

# International Green Energy Conference (IGEC-V)

## Conference Program

### For Oral Presentation

- For each presentation: please target for 15 min presentation and 5 min for Q&As (questions and answers) as well as for change over.
- A notebook computer and digital data projector will be available in each meeting room. Please load your PowerPoint presentation file (or .pdf file) before each session (you can ask the volunteer for help). You can also use your own notebook computer, please let the session chair know beforehand.

### Remarks

- The conference banquet will take place on June 2, 2010 from 6:30 – 9:30 p.m. Bus pick-up will be at 6:00 p.m. from Ring Road in front of Hagey Hall of the Humanities and at 6:10 p.m. from Ron Eydt Village.

## IGEC 2010 Schedule – Monday May 31, 2010

<b>Time</b>	<b>Activities</b>
4 pm – 6 pm	<b>Conference Registration (REV – Ron Eydt Village)</b>
6:00 – 9:30 pm	<b>Registration Reception (REV – Ron Eydt Village)</b>

**IGEC 2010 Schedule – Tuesday June 1, 2010 (Morning) – All sessions are held in Arts Lecture Hall (ALH)**

<i>Time</i>	<i>Room 113</i>		
8 am – 4:30 pm	<b>Conference Registration</b>		
8:50 – 9:20 am	<b>Opening Session: Dr. Xianguo Li and Dr. Jatin Nathwani</b> Dr. Feridun Hamdullahpur, VP Academics and Provost, University of Waterloo Dr. Kamiel Gabriel, Assistant Deputy Minister and Science Advisor, Ministry of Research and Innovation, Government of Ontario Mr. Jonathan Norman, Ministry of Energy and Infrastructure, Government of Ontario Mayor Brenda Halloran, City of Waterloo Robert Stasko, Ontario Centres of Excellence (OCE)		
9:20 – 10:00 am	<b>Keynote Lecture: Energy Sustainability: A Key to Addressing Environmental, Economic and Societal Challenges</b> Dr. Marc Rosen President, Engineering Institute of Canada Professor, Faculty of Engineering and Applied Science, University of Ontario Institute of Technology <b>Session Chair: Dr. X. Li</b>		
10:00 – 10:20 am	<b>COFFEE BREAK</b>		
<i>Time</i>	<i>Room 113</i>	<i>Room 105</i>	<i>Room 124</i>
	<b>Renewables I</b> <b>Session Chair: Dr. P. Parker</b>	<b>Specialized Session: PEM Fuel Cells</b> <b>Session Chair: Dr. A.X. Sun/Dr. M. Cai</b>	<b>Energy Analysis/Management</b> <b>Session Chair: Dr. J. Zhang</b>
10:20-10:40 am	Numerical modeling of pitch oscillating S809 airfoil dynamic stall in 2D with application to a horizontal axis wind turbine, K. Gharali and D. Johnson	A novel catalytic system for improved oxygen reduction activity and durability at low Pt loading: the effect of carbon support activation, S. Ye ( <b>INVITED</b> )	Information, incentives, or more money: what influences the level and type of retrofit activity resulting from residential energy efficiency programs? C.E. Hoicka and P. Parker
10:40-11:00 am	Dynamic performance of the shading type building integrated photovoltaic claddings, L. Sun and H. Yang		Energy and exergy analysis of a closed thermochemical energy storage system, A. Haji Abedin and M.A. Rosen
11:00 – 11:20 am	Wind resources assessment and loss factors for small wind turbines, V. Lam and D. Johnson	Advanced cathode nanocatalysts for PEM fuel cells, Z. Chen	Energy management in coal fired boilers – A case study, D. Gangacharyulu
11:20-11:40 am	Modeling of geothermal heat pumps with vertical ground interfaces for use in HVAC systems, S. Koohi-Fayegh and M.A. Rosen	Development of one-dimensional nanomaterials for high-performance and low-cost fuel cell applications, A.X. Sun, M. Cai and S. Ye	The importance of environmental champions for corporate energy management: comparing manufacturing firms to service sector businesses, T. Gliedt and P. Parker
11:40 – 12:00	Numerical study on combustion and emission characteristics of biodiesel fuel in a DI diesel engine, Y. Ren, E. Abu-Ramadan and X. Li	Electrochemical durability of heat treated and N-doped carbon as catalyst supports for PEM fuel cells, W. Wan, H. Lv, S. Mu and M. Pan	Exergy analysis and thermodynamic optimization in NGL plant in Kharg Island – Iran, K. Sadeghy and A.H. Najafi
12:00 – 1:30 pm	<b>LUNCH – South Campus Hall</b>		

**IGEC 2010 Schedule – Tuesday June 1, 2010 (Afternoon) – All sessions are held in Arts Lecture Hall (ALH)**

<i>Time</i>	<i>Room 113</i>	<i>Room 105</i>	<i>Room 124</i>
	<p><b>EXPERT PANEL SESSION ON GREEN ENERGY ACT (FEED - IN TARIFFS)</b></p> <p><b>Session Chair: Robert Stasko</b>  <b>Christopher Quirke:</b> Renewable Energy Facilitation Office, Ontario Ministry of Energy and Infrastructure</p> <p><b>Patricia Lightburn:</b> Ontario Power Authority</p> <p><b>Jatin Nathwani:</b> Ontario Research Chair in Public Policy and Sustainable Energy Management, University of Waterloo</p> <p><b>Derek Satnik:</b> Managing Director at OntarioGreenSpec.ca</p>	<p><b>Specialized Session: PEM Fuel Cells</b>  <b>Session Chair: Dr. S. Ye/Dr. Z. Chen</b></p> <p>Alternative electrocatalyst support for PEM fuel cell applications, M. Cai</p> <p>Single crystal PT nanowire based 3D electrodes for PEM fuel cell applications, S. Sun, G. Zhang, R. Li, D. Geng, Y. Zhong, A.X. Sun, M. Cai</p> <p>Effect of pore size of the carbon porous supports on catalytic performance of DMFC at anode, A.-Y. lo, N. Yu, S.-H. Liu, C.-T. Kuo and S.-B. Liu,</p>	<p><b>Emission Abatement</b>  <b>Session Chair: Dr. D. Gangacharyulu</b></p> <p>A novel combined cycle with synthetic utilization of natural gas and coal for CO<sub>2</sub> emission abatement, W. Han, H. Jin</p> <p>Absorption of nitric oxide from flue gas using hexamminecobalt (II) solution, H. Yu, Z. Tan and Q. Zhu</p> <p>The effect of new EGR cooling strategy for a diesel engine to improve engine power and emission, K. Choi, K. Kim and K. Lee</p> <p>Experimental investigation on the DME-fuelled chemical looping combustion for CO<sub>2</sub> capture, T. Han, Y. Pan and H. Hong</p>
1:30 – 1:50 pm			
1:50 – 2:10 pm			
2:10 – 2:30 pm			
2:30 – 2:50 pm			
2:50 – 3:10 pm	<b>COFFEE BREAK</b>		
3:10 – 3:50 pm	<p><b>Keynote Lecture:</b> How to develop a sustainable fossil fuel free country                  Dr. Erik Dahlquist                  Professor, Research Director, School of Sustainable Development of Society and Technology                  Malardalen University, Sweden  <b>Session Chair: Dr. M. Rosen</b></p>		
	<p><b>EXPERT PANEL SESSION ON WIND MARKETS &amp; SUPPLY AND VALUE CHAIN</b></p> <p><b>Session Chair: Dr. Jatin Nathwani</b>  <b>George Mandrapiliis:</b> Ministry of Economic Development and Trade, Government of Ontario</p> <p><b>Stephen Rach:</b> CanWEA (Canadian Wind Energy Association)</p> <p><b>Professor David Johnson:</b> University of Waterloo</p>	<p><b>Fuel Cell Applications</b>  <b>Session Chair: Dr. H. Zhang</b></p> <p>Impacts of nitrogen fraction in inlet fuel on performance of hybrid solid oxide fuel cell and gas turbine system, F. Zabihian, A.S. Fung and M. Koksall</p> <p>Analysis and validation of a PSAT model of a fuel cell hybrid rickshaw, M. Abu Mallouh, B. Surgenor, B. Denman and B. Peppley</p> <p>Implementation of a fuel cell plug-in hybrid electric vehicles and factors affecting transportation policy, A. Koch, M.W. Fowler, and R.A. Fraser</p> <p>Waste heat recovery for fuel cell system, W. Lin, J. Yuan and B. Sundén</p>	<p><b>PEM Fuel Cells I</b>  <b>Session Chair: Dr. S. Mo</b></p> <p>Various surface wettability conditions for gas diffusion media: fabrication and effect on PEMFC performance, Y. Wang, S. Al Shakhshir, P. Chen, X. Li</p> <p>Numerical investigation on the GDL deformation effects on mass transport in PEMFC, L. Qi, K. Jiao, A. Pereira and X. Li</p> <p>Effective electrical conductivity in carbon paper diffusion media – A numerical estimation, N. Zamel, X. Li and J. Shen</p> <p>Determination of the effective thermal conductivity of gas diffusion layer in PEM fuel cells: A fractal approach, E. Nikoee, G. Karimi and X. Li</p>
3:50 – 4:10 pm			
4:10 – 4:30 pm			
4:30 – 4:50 pm			
4:50 – 5:10 pm			
5:45 – 7:30 pm	<b>NETWORKING EVENT – EIT (Dinosaur Museum)</b>		

**IGEC 2010 Schedule – Wednesday June 2, 2010 (Morning) – All sessions are held in Arts Lecture Hall (ALH)**

<i>Time</i>	<i>Room 113</i>		
8 am – 4:30 pm	<b>Conference Registration</b>		
9:00 – 9:40 am	<b>Keynote Lecture:</b> Redox Flow Battery for Energy Storage Dr. Huamin Zhang Dalian Institute of Chemical Physics, Chinese Academy of Sciences Dalian Rongke Power CO, Ltd. <b>Session Chair: D. J. Zhang</b>		
9:40 – 10:20 am	<b>Keynote Lecture:</b> Thermal Management of Automotive Lithium-Ion Batteries Dr. Chao-Yang Wang Electrochemical Engine Center (ECEC) The Pennsylvania State University, USA <b>Session Chair: Dr. X. Li</b>		
10:20 – 10:40 am	<b>COFFEE BREAK</b>		
<i>Time</i>	<i>Room 113</i>	<i>Room 105</i>	<i>Room 124</i>
	<b>PEM Fuel Cells II</b> <b>Session Chair: Dr. B. Reddy</b>	<b>Renewables II</b> <b>Session Chair: Dr. H. Li</b>	<b>Green Buildings I</b> <b>Session Chair: N. Zamel</b>
10:40 – 11:00 am	Performance analysis of 3-D PEM fuel cell modeling with CO poisoning and O <sub>2</sub> bleeding at transient state, Y. Li and X. Li	Thermal design and management for performance optimization of solar thermoelectric generator, J. Xiao, T. Yang, P. Li, P. Zhai and Q. Zhang	Measuring buildings for sustainability: The ecological footprint of a renovated century home – the REEP house, G. Bin and P. Parker
11:00 – 11:20 am	Numerical studies on liquid water behavior in PEM fuel cell cathode with interdigitated design, S. Kang, B. Zhou and C.-H. Cheng	Investigation of wind heat loss from unglazed transpired solar collectors with corrugation, H. Abulkhair and M. Collins	First year's results for an atmospheric energy installation, R. Tolmie
11:20 – 11:40 am	Impact of different surface wettability graphite channel on two-phase flow and water removal from PEMFC, S. Al Shakhshir, Y. Wang, P. Chen and X. Li	Combustion characteristics of biomass based fuel using Cassava Husk, S. Torii, N.A. Pambudi, S. Sudarwanto and H. Saptoadi	Application of remote source lighting system in different layouts system in different layouts of enclosed lift lobbies in highrise residential building of central core design, I. Wong and H.X. Yang
11:40 – 12:00 am	Numerical study of effects of wettability on water droplet transport in the flow channels of PEM fuel cells, B. Mondal, K. Jiao and X. Li	Design and preliminary testing of a MEMS microphone phased array for aeroacoustic testing of a small scale wind turbine airfoil, A. Bale, S. Orlando and D. Johnson	Testing for correlations between solar technology adoption and energy conservation, T. Sherk and P. Parker
12:00 – 1:30 pm	<b>LUNCH – South Campus Hall</b>		

**IGEC 2010 Schedule – Wednesday June 2, 2010 (Afternoon) – All sessions are held in Arts Lecture Hall (ALH)**

<b>Time</b>	<b>Room 113</b>	<b>Room 105</b>	<b>Room 124</b>
	<b>PEM Fuel Cells III</b> <b>Session Chair: Dr. C.Y. Wang</b>	<b>Hydrogen Production</b> <b>Session Chair: Dr. P. Bénard</b>	<b>Waste Treatment</b> <b>Session Chair: N. Zamel</b>
1:30 – 1:50 pm	Effect of catalyst layer structure and wettability on liquid water transport in PEM fuel cell, P.K. Das, X. Li, Z. Xie and Z.-S. Liu	Analysis of an HVAC system for the molten cuprous chloride pouring operation in an industrial hydrogen production facility, S. Ghandehariun, M. Talimi, M.A. Rosen and G.F. Naterer	Research progress of CHOPS waste treatment, S. Yang, Y. Pan, X. Bao, J. Sun and Z. Chen
1:50 – 2:10 pm	Accelerated durability testing via reactants relative humidity cycling on PEM fuel cells, K. Panha, M. Fowler, X.-Z. Yuan and H. Wang	Hydrogen from natural gas and water electrolysis for residential car fueling system, F. Zabihian and A.S. Fung	Overview of environmental protection methods in heavy oil cold production, J. Sun, Y. Pan, X. Bao and Z. Chen
2:10 – 2:30 pm	On flow maldistribution in PEMFC stacks, J. Wang, J. Yan, J. Yuan and B. Sundén	Development of direct resistive heating method for SO <sub>3</sub> decomposition in the S-I cycle for hydrogen production, H. Li, G. Tan, W. Zhang and S. Suppiah	Organic waste treatment for power production and energy supply, A.M. Omer
2:30 – 2:50 pm	3D non-isothermal modeling of HT-PEMFC with CO effect, K. Jiao, I. Alaefour and X. Li		Renewable energy technology (RET) options for supplying energy in a post disaster recovery situation, K. Nigim, F. Uddin Amed and H. Reiser
2:50 – 3:10 pm	<b>COFFEE BREAK</b>		
	<b>Energy Storage</b> <b>Session Chair: Dr. T. Shuichi</b>	<b>Specialized Session: Compact Heat Transfer Equipments for Advanced Energy</b> <b>Session Chair: Dr. Q. Wang</b>	<b>Renewables III</b> <b>Session Chair: Dr. J. Xiao</b>
3:10 – 3:30 pm	Finite element simulation of heat and mass transfer in activated carbon hydrogen storage tank, J. Xiao, Y. Liu, P. Bénard and R. Chahine	Numerical optimization of gas inlet structure for microturbine recuperator, L. Du, D. Liao, M. Zeng and Q. Wang	Feasibility analysis of indirect heat pump assisted solar domestic hot water system, S.J. Sterling and M. Collins
3:30 – 3:50 pm	It's an electric future: A discussion of two battery technologies for storage of intermittent supplies of electricity, J. Parsons and L. Hughes	Mixed salts fouling of plate heat exchanger during convective heat transfer, X. Zhi-ming, H. Xing, G. Jin-shen and Z. Zhong-bin	Integrating wind generated electricity with space heating and storage batteries, A. Muralidhar and L. Hughes
3:50 – 4:10 pm	Energy and exergy analysis of a thermal energy storage system with variable speed chiller, A. Ereğ, O. Ekren, M.A. Ezan, H. Günerhan and A. Hepbasli	The fin design for fin-tube surface with small diameter tube and performance evaluation method, J.F. Fan, Z-G Wu, Z-G. Qu, Y.L. He, W.Q. Tao	Optimization of an environmentally friendly technique for heavy oil recovery – solvent enhanced SAGD process, M.H. Mohebati, B.B. Maini and T.G. Harding
4:10 – 4:30 pm	Investigation on crystallization of TiO <sub>2</sub> -water nanofluids and deionized water, S. Mo, Y. Chen, L. Jia and X. Luo	Experimental investigations of pool boiling on horizontal surface sintered with metallic fiber, J.Y. Huang, Z.G. Qu, D.G. Li, Z.G. Xu, W.Q. Tao	Numerical study on the performance characteristics of a ground source heat pump using a variable speed pump in ground water loop, W. Kim, H. Park and Y. Kim
4:30 – 4:50 pm	Thermochemical energy storage: Critical review and recent advances, A. Haji Abedin and M.A. Rosen	Comparative study of fin and tube heat exchangers with and without liquid vapor separation in air conditioning systems, Y. Chen, N. Hua, D. Wu and X.F. Peng	An evaluation testbed for alternative wind turbine blade tip designs, D.P. Gertz, D.A. Johnson
4:50 – 5:10 pm			Multi-component evaporation model for pure and blended biodiesel droplets in high temperature convective environment, K. Saha, E. Abu-Ramadan and X. Li
5:10 – 5:30 pm			The Capability of Grid to Accommodate the Photovoltaic Electricity through the Load-sunlight Synergy Dispatch without Storage, Y. Liu, D. Yu, X. Han, J. Zhao
6:30 – 9:30 pm	<b>Conference Banquet (Walper Terrace Hotel – Crystal Ball Room)</b>		

**IGEC 2010 Schedule – Thursday June 3, 2010 (Morning) – All sessions are held in Arts Lecture Hall (ALH)**

<i>Time</i>	<i>Room 113</i>		
8 am – 4:30 pm	<b>Conference Registration</b>		
9:00 – 9:40 am	<b>Keynote Lecture:</b> Effect of Impurities in Coal Syngas on the Performance of Solid Oxide Fuel Cells Dr. Ismail B. Celik Mechanical and Aerospace Engineering Department West Virginia University, USA <b>Session Chair: Dr. E. Dahlquist</b>		
9:40 – 10:20 am	<b>Keynote Lecture:</b> Non-noble Metal Electrocatalysis: A Sustainable Solution for PEM Fuel Cells Dr. Jiujun Zhang Senior Research Officer, Fuel Cell Catalysis Competency Leader Institute for Fuel Cell Innovation, National Research Council, Vancouver, Canada <b>Session Chair: Dr. Z. Chen</b>		
10:20 – 10:40 am	<b>COFFEE BREAK</b>		
<i>Time</i>	<i>Room 113</i>	<i>Room 105</i>	<i>Room 124</i>
	<b>EXPERT PANEL SESSION ON BIO-ENERGY</b>	<b>Green Buildings II</b>	<b>SOFCs</b>
	<b>Session Chair: Dr. C. Tan</b>	<b>Session Chair: Dr. S. Mu</b>	<b>Session Chair: J. Zhang</b>
10:40 – 11:00 am	<b>Erik Dahlquist:</b> Professor, Research Director, School of Sustainable Development of Society and Technology, Malardalen University, Sweden	A proposition for energy efficient demand controlled ventilation, G. Timar	Review of different renewable fuels for potential utilization in SOFCs, H. Paradis, M. Andersson, J. Yuan and B. Sundén
11:00 – 11:20 am	<b>Bob Gallant:</b> President & CEO, GreenField Ethanol Inc.	District heating and cooling: Review of technology and potential enhancements, B. Rezaie and M.A. Rosen	Thermodynamic optimization of solid oxide fuel cell based combined cycle cogeneration plant, A. Odukoya, B.V. Reddy and J.A. Carretero
11:20 – 11:40 am	<b>Jake DeBruyn:</b> Engineer, New Technology Integration, Ontario Ministry of Agriculture, Food and Rural Affairs	Experimental investigation of a latent thermal energy storage system, M.A. Ezan and A. Erek	Catalyst materials and catalytic steam reforming reactions in SOFC anodes, M. Andersson, H. Paradis, J. Yuan, B. Sundén
11:40 – 12:00		A novel approach of life cycle assessment on building reform for energy conservation, T. Han, G. Gong, R. Wang and F. Chen	
12:00 – 1:30 pm	<b>LUNCH – South Campus Hall</b>		

**IGEC 2010 Schedule – Thursday June 3, 2010 (Afternoon) – All sessions are held in Arts Lecture Hall (ALH)**

<b>Time</b>	<b>Room 113</b>		
1:30 – 2:10 pm	<b>Keynote Lecture:</b> Photovoltaic Energy Conversion: Future Directions and Role of the Research Community Dr. Siva Sivoththaman Professor, Department of Electrical and Computer Engineering, University of Waterloo <b>Session Chair: Dr. D. Johnson</b>		
<b>Time</b>	<b>Room 113</b>	<b>Room 105</b>	<b>Room 124</b>
	<b>Specialized Session: Advanced Biofuels</b> <b>Session Chair: Dr. C. Tan</b>	<b>Environment Assessment</b> <b>Session Chair: Dr. Y. Chen</b>	<b>PEM Fuel Cells IV</b> <b>Session Chair: Dr. S. Sivoththaman</b>
2:10 – 2:30 pm	Evolving biofuel and bioenergy opportunities in the Canadian context, W.E. Mabee	Exergetic and environmental impact assessments of an integrated organic rankine cycle with a biomass combustor for combined cooling, heating and power production, F.A. Al-Sulaiman, F. Hamdullahpur and I. Dincer	Liquid water behavior in PEM fuel cell cathode with parallel straight channels and porous layer, X. Wang and B. Zhou
2:30 – 2:50 pm	Hydrogen production from wheat and flax straws pyrolysis using tubular reactor : A comparative study, N. Mahinpe	Environmental life cycle assessment of two heating systems using a weighting method, A. Ozbilen, E. Oralli and M.A. Rosen	Experimental study of current distribution in PEM fuel cell, I. Alaefour, G. Karimi, K. Jiao, S. Al Shakhshir and X. Li
2:50 – 3:10 pm	Hydrothermal liquefaction of aquatic plants to bio-oil, D. Zhou, L. Zhang, S. Zhang, H. Fu and J. Chen	An exploration of the use of home energy rating systems in the preparation of low carbon planning strategies for use in community planning, S. O'Neill and P. Parker	Preparation of superhydrophobic coating on graphite channel with silica particle/poly(dimethylsiloxane) composite, Y. Wang, S. Al Shakhshir, P. Chen and X. Li
3:10 – 3:30 pm	The future of hydrothermal liquefaction of biomass to bio-oil, Z. Tan	Thermodynamic analyses of externally fired combined cycle power generation system with reheat combustor M. Elhebshi and B.V. Reddy	Dynamic modeling and control of power density in a PEM fuel cell, V. Meidanshahi, G. Karimi, M. Farsi
3:30 – 3:50 pm	Conversion of forest biomass to biochar for sequestration of carbon, A. Kumar	Teaching chemistry teachers constructal law and exergy for a sustainable future, L.M.P. Horta	
3:50 pm	<b>CONFERENCE ENDS</b>		