He is also the Director of Ability R&D Energy Research Centre at University of Hong Kong. His areas of expertise include solar photocatalysis, fuel-cell electrochemistry and advanced refrigeration and air-conditioning. He is listed as a highly cited scholar in energy science and engineering by Shanghai Ranking and Elsevier. He has published 130+ journal papers, 70+ conference papers, 15 books/book chapters and 6 patents. He is also a Past Chairman of the Energy Institute (Hong Kong Branch), Chairman in HKIE Education and Examinations Committee, a Chartered Engineer and a Registered Professional Engineer.

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Wilfried van Sark, J Fundam Renewable Energy Appl 2017, 7:5 (Suppl)
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Wilfried van Sark

Utrecht University, Netherlands

Smart solar charging to support widespread deployment of photovoltaic systems and electric mobility

Statement of the Problem: The transition to low carbon energy and transport systems requires not only the large-scale adoption of clean technologies and efficiency measures, but also new energy management strategies to efficiently incorporate these innovations. Grid integration of supply side technologies such as photovoltaics (PV) and demand side ones such as electric vehicles (EV) requires proper strategies for energy management. Smart solar charging using vehicle to grid (V2G) technology is a key element in matching supply and demand on a local level. Optimization of self-consumption and self-sufficiency would lead to lower stress levels on the local distributions grid.

Methodology & Theoretical Orientation: The smart solar charging concept has been pioneered in Utrecht and now will be extended in other pilot areas with different demographic characteristics. Analysis of PV generation and EV charging behavior will be combined with algorithm development, in order to optimize self-consumption and self-sufficiency.

Findings: Increased self-consumption of PV can be reached only if car use agendas are known in combination with perfect solar forecasting.

Conclusion & Significance: Smart solar charging has benefits in many ways: More EVs powered with clean energy, better local air quality, increased social cohesion due to the sharing aspect, lower amount of cars in the streets. Investment in local grid extension can be postponed, leading to economical benefits for distribution system operators and consumers.

Biography

Wilfried van Sark is an Associate Professor at the Copernicus Institute of Utrecht University, Netherlands. He has over 30 years of experience in the field of photovoltaics, ranging from thin film silicon and III-V solar cell experimental and modeling development and testing to solar cell processing development, outdoor and indoor performance of solar cells, policy and cost development. His current activities focus on employing spectrum conversion (down/up conversion) using nanocrystals to increase solar cell conversion efficiency for next-generation photovoltaic energy converters as well as performance analysis of (BI)PV systems in the field, in particular linked to the development of smart grid systems in the built environment.

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