



## **Eighth International Conference on Energy Research and Development**

**November 28-30, 2023**  
**Kuwait University City, Kuwait**

Co-organized by ASHRAE, Kuwait University, Kuwait Foundation for the Advancement of Sciences (KFAS) and Kuwait Institute for Scientific Research (KISR)



## Schedule Overview

All sessions and activities will be held at *Conference Center, Sabah Al-Salem Kuwait University City*

Time	Preconference Short Course - Sunday, 26 November 2023
9:00 am – 4:00 pm	<b>ASHRAE Short course</b> <b>Title: Variable Refrigerant Flow Systems: Design and Applications (MENA)</b> <i>Meeting Room 6 and 7</i>
12:00 pm – 1:00 pm	<b>Lunch Break</b>

Time	Preconference Course - Monday, 27 November 2023
9:00 am – 12:00 pm	<b>Kuwait Foundation for the Advancement of Sciences (KFAS) Workshop</b> <b>Title: Low Global Warming Potential (GWP) Refrigerant Safety Guide</b> <i>Meeting Room 1 and 2</i>
9:00 am – 4:00 pm	<b>ASHRAE Short course</b> <b>Title: Understanding Standard 189.1-2017 for High-Performance Green Buildings (MENA)</b> <i>Meeting Room 6 and 7</i>
12:00 pm – 1:00 pm	<b>Lunch Break</b>

Time	Day 1 - Tuesday, November 28, 2023		
8:30 am to 10:00 am	<b>Opening Ceremony</b> <i>Auditorium</i>		
10:00 am to 10:45 am	<b>Keynote</b> <b>Speaker: Sheikh Nawaf Saud Nasir Al-Sabah,</b> <b>Deputy Chairman and Chief Executive Officer, KPC, Kuwait</b> <b>Title: TBA</b> <i>Auditorium</i>		
10:45 am to 11:00 am	<b>Coffee Break</b>		
11:00 am to 12:45 pm	<table border="0"> <tr> <td> <b>Session No: TAM1</b>  <b>Carbon Footprint/Residential</b>  <i>Meeting Room 1 and 2</i> </td> <td> <b>Session No: TAM2</b>  <b>HVAC&amp;R Systems 1</b>  <i>Meeting Room 6 and 7</i> </td> </tr> </table>	<b>Session No: TAM1</b> <b>Carbon Footprint/Residential</b> <i>Meeting Room 1 and 2</i>	<b>Session No: TAM2</b> <b>HVAC&amp;R Systems 1</b> <i>Meeting Room 6 and 7</i>
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11:00 am to 12:45 pm	<b>Panel Discussion</b> <b>Title: Navigating Decarbonization for a Sustainable Energy Future</b> <i>Auditorium</i>		
12:45 pm to 1:45 pm	<b>Lunch Break</b>		
1:45 pm to 2:30 pm	<b>Keynote</b> <b>Speaker: Ms. Ginger Scoggins, PE, Fellow ASHRAE, ASHRAE President</b> <b>Principal - Mechanical Engineer at Engineered Designs, Inc., NC, USA</b> <b>Title: Challenge Accepted: Tackling the Climate Crisis</b> <i>Auditorium</i>		
2:30 pm to 2:45 pm	<b>Coffee Break</b>		
2:45 pm to 3:45 pm	<table border="0"> <tr> <td> <b>Session No: TPM 1</b>  <b>Energy Monitoring</b>  <i>Meeting Room 1 and 2</i> </td> <td> <b>Session No: TPM 2</b>  <b>HVAC&amp;R Systems 2</b>  <i>Meeting Room 6 and 7</i> </td> </tr> </table>	<b>Session No: TPM 1</b> <b>Energy Monitoring</b> <i>Meeting Room 1 and 2</i>	<b>Session No: TPM 2</b> <b>HVAC&amp;R Systems 2</b> <i>Meeting Room 6 and 7</i>
<b>Session No: TPM 1</b> <b>Energy Monitoring</b> <i>Meeting Room 1 and 2</i>	<b>Session No: TPM 2</b> <b>HVAC&amp;R Systems 2</b> <i>Meeting Room 6 and 7</i>		
2:45 pm to 3:45 pm	<b>Industrial session</b> Chair: Air-Conditioning, Heating, and Refrigeration Institute		

*Meeting Room 9 and 10*

<b>Time</b>		<b>Day 2 - Wednesday, November 29, 2023</b>	
9:00 to 9:45 am	<b>Keynote 3</b> Speaker: Dr. Husamuddin Ahmadzai, Tekn Dr., Sweden <b>Title: A Quest for Sustainable Energy – Key Aspects of Production and Consumption in a Global Perspective</b> <i>Auditorium</i>		
9:45 am to 10:00 am	<b>Coffee Break</b>		
10:00 am to 12:00 pm	<b>Session No: WAM 1</b> <b>Indoor Environmental Quality (IEQ)</b> <i>Meeting Room 1 and 2</i>	<b>Session No: WAM 2</b> <b>Renewable Energy</b> <i>Meeting Room 6 and 7</i>	
10:00 am to 12:00 pm	<b>Industrial session</b> Chair: Nabil Shahin, The Air-Conditioning, Heating, and Refrigeration Institute (AHRI) <i>Meeting Room 9 and 10</i>		
12:00 pm to 1:00 pm	<b>Lunch Break</b>		
1:00 pm to 1:45 pm	<b>Keynote 4</b> Speaker: Prof. Chen Qingyan, Department of Building Environment and Energy Engineering, The Hong Kong Polytechnic University <b>Title: The Art of Developing a High-Performance Building</b> <i>Auditorium</i>		
1:45 pm to 2:00 pm	<b>Coffee Break</b>		
2:00 pm to 3:30 pm	<b>Session No: WPM 1</b> <b>HVAC&amp;R Systems 3</b> <i>Meeting Room 1 and 2</i>	<b>Session No: WPM 2</b> <b>Refrigerants</b> <i>Meeting Room 6 and 7</i>	
2:00 pm to 4:00 pm	<b>ABET Accreditation Workshop</b> Speaker: Prof. M.H. Hosni Chair: Prof. Sorour Alotaibi, KU <i>Meeting Room 9 and 10</i>		

<b>Time</b>		<b>Day 3 - Thursday, November 30, 2023</b>	
9:00 to 9:45 am	<b>Keynote 5</b> Speaker: Dr. Drury B. Crawley Fellow ASHRAE, BEMP, Bentley Fellow and Director of Building Performance with Bentley Systems Inc., USA <b>Title: Impacts of Climate Change and Urbanization on Future Building Performance</b> <i>Auditorium</i>		
9:45 am to 10:00 am	<b>Coffee Break</b>		
10:00 am to 11:45 am	<b>Session No: THAM 1</b> <b>Biodiesel/Fluid</b> <i>Meeting Room 1 and 2</i>	<b>Session No: THAM 2</b> <b>Heat Transfer</b> <i>Meeting Room 6 and 7</i>	
11:45 am to 12:30 pm	<b>Lunch Break</b>		

12:30 pm to 5:00 pm

**Technical Tour, Kuwait Institute for Scientific Research (KISR)**

**Tuesday, November 28, 2023**

**11:00 - 12:45**

**Session No: TAM1**

**Session Title: Carbon Footprint/Residential**

**Chair:** Dr. Husamuddin Ahmadzai, Tekn

**Co-Chair:** Dr. Sreekanth K.J., KISR

- 1101 Exergy Analysis of the Energy Use in the Residential Sector for the State of Kuwait  
*May Saber Al-Suwaidan, Kuwait Institute for Scientific Research, Kuwait*
- 1102 Guidelines to Reduce the Carbon Footprint of Kuwait  
*Norah Manea Alkhaldi, Kuwait University, Kuwait*
- 1104 An Energy-efficient Task Scheduling Algorithm to Reduce the Carbon Footprint of Datacenters  
*Norah Manea Alkhaldi, Kuwait University, Kuwait*
- 1166 Indoor Comfort as Starting Point for HVAC System Design: What is the Carbon Footprint for Different Systems?  
*Maciej Danielak, Kampmann GmbH & Co KG, Germany*

**Tuesday, November 28, 2023**

**11:00 - 12:45**

**Session No: TAM2**

**Session Title: HVAC&R Systems 1**

**Chair:** Prof. Sorour Alotaibi, KU

**Co-Chair:** Dr. Nawaf Aljuwayhel

- 1110 Investigations on Intelligent Wind Turbine System to Improve the Power Output  
*Javad Farrokhi Derakhshandeh, American University of the Middle East, Kuwait*
- 1127 Optimizing HVAC System of Kuwaiti Residential Building Based on Internet of Energy (IoE) Concept  
*Ammar Bahman, Kuwait University, Kuwait*
- 1128 Sensitivity Analysis of VRF Systems in Hot Climate Buildings: Kuwait Case  
*Ammar Bahman, Kuwait University, Kuwait*
- 2130 A Systems Engineering Approach on Efficiency: The case of Gas Turbines  
*Mounir Mossolly, Technip Energies, France*
- 1171 Analysis of Highly-Efficient Multi-Fuel Micro-Cogeneration Based on Solid Oxide Fuel Cells  
*Jakub Kupecki, Institute of Power Engineering, Poland*

**Tuesday, November 28, 2023**

**14:45 - 15:45**

**Session No: TPM1**

**Session Title: Energy Monitoring**

**Chair:** Dr. Yousef M. Al-Abdullah, KISR

**Co-Chair:** Dr. Fareed Alghimlas, KISR

- 1115 Inverse Uncertainty Analysis of Indeterministic Building Design Parameters Based on Detailed Energy Monitoring Measurements in Hot Climate  
*Ali Falah Alajmi, College of Technological Studies, Kuwait*
- 1129 Towards Energy-Autonomous Buildings in Kuwait: A Case Study  
*Ammar Bahman, Kuwait University, Kuwait*
- 1146 Case Study: Reducing Energy Consumption Through Optimizing Sequence of Operation of an Existing DOAS  
*Hamza Al-Khateeb, Saudi Aramco, Saudi Arabia*

**Tuesday, November 28, 2023**

**14:45 - 15:45**

**Session No: TPM2**

**Session Title: HVAC&R Systems 2**

**Chair:** Dr. Nawaf Almutawa, KU

**Co-Chair:** Dr. Ammar Bahman, KU

1114 Evaluating Air Conditioner Rating Temperatures, T3 and T4, and Kuwait's Minimum Energy Performance Standards

*Mubarak Khaled Alawadhi, Arizona State University, United States of America*

1119 Development of Load Reset Control for Energy Saving of Building with Simultaneous Heating and Cooling System

*YuJin Lee, Kunsan National University, Republic of Korea (South Korea)*

1151 Off-Design Operation of Super Critical CO<sub>2</sub> Cycle Integrated with Reciprocating Engine

*Jaroslav Milewski, Warsaw University of Technology, Poland*



**Wednesday, November 29, 2023**

**10:00 - 12:00**

**Session No: WAM1**

**Session Title: Indoor Environmental Quality (IEQ)**

**Chair:** Prof. Chen Qingyan, HKPU

**Co-Chair:** Prof. Walid Chakroun

- 1113 Enhancing Safety in Underground Workshops: Adapting Impulse Ventilation System for Smoke Management in Various Scenarios  
*Ahmed Saber, College of Engineering and Technology, AUM, Kuwait*
- 1120 Experimental and Numerical Performance Evaluation and Optimization of an Impinging Jet Ventilation System  
*Mohammed M. Asaad, Kuwait University, Kuwait*
- 1126 Studying the Effect of a Tree Underfloor Air Distribution System in Improving Indoor Air Quality  
*Yazan Emad Alzaben, Kuwait University, Kuwait*
- 1137 Evaluation of the Protocols for Micro-Zonal Occupant Centric Control for HVAC Energy Efficiency  
*Jeslu Celine Jacob, IIT Kharagpur, India*
- 1159 Quantifying Circadian Heat, Moisture, and Carbon Loads of Overcrowded Swedish Apartments – A Synthesis  
*Akram Abdul Hamid, Lund University, Sweden*

**Wednesday, November 29, 2023**

**10:00 - 12:00**

**Session No: WAM2**

**Session Title: Renewable Energy**

**Chair:** Prof. Esam Alawadhi, KU

**Co-Chair:** Dr. Ali H. Abdulrahim, KISR

- 1118 Numerical Analysis of the Thermal Performance of Photovoltaic Panel in Hot Weather Regions using PCM Materials  
*Khalil Khanafer, University of Michigan, United States of America*
- 1122 Thermo – Economic Investigation of a Multi-generation System Based on Solar Energy Considering Emission Reduction and Relying on Maximum utilization of Renewable Energies  
*Mohammad Badri, Sharif University of Technology, Islamic Republic of Iran*
- 1131 Design and Manufacture a Seawater Desalination System Using Solar Energy  
*Amnah Ahmad Ashkanani, AUM, Kuwait*
- 1135 Multi-Objective Optimization of Solar Power Tower Hybridization with Gas Turbine and Thermal Energy Storage Back Up  
*Mohammed Alfaiakawi, The University of Sheffield, United Kingdom*
- 1165 The Impact of Wind Speed and Direction on Performance Assessment of Photovoltaic Modules for Different Climatic Conditions  
*Mueez Ul-Haq, University of Engineering and Technology, Lahore, Pakistan*
- 1167 Passive Cooling System for Enhancing Photovoltaic Cell Efficiency in Kuwait  
*Abdulazim Falah, Kuwait University, Kuwait*
- 1172 Energy and Exergy Analysis of the Historical Development of MSF Desalination Plants in Kuwait  
*Sorour Alotaibi, Kuwait University, Kuwait*

**Wednesday, November 29, 2023**

**14:00 - 15:30**

**Session No: WPM1**

**Session Title: HVAC&R Systems 3**

**Chair:** Dr. Osama Ibrahim, KU

**Co-Chair:** Dr. Fotouh Al-Ragom, KISR

- 1125 Air Conditioning Condensate Collection and Reuse for Water and Energy Conservation  
*Hamza Al-Khateeb, Saudi Aramco, Saudi Arabia*
- 1160 Experimental and Numerical Analysis of Thermoelectric Air Funnel Cooler System for Dry Climatic Conditions  
*Salem Algarni, King Khalid University, Saudi Arabia*
- 1163 Moving Towards Sustainable Development by Employing Condensate Water from HVAC Systems to Get Used for Other Cooling Purposes  
*Esmaeil Jalali Lavasani, 3nanoSAE research center, Romania*
- 1170 In Situ Performance Assessment for Dual-Cycle and Dual-Outlet Air Conditioner  
*Fotouh Alraqom, Kuwait Institute for Scientific Research, Kuwait*

**Wednesday, November 29, 2023**

**14:00 - 15:30**

**Session No: WPM2**

**Session Title: Refrigerants**

**Chair:** Dr. Adel Alshayji, KU

**Co-Chair:** Dr. Mohammad Alalaimi, KU

1116 Numerical Studies on the Enhancement of Heat Transfer in a Channel Through Employment of Vortex Generator Mechanisms

*Fajer Ali Dashti, AUM, Kuwait*

1130 Modeling and Sizing a Compressor Test Stand for Nanolubricant Measurements

*Ammar Bahman, Kuwait University, Kuwait*

1143 Process for Selecting Best Refrigerant for High-Ambient-Temperature Environments

*Abdulaziz Al Ghannami, Kuwait University, Kuwait*

1155 Enhancement of Diesel Engine Performance and Emissions using Ethanol-Blends with Mo-Doped TiO<sub>2</sub> Nanomaterial Additives

*Mohamed Anwar Ismail, King Faisal University, Saudi Arabia*

**Thursday, November 30, 2023**

**10:00 - 11:45**

**Session No: THAM1**

**Session Title: Biodiesel/Fluid**

**Chair:** Prof. M.H. Hosni, KSU

**Co-Chair:** Dr. Alia Marafie, KU

- 1107    Laminar Flow across Tandem-Manipulated Surface Cylinders: Effect of Reynolds Number and Groove Orientation  
*Yousef Gharbia, American University of the Middle East, Kuwait*
- 1108    Piezoelectric Energy Harvester Using Wake Induced Vibration  
*Javad Farrokhi Derakhshandeh, American University of the Middle East, Kuwait*
- 1134    Design and Analysis of a Domestic Device for Converting Waste Cooking Oil to Biodiesel: A Multidisciplinary Study  
*Omar Fakhreddine, American University of the Middle East, Kuwait*
- 1164    Biodiesel Production from Waste Cooking Oil: A Sustainable and Innovative Approach Towards Fuel Sustainability  
*Mahdi Chehimi, Virginia Tech University, United States of America*

**Thursday, November 30, 2023**

**10:00 - 11:45**

**Session No: THAM2**

**Session Title: Heat Transfer**

**Chair:** Dr. Shikha Ebrahim, KU

**Co-Chair:** Dr. Naser Alsayegh, KISR

- 1105 Numerical Study on the Fluid Flow and Heat Transfer Characteristics of different Nanoparticles-EG water in Microchannels  
*Ibrahim Elasyed Elbadawy Mohamed, American University of the Middle East, Kuwait*
- 1109 Investigation of the Effect of Nano-particles and Pipe Arrangement on Heat Transfer of Car Radiator  
*Nima Gharib, American University of the Middle East, Kuwait*
- 1117 Examination of Thermal and Flow Performance of Different Nanofluids in Rectangular Microchannel with Different Geometric Parameters  
*Mohammad Yousef Doust, American University of the Middle East, Kuwait*
- 1133 Experimental Investigations on the Effects of Using Carbon-Based Nanofluids on the Heat Transfer Enhancement in Pool Boiling  
*Halima Hasan Alfaiakawi, Kuwait University, Kuwait*
- 1145 Electrochemical Testing of Al-3102 Microchannel Heat Exchanger Tube Sheets in Various Corrosive Electrolytes  
*Seifollah Nasrazadani, University of North Texas, United States of America*