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*

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

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

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<thead>
<tr>
<th>Time</th>
<th>Day 1 - Tuesday, November 28, 2023</th>
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| 8:30 am to 10:00 am| Opening Ceremony  
|                    | *Auditorium*                                                                                                         |
| 10:00 am to 10:45 am| Keynote  
|                    | Speaker: Sheikh Nawaf Saud Nasir Al-Sabah, Deputy Chairman and Chief Executive Officer, KPC, Kuwait  
|                    | Title: TBA  
|                    | *Auditorium*                                                                                                         |
| 10:45 am to 11:00 am| Coffee Break                                                                                                        |
| 11:00 am to 12:45 pm| Session No: TAM1  
|                    | Carbon Footprint/Residential  
|                    | *Meeting Room 1 and 2*                                                                                              |
| 11:00 am to 12:45 pm| Session No: TAM2  
|                    | HVAC&R Systems 1  
|                    | *Meeting Room 6 and 7*                                                                                              |
| 11:00 am to 12:45 pm| Panel Discussion  
|                    | Title: Navigating Decarbonization for a Sustainable Energy Future  
|                    | *Auditorium*                                                                                                         |
| 12:45 pm to 1:45 pm| Lunch Break                                                                                                         |
| 1:45 pm to 2:30 pm | Keynote  
|                    | Speaker: Ms. Ginger Scoggins, PE, Fellow ASHRAE, ASHRAE President Principal - Mechanical Engineer at Engineered Designs, Inc., NC, USA  
|                    | Title: Challenge Accepted: Tackling the Climate Crisis  
|                    | *Auditorium*                                                                                                         |
| 2:30 pm to 2:45 pm | Coffee Break                                                                                                        |
| 2:45 pm to 3:45 pm | Session No: TPM 1  
|                    | Energy Monitoring  
|                    | *Meeting Room 1 and 2*                                                                                              |
| 2:45 pm to 3:45 pm | Session No: TPM 2  
|                    | HVAC&R Systems 2  
|                    | *Meeting Room 6 and 7*                                                                                              |
| 2:45 pm to 3:45 pm | Industrial session  
|                    | Chair: Air-Conditioning, Heating, and Refrigeration Institute                                                        |
### Day 2 - Wednesday, November 29, 2023

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

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<th>Time</th>
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<tbody>
<tr>
<td>9:00 to 9:45 am</td>
<td>Keynote 5</td>
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<td>Speaker: Dr. Drury B. Crawley, Fellow ASHRAE, BEMP, Bentley Fellow and Director of Building Performance with Bentley Systems Inc., USA</td>
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<tr>
<td></td>
<td><strong>Title:</strong> Impacts of Climate Change and Urbanization on Future Building Performance</td>
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<td><strong>Auditorium</strong></td>
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<tr>
<td>9:45 am to 10:00 am</td>
<td>Coffee Break</td>
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<tr>
<td>10:00 am to 11:45 am</td>
<td>Session No: THAM 1</td>
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<td></td>
<td>Biodiesel/Fluid</td>
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<td></td>
<td><strong>Meeting Room 1 and 2</strong></td>
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<tr>
<td>11:45 am to 12:30 pm</td>
<td>Lunch Break</td>
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</tbody>
</table>
12:30 pm to 5:00 pm  **Technical Tour, Kuwait Institute for Scientific Research (KISR)**
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*
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

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

*Jaroslaw Milewski, Warsaw University of Technology, Poland*
**Wednesday, November 29, 2023**

**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*
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

Mohammed Alfailakawi, 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
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
Session No: WPM2
Session Title: Refrigerants

Chair: Dr. Adel Alshayji, KU
Co-Chair: Dr. Mohammad Alalaimi, KU

   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

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