

2017 ASHRAE Annual Conference

Conference Papers



Long Beach, California
ISSN 2578-5257

June 24–28, 2017
© 2017 ASHRAE (www.ashrae.org)

LB-17-C001 Typical and Design Weather Year for Building Energy Simulation
Yusuke Arima; Ryoza Ooka, PhD, Member ASHRAE; Hideki Kikumoto, PhD

LB-17-C002 An Analytical Approach to the Impact of Heat Waves on Buildings and their Occupants
Alfonso Ramallo-González, PhD, Member ASHRAE; Matthew Eames, PhD; Manuel Herrera, PhD; David Coley, PhD

LB-17-C003 Investigation of the Thermal Performance of an Outdoor Commercial Plaza Walkway
Saud Ghani; Esmail M. Bialy, PhD

LB-17-C004 Analysis of HVAC Configurations for a Hospital Operating Room
Kishor Khankari, PhD, Fellow ASHRAE

LB-17-C005 An Efficient Ventilation Configuration for Preventing Bioaerosol Exposures to Health Care Workers in Airborne Infection Isolation Rooms
Deepthi Sharan Thatiparti, Student Member ASHRAE; Urmila Ghia, PhD, Member ASHRAE; Kenneth R. Mead, PhD, PE, Member ASHRAE

LB-17-C006 Cross Infection due to Pathogen Transport in Indoor Environments: Investigative Study Assessing Impact of Ventilation Type, Air Changes, and Furniture
Shamia Hoque, PhD, Associate Member ASHRAE; Firoza Binte Omar, Student Member ASHRAE

LB-17-C007 Air Flow Regimes in an Air-Conditioned Playground Zone of Open-Roof Football Stadium
M.E. Ashmawy; E.E. Khalil, PhD, Fellow ASHRAE; W. Abdelmaksoud, PhD; E.M. El-Bialy, PhD

LB-17-C008 Legionella Bacteria Control in Cooling Tower Water Systems
Paul R. Puckorius, Member ASHRAE; John E Dresty, Jr., Member ASHRAE

LB-17-C009 Case Study of Chiller Selection for the Retrofit of a Large Building Cooling System
James Turcato, EIT, Student Member ASHRAE; Kevin Anderson, PhD, PE, Member ASHRAE

LB-17-C010 Precise Process Air Conditioning for a Pharma Warehouse with a System Design Enabling up to 60% Energy Savings
Dinesh Jaikumar

LB-17-C011 Rapid Modelling of Airflow through Louvers
Taresh Taneja; Vaibhav Arghode, PhD

LB-17-C012 Efficiency Enhancement of a V-Shaped Evaporator
Haijing Xu, PE, Member ASHRAE; Xinyu Zhang, Student Member ASHRAE; Wenxing Zhang, PE; D.M.L. Meyer, PhD; Zongqin Zhang, PhD, Member ASHRAE

LB-17-C013 Low Reynolds Number Flow and Heat Transfer in Vortex-Enhanced Offset Strip-Fin Array – Numerical Study
A. Joardar, PhD, Member ASHRAE; A. M. Jacobi, PhD, Member ASHRAE

LB-17-C014 A Systematic Classification for HVAC Systems and Components
Han Li, LEED AP, Student Member ASHRAE; Yan Chen, PhD, Associate Member ASHRAE; Jian Zhang, PhD, Member ASHRAE; Rahul Athalye, Member ASHRAE; Vrushali Mendon, Member ASHRAE; YuLong Xie, PhD, Member ASHRAE

LB-17-C015 Ventilation Efficiency and Thermal Passenger Comfort of Novel Car Ventilation Concepts
Tobias Dehne; Pascal Lange; André Volkmann; Daniel Schmeling, PhD; Johannes Bosbach

LB-17-C016 Numerical Investigation of Improving Airflow Patterns in Commercial Aircraft Cabins
Moustafa S. Gelgel, Member ASHRAE; Essam E. Khalil, PhD, Fellow ASHRAE; Esmail Elbially, PhD; Ahmed A. Fahim, PhD, Member ASHRAE

LB-17-C017 Effects of Diffuser Arrangements for Mixing and Displacement Ventilations on Indoor Environmental Qualities in Two Adjacent Spaces
Hyeunguk Ahn, Student Member ASHRAE; Donghyun Rim, PhD, Associate Member ASHRAE

LB-17-C018 Analysis of Heat Transfer Inside Vehicle Cabins on the Basis of the Contribution Ratio of Indoor Climate
Yasuhiro Tanoue; Hideaki Nagano, PhD; Shinsuke Kato, Dr.Eng., Fellow ASHRAE; Itsuhei Khori, PhD

LB-17-C019 Sizing Methodology for Domestic Hot-Water Systems Based on Simulated Occupant Behavior
Jean Rouleau, Jr., Student Member ASHRAE; Louis Gosselin, PEng., PhD, Member ASHRAE; Alfonso Ramallo-Gonzalez, PhD, PE, Member ASHRAE

LB-17-C020 Modelling Residential Building Stock Heating Load Demand-Comparison of Occupancy Models at Large Scale
Giuseppina Buttitta, Student Member ASHRAE; Olivier Neu, Member ASHRAE; William Turner; Donal Finn, Member ASHRAE

LB-17-C021 Development and Comparison of Three Different Occupancy Counting and Estimation Strategies

Junjing Yang, PhD, Associate Member ASHRAE; Alexandros Pantazaras; Arun Kumar Chandran, PhD; Siew Eang Lee, PhD; Mat Santamouris, PhD; Kwok Wai Tham, PhD; Lawrence Wong

LB-17-C022 A Low-Cost Bidirectional People Counter for Building Control
Peng Yin, PhD, Associate Member ASHRAE; Xiaoguang Xiao, Student Member ASHRAE

LB-17-C023 Defining Room Area for Connected Spaces for Flammable Refrigerants
Bill Hansen, PE, Member ASHRAE; Steve Kujak, Member ASHRAE

LB-17-C024 Long-Term Thermal Performance of Polyurethane Insulation within Cold Storage Panel Systems Used in U.S. Retail Grocery Environments
James M. Costanza, Member ASHRAE

LB-17-C025 Analysis of Closed Loop Water-Cooled Refrigeration Systems for the Food Retail Industry: A UK Case Study
Maria-Aliki Efstratiadi, MSc; Salvador Acha, PhD, Associate Member ASHRAE; Nilah Shah, PhD; Christos N. Markides, PhD

LB-17-C026 Pressurized Stairwells with Open Doors and the IBC
John H. Klote, DSc, PE, Fellow ASHRAE; Paul G. Turnbull, Member ASHRAE; Douglas H. Evans, PE

LB-17-C027 Fire and Life Safety Systems at Delhi Metro Underground Stations
Anoop Kumar Gupta, Member ASHRAE; Abdhesh Kumar Singh, Member ASHRAE; Rajesh Kumar Jain

LB-17-C028 Life Safety Considerations in Tunnel Smoke Control with Suppression Systems
Yoon Ko, PhD, Member ASHRAE; Ahmed Kashef, PhD, Member ASHRAE

LB-17-C029 Residential Hybrid-Ground Source Heat Pump – Phase I
Nelson Fumo, PhD, Member ASHRAE; Vicente Bortone, PE, Member ASHRAE

LB-17-C030 Thermo-economic Comparison of Residential Solar-Powered Heat Pump Systems
Yeshpal Gupta, PhD; Patrick E. Phelan, PhD, Member ASHRAE

LB-17-C031 Design and Pilot Testing of a Residential Chilled Water Thermal Storage System as Part of a Net Zero Energy and Water House
Charles R. Upshaw, PhD, Associate Member ASHRAE; Joshua D. Rhodes, PhD, Associate Member ASHRAE
Michael E. Webber, PhD

LB-17-C032 Validity of Energy Simulations and Energy Measurements in a Net Zero Energy Office Building: A Case Study
Hidemitsu Koyonagi, PhD; Alan Meier, PhD

LB-17-C033 Improving the Accuracy of Building Energy Simulation Using Real-Time Occupancy Schedule and Metered Electricity Consumption Data

Prashant Anand, Student Member ASHRAE; Junjing Yang, PhD, Member ASHRAE; David Cheong, PhD, Member ASHRAE; Chandra Sekhar, PhD, Fellow ASHRAE

LB-17-C034 Half-Hourly Regional Electricity Price Modelling for Commercial End Users in the UK
Aitor Soler Garcia; Salvador Acha, PhD; Nilay Shah, PhD; Gonzalo Bustos, Member ASHRAE

LB-17-C035 A Systematic Feature Selection Procedure for Data-Driven Building Energy Forecasting Model Development
Liang Zhang, Student Member ASHRAE; Jin Wen, PhD, Member ASHRAE

LB-17-C036 Tenability Analysis and Atrium Smoke Control
John H. Klote, DSc, PE, Fellow ASHRAE

LB-17-C037 CFD Modeling of Full-Size High-Rise Fire Smoke Spread and Control
Dahai (Darren) Qi, PhD, Student Member ASHRAE; Liangzhu (Leon) Wang, PhD, Member ASHRAE; Malek Soubra; Shamim Mashayekh

LB-17-C038 Computational Fluid Dynamics (CFD) Analysis of Smoke-Protected Seating
Jennifer L. Wiley, PE; Michael J. Ferreira, PE

LB-17-C039 Application of TPRT (Thermal Performance–Response Test) in a Saturated Porous Formation
Wonjun Choi, PhD, Associate Member; Ryoza Ooka, PhD, Member ASHRAE

LB-17-C040 Investigation of a Design and Operation Method for a Heat Recovery Ground Source Heat Pump System
Takao Katsura, PhD; Katsunori Nagano, PhD; Yasushi Nakamura, PhD

LB-17-C041 Retrofit of Commercial Buildings Using a Gas Heat Pump System
Leticia Neves, DSc, Member ASHRAE; Tássia Marques, MD, Member ASHRAE; Bruno Scalet, PE; Fernando Alves, PE; Edson Kurotsu, PE

LB-17-C042 Successful Commissioning Process for a Design-Build Project
Bishara Mogannam, PE, Member ASHRAE; Michael Flemming, PE, CxA, Associate Member ASHRAE

LB-17-C043 Integrated Energy Design and Life Cycle Assessment in Refurbishment Design Processes
Mathilde Landgren, Lotte M.B. Jensen

LB-17-C044 Using Pattern Matching and Principal Component Analysis Method for Whole-Building Fault Detection
Yimin Chen, Student Member ASHRAE; Jin Wen, PhD, Member ASHRAE; Adam Reigner, Student Member ASHRAE

LB-17-C045 Codes and Standards Options for Existing Buildings in BC

Andrew Pape-Salmon, PEng., MRM, FCAE, Member ASHRAE; James Montgomery, PhD, Associate Member ASHRAE; Toby Lau, PEng., Member ASHRAE

LB-17-C046 Application of Safety Factors When Setting Charge Limits for A2L Flammable Refrigerants
Bill Hansen, PE, Member ASHRAE; Steve Kujak, Member ASHRAE

LB-17-C047 Impact of Next-Generation Low-GWP Refrigerants on Building Sustainability
Steve Kujak, Member ASHRAE; Tina Li; Juan Hong, PhD; Emily Xiu Wei Yin, Member ASHRAE; Ted Xueyan Yang

LB-17-C048 Predicted Heat Transfer Performance of Low Global Warming Potential R-410A Alternatives
Jordan A. Morrow, Student Member ASHRAE; Xi Chen, Student Member ASHRAE; Melanie M. Derby, Member ASHRAE

LB-17-C049 Performance of an Air-Cooled Chiller with R410A Alternatives R-452B and R-32
Kenneth Schultz, PhD, Member ASHRAE; Gurudath Nayak, PhD

LB-17-C050 Quantification of the Potential for Advanced Thermal Control Strategy over a Range of Buildings Characteristics
Solène Goy, Student Member ASHRAE; François Maréchal; Donal Finn, Member ASHRAE

LB-17-C051 The Impact of Chiller Plant Retrofit on Energy Consumption for Office Buildings in Singapore
Lee Siew Eang, PhD; Chirag Deb; Junjing Yang, PhD, Associate Member ASHRAE

LB-17-C052 Unsupervised Nonintrusive Energy Disaggregation for Commercial Buildings
Mohammad A. Hossain, Student Member ASHRAE; Arash Khalilnejad; Ethan M. Pickering; Rachel A. Swanson; Roger H. French, PhD; Jack Mousseau; Alexis R. Abramson, PhD

LB-17-C053 Analysis of Energy Consumption in Office Buildings Based on the National Building Energy Database in Korea
Haeng Pil Jo; Hye Gi Kim; Sun Sook Kim, Member ASHRAE

LB-17-C054 An Implementation Framework of Model Predictive Control for HVAC Systems: A Case Study of EnergyPlus Model-Based Predictive Control
Zhiang Zhang, Student Member ASHRAE; Khee Poh Lam, PhD

LB-17-C055 Dynamic Scheduling of HVAC Systems' Occupied Period using Access Control Data
Bianca Howard, PhD; Salvador Acha, PhD; Nilay Shah, PhD; John Polak

LB-17-C056 Comparing Guideline 36 Single-Duct VAV Terminal Reheat Strategy with a Similar, Homegrown Approach.
Andrew Windham, PhD, Member ASHRAE

LB-17-C057 Field Performance of a Model Predictive Controller for Coordinating Multiple Rooftop Units
Donghun Kim, PhD; James E. Braun, PhD, Fellow ASHRAE

LB-17-C058 Experimental Study of Energy Savings Using a Household Dehumidifier
Patricia Wasseem, Student Member ASHRAE; Kevin R. Anderson, PhD, PE, Member ASHRAE

LB-17-C059 Improving Thermal Comfort via Spatially Adaptive HVAC
Robert Bailey, PhD, PE, Member ASHRAE; Matthew Kalensky, Student Member ASHRAE; Charles Wilson, Student Member ASHRAE

LB-17-C060 Cooling Performance Analysis and Optimization of a Room with Radiant Panel using CFD
Abdullah Karimi, Affiliate Member ASHRAE; Reza Ghias, PhD, Member ASHRAE

LB-17-C061 Experimental Performance Study on a Dual-Mode CO₂ Heat Pump System with Thermal Storage
Fang Liu, PhD, PE; Weiquan Zhu; Yang Cai

LB-17-C062 Integrated Optimization of PV and Battery Storage Systems for UK Nondomestic buildings
Arthur Mariaud; Salvador Acha, PhD, Member ASHRAE; Ned Ekins-Daukes, PhD; Romain Lambert, PhD; Nilay Shah, PhD

LB-17-C063 Efficient Interaction Between Energy Demand, Surplus Heating/Cooling and Ground-Source Heat Pump Thermal Storage
Trond Thorgeir Harsem; Janne Grindheim, .

LB-17-C064 Motorized Windows: A New Approach to Saving Energy in Office Buildings
Niraj Chandra, PEng., Member ASHRAE; Udit Sapre

LB-17-C065 Experimental Study on Influence of Overhang of Exhaust Hood on Ventilation Requirements
Toshiya Iwamatsu, PhD, Associate Member ASHRAE; Wataru Urabe

LB-17-C066 Ventilation and Corresponding CO₂ Levels in High School Classrooms
L. A. Lesnick, Student Member ASHRAE; R. L. Corsi, PhD, PE; A. Novoselac, PhD, Member ASHRAE

LB-17-C067 The Effects of Temperature and Humidity on the Permeation Properties of Membrane Transport Media Used in Energy Recovery Ventilators
Amin Engarnevis, Student Member ASHRAE; Sarah Romani; Alexander Sylvester, Student Member ASHRAE; Ryan Huizing, PEng., Member ASHRAE; Sheldon Green, PhD, PEng.; Steven Rogak, PhD, PEng., Member ASHRAE

LB-17-C068 Comparison of the Energy Saving Potential between Centralized and Decentralized Pumping Systems under Various Flow Conditions
Mingzhe Liu; Ryoza Ooka, PhD, Member ASHRAE; Wonjun Choi, PhD, Associate Member ASHRAE; Shintaro Ikeda

LB-17-C069 CFD Investigation on Parameters Affecting the Thermal Performance of Mechanical Draft Cooling Towers in District Cooling Plants

Essam E. Khalil, Fellow ASHRAE; Esmail M. Bialy

LB-17-C070 Large Campus Loop Performance Improvement: Negative Pressure Issue

Hui Chen, PE, Member ASHRAE; James G. Riley; Robert Henry, PE; Homer Bruner, Associate Member ASHRAE; Klayton Wittler, Student Member ASHRAE; Elijah Crosby, Student Member ASHRAE

LB-17-C071 Evaluating and Improving the Chilled-Water System of a Data Center Using Flow Network Modeling

Amir Radmehr, PhD; John M. Fitzpatrick; Kanchan M. Kelkar, PhD