KODY M. POWELL, PH.D.

Salt Lake City, UT | kody.powell@utah.edu | kodypowell.che.utah.edu | 801-581-3957
LinkedIn | Google Scholar

WORK EXPERIENCE

The University of Utah, SLC, UT   2016-Present
Assistant Professor of Chemical Engineering | Adjunct Professor of Mechanical Engineering
Research in energy systems (renewable, nuclear, fossil) with a specialty
in process modeling, optimization, advanced control, and energy storage

U.S. Department of Energy | Industrial Assessment Centers Program   2016-Present
Director of the Intermountain Industrial Assessment Center
Consulting and team management for 24 students and professionals
with a focus on energy efficiency in the manufacturing sector

ExxonMobil Research and Engineering, The Woodlands, TX   2013-2016
Real-Time Optimization Research and Development Engineer
Real-time optimization development and global support for refining and
chemical plant utility networks, first principles process modeling and
estimation for fault detection, model predictive control, real-time
optimization, and distributed control system development for refinery-
wide utilities, gasoline blending, environmental

The University of Texas at Austin – Utilities and Energy Management   2012 – 2013
Project Leader for Large-Scale Utilities Optimization Project
Dynamic real-time optimization of campus-wide utilities (electricity
heating, and cooling), energy demand forecasting, model development
for gas and steam turbines, waste heat boilers, centrifugal chillers,
cooling towers, energy storage system

EDUCATION

Ph.D. in Chemical Engineering   2013
The University of Texas at Austin, Austin, TX
Dissertation: "Dynamic Optimization of Energy Systems with Thermal Energy Storage"
National Science Foundation Graduate Research Program Fellow
Cockrell School of Engineering Graduate Research Fellow

B.S. in Chemical Engineering, Chemistry Minor   2009
The University of Utah, Salt Lake City, UT
Magna Cum Laude
Oblad Silver Medal of Excellence
American Institute of Chemical Engineers Outstanding Senior
University of Utah Presidential Scholarship

TEACHING

Fundamentals of Heat Transfer	2016-Present
Fundamentals of Smart Systems	2017-Present
Cooperative Education	2020-Present

AWARDS

Top 15% Rated Undergraduate Instructor – U. of Utah College of Engineering	2021
IAC Center of Excellence – U.S. Department of Energy – Advanced Mfg. Office	2020
2020 Young Investigator of the Year Award – *Processes* Journal	2020
Excellence in Applied Energy Engineering Research – U.S. Department of Energy	2020
Faculty Career Champion Award – University of Utah Career Center	2020
Patriot Award – Employer Support of the Guard and Reserve	2019
Outstanding Faculty in Chemical Engineering – AIChE Student Chapter	2019
Top 15% Rated Graduate Instructor – U. of Utah College of Engineering	2019
Excellence in Applied Energy Engineering Research – U.S. Department of Energy	2018
Outstanding Faculty in Chemical Engineering – AIChE Student Chapter	2018
Top 15% Rated Graduate Instructor – U. of Utah College of Engineering	2018
Top 15% Rated Undergraduate Instructor – U. of Utah College of Engineering	2017
Excellence in Applied Energy Engineering Research – U.S. Department of Energy	2017
Faculty Career Champion Award – University of Utah Career Center	2017
Top 15% Rated Graduate Instructor – U. of Utah, College of Engineering	2017
Graduate Research Fellowship Program (GRFP) – National Science Foundation	2009-2012
Graduate Research Fellow – Cockrell School of Engineering	2009-2013

PEER-REVIEWED PUBLICATIONS

“Dynamic simulation of a novel nuclear hybrid energy system with large-scale hydrogen storage in an underground salt cavern”
A. Ho, K. Mohammadi, M. Memmott, J.D. Hedengren, **K.M. Powell**
International Journal of Hydrogen Energy, Volume 46 (61), 31143-31157   2021

“Improving the economics of battery storage for industrial customers: Are incentives enough to increase adoption?”
A. Dougherty, B. Billings, N. Camacho, **K.M. Powell**
The Electricity Journal, Volume 34 (9), 107027   2021

“A novel implicit hybrid machine learning model and its application for reinforcement learning”
D. Machalek, T. Quah, **K.M. Powell**
Computers & Chemical Engineering, Volume 155, 107496   2021

“Thermoeconomic evaluation and optimization of using different environmentally friendly refrigerant pairs for a dual-evaporator cascade refrigeration system”
K. Mohammadi, **K.M. Powell**
Processes, Volume 9 (10), 1855   2021

"Benchmarks for grid energy management with Python Gekko"
N.S. Gates, D.C. Hill, B.W. Billings, **K.M. Powell**, J.D. Hedengren
Proceedings of the 60th IEEE Conference on Decision and Control, pp. 4868-4874   2021

"Comparison of the most likely low-emission electricity production systems in Estonia"
Z.S. Baird, D. Neshumayev, O. Järvik, **K.M. Powell**
PLoS ONE, Volume 16 (12), e0261780   2021

"Thermoeconomic analysis of a multigeneration system using waste heat from a triple power cycle"
K. Mohammadi, J.G. McGowan, **K.M. Powell**
Applied Thermal Engineering, Volume 190, 116790   2021

"State-by-State comparison of combined heat and power to photovoltaic installations at manufacturing facilities with heat and power loads"
D. Machalek, K. Mohammadi, **K.M. Powell**
Sustainable Energy Technologies and Assessments, Volume 47, 101502   2021

"Techno-economic analysis of the impact of dynamic electricity prices on solar penetration in a smart grid environment with distributed energy storage"
M. Sheha, K. Mohammadi, **K.M. Powell**
Applied Energy, Volume 282, 116168   2021

"Modeling, Control, and Optimization of Multi-Generation and Hybrid Energy Systems"
K.M. Powell, K. Mohammadi
Processes, Volume 9 (7), 1125   2021

"Scenario Generation for Cooling, Heating, and Power Loads Using Generative Moment Matching Networks"
W. Liao, Y. Wang, **K.M. Powell**, Q. Liu
CSEE Journal of Power and Energy Systems   In Press

"A systematic comparison of machine learning methods for modeling of dynamic processes applied to combustion emission rate modeling"
J.F. Tuttle, L.D. Blackburn, K. Andersson, **K.M. Powell**
Applied Energy, Volume 282, 116886   2021

"Techno-economic analysis and environmental benefits of solar industrial process heating based on parabolic trough collectors"
K. Mohammadi, S. Khanmohammadi, J. Immonen, **K.M. Powell**
Sustainable Energy Technologies and Assessments, Volume 47, 101412   2021

"Geographical impact on solar utility and levelized cost in flexible hybrid CSP plants"
K. Ellingwood, **K.M. Powell**
Proceedings of the 26th SolarPACES International Conference   2021

"Proposal and assessment of a novel multigeneration system based on a supercritical CO_2 Brayton Cycle driven by a solar power tower plant"
K. Mohammadi, **K.M. Powell**
Proceedings of the 26th SolarPACES International Conference   2021

"Real-time optimization using reinforcement learning"
K.M. Powell, D. Machalek, T. Quah
Computers and Chemical Engineering, Volume 143, 107077   2020

"Dynamic optimization and economic evaluation of flexible heat integration in a hybrid concentrated solar power plant"
K. Ellingwood, K. Mohammadi, **K.M. Powell**
Applied Energy, Volume 276, 115513   2020

"A Novel Means to Flexibly Operate a Hybrid Concentrated Solar Power Plant and Improve Operation During Non-Ideal Direct Normal Irradiance Conditions"
K. Ellingwood, K. Mohammadi, **K.M. Powell**
Energy Conversion and Management, Volume 203, 112275   2020

"Design and analysis of a dual-receiver direct steam generator solar power tower plant with a flexible heliostat field"
M. Saghafifar, K. Mohammadi, **K.M. Powell**
Sustainable Energy Technology and Assessments, Volume 39, 121816   2020

"Long-term calibration models to estimate ozone concentrations with a metal oxide sensor"
T. Sayahi, A. Garff, T. Quah, K. Le, T. Becnel, **K.M. Powell**, P.E. Gaillardon, A.E. Butterfield, K.E. Kelly
Environmental Pollution, Volume 267, 115363   2020

"Novel hybrid solar tower-gas turbine combined power cycles using supercritical carbon dioxide bottoming cycles"
K. Mohammadi, K. Ellingwood, **K.M. Powell**
Applied Thermal Engineering, Volume 178, 115588   2020

"Comparing Reinforcement Learning Methods for Real-Time Optimization of a Chemical Process"
T. Quah, D. Machalek, **K.M. Powell**
Processes, Volume 8 (11), 1497   2020

"A comprehensive review of solar only and hybrid solar driven multigeneration systems: Classifications, benefits, design and prospective"
K. Mohammadi, S. Khanmohammadi, H. Khorasanizadeh, **K.M. Powell**
Applied Energy, Volume 268, 114940   2020

"Development of high concentration photovoltaics (HCPV) power plants in the US Southwest: Economic assessment and sensitivity analysis"
K. Mohammadi, S. Khanmohammadi, H. Khorasanizadeh, **K.M. Powell**
Sustainable Energy Technologies and Assessments, Volume 42, 100873   2020

"Dynamic Simulation and Techno-Economic Analysis of a Concentrated Solar Power (CSP) Plant Hybridized with both Thermal Energy Storage and Natural Gas"
K. Rashid, K. Mohammadi, **K.M. Powell**
Journal of Cleaner Production, Volume 248, 119193   2020

"Solving the duck curve in a smart grid environment using a non-cooperative game theory and dynamic pricing profiles"
M. Sheha, K. Mohammadi, **K.M. Powell**
Energy Conversion and Management, Volume 220, 113102   2020

"Thermo-economic assessment and optimization of a hybrid triple effect absorption chiller and compressor"
K. Mohammadi, Y. Jiang, S. Borjian, **K.M. Powell**
Sustainable Energy Technologies and Assessments, Volume 38, 100652   2020

"Economic and environmental impacts of a non-traditional combined heat and power system for a discrete manufacturing facility"
D. Machalek, M. Henning, K. Mohammadi, **K.M. Powell**
Journal of Cleaner Production, Volume 265, 121816 2020

"On-Line Classification of Coal Combustion Quality Using Nonlinear SVM for Improved Neural Network NOx Emission Rate Prediction"
J.F. Tuttle, L.D. Blackburn, **K.M. Powell**
Computers & Chemical Engineering, Volume 141, 106990 2020

"Dynamic Economic Optimization of a Continuously Stirred Tank Reactor Using Reinforcement Learning"
D. Machalek, T. Quah, **K.M. Powell**
Proceedings of the 2020 American Control Conference, pp. 2955-2960 2020

"A novel triple power cycle featuring a gas turbine cycle with supercritical carbon dioxide and organic Rankine cycles: Thermoeconomic analysis and optimization"
K. Mohammadi, K. Ellingwood, **K.M. Powell**
Energy Conversion and Management, Volume 220, 113123 2020

"A novel dynamic simulation methodology for high temperature packed-bed thermal energy storage with experimental validation"
J.F. Tuttle, N. White, K. Mohammadi, **K.M. Powell**
Sustainable Energy Technologies and Assessments, Volume 42, 100888 2020

"Real-time optimization of multi-cell industrial evaporative cooling towers using machine learning and particle swarm optimization"
L.D. Blackburn, J.F. Tuttle, **K.M. Powell**
Journal of Cleaner Production, Volume 271, 122175 2020

"Thermodynamic and Economic Analysis of Different Cogeneration and Trigeneration Systems Based on Carbon Dioxide Vapor Compression Refrigeration Systems"
K. Mohammadi, **K.M. Powell**
Applied Thermal Engineering, Volume 164, 114503 2020

"Hybrid Systems Based on Gas Turbine Combined Cycle for Trigeneration of Power, Cooling, and Freshwater: A Comparative Techno-Economic Assessment"
K. Mohammadi, M.S.E. Khaledi, M. Saghafifar, **K.M. Powell**
Sustainable Energy Technologies and Assessments, Volume 37, 100632 2020

"Mine Operations as a Smart Grid Resource: Leveraging Excess Process Storage Capacity to Better Enable Renewable Energy Sources"
D. Machalek, A. Young, L.D. Blackburn, W.P. Rogers, **K.M. Powell**
Minerals Engineering, Volume 145, 106103 2020

"Using Real-Time Electricity Prices to Leverage Electrical Energy Storage and Flexible Loads in a Smart Grid Environment Utilizing Machine Learning"
M. Sheha, **K.M. Powell**
Processes, Volume 7 (12), 870 2019

"Proactive Energy Optimization in Residential Buildings with Weather and Market Forecasts"
C.R. Simmons, J.R. Arment, **K.M. Powell**, J.D. Hedengren
Processes, Volume 7 (12), 929 2019

"Sustainable NOx Emission Reduction at a Coal-Fired Power Station through the Use of Online Neural Network Modeling and Particle Swarm Optimization"
J.F. Tuttle, R. Vesel, S. Alagarsamy, L.D. Blackburn, **K.M. Powell**
Control Engineering Practice, Volume 93, 104167   2019

"Model Predictive Control of a Rotary Kiln for Fast Electric Demand Response"
D. Machalek, **K.M. Powell**
Minerals Engineering, Volume 144, 106021   2019

"Analysing the Benefits of Hybridisation and Storage in a Hybrid Solar Gas Turbine Plant"
K. Ellingwood, S.M. Safdarnejad, H. Kovacs, J.F. Tuttle, **K.M. Powell**
International Journal of Sustainable Energy, Volume 38 (10), pp. 937-965   2019

"Thermo-Economic Analysis of a Novel Hybrid Multigeneration System Based on an Integrated Triple Effect Refrigeration System for Production of Power and Refrigeration"
K. Mohammadi, M. Saghafifar, J.G. McGowan, **K.M. Powell**
Journal of Cleaner Production, Volume 238, 117912   2019

"Smart Scheduling of a Batch Manufacturer's Operations by Utilization of a Genetic Algorithm to Minimize Electrical Demand"
P. Brimley, D. Machalek, **K.M. Powell**
Smart and Sustainable Manufacturing Systems, Volume 3 (2), pp. 53-67   2019

"Hybrid Concentrated Solar Power (CSP)-Desalination Systems: A Review"
K. Mohammadi, M. Saghafifar, K. Ellingwood, **K.M. Powell**
Desalination, Volume 468, 114083   2019

"A Novel Hybrid Dual-Temperature Absorption Refrigeration System: Thermodynamic, Economic, and Environmental Analysis"
K. Mohammadi, M.S.E. Khaledi, **K.M. Powell**
Journal of Cleaner Production, Volume 233, pp. 1075-1087   2019

"Techno-Economic Evaluation of Different Hybridization Schemes for a Solar Thermal/Gas Power Plant"
K. Rashid, S.M. Safdarnejad, K. Ellingwood, **K.M. Powell**
Energy, Volume 181, pp. 91-106   2019

"Automation in the Mining Industry: Review of Technology, Systems, Human Factors, and Political Risk"
W.P. Rogers, M.M. Kahraman, F.A. Drews, **K.M. Powell**, J.M. Haight, Y. Wang, K. Baxla, M. Sobalkar
Mining, Metallurgy, and Exploration, Volume 36, pp. 607-631   2019

"Automated Electrical Demand Peak Leveling in a Manufacturing Facility with Short-Term Energy Storage for Smart Grid Participation"
D. Machalek, **K.M. Powell**
Journal of Manufacturing Systems, Volume 52, pp. 100-109   2019

"Analysis of a Thermal Generator's Participation in the Western Energy Imbalance Market and the Resulting Effects on Overall Performance and Emissions"
J.F. Tuttle, **K.M. Powell**
The Electricity Journal, Volume 32 (5), pp. 38-46   2019

"Development of a Roadmap for Dynamic Process Intensification by Using a Dynamic, Data-Driven Optimization Approach"
S.M. Safdarnejad, J.F. Tuttle, **K.M. Powell**
Chemical Engineering and Processing: Process Intensification, Volume 140, pp. 100-113   2019

"Process Intensification of Solar Thermal Power Using Hybridization, Flexible Heat Integration, and Real-Time Optimization"
K. Rashid, S.M. Safdarnejad, **K.M. Powell**
Chemical Engineering and Processing: Process Intensification, Volume 139, pp. 155-171   2019

"Fault Detection on Big Data: A Novel Algorithm for Clustering Big Data to Detect and Diagnose Faults"
A. Smith, **K.M. Powell**
International Federation of Automatic Control Papers Online, Volume 52 (10), pp. 328-333   2019

"Integrating a Microturbine into a Discrete Manufacturing Process with Combined Heat and Power Using Smart Scheduling and Automation"
M. Henning, D. Machalek, **K.M. Powell**
Computer-Aided Chemical Engineering, Volume 47, pp. 293-298   2019

"Designing Flexibility into a Hybrid Solar Thermal Power Plant by Real-Time Adaptive Heat Integration"
K. Rashid, K. Ellingwood, S.M. Safdarnejad, **K.M. Powell**
Computer-Aided Chemical Engineering, Volume 47, pp. 457-462   2019

"Dynamic modeling and optimization of a coal-fired utility boiler to forecast and minimize NOx and CO emissions simultaneously"
S.M. Safdarnejad, J.F. Tuttle, **K.M. Powell**
Computers & Chemical Engineering, Volume 124, pp. 62-79   2019

"An economic and policy case for proactive home energy management systems with photovoltaics and batteries"
M. Sheha, **K.M. Powell**
The Electricity Journal, Volume 32, Issue 1, pp. 6-12   2019

"Dynamic optimization of a district energy system with storage using a novel mixed-integer quadratic programming algorithm"
L. Blackburn, A. Young, W.P. Rogers, J.D. Hedengren, **K.M. Powell**
Optimization and Engineering, pp. 1-29   2019

"Dynamic simulation, control, and performance evaluation of a synergistic solar and natural gas hybrid power plant"
K. Rashid, S.M. Safdarnejad, **K.M. Powell**
Energy Conversion and Management, Volume 179, pp. 270-285   2019

"Leveraging Energy Storage in a Solar-Tower and Combined Cycle Hybrid Plant"
K. Ellingwood, S.M. Safdarnejad, K. Rashid, **K.M. Powell**
Energies, Volume 12, Issue 40   2019

"Proactive automation of a batch manufacturer in a smart grid environment"
B. Westberg, D. Machalek, S. Denton, D. Sellers, **K.M. Powell**
Smart and Sustainable Manufacturing Systems, Volume 2, pp. 1-23   2018

"Performance comparison of low temperature and chemical absorption carbon capture processes in response to dynamic electricity demand and price profiles"
S.M. Safdarnejad, J.D. Hedengren, **K.M. Powell**
Applied Energy, Volume 228, pp. 577-592   2018

"Dynamic real-time optimization of air conditioning systems in residential houses under different electricity pricing structures"
M.N. Sheha, K. Rashid, **K.M. Powell**
Proceedings of the American Control Conference, 2018, pp. 5356-5361   2018

"Real-time optimization of a solar-natural gas hybrid power plant to enhance solar power utilization"
K. Rashid, M.N. Sheha, **K.M. Powell**
Proceedings of the American Control Conference, 2018, pp. 3002-3007   2018

"Dynamic real-time optimization of air-conditioning systems in residential houses with battery energy storage under different electricity pricing structures"
M.N. Sheha, **K.M. Powell**
Computer Aided Chemical Engineering, Volume 44, pp. 2527-2532   2018

"Hybrid concentrated solar thermal power systems: a review"
K.M. Powell, K. Rashid, K. Ellingwood, J. Tuttle, B.D. Iverson
Renewable and Sustainable Energy Reviews, Volume 80, pp. 215-237   2017

"Optimal combined long-term facility design and short-term operational strategy for CHP capacity investments"
J.L. Mojica, D. Petersen, B. Hansen, **K.M. Powell**, J.D. Hedengren
Energy, Volume 118, pp. 97-115   2017

"Thermal energy storage to minimize cost and improve efficiency of a polygeneration district energy system in a real-time electricity market"
K.M. Powell, J.S. Kim, W. Cole, K. Kapoor, J. Mojica, J.D. Hedengren, T.F. Edgar
Energy, Volume 113, pp. 52-63   2016

"A continuous formulation for logical decisions in differential algebraic systems using mathematical programs with complementarity constraints"
K.M. Powell, A.N. Eaton, J.D. Hedengren, T.F. Edgar
Processes, Volume 4, Issue 1   2016

"Energy intensification using thermal storage"
T.F. Edgar, **K.M. Powell**
Current Opinion in Chemical Engineering, Volume 9, pp. 83-88   2015

"Nonlinear modeling, estimation and predictive control in APMonitor"
J.D. Hedengren, R.A. Shishavan, **K.M. Powell**, T.F. Edgar
Computers & Chemical Engineering, Volume 70, pp. 133-148   2014

"Heating, cooling, and electrical load forecasting for a large-scale district energy system"
K.M. Powell, A. Sriprasad, W.J. Cole, T.F. Edgar
Energy, Volume 74, pp. 877-885   2014

"Dynamic optimization of a hybrid solar thermal and fossil fuel system"
K.M. Powell, J.D. Hedengren, T.F. Edgar
Solar Energy, Volume 108, pp. 210-218   2014

"Reduced-order residential home modeling for model predictive control"
W.J. Cole, **K.M. Powell**, E.T. Hale, T.F. Edgar
Energy and Buildings, Volume 74, pp. 69-77   2014

"Turbine inlet cooling with thermal energy storage"
W.J. Cole, J.D. Rhodes, **K.M. Powell**, E.T. Hale, T.F. Edgar
International Journal of Energy Research, Volume 38, pp. 151-161   2014

"An adaptive-grid model for dynamic simulation of thermocline energy storage systems"
K.M. Powell, T.F. Edgar
Energy Conversion and Management, Volume 76, pp. 865-873   2013

"Optimal chiller loading in a district cooling system with thermal energy storage"
K.M. Powell, W.J. Cole, U.F. Ekarika, T.F. Edgar
Energy, Volume 50, pp. 445-453   2013

"Improved large-scale process cooling operation through energy optimization"
K. Kapoor, **K.M. Powell**, W.J. Cole, J.S. Kim, T.F. Edgar
Processes, Volume 1, pp. 312-329   2013

"Dynamic optimization of a campus cooling system with thermal storage"
K.M. Powell, W.J. Cole, U.F. Ekarika, T.F. Edgar
Proceedings of the European Control Conference, 2013, pp. 4077-4082   2013

"Nonlinear model predictive control for a heavy-duty gas turbine power plant"
J.S. Kim, **K.M. Powell**, T.F. Edgar
Proceedings of the American Control Conference, 2013, pp. 2952-2957   2013

"Dynamic optimization of a solar thermal energy storage system over a 24-hour period using weather forecasts"
K.M. Powell, J.D. Hedengren, T.F. Edgar
Proceedings of the American Control Conference, 2013, pp. 2946-2951   2013

"Modeling and control of a solar thermal power plant with thermal energy storage"
K.M. Powell, T.F. Edgar
Chemical Engineering Science, Volume 71, pp. 138-145   2012

"Optimization and advanced control of thermal energy storage systems"
W.J. Cole, **K.M. Powell**, T.F. Edgar
Reviews in Chemical Engineering, Volume 28, pp. 81-99   2012

"Control of a large scale solar thermal energy storage system"
K.M. Powell, T.F. Edgar
Proceedings of the American Control Conference, 2011, pp. 1530-1535   2011

CONFERENCE PRESENTATIONS

"Benchmarks for grid energy management with Python Gekko"
N.S. Gates, D.C. Hill, B.W. Billings, **K.M. Powell**, J.D. Hedengren
60th IEEE Conference on Decision and Control*, Austin, TX, Dec. 2021   2021

"Economic Analysis and Environmental Impact of a Novel Solar Parabolic Trough Plant Used for Industrial Process Heat That Utilizes Flexible Heat Integration"
J. Immonen, K. Mohammadi, **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, Boston, MA, Nov. 2021   2021

"Industrial Battery Storage Dispatch and Optimization Using Gaussian Process Regression and Bayesian Decision Theory"
B. Billings, P. Smith, S. Smith, **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, Boston, MA, Nov. 2021   2021

"Modeling and Optimization of a Novel Solar Parabolic Trough Plant Used for Industrial Process Heat That Utilizes Flexible Heat Integration"
J. Immonen, K. Mohammadi, **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, Boston, MA, Nov. 2021   2021

"Improving the Economics of Industrial Battery Storage: A Proactive Policy and Management Approach"
B. Billings, A. Dougherty, N. Camacho, **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, Boston, MA, Nov. 2021   2021

"Optimizing the Use of Solar Industrial Process Heat through Flexible Heat Integration"
J. Immonen, K. Mohammadi, **K.M. Powell**
3rd Solar Energy Systems Conference, Virtual Conference, Aug. 2021   2021

"Long-Term Calibration Models to Predict Ozone Levels with a Metal Oxide Sensor"
T. Sayahi, A. Garff, T. Quah, K. Le, T. Becnel, **K.M. Powell**, P.E. Gaillardon, A.E. Butterfield, K.E. Kelly
American Institute of Chemical Engineers Annual Conference, San Francisco, CA, Nov. 2020   2020

"Comparison of State-of-the-Art Dynamic Machine Learning Methods for MPC of Coal-Fired Utility Generator Performance"
J.F. Tuttle, L. Blackburn, **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, San Francisco, CA, Nov. 2020   2020

"Machine Learning Based Real-Time Optimization of Multi-Cell Industrial Evaporative Cooling Tower"
L. Blackburn, J.F. Tuttle, **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, San Francisco, CA, Nov. 2020   2020

"Leveraging the Manufacturing Sector as a Grid Asset through Demand Response – Four Real-World Case Studies"
D. Machalek and **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, San Francisco, CA, Nov. 2020   2020

"Enhancing the Department of Energy's Industrial Assessment Center Experience for Undergraduate Students through Real-World Problem Solving, Research, and Publication"
D. Machalek and **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, San Francisco, CA, Nov. 2020   2020

"Long-Term Hybrid AI-Expert Combustion Optimization System for Coal-Fired Electricity Generation NO_x Reduction"
J.F. Tuttle, R. Vesel, S. Alagarsamy, L. Blackburn, and K.M. Powell
American Institute of Chemical Engineers Annual Conference, San Francisco, CA, Nov. 2020   2020

"State-By-State Comparison of the Economic, Environmental, and Energy Impacts of Manufacturing Facilities Integrating Solar Photovoltaic or Combined Heat and Power Systems"
D. Machalek and **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, San Francisco, CA, Nov. 2020   2020

"Comparison of Dynamic and Steady-State Machine Learning Based Optimization of a Coal-Fired Boiler"
L. Blackburn, J.F. Tuttle, **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, San Francisco, CA, Nov. 2020   2020

"Geographical Impact on Solar Utility and Levelized Cost in Flexible Hybrid CSP Plants"
K. Ellingwood and **K.M. Powell**
SolarPACES International, Albuquerque, NM, Sept. 2020   2020

"Proposal and Assessment of a Novel Multigeneration System Based On A Supercritical CO_2 Brayton Cycle Driven By a Solar Power Tower Plant"
K. Mohammadi and **K.M. Powell**
SolarPACES International, Albuquerque, NM, Sept. 2020   2020

"Dynamic Economic Optimization of a Continuously Stirred Tank Reactor Using Reinforcement Learning"
D. Machalek, T. Quah, and **K.M. Powell**
The American Control Conference 2020, Denver, CO, July 2020   2020

"Flexible Heat Integration to Enhance Solar Energy Utilization in a Hybrid CSP Power Plant"
K. Ellingwood and **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, Orlando, FL, Nov. 2019   2019

"Dynamic Optimization to Leverage Flexible Heat Integration within a Hybrid CSP Plant"
K. Ellingwood and **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, Orlando, FL, Nov. 2019   2019

"Educating Students and Colleagues on Data Analytics and Machine Learning"
Panel Speakers: M. Rappa, R. Braatz, J. Matranga, and **K.M. Powell**
Foundations of Process Analytics and Machine Learning, Raleigh, NC, Aug. 2019   2019

"Online Classification of Coal Combustion Quality Using Nonlinear SVM for Improved Neural Network Optimizer Performance"
Poster Presentation: J.F. Tuttle and **K.M. Powell**
Foundations of Process Analytics and Machine Learning, Raleigh, NC, Aug. 2019   2019

"A Novel Algorithm for Clustering Big Data to Detect and Diagnose Faults"
Poster Presentation: A. Smith and **K.M. Powell**
Foundations of Process Analytics and Machine Learning, Raleigh, NC, Aug. 2019   2019

"Designing Flexibility into a Hybrid Solar Thermal Power Plant by Real-Time Adaptive Heat Integration"
Poster Presentation: K. Rashid, K. Ellingwood, S.M. Safdarnejad, and **K.M. Powell**
Foundations of Computer-Aided Process Design, Copper Mountain, CO, July 2019   2019

"Integrating a Microturbine into a Discrete Manufacturing Process with Combined Heat and Power Using Smart Scheduling"
Poster Presentation: M. Henning, D. Machalek, and **K.M. Powell**
Foundations of Computer-Aided Process Design, Copper Mountain, CO, July 2019   2019

"Model Predictive Control of a Rotary Kiln for Fast Electric Demand Response"
D. Machalek and **K.M. Powell**
Computational Modeling '19, Falmouth, Cornwall, UK, June 2019   2019

"A Novel Predictive Automation Methodology for Mine De-Watering and Intermediate Product Transportation Interacting with the Smart Grid"
D. Machalek, A. Young, W.P. Rogers, and **K.M. Powell**
Computational Modeling '19, Falmouth, Cornwall, UK, June 2019   2019

"Real-time Optimization of Chillers with Thermal Energy Storage and Variable Electricity Rates"
L.D. Blackburn, J.D. Hedengren, **K.M. Powell**
INFORMS Annual Meeting, Phoenix, AZ, Nov. 2018   2018

"A Novel Dynamic Simulation Methodology for High Temperature Packed-Bed Thermal Energy Storage"
J.F. Tuttle, N. White, **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, Pittsburgh, PA, Nov. 2018   2018

"Application of a Data-Driven Modeling Approach to a Large-Scale Power Plant"
S.M. Safdarnejad, J.F. Tuttle, **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, Pittsburgh, PA, Nov. 2018   2018

"Dynamic Real-Time Optimization of a Coal-Fired Power Plant Using an Artificial Neural Network Model"
J.F. Tuttle, S.M. Safdarnejad, **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, Pittsburgh, PA, Nov. 2018   2018

"Analysis of a Thermal Generator's Participation in the Western Energy Imbalance Market and the Resulting Effects on Overall Performance and Emissions"
J.F. Tuttle, W.J. Cole, **K.M. Powell**
Energy Policy Research Conference, Boise, ID, Sept. 2018   2018

"An Economic and Policy Case for Proactive Home Energy Management Systems with Photovoltaics and Batteries"
M.N. Sheha, **K.M. Powell**
Energy Policy Research Conference, Boise, ID, Sept. 2018   2018

"Dynamic Real-Time Optimization of Air Conditioning Systems in Residential Houses under Different Electricity Pricing Structures"
M.N. Sheha, K. Rashid, **K.M. Powell**
American Control Conference, Milwaukee, WI, June 2018   2018

"Real-Time Optimization of a Solar-Natural Gas Hybrid Power Plant to Enhance Solar Power Utilization"
K. Rashid, M.N. Sheha, **K.M. Powell**
American Control Conference, Milwaukee, WI, June 2018   2018

"Dynamic Real-Time Optimization of Air Conditioning Systems in Residential Houses with Battery Energy Storage under Different Electricity Pricing Structures"
M.N. Sheha, **K.M. Powell**
Process Systems Engineering Conference, San Diego, CA, July 2018   2018

"Maximizing the Output of a Solar and Natural Gas Hybrid Power Plant Using Real-Time Optimization"
K. Rashid, **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, Minneapolis, MN, Nov. 2017   2017

"Design and Dynamic Simulation of a Solar and Natural Gas Hybrid Power Plant to Investigate the Synergies of Hybridization"
K. Rashid, **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, Minneapolis, MN, Nov. 2017   2017

"Leveraging Storage and Hybridization to Maximize Renewable Utilization"
K. Ellingwood, J.F. Tuttle, **K.M. Powell**
American Institute of Chemical Engineers Annual Conference, San Francisco, CA, Nov. 2016   2016

"Maximization of Energy Efficiency of a Combined Heat and Power Plant"
T.F. Edgar, **K.M. Powell**, J.S. Kim, K. Kapoor
American Institute of Chemical Engineers Annual Conference, San Francisco, CA, Nov. 2013   2013

"Nonlinear Model Predictive Control for a Heavy-Duty Gas Turbine Power Plant"
J.S. Kim, **K.M. Powell**, T.F. Edgar
American Control Conference, Washington, DC, June 2013   2013

"Dynamic Optimization of a Campus Cooling System with Thermal Storage"
K.M. Powell, W.J. Cole, U.F. Ekarika, T.F. Edgar
European Control Conference, Zurich, Switzerland, July 2013   2013

"Dynamic Optimization of a Solar Thermal Energy Storage System over a 24-Hour Period Using Weather Forecasts"
K.M. Powell, J.D. Hedengren, T.F. Edgar
American Control Conference, Washington, DC, June 2013   2013

"Dynamic Optimization of Solar Thermal Systems with Storage"
K.M. Powell, J.D. Hedengren, T.F. Edgar
American Institute of Chemical Engineers Annual Conference, Pittsburgh, PA, Oct. 2012   2012

"A Process Systems Approach to Teaching Distillation"
K.M. Powell, T.F. Edgar
American Institute of Chemical Engineers Annual Conference, Pittsburgh, PA, Oct. 2012   2012

"Control of a Large-Scale Solar Thermal Energy Storage System"
K.M. Powell, T.F. Edgar
American Control Conference, San Francisco, CA, June 2011   2011

INVITED PRESENTATIONS, WORKSHOPS, AND CHAIRED SESSIONS

"Automation Opportunities in the Manufacturing Sector to Improve Smart Grid Participation"
K.M. Powell
Invited talk
Trends in Invigoration of Manufacturing and Engineering (TIME) by AIChE, Virtual, July 2021   2021

"Maximizing Renewable Energy Resource Utilization through Hybridization and Systems Engineering"
K.M. Powell
Brigham Young University and University of Utah Departments of Chemical Engineering
Joint Graduate Research Seminar, Salt Lake City, UT, April 2021   2021

"Learning III"
Sze Zheng Yong (Session Chair) and **K.M. Powell** (Co-Chair)
American Control Conference 2020, Denver, CO, July 2020   2020

"Aligning Higher Education with Industry 4.0"
Panel Speakers: E. Trump, M. Parvania, **K.M. Powell**, and A. Young
OSIsoft Regional Seminar - Salt Lake City, UT, Feb. 2020   2020

"Advances in Optimization: Global, Surrogate, & Mixed-Integer Models II"
K.M. Powell (Session Chair) and Tony Wu (Co-Chair)
AIChE National Conference, Orlando, FL, Nov. 2019   2019

"Quality and Manufacturing"
K.M. Powell (Session Chair)
Intelligent Manufacturing Systems, Oshawa, Ontario, Canada, Aug. 2019   2019

"Advanced Manufacturing and Design"
K.M. Powell (Session Chair) and Jason Goepel (Session Chair)
Foundations of Computer-Aided Process Design (FOCAPD), Denver, CO, July 2019   2019

"Forecasting and Dynamic Real-Time Optimization of a Campus District Energy System Using PI"
K.M. Powell and W.P. Rogers
PI World National Users Group Meeting - OSIsoft
San Francisco, CA, April 2019   2019

"Design and Performance Evaluation of Solar Thermal and Natural Gas Hybrid Power Plants"
K.M. Powell
Boise State University Department of Mechanical Engineering
Graduate Research Seminar, Boise, ID, Sept. 2018   2018

"An Overview of DOE's 50001 Ready Energy Management Program"
J. Sieving, **K.M. Powell**
Given in Conjunction with Utah Clean Energy and the Utah Governor's Office of Energy Development
Professional Workshop for Energy Managers, Salt Lake City, UT, Aug. 2018   2018

"The Faculty Champions Initiative: Why it Works"
K. Dries, **K.M. Powell**
The Career Leadership Collective
Professional Workshop for University Career Representatives, Webinar, Aug. 2018   2018

"Optimization and the Smart Grid"
K.M. Powell
Session Chair
The American Control Conference, Milwaukee, WI, June 2018   2018

"Synergistic Solar Hybrids"
K.M. Powell
Brigham Young University Department of Chemical Engineering
Graduate Research Seminar, Provo, UT, Nov. 2017   2017

"Advancing Energy Efficiency in Manufacturing"
K.M. Powell
Energy Services Coalition Workshop – Utah Chapter
Energy Services Coalition – Utah Chapter, Salt Lake City, UT, Nov. 2017   2017

"Design and Operation of Synergistic Solar Hybrids"
K.M. Powell
University of Utah Department of Chemical Engineering
Graduate Research Seminar, Salt Lake City, UT, Oct. 2017   2017

"A Career in the Energy Sector"
K.M. Powell
Given to Students and Energy Professionals
Utah Energy Career Expo, Salt Lake City, UT, June 2017   2017

"Dynamic Optimization of Energy Systems with Energy Storage"
K.M. Powell
Brigham Young University Department of Chemical Engineering
Graduate Research Seminar, Provo, UT, Oct. 2016   2016

"Hybrid Systems, Optimization, and Energy Storage"
K.M. Powell
INL Nuclear Hybrid Energy Systems CORE Workshop, Idaho Falls, ID, June 2013   2013

RESEARCH GRANTS

Department of Energy Office of Energy Efficiency and Renewable Energy and Rocky Mountain Power, "Intermountain Industrial Assessment Center", 2021-2026, K.M. Powell (PI), J. Sieving (co-PI), Dr. Pershing (co-PI), **$2,194,700**.

Giv Development, "Affordable and Energy Efficient Housing Through Technological Development" 2021-2024, K.M. Powell (PI), J. Sieving (co-PI), M. Reynolds, **$120,000.**

Dominion Energy, "Developing Clean Natural Gas Technologies in Utah" 2020-2022, K.M. Powell (PI), K. Kelly (co-PI), D. Pershing (co-PI), J. Sieving (co-PI), **$1,000,000**.

Utah Governor's Office of Energy Development, "A Survey of Energy Investment Opportunities in the Agricultural Sector" 2020-2021, J. Sieving (PI), K.M. Powell (co-PI), **$30,000**.

Department of Energy: Office of Energy Efficiency and Renewable Energy, "Improving the Economics of Industrial Battery Storage: A Proactive Policy and Management Approach" 2020-2021, K.M. Powell (PI), J. Sieving (co-PI), **$25,000**.

Department of Energy: Office of Fossil Energy, "Deployment of Dynamic Neural Network Optimization to Minimize Heat Rate during Ramping for Coal Power Plants" 2019-2022, K.M. Powell (PI), A. Fry (co-PI), K. Andersson (co-PI), D. Pershing (co-PI), **$3,784,781**.

Department of Energy: Office of Nuclear Energy, "Proactive Hybrid Nuclear with Load Forecasting" 2019-2022, J.D. Hedengren (PI), M. Memmot (co-PI), K.M. Powell (co-PI), P. Talbot (co-PI), $799,933 **($189,272 to University of Utah)**.

Department of Energy: Office of Energy Efficiency and Renewable Energy, "Machine-Learning-Based Optimization of Industrial Cooling Towers" 2018-2019, J. Sieving (PI), K.M. Powell (co-PI), **$25,000**.

Utah Governor's Office of Energy Development, "Smart Energy Management in Industrial Systems", 2017-2022, K.M. Powell (PI), **$190,000**.

Utah Science and Technology Research (USTAR): Energy Research Triangle, "Proactive Energy Management using Weather and Market Forecasts to Enhance Efficiency and Renewables on the Grid", 2017-2022, K.M. Powell (PI), J.D. Hedengren (co-PI), S. Clyde (co-PI), **$125,000**.

Department of Energy: Office of Energy Efficiency and Renewable Energy, "Proactive Automation of Batch Manufacturing in a Smart Grid Environment" 2017-2018, K.M. Powell (PI), Stephen Denton (co-PI), Helga Kovacs (co-PI), **$25,000**.

PacifiCorp: Sustainable Transportation and Energy Plan (STEP), "Artificial Intelligence to Enhance Clean Coal", 2017-2019, K.M. Powell (PI), **$395,000**.

Department of Energy Office of Energy Efficiency and Renewable Energy, "Intermountain Industrial Assessment Center", 2016-2021, K.M. Powell (PI), A. Smith (co-PI), K. Whitty (co-PI), **$1,805,161**.

The University of Texas at Austin Office of Sustainability, "Optimization of the Campus Cooling System to Reduce Energy Usage", 2012-2013, K. M. Powell (PI), T. F. Edgar, K. Kuretich, W. J. Cole, R. Thompson, J. Hedengren, K. Kapoor, J. Mojica, A. Sriprasad, J. Kim (co-PI's), **$36,930**.

National Science Foundation Graduate Research Fellowship Program, "Measurement Techniques and Improved Control Systems for Rapid Thermal Annealing Processes Used for Printed Thin Film Solar Cells", 2009-2012, K.M. Powell (PI), **$121,500**.

COMMITTEE APPOINTMENTS AND SERVICE ROLES

Graduate Committee Member University of Utah – Department of Chemical Engineering	2020-Present
Chair – Engineering Faculty Career Council University of Utah – College of Engineering	2019-Present
Editorial Board Member *Processes* Journal	2020-Present
Teaching Excellence Committee Member University of Utah – College of Engineering	2021-Present
Guest Editor for *Processes* Journal "Modeling, Control, and Optimization of Multi-Generation and Hybrid Energy Systems"	2019-2020
Associate Editor for AIChE Contributed Papers American Control Conference 2020	2019-2020
Webinar Series Committee Member American Institute of Chemical Engineers	2016-Present
Member Department of Chemical Engineering Faculty Search Committee	2018-2019
Student Career Advisor Department of Chemical Engineering Service Assignment	2016-Present
University Studies Committee Member University of Utah University Studies Committee	2016-2019
University Graduate Fellowship Evaluation Committee Member University of Utah Graduate Fellowship Committee	2016, 2020
Affiliate International Federation of Automatic Control (IFAC)	2019-Present
Member American Society of Engineering Educators	2017-Present
Member Computers and Systems Technology (CAST) Division of AIChE	2010-Present

Member   2006-Present
American Institute of Chemical Engineers

DOCTORAL STUDENTS SUPERVISED

Khalid Rashid, Ph.D.	2019
Kevin Elllingwood, Ph.D.	2020
Moataz Sheha, Ph.D.	2020
Jacob Tuttle, Ph.D.	2020
Landen Blackburn	2021
Derek Machalek	2021
Blake Billings	2023 (expected)
An Ho	2023 (expected)
Jake Immonen	2024 (expected)
Michael Reynolds	2024 (expected)
Jiwei Yao	2024 (expected)
Yunzhi Chen	2025 (expected)
R.T. Williams	2025 (expected)