

# 2018 ASHRAE Annual Conference

## Conference Papers

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HO-18-C001

Optimal CHP Investments Applying Sensitivity Analyses and Financial Risk Management Indicators  
Salvador Acha, PhD, CEng, Member ASHRAE; Romain Lambert, PhD; Niccolo Le Brun, PhD; Christos N. Markides, PhD, Member ASHRAE; Nilay Shah, PhD, CEng

HO-18-C002

Fuel Cells as CHP Systems in Commercial Buildings: a Case Study for the Food Retail Sector  
Niccolò Le Brun, PhD; Salvador Acha, PhD, CEng, Member ASHRAE; Romain Lambert, PhD; Christos N. Markides, PhD, Member ASHRAE; Nilay Shah, PhD, CEng

HO-18-C003

Effect of Gasper Jets on Human Thermal Comfort in Aircraft Cabins  
Alaa Abdullah; Essam E.Khalil, Fellow Member ASHRAE; Taher M. Abou Deif; Eslam S. Abdelghany

HO-18-C004

Viral Particle Dispersion and Viability in Commercial Aircraft Cabins  
John A. Lynch; James S. Bennett, Member ASHRAE; Byron W. Jones, Fellow Member ASHRAE; Mohammad H. Hosni, Fellow Member ASHRAE

HO-18-C005

Air Flow Regimes and Thermal Comfort in Passengers Car  
Ahmed ElDegwy; Essam E. Khalil, Member ASHRAE

HO-18-C006

Comparative Analysis on GSHP with Different AC Units in Hot Summer and Cold Winter Zone  
Mingyang Qian; Da Yan, PhD

HO-18-C007

The Effect of Fenestration System on Building Daylighting and Solar Radiation: An Experimental Study in Humid Subtropical Climate  
Stephanie Chin, Student Member ASHRAE; Joseph Rendall, Student Member ASHRAE; Xiaoyu Liu, PhD, Member ASHRAE; Hui Shen, PhD, Member ASHRAE

HO-18-C008

An Evaluation of the Effect of Age of House Construction on Electrical Energy Consumption in Montgomery County, Texas  
Melina Cedillo; Ben F. Bigelow, PhD

HO-18-C009

Assessing the Risk of Overheating in High-Performance Social Housing Buildings with the Use of

## Regression Analysis

Jean Rouleau, Jr., Eng., Student Member ASHRAE; Louis Gosselin, PEng, PhD, Member ASHRAE

## HO-18-C010

Comparison of Air Resistance between Electrospun Nanofiber Filters and Conventional Filters

Tongling Xia, Student Member ASHRAE; Chun Chen, PhD, Associate Member ASHRAE

## HO-18-C011

Particulate Matter Emission Rates from Common Scent Sources

Ernesto Diaz Lozano Patino, Student Member ASHRAE; Alireza Mahdavi, Student Member ASHRAE;

Jeffrey Siegel, PhD, Fellow Member ASHRAE

## HO-18-C012

In-situ Integrated Filter Efficiency Measurement

Masih Alavy, Student Member ASHRAE; Tianyuan Li, Student Member ASHRAE; Alireza Mahdavi, Student Member ASHRAE; Jeffrey Siegel, PhD

## HO-18-C013

Evaluation of Low-Cost Particulate Matter (PM) Sensors: A Preliminary Investigation

Defeng Qian, Student Member ASHRAE; Zhihong Pang, Student Member ASHRAE; Zheng O'Neill, PhD, PE, Member ASHRAE

## HO-18-C014

Application of Mobile-Internet-Based Occupancy Data in Building Energy Model Calibration: A Case Study

Zhihong Pang, Student Member ASHRAE; Peng Xu, PhD, PE, Member ASHRAE; Zheng O'Neill, PhD, PE, Member ASHRAE

## HO-18-C015

Results from a Case Study: Fault Detection in Air-Handling Units in Commercial Buildings

Suhrid Deshmukh; Leon Glicksman, PhD, Leslie Norford, PhD

## HO-18-C016

Performance and Economical Analyses of a Dew Point Evaporative Cooling System Using Stepwise Regression Approach

Ali Sohani; Hamidreza Hasani-Balyani, Student Member ASHRAE; Hoseyn Sayyaadi, Member ASHRAE; Valeriy Maisotsenko, Member ASHRAE

## HO-18-C017

Low-Lift Cooling for Non-Residential Buildings in Hot-Humid Climates: A Case Study of the 3 for 2 Project in Singapore

Bharath Seshadri, MEng; Adam Sysanek, PhD; Arno Schlueter, PhD

## HO-18-C018

Energy Performance of Automated Dynamic Interior Venetian Blinds in Commercial Buildings

Niraj Kunwar, Student Member ASHRAE; Kristen S. Cetin, PhD, PE, Associate Member ASHRAE; Ulrike Passe, PhD, Associate Member ASHRAE

~~HO-18-C019~~ WITHDRAWN

HO-18-C020

Use of Optical Distributed Sensors for Spatial Temperature Measurements in HVAC&R Research  
Tabeel A. Jacob, Student Member ASHRAE; Brian M. Fronk, PhD, Associate Member ASHRAE

HO-18-C021

Testing Occupancy-Driven Controls to Reduce Energy Consumption of a VAV System  
Liping Wang, PhD, PE, Member ASHRAE; Aaron Stidolph, Student Member ASHRAE; Joel Dickie, Student Member ASHRAE; Jessica Brist, Student Member ASHRAE; Dhayanandh Udupam, Student Member ASHRAE; Caymen Perrault, Student Member ASHRAE

HO-18-C022

Data Driven Ventilation Reset Control for Educational Institutions  
Lourdes Marozas-Aliaga, CEM, PhD, Student Member ASHRAE; Roger Chen, PhD; Thomas Trabold

HO-18-C023

A Statistical Approach for Estimating Ventilation Rates in an Office Environment  
Tomas Novotny, MSc, Member ASHRAE; Samy Clinchard, MSc; Ulla Haverinen-Shaughnessy, DSc

HO-18-C024

The Different Effects of a Morphological Approach on Design Team Cooperation with Students and Professionals  
Wim Zeiler

HO-18-C025

Forming Design Teams for Improved Performances  
Wim Zeiler

HO-18-C026

PCM Cooling Vests of Different Melting Temperatures in a Two-Bout Strategy to Enhance Comfort and Sensation: An Experimental Study  
Mariam Itani; Nesreen Ghaddar, PhD, Member ASHRAE; Kamel Ghali, PhD, Member ASHRAE; Djamel Ouahrani, PhD; Beatrice Khater, MD

HO-18-C027

Application of Model Predictive Control to Building Energy Systems with Thermal Energy Storage  
Ryozo Ooka, PhD, Member ASHRAE; Doyun Lee; Shintaro Ikeda; Wonjun Choi, PhD, Associate Member ASHRAE; Younghoon Kwak, PhD

HO-18-C028

Thermal Comfort in Educational Buildings Using Computer Simulation as a Tool: The Challenge of a Brazilian Public University  
Ana Julia C. Kfoury, Student Member ASHRAE; Cristóvão Vicente S. Fernandes, PhD

HO-18-C029

Sustainability and Resilience – Examples of Community and Campus Energy Assessments

Chonghui Liu, PE, CEM, LEEP AP, Member ASHRAE

HO-18-C030

Analysis of Load Diversity in China Residential Districts and its Influence on District HVAC System Design

Jingjing An; Da Yan, PhD

HO-18-C031

Influence of the Rate of Renovation of the Public Communities on the Efficiency of the District Heating Systems

Aleksandrs Zajacs, PhD; Anatolijs Borodiņecs, PhD; Raimonds Bogdanovics

HO-18-C032

CFD Modeling of Flammable Refrigerant Leaks inside Machine Rooms- Emergency Ventilation Rate for Different Size Chillers

Shiling Zhang, PhD; Paul Papas, PhD; Parmesh Verma, MBA, Associate Member ASHRAE; Richard Lord, BE ME, Fellow Member ASHRAE; Larry Burns, BS, Member ASHRAE

HO-18-C033

A New Look at Door-Opening Forces and Smoke Control

John H. Klote, DSc, PE

HO-18-C034

Design Considerations for Modulating Stair Pressurization Systems

Steven M. Strege, PE, Member ASHRAE; Brandon C. Ingram, PE

HO-18-C035

Investigation and Evaluation of Multi-Source Heat Pump Units for Maximizing System Efficiency

Yao Yu, PhD, Associate Member ASHRAE; Gaylord Olson; Rui Miao, Student Member ASHRAE

HO-18-C036

Real-time Optimization of Vapor-Injection Air-Source Heat Pump based Water Heating with Extremum Seeking

Wenyi Wang, Student Member ASHRAE; Yaoyi Li, PhD, Member ASHRAE; Feng Cao, PhD, Member ASHRAE

HO-18-C037

Performance Mapping and Modelling of Residential Gas-Fired Absorption Heat Pump in Cooling Mode

Kajen Ethirveerasingham, Student Member ASHRAE; Alan S. Fung, PhD, PEng, FCSME, Member & SBA ASHRAE

HO-18-C038

Energy, Cost and CO<sub>2e</sub> Analyses of Reversible, Hybrid and Heating-Only LF-AHP in the Northeast

Christopher Keinath, PhD, Member ASHRAE; Thomas Butcher, PhD, Member ASHRAE; Michael Garrabrant, PE, Member ASHRAE

HO-18-C039

Buildings' Energy Flexibility From the User to the Smart Grid to Cope with Fluctuations of Renewable Energy

Wim Zeiler; Kevin de Bont; Kennedy Aduda

HO-18-C040

Active Participation of Buildings as a Source of Energy Flexibility

Michiel Voerman; Kevin de Bont, Student Member ASHRAE; Wim Zeiler

HO-18-C041

Energy Flexibility of Battery Electricity Storage System: Design, Commissioning and Application

Kevin de Bont; Michiel Voerman; Wim Zeiler

HO-18-C042

Comparison on Ventilation Requirements for Electric Cooking Appliances between Wall-Mounted Hood and Single Island Hoods

Toshiya Iwamatsu, PhD, Associate Member ASHRAE; Wataru Urabe

HO-18-C043

Analysis of Spread Index: A Measure of Laboratory Ventilation Effectiveness

Kishor Khankari, PhD, Fellow Member ASHRAE

HO-18-C044

Effectiveness of particle confinement in offices equipped with intermittent personalized ventilation system

Douaa Al Assaad, MS; Kamel Ghali, PhD, Member ASHRAE; Nesreen Ghaddar, PhD, Member ASHRAE

HO-18-C045

Food Service Building Asset Rating Methodology and Analysis

Supriya Goel; Juan Gonzalez Matamoros; Alex Vlachokostas, PhD; Na Wang, PhD

HO-18-C046

Simplifying ASHRAE Standard 62.1 for Application to Existing Buildings: A Comparative Analysis with Real-World Data

Meghan McNulty, PE, Associate Member ASHRAE; Pamela Moua-Vargas, Associate Member ASHRAE; Barry Abramson, PE, Member ASHRAE

HO-18-C047

Transient Air Flow Regimes in Large Scale High Density Data Centers

Essam E. Khalil, Fellow Member ASHRAE; Yousri Abd El Rahman

HO-18-C048

Nearly Zero Energy Schools: Their Systems, Energy Use and Perceived Indoor Air Quality

Wim Zeiler

HO-18-C049

The Effects of Ventilation on Indoor Air Quality in Schools

Lexuan Zhong, PhD, PEng, Member ASHRAE

~~HO-18-C050~~ WITHDRAWN

HO-18-C051

Comparison of Pressure Drop and Cooling Duty of Ice Slurry with Chilled Water in a PHE

Rajinder Singh, PhD, Member ASHRAE; Ashish Kumar, Student Member ASHRAE

HO-18-C052

Design-Guidelines for Liquid Tub in Immersion System Using Natural Convection Below PUE = 1.04

Morito Matsuoka, PhD, Member ASHRAE; Kazuhiro Matsuda; Hideo Kubo, PhD

HO-18-C053

Experimental Comparison of Energy Consumption between Constant and Variable Speed Air-Conditioner under the Korean and Saudi Arabian Climates

JaeHun Lim; MyungSup Yoon, PhD; Turki Salem M AL Qahtani, Member ASHRAE; YuJin Nam, PhD, Member ASHRAE

HO-18-C054

Variable Speed HVAC Systems and the Moving Target for Designing Noise Treatments

Roman Wowk, Associate Member ASHRAE

HO-18-C055

Energy and Economic Analysis of Variable-Speed Operation for Packaged Rooftop Units

Jie Cai, PhD; James E. Braun, PhD, PE, Fellow Member ASHRAE

HO-18-C056

Comparison of Four Methods to Generate Typical Summer Days Using in HVAC Design

Siyue Guo, PhD; Da Yan, PhD; Ying Cui

HO-18-C057

Design and Commissioning of Photovoltaic-Generation System

Kevin de Bont; Wim Zeiler

HO-18-C058

Design Requirements for Renewable Energy Systems as Building Facility

Kevin de Bont; Wim Zeiler

HO-18-C059

Using Bluetooth Based Occupancy Estimation for HVAC Set-back to Reduce Energy Consumption in Buildings

Zoltan Nagy, Member ASHRAE; Jose Vaquez-Canteli; June Young Park, Student Member ASHRAE

HO-18-C060

Beneficial Use of Air Handling Unit Condensate for Laboratory HVAC Energy and Water Recovery in Hot and Humid Climates

William Eades, PE, Member ASHRAE

HO-18-C061

Calculating Energy Savings on Air Conditioners in Industrial Facilities Using Simple Physics

Joseph Carpenter, Student Member ASHRAE; Keith Woodbury, PhD, PE, Member ASHRAE; Zheng O'Neill, PhD, PE

HO-18-C062

An Interaction Between Occupant Related Energy Consumption Among Different Spaces

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

HO-18-C063

Estimating Energy Consumption Using Instantaneous Temperature

Mohammed Fadul; Ameer Patel; Donald Reising, PhD; T. Daniel Loveless, PhD; Mina Sartipi, PhD

HO-18-C064

Nationwide Energy Saving Analysis of Radiant Floor System for Commercial Buildings

Yanfei Li, Student Member ASHRAE; Fuxin Niu, Student Member ASHRAE; Defeng Qian, Student Member ASHRAE; Zheng O'Neil, PhD, PE, Member ASHRAE

HO-18-C065

Comparison of Cooling Load Between Radiant Slab and Air Systems in Large Space Buildings with Solar Radiation

Haida Tang, Student Member ASHRAE; Tao Zhang, PhD; Xiaohua Liu, PhD, Member ASHRAE

HO-18-C066

Effectiveness of Parallel versus Counter Flow in Liquid Desiccant Permeable Membrane Cooled Ceiling in Preventing Condensation

Mohamad Hout, MS; Nesreen Ghaddar, PhD, Member ASHRAE; Kamel Ghali, PhD, Member ASHRAE; Nagham Ismail, PhD; Racha Seblany, MS; Marco Simonetti, PhD; Fracastoro Giovanni Vincenzo, PhD; Joseph Virgone, PhD; Assaad Zoughaib, PhD

HO-18-C067

Application of Internal Cooled Desiccant Wheel in Air-Conditioning System

Xingchao Zhou, PhD; Mark Goldsworthy, DrEng; Alistair Sproul, DrEng