University of Pittsburgh Bradford

THE WORLD ENERGY STORAGE CONFERENCE (WESC-2023)

November 05-08, 2023

University of Pittsburgh at Bradford, USA



For details, visit: **www.wesc-conference.org**

Contact: **info@wesc-conference.org**

CONFERENCE PROGRAM

Sunday – November 05, 2023
15:00-17:00 **Conference Registration** **University of Pittsburgh, Bradford, PA** **Location: Duke Engineering Building's Atrium, the University of Pittsburgh at Bradford**

Monday – November 06, 2023	
08:00-15:00 **Conference Registration** **Location: Duke Engineering Building's Atrium, the University of Pittsburgh at Bradford**	
Opening Speeches	
09:00 –10:30 am	**Dr. Jeffery Johnson** Vice President and Dean of Academic Affairs, University of Pittsburgh, Bradford
	Dr. Matt Kropf Chair of the Engineering Department & Executive Committee member
	Dr. Behnaz Rezaie Conference Chair
	Keynote Speakes Session Chair**: Dr. Matt Kropf** Keynote Speaker: **Dr. Feridun Hamdullahpur** Energy-Climate Change-Education Triangle: Toward Achieving a Global Solution
Coffee Break **10:30-10:45**	
10:45 -12:15 pm	Keyote Speaker: **Dr. Ibrahim Dincer** Development of Integrated Sustainable Energy Systems with Storage Options: Challenges and Opportunities
	Keynote Speaker: **Dr. Mihri Ozkan** Technological Innovations in Response to Climate Change
12:30- 2:00 pm **Lunch: Duke Building**	

2:00 -3:30 pm	**Keynote Speakrs** Session Chair: **Dr. Ibrahim Dincer**
	Keynote Speaker: **Dr. Cengiz S. Ozkan** Materials Design for Energy Storage
	Keynote Speaker: **Dr. Donghai Wang** Material Development for Next-Generation Electrochemical Energy Storage Technologies towards Electrification and Decarbonization
Coffee Break **3:30-3:45 p.m**	
3:45- 5:15 pm	**ROOM – Duke Engineering Building's Atrium**
	Session 1, Monday – November 06 Session Chair: **Dr. Matt Kropf**
	#3 TRANSIENT ANALYSIS OF VERTICAL SHELL-AND-TUBE TYPE LATENT HEAT STORAGE SYSTEMS USING PHASE CHANGE MATERIAL *Hookyung Lee, Dong Myung Seo, Dongho Park, Hyo Jae Jeong* **#73** PEM FUEL CELL DEGRADATION MECHANISEM FOR HYDOGEN BUSES IN REAL-WORD DRIVING PATTERS *Pouria Ahmadi* **#66** AN ENVIRO-ECONOMIC FUNCTION FOR EVALUATING ENERGY SYSTEMS *Behnaz Rezaie, Marc A. Rosen* **#17** A STUDY ON PREDICTION MODEL BASED ON SUPERVISED LEARNING FOR THE DISTRICT HOT WATER SUPPLY USING THERMAL STORAGE SYSTEM *HyungYong Ji, Chaedong Kang, Dongho Park* **#6** AN INTEGRATED GLASS MAKING PLANT FOR HYDROGEN AND METHANE PRODUCTION WITH STORAGE OPTIONS *Andre A Bolt, Ibrahim Dincer; Martin Agelin-*Chaab **#59** NUMERICAL SIMULATION AND MODELING OF ELECTROCHEMICAL PROCESSES IN LITHIUM-ION BATTERIES *Elham Hasani, Sina Eghbal, Farschad Torabi* **#14** INSIGHTS ON THE ACTIVE CATALYTIC SPECIES EXISTING IN THE V2O5 ADDITIVE LOADED MGH2 SYSTEM FOR ENERGY STORAGE APPLICATIONS *Pukazhselvan Dharmakkon*

18:00-20:00
Gala Dinner
University Room

Tuesday – November 07, 2023	
09:00 – 10:30 am	**Location: Duke Engineering Building**
	Keynote Speaker Session Chair: **Dr. Behnaz Rezaie**
	Keynote Speaker: **Dr. Thomas B. Murphy** "Energy Storage at the Convergence of Solar and Hydrogen"
	Keynote Speaker: **Dr. Fardad Azarmi** Energy Storage Capacity of Materials
10:30-10:45 **Coffee Break**	

10:45 - 12:15 pm	**ROOM – Duke Engineering Building's Atrium**
	Session 2, Tuesday – November 07 Session Chair: **Dr. Hyo Jae Jeong**
	#84 DESIGN AND SIMULATION OF THERMAL MANAGEMENT SYSTEM FOR LITHIUM-ION BATTERIES OF HYBRID AND ELECTRIC VEHICLES *Elham Hasani, Negar Razzaghi, Sina Eghbal, Farschad Torabi*
	#21 THE EFFECT OF CLIMATE CONDITIONS ON THERMAL MANAGEMENT SYSTEMS FOR BATTERY ELECTRIC VEHICLES *Pouria Ahmadi*
	#36 COMPARATIVE DYNAMIC BEHAVIOR ANALYS OF FULL-ELECTRIC AND HYDROGEN FUEL CELL VEHICLES *Aidin Teimouri, Kaveh Zayer Kabeh, Sina Changizian, Pouria Ahmadi*
	#01 INCORPORATION OF ENERGY STORAGE OPTIONS INTO AN INTEGRATED RENEWABLE ENERGY SYSTEM FOR SUSTAINABLE RESIDENTIAL COMMUNITIES *Moslem Sharifishourabi; Ibrahim Dincer, Atef Mohany*
	#09 A COMMUNITY-BASED ENERGY SYSTEM WITH RENEWABLES AND HYDROGEN WITH ENERGY STORAGE OPTIONS *Muarij Khalil and Ibrahim Dincer*
	#24 THERMODYNAMIC ANALYSIS OF PHOTOVOLTAIC SYSTEMS WITH BATTERY ENERGY STORAGE *Masoud Haddad, Nader Javani, Behnaz Rezaie*
	#8 EXPLOITATION AND INVESTMENT THE POTABLE WATER DISTRIBUTION FOR HYDROPOWER STORAGE ENERGY AND WATER *Djeriou Salim*
12:30-2:00 pm **Lunch: Duke Engineering Building**	

Tuesday – November 07, 2023		
	ROOM – Duke Engineering Building's Atrium	**ROOM – Duke Eng. Building 222**
	Session 3 Session Chair: **Dr. Pouria Ahmadi**	**Session 4** Session Chair: **Aaron Straus**
2:00- 3:30 pm	**#83** MODELING OF ELECTROCHEMICAL DYNAMICS IN LITHIUM TITANATE OXIDE BATTERIES *Elham Hasani, Negar Razzaghi, Sina Eghbal, Farschad Torabi* **#16** COMPREHENSIVE THERMODYNAMIC ANALYSIS OF A HYDROGEN POWERED MICRO-GAS TURBINE *Hadis Montazerinejad, Dennis Meelkop, Stefan Gräfe, Ursula Eicker* **#34** DYNAMIC MODELING OF LIQUID AIR ENERGY STORAGE FOR ENERGY EFFICIENCY COMPARISON *Shadi Bashiri Mousavi, Peimaneh Shirazi, Pouria Ahmad, Nader Javani, Behnaz Rezai* **#46** A HIGHLY ADJUSTABLE SYSTEM FOR LOW GRADE HEAT DRIVEN DESALINATION WITH MINIMUM LIQUID DISCHARGE APPROACH *Mahsa Khavari, Mohammad Akhlaghi, Norouz Mohammad Nouri* **#26** INVESTIGATION OF AIR-COOLING AND PHASE CHANGE MATERIAL COOLING FOR TWO DIFFERENT ARRANGMENTS OF ELECTRIC VEHIECLES *Alireza Khoshnevisan, Peimaneh Shirazi, Pouria Ahmadi, Nader Javani* **#28** DYNAMIC SIMULATION AND EFFECTS OF DRIVING PATTERNS ON THE PERFORMANCE OF ELECTRIC VEHICLES USING NEURAL NETWORKS ALGORITHMS *Arian Ghods, Mehdi Ashjaee* **#19** COMPARATIVE STUDY OF RENEWABLE ENERGY INTEGRATION IN SMART BUILDINGS FOR EFFICIENT ENERGY GENERATION, UTILIZATION, AND STORAGE *Parmida Kamaribidkorpeh, Amirmohammad Behzadi, Pouria Ahmadi, and Sasan Sadrizadeh*	**#22** GREEN HYDROGEN STORAGE PREDICTION USING MACHINE LEARNING *Ceren Ceylan, Zehra Yumurtacı* **#23** A COMPARISON STUDY BETWEEN PCM-BASED AND AIR-COOLED THERMAL MANAGEMENT SYSTEMS FOR LITHUM ION BATTERY PACK *Enis Selcuk Altuntop, Dogan Erdemir, Veysel Ozceyhan, Yuksel Kaplan* **#5** A UNIQUE SOLAR POND SYSTEM INTEGRATED WITH CHLOR-ALKALI ELECTROLYZER FOR HEAT STORAGE AND HYDROGEN PRODUCTION *Dogan Erdemir, Ibrahim Dincer* **#2** INCREASING THE STORAGE IN OFF-GRID HYBRID SYSTEMS OF WIND AND TIDAL *Navid Majdi Nasab, Shamzin Yazdanian* **#15** SIMULATION OF GREEN HYDROGEN STORAGE OPTIONS AND CHARGING STATIONS IN ONTARIO, CANADA *G. Kubilay Karayel and Ibrahim Dincer* **#12** A RENEWABLE ENERGY-BASED MULTIGENERATION SYSTEM WITH THERMAL ENERGY STORAGE AND HYDROGEN STORAGE *Sibel Uygun Batgi and Ibrahim Dincer* **#25** THERMODYNAMIC EVALUATION OF A NEW INTEGRATD SOLAR-BIOMASS SYSTEM WITH HYDROGEN STORAGE *Mohammad Ali Sabbaghi, Ehsan Baniasadi, Nader Javani*
3:30-3:45 **Coffee Break**		

Tuesday – November 7, 2023		
	ROOM – Duke Engineering Building's Atrium	**ROOM – Duke Eng. Building 222**
	Session 5 Session Chair: **Dr. Hookyung Lee**	**Session 6** Session Chair: **Dr. Nader Javani**
3:45 - 5:15 pm	**# 85** INVESTIGATION OF LTO/GRAPHENE COMPOSITE ELECTRODE ON THE PERFORMANCE OF LTO BATTERIES *Elham Hasani, Seyedreza Moosavinezhad, Sina Eghbal, Farschad Torabi* **#30** ANALYZING THE HEATING CONTROL STRATEGY FOR THE HYDROGEN-POWERED MICRO-GAS TURBINE COUPLED WITH A HEAT RECOVERY UNIT *Hadis Montazerinejad, Ursula Eicker* **# 79** THERMAL RUNAWAY PREDICTION OF A LITHIUM-ION BATTERY CELL UNDER MECHANICAL ABUSE CONDITIONS *Enes Furkan Örs, Nader Javani* **#13** ANALYSIS AND SIMULATION OF NANO ENRICHED LHTS SYSTEM FOR CONCENTRATED SOLAR ENERGY *M. M. Ismail, I. Dincer, and Y. Bicer* **#86** DEVELOPING A MULTIGENERATION SYSTEM TO PRODUCE METHANE, HYDROGEN AND OXYGEN USING MEA CARBON CAPTURE SYSTEM AND THERMOCHEMICAL WATER SPLITTING CYCLE *Matin Aslani Yekta, Samane Ghandehariun* **#65** OPTIMIZATION OF DISTRICT ENERGY SYSTEM WITH HYDROGEN ENERGY STORAGE INTEGRATED WITH WASTE HEAT RECOVERY SYSTEM *Mohammadreza Khosravi, Pouria Ahmadi*	**#80** THERMODYNAMIC AND SUSTAINABILITY ANALYSES OF BIOMASS-BASED COMBINED PLANT *Yunus Emre Yuksel, Fatih Yilmaz, Murat Ozturk* **#10** A SOLAR COMBINED CYCLE WITH HYDROGEN LIQUEFACTION AND STORAGE *Mehmet Gursoy, Ibrahim Dincer.* **#77** MARKET FACTORS MODELING AND POLICY WITH REGULATORY ASPECTS OF ADOPTING RENEWABLE ENERGY IN LEBANON *Ghadeer Kaddour* **#81** DESIGN AND THERMODYNAMIC ANALYSIS OF GEOTHERMALLY DRIVEN TRIGENERATION PLANT *Yunus Emre Yuksel, Fatih Yilmaz, Murat Ozturk* **#18** ASSESSMENT AND OPTIMIZATION OF A NEW CO-GENERATION SYSTEM BASED ON HYDROGEN-FUELED COMPRESSED-AIR ENERGY STORAGE (CAES) AND HOT/COLD STORAGE *Ehsanolah assareh, Pouria Ahmadi, Ali Ershadi, Ahmad Naquash, Ardeshir Ghalavand, Amjad Riaz, Majid Sina, Moonyong Lee* **#11** SOLAR ENERGY DRIVEN INTEGRATED SYSTEM WITH ENERGY STORAGE OPTIONS *Hilal Sayhan Akci Turgut, Ibrahim Dincer* **#37** EXPERIMENTAL INVESTIGATION OF THERMAL ENERGY STORAGE UTILIZING PHASE CHANGE MATERIAL IN A RECTANGULAR BOX ENHANCED WITH ALUMINUM FOAM *Mahdi Fatoureh Chi, Mustafa Özdemir, Ersin Sayar*
18:00-19:00 **Dinner** **University Room**		

Wednesday – November 08, 2023

	ROOM – Duke Engineering Building's Atrium	ROOM – Duke Eng. Building 222
	Session 7 Session Chair: **Dr. David Soriano**	**Session 8** Session Chair: **Dr. Michael Liu**
09:00 - 10:30 am	**#39** ENERGY, EXERGY, EMISSIONS AND SUSTAINABILITY (3E-S) ASSESSMENT OF FUEL-CELL GAS TURBINE HYBRID SYSTEM *Abhinav Anand Sinha, Tushar Choudhary, Anoop Kumar Shukla, Kriti Srivastava, Aman Singh Rajpoot* **#77** MARKET FACTORS MODELING AND POLICY WITH REGULATORY ASPECTS OF ADOPTING RENEWABLE ENERGY IN LEBANON *Ghadeer Kaddour* **#41** ENERGY CONSUMPTION AND CARBON FOOTPRINT OF AN EJECTOR-EQUIPPED AIR CONDITIONING SYSTEM IN ELECTRIC VEHICLES *Siavash Mansouri, Mehrdad Raeesi* **# 87** COMPARATIVE ANALYSIS OF HYDROGEN AND LITHIUM-ION ENERGY STORAGE SYSTEMS FOR RESIDENTIAL BUILDINGS *Hanieh Mohebi, Samane Ghandehariun* **#27** THERMODYNAMIC ANALYSIS OF A MULTIPLE ENERGY PRODUCTION SYSTEM BASED ON GEOTHERMAL ENERGY FOR COMMISSIONING IN JAPAN *Ehsanolah Assareh, Behroz rafiei, Sajjad Keykhah* **#44** EFFECT OF GRAPHITE POWDER ON THERMAL PROPERTIES OF LATENT HEAT STORAGE MATERIALS *Yuuhi Hatta, Makoto Shibahara, Qiusheng Liu, Sutopo P. Fitri* **#74** THERMAL CONDUCTIVITY ENHANCEMENT OF ORGANIC PHASE CHANGE MATERIAL WITH GRAPHENE NANOPLATELET *Sercan Gülce GÜNGÖR, Mehmet ESEN*	**#45** BIODEGRADATION OF AGRICULTURAL RESIDUES AND CHICKEN MANURE WITH DIFFERENT ADDITIVES THROUGH IN-VESSEL COMPOSTING PROCESS FOR VALUE-ADDED PRODUCTS *Ravindran Balasubramani, WooJin Chung, Donggyu bang, Jaehong Shim, Soon Woong Chang* **#47** A STUDY OF RENEWABLE ENERGY AND H2-BATTERY ENERGY STORAGE SYSTEM *Muhammad Ishaq and Ibrahim Dincer* **#48** ON THE ROLE OF THERMAL STORAGE IN THE LONG-TERM OPTIMAL PLANNING OF ENERGY SYSTEMS *Meisam Sadi, Jóhannes Kristófersson, Pierre-Jean Emmanuel Delêtre, Brian Elmegaard, Ahmad Arabkoohsar* **#49** MULTI-OBJECTIVE OPTIMIZATION AND EMERGY ANALYSIS OF A SOLAR-BASED SORPTION-ENHANCED GASIFICATION SYSTEM INTEGRATED WITH THERMAL ENERGY STORAGE AND WASTE HEAT RECOVERY SYSTEMS *Soheil Khosravi, Dibyendu Roy, Rahim Khoshbakhti Saray, Elaheh Neshat, Ahmad Arabkoohsar* **#50** DYNAMIC ANALYSIS OF STRATIFIED HOT WATER HEAT STORAGE TANKS IN DISTRICT HEATING SYSTEMS *Halil Ibrahim Topal, Ahmad Arabkoohsar* **#51** SIMULINK MODEL OF HYBRID BATTERY AND FUEL CELL POWERED MOTOR FOR FUEL CELL ELECTRIC VEHICLE *Nanmaran R, Srimathi S, Thanigaivel S, Saravanan R* **#52** HYDROGEN FUEL CELL MODEL DEVELOPMENT AND ANALYZING THE EFFECT OF CHANGING FUEL CELL RESISTANCE ON MODEL PERFORMANCE *Nanmaran R, Srimathi S, Thanigaivel S, Saravanan R*
10:30-10:45 **Coffee Break**		

Wednesday – November 8, 2023

10:45 - 12:15 am

ROOM – Duke Engineering Building's Atrium

Session 9
Session Chair: **Dr. Nader Javani**

#53 DEVELOPMENT OF CARBON NANOSHEETS ENVELOPED NICKEL-PALLADIUM CAPSULES FOR GREEN HYDROGEN GENERATION
Nangan Senthilkumar, Manunya Okhawilai, Saravanan Rajendrsn

#56 APPLICATION OF A NEW COGENERATION SYSTEM WITH SOLAR AND GEOTHERMAL RENEWABLE ENERGY RESOURCES-CASE STUDY- ROME- ITALY
Ehsanolah Assareha, Siamak Hoseinzadehb, Davide Astiaso Garciab

#57 COMPARATIVE ANALYSIS OF A COMPRESSED AIR ENERGY STORAGE SYSTEM WITH PEM FUEL CELL: ENERGY, EXERGY AND EXERGO-ECONOMIC ANALYSES
Shoaib Khanmohammadi, Mohammadreza Sharifinasab, Natasa Nord

#68 MULTI-OBJECTIVE OPTIMIZATION OF A SOLAR-DRIVEN COGENERATION ENERGY SYSTEM EQUIPPED WITH PEM ELECTROLYZER AND DUAL-PRESSURE ORGANIC RANKINE CYCLE USING GENETIC ALGORITHMS
Shahin Akbari, Ali Mehrparwar Zinjanabi, Mohamad Ali Bijarchi, Mehdi Mortazavi

#69 THERMODYNAMIC PERFORMANCE ASSESSMENT OF A SMALL-SCALE BIOGAS-TO-AMMONIA SYSTEM
Alper Can Ince, Yagmur Nalbant Atak, C. Ozgur Colpan, Ugur Pasaogullari

#72 A BRIEF ANALYSIS OF CONCENTRATED SOLAR ENERGY BASED BIOMASS GASIFICATION FOR SUSTAINABLE HYDROGEN PRODUCTION
Nurhan Uregen Güler, Zehra Yumurtacı

#60 THE NOVEL DESIGN AND STABILITY ANALYSIS OF A RENEWABLE ENERGY POWERED MULTI-GENERATION SYSTEM USING PTC SOLAR PANELS
Mustafa Maqsood, Uzair Bhatti, Tahir Abdul Hussain Ratlamwala, Khurram Kamal

#20 EVALUATING THE PERFORMANCE OF PLUG-IN HYBRID FUEL CELL VEHICLES CONSIDERING BATTERY HEALTH AND FUEL CELL DEGRADATION.
Pourya Hassani, Mehrdad Raeesi, Mohammad Javad izadi, Pouria Ahmadi

ROOM – Duke Eng. Building 222

Session 10
Session Chair: **Dr. Femi Oloye**

#61 PARAMETRIC STUDY OF SOLAR WATER HEATER SYSTEMS WITH EVACUATED TUBE COLLECTORS FOR VARIOUS HOT WATER CONSUMPTION PROFILES
Mahsa Khavari, Farzad Veysi

#62 TRANSIENT ANALYSIS OF A SOLAR TOWER POWER PLANT WITH DIFFERENT THERMAL STORAGE SYSTEM: A CASE STUDY
Masoud Haddad, Nader Javani, Behnaz Rezaie

#63 PROPOSAL A NEW WASTE ENERGY RECOVERY SYSTEM WITH HYDROGEN AS AN ENERGY STORAGE SYSTEM
Shoaib Khanmohammadi, Hadi Genceli, Amirhossein Pakseresht, Safora Sadat Seyedani

#64 MACHINE LEARNING-BASED OPTIMIZATION OF AN INTEGRATED SOLAR-THERMAL POWER/HYDROGEN PRODUCTION SYSTEM USING GREY WOLF OPTIMIZER AND ARTIFICIAL NUERAL NETWORK
Mohammad Mahdi Forootan, Shahin Akbari, Mehdi Mortazavi

#70 DYNAMICS OF SESSILE DROPLETS EXPOSED TO SHEARING HYDROGEN FLOW
Amir Abdollahpour, Sung Yong Jung, Mehdi Mortazavi

#67 MASS TRANSPORT LOSS DUE TO GAS DIFFUSION LAYER DEGRADATION UNDER WET/DRY CYCLE IN POLYMER ELECTROLYTE MEMBRANE FUEL CELL
HanBeen Seo, SungYong Jung

#58 EXTERNAL EXCITATION EFFECT ON WATER DISCHARGE IN THE FLOW CHANNEL OF PEM FUEL CELL
Ji Yeon Kim, Mehdi Mortazavi, Sung Yong Jung

#71 EXPERIMENTAL ASSESSMENT OF ENERGY, EXERGY, EMISSION, ENTROPY AND SUSTAINABILITY ASPECTS OF A DIESEL ENGINE WITH BIODIESEL, TITANIUM OXIDE (TIO2) NANOPARTICLES AND OXY HYDROGEN (HHO) GAS
Aman Singh Rajpoot, Tushar Choudhary, H. Chelladurai, Anoop Shukla, Upendra Rajak, Abhinav Anand Sinha

Lunch
12:30-2:00 pm
Location: Commons, Dinning Hall

2:00-4:30
Social Event
Visit to: ZIPPO/CASE museum