

Curriculum Vitae

Charles H. Culp, P.E., Ph.D., FASHRAE, LEED-AP, HBDP

Department of Architecture
Texas A&M University
3137 TAMU
College Station, TX 77843-3137
979-458-3600
cculp@tamu.edu

EDUCATION

Ph.D., Solid State Physics (EE minor), 1976, Iowa State University, Ames, IA.
B.S., Physics, 1970, with Highest Honors, New Mexico Institute of Mining and Technology, Socorro, NM.

PROFESSIONAL REGISTRATION

Professional Engineer, State of Texas, License Number 87201.

PROFESSIONAL EXPERIENCE

1999 TO TEXAS A&M UNIVERSITY

PRESENT PROFESSOR, DEPARTMENT OF ARCHITECTURE

2011 TO PRESENT

& ASSOCIATE DIRECTOR, ENERGY SYSTEMS LAB

Teaching Environmental Design, High Performance Building and HVAC classes to Architecture and Engineering students. Leading sponsor supported research in the Heating Ventilating and Air Conditioning field in sustainable, performance based buildings. Introducing undergrad and graduate students to current research. Specifically, leading Measurement and Verification technology efforts needed in performance based architecture, leading the introduction of energy efficiency codes in Texas and researching sustainable efficiency improvements in buildings. Co-inventor of a novel non-refrigerant based air conditioner and secured \$8M to create prototypes. Inventor of a new concept heat and energy recovery ventilator and writing proposals to secure funding to build prototypes. Past-President of the American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) College of Fellows. Have proposed and secured over \$15 million in funding from federal, state and industry sources since August, 1999.

ASSOCIATE PROFESSOR, DEPARTMENT OF ARCHITECTURE

2004 to 2011

ASSOCIATE DIRECTOR, ENERGY SYSTEMS LAB

1999 to 2004

& VISITING PROFESSOR, MECHANICAL ENGINEERING DEPARTMENT

Conducted sponsor-supported research in the HVAC field on sustainable, performance based buildings, focused on M&V, energy efficiency codes and sustainable design. Taught Design and HVAC courses to Mechanical Engineering and Architecture students. Introduced a trademark and patent strategy to significantly improve research funding levels. By 2004, proposed and secured over \$8 million in funding from federal, state and industry sources as part of the Energy Systems Lab.

**1994 TO
1999**

EMERSON ELECTRIC INC.

FISHER CONTROLS, MARSHALLTOWN, IA

1997 TO 1999

DIRECTOR OF RESEARCH

Led developments in air quality sensor technology, simulation, materials and instrument products. Developed chemical sensors, hall-effect transducers and electronic controls for field installations. Planned and implemented technology roadmaps with cost and functionality targets. Managed polymer, metals, electronics and flow testing laboratories. Established a patent strategy that substantially increased intellectual property output.

EMERSON HVAC/R ADVANCED DEVELOPMENT CENTER, SIDNEY, OH

DIRECTOR

1995 TO 1997

Developed system technology for HVAC air conditioning compressors, valves and controls. Analyzed and supported electronic acquisitions. Conducted annual Technology Conferences for Emerson executive management. Managed a psychrometric, load and home laboratory facility for testing the performance of air-conditioners. Developed an air-conditioner simulation used for achieving low energy building components. Developed a high performance heat-pump/air-conditioner system which improved comfort and significantly reduced cost. This required measuring the performance of various components in the air-conditioner and assembling into a complete system. Designed a complete supermarket control system which reduced the spoilage and shrinkage of meats and vegetables in supermarket display refrigeration cases.

ALCO CONTROLS, ST. LOUIS, MO

DIRECTOR OF ENGINEERING

1995 TO 1997

This was an additional concurrent Emerson responsibility to develop electronic capabilities in Alco's engineering department. Department developed two models of electric stepper refrigeration valves and a self-adaptive electronic controller module with user interface for use in low-energy use supermarkets. Prototyped stand-alone electronic controls for supermarkets. A high performance refrigeration valve design won a major supermarket customer from Alco's main competitor.

EMERSON ADVANCED MATERIALS CENTER, COLUMBUS, OH

DEPUTY DIRECTOR

1994 TO 1995

Supported divisional technology needs. Led design review teams in mechanical design, advanced materials and hardware/software systems to reduce the cost and improve the performance of HVAC and other electro-mechanical systems. Directed extensive outside research to benefit Emerson companies.

**1977 TO
1994**

HONEYWELL INC., ARLINGTON HEIGHTS, IL

SENIOR ENGINEER, PRINCIPAL ENGINEER, SR PRINCIPAL ENGINEER, HONEYWELL FELLOW

Specified, designed and managed the hardware and software development of Honeywell's Delta 21 Energy Management System from concept through production (~\$8M, 3 year effort). Led the development of two custom mixed signal integrated circuits. Developed an expert chiller maintenance and diagnostics system for chiller maintenance diagnostics, which led to a two-fold growth in business over a sixteen-month period. Performed technology development of real time pricing applications, which saved the Marriott Marquis over \$300,000 per year. Designed and managed the

hardware and diagnostics of Honeywell's Delta 2500L Energy Management System for automating large military base HVAC controls (\$2M, 2 year effort). Supported the Honeywell field organization effort to achieve energy efficiency in a wide variety of buildings.

1975 TO 1977 **INTERAND CORPORATION, CHICAGO, IL**
PROJECT DIRECTOR

Developed video-based interactive systems for training US Army personnel, police, pre-medical students and children with cerebral palsy. Conducted communication studies for US Army.

1970 TO 1975 **IOWA STATE UNIVERSITY, AMES, IA**
GRADUATE RESEARCH ASSISTANT
NSF FELLOWSHIP

Studied and predicted electric field induced bi-stable conduction properties of amorphous organic and inorganic semiconductors. Research findings in melanin, an organic semiconductor, were used by medical researchers to study Parkinsonism and other neural diseases. Also, studied and discovered new Fermi bands from the optical properties of thin film metals at cryogenic temperatures.

Thesis – Threshold Switching Properties of Organic and Inorganic Amorphous Semiconductors.

1966 TO 1970 **GEOPHYSICS RESEARCH LABORATORY AT NEW MEXICO TECH, SOCORRO, NM**
CO-OP STUDENT (DESIGN ENGINEER)

Radar and electronic equipment repair technician during freshman year. Lead designer of analog and digital electronics for three complex data acquisition systems used in thunderstorm research during sophomore through senior years.

HONORS, AWARDS and SPECIAL RECOGNITION

- 2020 Invited and am serving on the TAMU Faculty Advisory Board for Commercialization.
- 2019 Invited and am serving on a National Academy of Science, Engineering and Medicine Panel.
- 2019 Certificate of Appreciation for a two-year service term on ASHRAE's Residential Building Committee.
- 2019 Certificate of Appreciation for a three-year service term on ASHRAE's Technology Council.
- 2017 Elected to be a voting member of ASHRAE's Residential Building Committee.
- 2016 Elected to be a voting member of ASHRAE's Technology Council
- 2015 Certificate of Appreciation for a three-year service term on ASHRAE's Board of Directors.
- 2015 Honored with the E. K. Campbell Award for teaching in 2015 from ASHRAE, included a \$10,000 honorarium (used for students).
- 2013 Awarded ASHRAE's Life Member status.
- 2013 Awarded ASHRAE's Distinguished Service Award.
- 2012 Elected to the ASHRAE Board of Directors as a Director-at-Large.
- 2010 Elected President of the ASHRAE College of Fellows.
- 2010 Invited to revise ASHRAE's High Performance Building Design Professional Certification Test.

Charles H. Culp - *Curriculum Vitae*

- 2009 Team selected to define Texas A&M University's research direction. I represented the College of Architecture in a team with the College of Science that was 1 of 8 teams (out of 111) selected for major internal funding for research by the Provost.
- 2009 Elected President-Elect of the ASHRAE College of Fellows.
- 2008 Awarded ASHRAE's High Performance Building Design Professional Certification.
- 2008 Invited by the President of ASHRAE to be on a select group to advise the US General Services Agency on energy efficiency in using their \$5.5B stimulus funding.
- 2008 Selected to be an expert adviser to Elsevier on a web based HVAC course. Elsevier included a \$7.5K honorarium (donated to the College of Architecture).
- 2008 Selected to advise the Air-Conditioning Contractors of America (ACCA) on the next version of their "Manual D – Residential Duct Systems". ACCA included a \$5K contract through Texas A&M for my time and travel.
- 2007 Letter of recognition from Major General Del Eulberg, Commander USAF Civil Engineering, for contributions to energy savings at Elmendorf AFB.
- 2007 ASHRAE Certificate of Appreciation, Technical Committee Chair, TC-9.5, Residential and Small Commercial Applications.
- 2007 ASHRAE Certificate of Appreciation, 2007 ASHRAE Handbook – HVAC Applications.
- 2006 US Green Building Council Accredited Professional, LEED-AP.
- 2006 Invited by TEKES (the Finnish equivalent of NSF) to review over 30 energy efficiency programs in Finland. Traveled to Finland to perform this review.
- 2006 ASHRAE Letter of Recognition, co-author Advanced Energy Design Guide for Small Retail Buildings.
- 2005 Elected to the grade of ASHRAE Fellow.
- 2005 Texas A&M College of Architecture Letter of Recognition.
- 2005 DOE Build America Program Review Panel Member, Washington, DC.
- 2005 Letter of recognition from Major General L. Dean Fox, Commander USAF Civil Engineering, for Energy Savings at Fairchild AFB.
- 2005 ASHRAE Letter of Appreciation, Research Advisory Panel.
- 2003 Air Distribution Institute, Certificate of Appreciation, Santa Fe, NM.
- 2002 ASHRAE Certificate of Appreciation for contributions to ASHRAE's Guideline 14-2002.
- 2001 Awarded DOE's Energy Challenge Grand Prize, Faculty Advisor to the Texas A&M Fuel Cell Inverter Design Team.
- 2001 DOE Federal Energy Management Program, Letter of Invitation.
- 2000 Certificate of Appreciation from the Assistant Secretary of the Army.
- 1999 DOE Proposal Review Team, Chicago.
- 1997 Iowa Governor's Achievement Award.
- 1996 ASHRAE Certificate of Appreciation, Chairman Journal / Insights Committee.
- 1994 ASHRAE Certificate of Appreciation, Technical Committee Chair, TC-2.5, Computer Applications.
- 1992 Elected to the American Society of Distinguished Patent Holders.
- 1986 Elected to the position of Honeywell Fellow.
- 1973 NSF Fellowship awarded as a graduate student.
- 1962 Order of the Arrow, Boy Scouts of America.

Charles H. Culp - *Curriculum Vitae*

1962 Eagle Scout, Boy Scouts of America.

PUBLICATIONS

Refereed Journal Publications (*Graduate Student)

1. D.E. Claridge, C. H. Culp, W. Liu, M. Pate, J. Haberl, J Bynum*, O. Tanskyi* and F. Schaff*. 2019. "A New Approach for Drying Moist Air: the Ideal Claridge-Culp-Liu Dehumidification Process with Membrane Separation, Vacuum Compression and Sub-atmospheric Condensation." *International Journal of Refrigeration*, 101-211-217.
2. Shajahan A*, Culp C. H. 2019. "Effects of indoor environmental parameters related to building HVAC systems on patients' medical outcomes: A review of scientific research on hospital buildings." *Indoor Air*, Mar, Vol. 29 Issue 2, p161-176. 16p.
3. Dixit, M. K.*, C. H. Culp, J. L Fernandez-Solis. 2016. "Reducing Carbon Footprint of Facilities Using a Facility Management Approach." *Facilities*, 2016, Vol. 34 Issue 3/4, 247-259.
4. Ian C. Nelson*, Charles H. Culp, Julian Rimmer, Brad Tully. 2016. "The Effect of Thermal Load Configuration on the Performance of Passive Chilled Beams." *Building and Environment*, 96, 188-197.
5. Mitchell T. Paulus*, D. E. Claridge, C. H. Culp. 2015. "Algorithm for Automating the Selection of a Temperature Dependent Change Point Model." *Energy and Buildings*, 87:95–104.
6. Dixit, M. K.*, C. H. Culp, J. L Fernandez-Solis. 2015. "Embodied Energy of Construction Materials: Integrating Human and Capital Energy into an IO-Based Hybrid Model." *Environmental Science & Technology*, 49(3), 1936-1945.
7. Ugursal, A.*, L. G. Tassinary, C. H. Culp. 2014. "Airflow Perception and Draught Rating for Varying Thermal Conditions," *ASHRAE Transactions*, Vol. 120 Part 2, 1-8.
8. Dixit, M. K.*, C. H. Culp, S. Lavy, J. L Fernandez-Solis. 2014. "Recurrent Embodied Energy and Its Relationship with Service Life and Life Cycle Energy: A Review Paper," *Facilities*, Vol. 32 Issue 3/4, 160-181.
9. Ugursal A.*, C. H. Culp. 2013. "The effect of temperature, metabolic rate and dynamic localized airflow on thermal comfort," *Applied Energy*, 111, 64–73.
10. Dixit, M. K.*, C. H. Culp, and J. L. Fernández-Solís. 2013. "System boundary for embodied energy in buildings: A conceptual model for definition," *Renewable and Sustainable Energy Reviews*, 21, 153–164.
11. Ugursal, A.*, C. H. Culp. 2013. "Gender Differences of Thermal Comfort Perception Under Transient Environmental and Metabolic Conditions," *ASHRAE Transactions*, Volume 119, Part 2, 52–62.
12. Andolsun, S.*, C. H. Culp. 2012. "Occupancy Based Heating/Cooling for Low Energy Affordable Housing in Hot-Humid Climates," *ASHRAE Transactions*, Volume 118, Part 1, 233–240.
13. Dixit, M. K.*, J. L. Fernández-Solís, S. Lavy, and C. H. Culp. 2012. "Need for an embodied energy measurement protocol for buildings: A review paper," *Renewable and Sustainable Energy Reviews*, 16 (6), 3730–3743.
14. Ugursal, A.*, C. H. Culp. 2012. "An Empirical Thermal Comfort Model for Transient Metabolic Conditions," *ASHRAE Transactions*, Volume 118, Part 1, 742–750.

15. Andolsun, S.*, C. H. Culp, J. S. Haberl, and M. J. Witte. 2012. "EnergyPlus vs DOE-2.1e: The effect of ground coupling on cooling/heating energy requirements of slab-on-grade code houses in four climates of the US," *Energy and Buildings*, 52, 189–206.
16. Andolsun, S.*, C. H. Culp, J. S. Haberl, and M. J. Witte. 2011. "EnergyPlus vs. DOE-2.1e: The effect of ground coupling on energy use of a code house with a basement in a hot-humid climate," *Energy and Buildings* 43(7), 1663–1675.
17. Dixit, M.K.*, J. L. Fernández-Solís, S. Lavy, and C. H. Culp. 2010. "Identification of parameters for embodied energy measurement: A literature review," *Energy and Buildings*, 42 (8), 1238 – 1247.
18. Yan, W., C. H. Culp, R. Graf*. 2010. "Integrating BIM and Gaming for Real-time Interactive Architectural Visualization," *Autom. Constr.*, doi:10.1016/j.autcon.2010.11.013.
19. Dixit, M. K.*, J. L. Fernández-Solís, S. Lavy, C. H. Culp. 2010. "Identification of Parameters for Embodied Energy Measurement: A Literature Review," *Energy and Buildings*, Volume 42, pages 1238-1247.
20. Culp, C. H., D. Cantrill*. 2009. "Pressure Losses in 12", 15" and 16" Non-Metallic Flexible Ducts with Compression and Sag (RP-1333)," *ASHRAE Transactions*, Volume 115, Part 1, January.
21. Weaver, K.*, C. H. Culp. 2007. "Static Pressure Losses in Nonmetallic Flexible Duct (RP-1333)," *ASHRAE Transactions*, Volume 113, Part 2, June.
22. Ugursal, A.*, C. H. Culp. 2007. "Comparative Analysis of CFD ΔP vs. Measured ΔP for Compressed Flexible Ducts," *ASHRAE Transactions*, Volume 113, Pg. 462-469.
23. Ahmad, M.*, C. H. Culp. 2006. "Uncalibrated Building Energy Simulation Modeling Results," *HVAC&R Research*, Vol. 12, No. 4, pp. 1141-1155, October.
24. Claridge, D. E., W. D. Turner, M. Liu, S. Deng, G. Wei, C. H. Culp, H. Chen, S. Y. Cho. 2004. "Is Commissioning Once Enough?" *Energy Engineering*, Vol. 101, No. 4, pp. 7-19.
25. Yearly, M., J. Sweeney, B. Swan, C. H. Culp. 2003. "A Low Cost Embedded System for Internet Based Power Measurement," *International Journal of Information Technology and Decision Making*, Vol. 2, No. 4, pp 669-682.
26. Haberl, J. S., R. J. Sparks, and C. H. Culp. 1996. "Exploring New Techniques for Displaying Complex Building Energy Consumption Data," *Energy and Buildings*, 24, pp. 27-38.
27. Culp, C. H., B. Krafthefer, M. Rhodes, and M. Listvan. 1993. "Silicon Infrared Sensors for Thermal Comfort and Control," *ASHRAE Journal*, Vol. 35, No. 4, April.
28. Culp, C. H., J. S. Haberl, L. Norford, P. Brothers, and J. Hall. 1990. "The Impact of AI Technology within the HVAC Industry," *ASHRAE Journal*, December.
29. Culp, C. H. 1989. "Expert Systems in Preventative Maintenance and Diagnostics," *ASHRAE Journal*, Vol. 31, No. 8, August.
30. Culp, C. H. 1988. "Mentor and AI Technology Transfer," *Scientific Honeyweller*, Vol. 9, No. 1.
31. Weaver, J. H., D. W. Lynch, C. H. Culp, R. Rosei. 1976. "Thermo-reflectance of V, Nb, and Paramagnetic Cr," *Physics Review*, B14, p. 459.
32. Culp, C. H., L. Reiffel. 1976. "Electronic Graphics and Visual Programming Effects," *Broadcast Programming and Production*, Vol. 2, No. 3, May.

33. Rosei, R., C. H. Culp, J. H. Weaver. 1975. "Temperature Modulation of the Optical Transition Involving the Fermi Surface in Ag: Experimental," *Physics Review*, B10, p. 484.
34. Culp, C. H., D. E. Eckles, P. H. Sidles. 1975. "Threshold Switching in Melanin," *Journal of Applied Physics*, Vol. 46, No. 8, August.

Books and Authoritative References

1. Claridge, D. E., Culp, C. H., Haberl J. E., Martinez, J., Christman K., Eluvathingal, S., Nemer H., Shajahan, A., Negandhi, V. 2018. "Existing Building Commissioning Fundamentals," Internal TEES publication, 188 pages. In final review.
2. Claridge, D. E., Culp, C. H., Haberl J. E., Martinez, J., Christman K., Eluvathingal, S., Nemer H., Shajahan, A., Negandhi, V. 2018. "Continuous Commissioning® Theory and Practice," Internal TEES publication, 120 pages. In final review.
3. Claridge, D. E., M. T. Paulus, C. H. Culp, K. Christman. 2016. Chapter: Continuous Commissioning, "A Whole-System Approach to High-Performance Green Building," editors: David Strong and Victoria Burrows.
4. Culp, C. H. 2009. Contributing author, "Residential Duct Systems, Manual D", an ANSI Standard developed and published by the Air Conditioning Contractors of America, Arlington, VA. My contribution included revising this standard to reflect the results of the research of flexible duct.
5. Culp, C. H. 2009. Contributing author, "HVAC Systems and Equipment, Duct Design," Chapter 32 in *ASHRAE Handbook*, 1-14. Included results from my research on flexible ducts.
6. Culp, C. H. 2007. Principal author of (2) revised pages in "Heating, Ventilation, and Air – Conditioning (HVAC)," In *Architectural Graphic Standards*, 11th Edition, 451-453.
7. Claridge, D. E., C. H. Culp. 2007. "HVAC System Control," Chapter 11 in *CRC Handbook of Energy Efficiency and Renewable Energy*, edited by Frank Kreith and D. Yogi Goswami, CRC Press.
8. Culp, C. H. 2007. Lead author, "Building Commissioning," In *ASHRAE Handbook*, Chapter 42, 1-14. I was the chair of the Handbook Committee and primary author.
9. Culp, C. H. 2006. Co-author, *Advanced Energy Design Guide – Small Retail*. Atlanta, GA: ASHRAE.
10. Haberl, J. S., C. H. Culp. 2005. Co-authors, "Monitoring and Verification," Chapter 27 in *Energy Management Handbook*, 5th Edition, Edited by Wayne Turner, 715-762. New York: Fairmont Press.
11. Culp, C. H. 2002. Contributing author, *ASHRAE Guideline 14-2002, Measurement of Energy and Demand Savings*. Atlanta, GA: ASHRAE.
12. Culp, C. H. 1995. Lead author, "HVAC Applications, Energy Management," Chapter 32 in *ASHRAE Handbook*, 1-14. I was the chair of the Handbook Committee and primary author.
13. Culp, C. H. 1995. Lead author, "HVAC Applications, Building Energy Monitoring," Chapter 37 in *ASHRAE Handbook*, 1-14. I was the chair of the Handbook Committee and primary author.

Peer Reviewed Conference Proceedings (*Graduate Student)

1. Culp, C. H. 2018. "What's Inside ASHRAE's Duct Calculator Tool: How It Works, and Why It Helps," ASHRAE Conference Paper, Session 7, Chicago, Illinois.
2. Culp, C. H. 2017. "Research Background for ASHRAE's New Duct Calculator Tool," ASHRAE Conference Paper, Workshop 1, Las Vegas, Nevada.
3. Ugursal, A. *, L. G. Tassinary, C. H. Culp. 2014. "Airflow Perception and Draught Rating for Varying Thermal Conditions," ASHRAE Conference Paper, SE-14-C068.
4. Dixit, M.K.*, Culp, C.H., Fernández-Solís, J.L., & Lavy, S. (2014). "A Facility Management Approach to Reducing Energy and Carbon Footprint of Built Facilities." In Proceedings of Joint CIB W070, W111 and W118 International Conference, Copenhagen, May 21-23, 2014
5. Ugursal, A.*, C. H. Culp. 2013. "The Development of a Test Methodology for Transient Thermal Comfort Analysis," ASHRAE Conference Paper, DA-13-C080.
6. Andolsun, S.*, C. H. Culp. 2013. "Transformation of a Baseline Affordable House into a Partially Cooled Atrium House in a Hot-Humid Climate," ASHRAE Conference Paper, DA-13-C016.
7. Dixit, M. K.*, C. H. Culp, S. Lavy, and J. L. Fernández-Solís. 2012. "Recurrent Embodied Energy and Its Relationship with Service Life and Life Cycle Energy: A Review Paper," Best Paper Award, Facilities Management Theme, Joint CIB W070, W092 and TG72 International Conference on Facilities Management, Procurement Systems and Public Private Partnership, Cape Town, South Africa, January 23–25.
8. Dixit, M. K.*, J. L. Fernández-Solís, S. Lavy, and C. H. Culp. 2010. "State of Standardization in Embodied Energy Computation: The need for a Protocol," FM in the Experience Economy, September 13–15, 2010, Sao Paulo, Brazil.
9. Caffey, S. M., R. G. Graf*, C. H. Culp, W. Yan, E. Barekati, and M. Marshall. 2010. "Reconstructing the Music Hall Rotunda and Annex at Vauxhall Pleasure Gardens c. 1764," Electronic Visualization and the Arts London, 2010 Conference British Computer Society London, July 5–7.
10. Dixit, M. K.*, J. L. Fernández-Solís, S. Lavy, and C. H. Culp. 2010. "Protocol for Embodied Energy Measurement Parameters," In P. Barrett et al. (Ed.) Proceedings TG66 - Special Track 18th CIB World Building Congress (pp. 188–203), May 10–13, 2010, Salford, United Kingdom.
11. Haberl, J., Culp, C., Yazdani, B., Liu, Z., Gilman, D., Marshall, K., Mukopadhyay, J., Baltazar-Cervantes, J-C., Montgomery, C., McKelvey, K. 2009. "Development of a Web-based, Code-compliant 2001 IECC Residential Simulator for Texas", 2009 Building Simulation Conference, International Building Performance Simulation Association (IBPSA), University of Strathclyde, Glasgow, Scotland (April).
12. Andolsun, S.*, C. H. Culp. 2008. "A Comparison of EnergyPlus to DOE-2.1E: Multiple Cases Ranging from a Sealed Box to a Residential Building," *Proceedings of the Sixteenth Symposium on Improving Building Systems in Hot and Humid Climates*, Plano, TX, December 15 - 17.
13. Ugursal, A.*, C. H. Culp. 2008. "The Effects of Geometry on Flexible Duct CFD Simulations," *Proceedings of the Sixteenth Symposium on Improving Building Systems in Hot and Humid Climates*, Plano, TX, December 15 - 17.

14. Nelson, I. C.*, C. H. Culp, R. D. Graves. 2008. "Semi-Empirical Screw Compressor Chiller Model," *Proceedings of the Sixteenth Symposium on Improving Building Systems in Hot and Humid Climates*, Plano, TX, December 15 - 17.
15. Liu, Z., J. Haberl, J. C. Baltazar, C. H. Culp, B. Yazdani, V. Chandrasekaran. 2008. "Calculating Emissions Reductions from Renewable Energy Programs and its Application to the Wind Farms in the Texas ERCOT Region," *Proceedings of the Sixteenth Symposium on Improving Building Systems in Hot and Humid Climates*, Plano, TX, December 15 - 17.
16. Gilman, D. R., K. Marshall, Z. Liu, J. Mukhopadhyay, R. Stackhouse, J. Cordes, C. Montgomery, K. McKelvey, S. O'Neal, C. H. Culp, J. Haberl, B. Yazdani. 2008. "Development of A Residential Code-compliant Web-based Energy Efficiency Calculator," *Proceedings of the Sixteenth Symposium on Improving Building Systems in Hot and Humid Climates*, Plano, TX, December 15 - 17.
17. Liu Z., J. Haberl, J. C. Baltazar, K. Subbarao, C. H. Culp, B. Yazdani. 2007. "A Methodology for Calculating Emissions Reductions from Renewable Energy Programs and Its Application to the Wind Farms in the Texas ERCOT Region," *Proceedings of the 2007 International Conference for Enhanced Building Operations*, San Francisco, California, November 1-2.
18. Baltazar, J. C., J. Haberl, C. H. Culp, B. Yazdani, D. Gilman. 2007. "Procedures for the Integration of Complete Year Texas Weather Data Files for eCalc-Emissions Reduction Calculator," *Proceedings of the 2007 International Conference for Enhanced Building Operations*, San Francisco, California, November 1-2.
19. Culp, C. H., J. S. Haberl, J. Mukhopadhyay, J. B. Liu, B. Yazdani, M. Malhotra. 2007. "Recommendations for 15% Above-Code Energy Efficiency Measures for Single-Family Residences," *Proceedings of the 2007 Symposium on Improving Building Systems in Hot and Humid Climates*, San Antonio, TX, December 17 - 18.
20. Haberl, J. S.; K. Marshall, J. Mukhopadhyay, D. R. Gilman, R. Stackhouse, J. Cordes, B. Yazdani, C. H. Culp, R. Morgan, C. Montgomery, Z. Liu. 2007. "Development of a Residential Code-Compliant Calculator for the Texas Climate Vision Project," *Proceedings of the 2007 Symposium on Improving Building Systems in Hot and Humid Climates*, San Antonio, TX, December 17 - 18.
21. Culp, C. H., J. S. Haberl, J. Mukhopadhyay, J. B. Liu, B. Yazdani, S. Cho. 2007. "Recommendations for 15% Above-Code Energy-Efficiency Measures for Commercial Office Buildings," *Proceedings of the 2007 Symposium on Improving Building Systems in Hot and Humid Climates*, San Antonio, TX, December 17 - 18.
22. Bou-Saada, T., C. H. Culp. 2006. "A Pilot Case Study of Measurement and Verification for a Major Texas State Agency Performance Contracting Initiative," *Proceedings of the Sixteenth Symposium on Improving Building Systems in Hot and Humid Climates*, San Francisco, California, November 1-2
23. Weaver, K.*, C. H. Culp. 2006. "Static Pressure Losses in 6", 8", and 10" Non-Metallic Flexible Duct," *Proceedings of the 2006 International Conference for Enhanced Building Operations*, Shenzhen, China, November 6-8.
24. Liu, Z., J. S. Haberl, D. Gilman, C. H. Culp, B. Yazdani. 2006. "Development of a Web-based Emissions Reduction Calculator for High Efficiency Pump/Motor Retrofits," *Proceedings of the 2006 International Conference for Enhanced Building Operations*, Shenzhen, China, November 6-8.

25. Liu, Z., J. S. Haberl, D. Gilman, C. H. Culp, B. Yazdani. 2006. "Development of a Web-based Emissions Reduction Calculator for Storm Water/Infiltration Sanitary Sewage Separation," *Proceedings of the 2006 International Conference for Enhanced Building Operations*, Shenzhen, China, November 6-8.
26. Verdict, M., J. S. Haberl, C. H. Culp. 2006. "Quantification of NO_x Emissions Reductions for SIP Credits from Energy Efficiency and Renewable Energy Projects in Texas," *Proceedings of the 2006 ACEEE Summer Study on Energy Efficiency in Buildings*, Monterey, CA, August.
27. Ugursal, A.*, C. H. Culp, 2006. "Comparative Study: CFD ΔP Versus Measured ΔP for 30% Flexible Ducts," *Proceedings of the Fifteenth Symposium on Improving Building Systems in Hot and Humid Climates*, Orlando, FL, July 24-26.
28. Bou-Saada, T., C. H. Culp. 2006. "A Pilot Case Study of Measurement and Verification for a Major Texas State Agency Performance Contracting Initiative," *Proceedings of the Fifteenth Symposium on Improving Building Systems in Hot and Humid Climates*, Orlando, FL, July 24-26.
29. Baltazar, J. C., J. S. Haberl, C. H. Culp, B. Yazdani. 2006. "Impact of the Implementation of the 2000/2001 IECC on Residential Energy Use in Texas: Preliminary Verification of Residential Energy Savings," *Proceedings of the Fifteenth Symposium on Improving Building Systems in Hot and Humid Climates*, Orlando, FL, July 24-26.
30. Kim, S., M. Ahmad, P. Im, C. Chongcharoensuk, J. S. Haberl, C. H. Culp, B. Yazdani. 2006. "Impact of the Implementation of the 2000/2001 IECC on Commercial Energy Use in Texas: Analysis of Commercial Energy Savings," *Proceedings of the Fifteenth Symposium on Improving Building Systems in Hot and Humid Climates*, Orlando, FL, July 24-26.
31. Ahmad, M., P. Im, J. Mukhopadhyay, M. Malhotra, J. S. Haberl, C. H. Culp, B. Yazdani. 2006. "Impact of the Implementation of the 2000/2001 IECC on Residential Energy Use in Texas: Analysis of Residential Energy Savings," *Proceedings of the Fifteenth Symposium on Improving Building Systems in Hot and Humid Climates*, Orlando, FL, July 24-26.
32. Bou-Saada, T., C. H. Culp. 2005. "Guaranteed Long-Term Savings Persistence – An Owner's Perspective," *Proceedings of the Fifth International Conference for Enhanced Building Operations (ICEBO)*, Carnegie Mellon University, Pittsburgh, PA, published on CDROM, October.
33. Ahmad, M.*, D. Gilman, S. Kim, C. Chongcharoensuk, M. Malhotra, J. S. Haberl, C. H. Culp. 2005. "Development of a Web-Based Emissions Reduction Calculator for Code-Compliant Commercial Construction," *Proceedings of the Fifth International Conference for Enhanced Building Operations (ICEBO)*, Carnegie Mellon University, Pittsburgh, PA, published on CDROM, October.
34. Ahmad, M.*, D. Gilman, S. Kim, J. Mukhopadhyay, J. S. Haberl, C. H. Culp. 2005. "Development of a Web-Based Emissions Reduction Calculator for Code-Compliant Single-Family and Multi-Family Construction," *Proceedings of the Fifth International Conference for Enhanced Building Operations (ICEBO)*, Carnegie Mellon University, Pittsburgh, PA, published on CDROM, October.
35. Baltazar, J.C., J. S. Haberl, D. R. Gilman, C. H. Culp. 2005. "Development of a Web-Based Emissions Reduction Calculator for Solar Thermal and Solar Photovoltaic Installation," *Proceedings of the Fifth International Conference for Enhanced Building Operations (ICEBO)*, Carnegie Mellon University, Pittsburgh, PA, published on CDROM, October.

36. Haberl, J. S., D. E. Claridge, C. H. Culp. 2005. "ASHRAE's Guideline 14-2002 for Measurement of Energy and Demand Savings: How to Determine What Was Really Saved by the Retrofit," *Proceedings of the Fifth International Conference for Enhanced Building Operations (ICEBO)*, Carnegie Mellon University, Pittsburg, PA, published on CDROM, October.
37. Liu, Z., D. Gilman, J. S. Haberl, C. H. Culp. 2005. "Development of a Web-Based Emissions Reduction Calculator for Street Light and Traffic Light Retrofits," *Proceedings of the Fifth International Conference for Enhanced Building Operations (ICEBO)*, Carnegie Mellon University, Pittsburg, PA, published on CDROM, October.
38. Baltazar, J. C., J. S. Haberl, Z. Liu, D. Gilman, C. H. Culp. 2005. "Development of a Web-Based Emissions Reduction Calculator for Retrofits to Municipal Water Supply and Waste Water Facilities," *Proceedings of the Fifth International Conference for Enhanced Building Operations (ICEBO)*, Carnegie Mellon University, Pittsburg, PA, published on CDROM, October.
39. Liu, Z., J. C. Baltazar, J. S. Haberl, D. R. Gilman, C. H. Culp. 2005. "Development of a Web-Based Emissions Reduction Calculator for Green Power Purchases from Texas Wind Energy Providers," *Proceedings of the Fifth International Conference for Enhanced Building Operations (ICEBO)*, Carnegie Mellon University, Pittsburg, PA, published on CDROM, October.
40. Haberl, J. S., C. H. Culp, D. Gilman, B. Yazdani, T. Fitzpatrick, W. D. Turner. 2004. "Calculating NO_x Emissions Reductions from Energy Conservation and Renewable Energy Projects (EE/RE)," *Proceedings of the Industrial Energy Technology Conference*, Houston, TX, April 21.
41. Najafi, M.*, C. H. Culp, R. Langari. 2004. "Performance Study of Enhanced Auto-Associative Neural Networks for Sensor Fault Detection," *Proceedings of the Fourth International Conference for Enhanced Building Operations*, Paris, France, October 18-19.
42. Najafi, M.*, C. H. Culp, R. Langari. 2004. "Enhanced Auto-Associative Neural Networks for Sensor Diagnostics," 2004 IEEE International Conference on Fuzzy Systems, Pages 453-456, Vol. 1.
43. Haberl, J. S., C. H. Culp, et al. 2004. "Calculation of NO_x Emissions Reductions from Energy Efficient Residential Building Construction in Texas," *Proceedings of the Fourth International Conference for Enhanced Building Operations*, Paris, France, October 18-19.
44. Haberl, J. S., P. Im, C. H. Culp. 2004. "Methodology to Calculate NO_x Emissions Reductions from the Implementation of the 2000 IECC / IRC Conservation Code in Texas," *Proceedings of the Fourteenth Symposium on Improving Building Systems in Hot and Humid Climates*, Richardson, TX, May, pp. 113-126.
45. Culp, C. H., J. S. Haberl, B. Yazdani, T. Fitzpatrick, J. Bryant, W. D. Turner. 2004. "Texas Senate Bill 5 Legislations for Reducing Pollution in Non-Attainment and Affected Areas: an Overview of Legislative Responsibilities, Code Compliance Issues and Accomplishments," *Proceedings of the Fourteenth Symposium on Improving Building Systems in Hot and Humid Climates*, Richardson, TX, May, pp. 127-138.
46. Haberl, J. S., P. Im, C. H. Culp, B. Yazdani, T. Fitzpatrick. 2004. "NO_x Emissions Reductions from Implementation of the 2000 IECC / IRC Conservation Code to Residential Construction in Texas," *Proceedings of the Fourteenth Symposium on Improving Building Systems in Hot and Humid Climates*, Richardson, TX, May, pp. 139-150.

47. Culp, C. H., K. Q. Hart, W. D. Turner, S. Berry-Lewis. 2003. "Cost Effective Measurement and Verification at Fairchild AFB," *Proceedings of the Third International Conference for Enhanced Building Operations*, Berkeley, CA, October 13-15.
48. Haberl, J. S., C. H. Culp, et al. 2003. "Calculation of NO_x Emissions Reduction from Implementation of the 2000 IECC/IRC Conservation Code in Texas," *Proceedings of the Third International Conference for Enhanced Building Operations*, Berkeley, CA, October 13-15.
49. Haberl, J. S., P. Im, C. H. Culp, B. Yazdani, T. Fitzpatrick, W. D. Turner. 2003. "Calculation of NO_x Emissions Reductions from Implementation of the 2000 IECC/IRC Conservation Code in Texas," *Proceedings of the 2003 IBPSA Conference*, Eindhoven, The Netherlands, Vol. 1, pp. 443-450, August 11-14.
50. Claridge, D. E., W. D. Turner, M. Liu, S. Deng, G. Wei, C. H. Culp, H. Chen, S. Y. Cho. 2002. "Is Commissioning Once Enough?" Solutions for Energy Security and Facility Management Challenges, *Proceeding of the Twenty-Fifth WEEC*, Atlanta, GA, October 9-11, pp. 29-36.
51. Hart, K. Q., C. H. Culp, K. Heinemeier. 2002. "Measurement and Verification in the Air Force's Energy Savings Performance Contracts Program," *Proceedings of the 2002 ACEEE Summer Study*, Pacific Grove, CA, August, Vol. 9, pp. 10.125 – 10.134.
52. Culp, C. H., J. S. Haberl, B. Yazdani, T. Fitzpatrick, J. Bryant, W. D. Turner. 2002. "Texas Senate Bill 5 - Reducing Pollution in Non-Attainment Areas: An Overview of the Legislation," *Proceedings of the 2002 ACEEE Summer Study*, Pacific Grove, CA, August, Vol. 9, pp. 9.43 - 9.54.
53. Haberl, J. S., C. H. Culp, B. Yazdani, T. Fitzpatrick, W. D. Turner. 2002. "An Introduction to Texas Senate Bill 5," *Proceedings of the Thirteenth Symposium on Improving Building Systems in Hot and Humid Climates*, Houston, TX, May, pp. 1-10.
54. Haberl, J. S., C. H. Culp, B. Yazdani, T. Fitzpatrick, W. D. Turner. 2002. "Texas' Senate Bill 5 Legislation for Reducing Pollution in Non-Attainment and Affected Areas: Procedures for Measuring Pollution Reductions from the Adoption of the International Energy Conservation Code (IRC/IECC 2001) in New Residences," *Proceedings of the Thirteenth Symposium on Improving Building Systems in Hot and Humid Climates*, Houston, TX, pp. 11-24, (May 2002).
55. Haberl, J. S., C. H. Culp, et al. 2001. "ASHRAE's Proposed Guideline 14P for Measurement of Energy and Demand Savings: How to Determine what was Really Saved by the Retrofit," *Proceedings of the First International Conference for Enhanced Building Operations*, Austin, TX, July, pp. 25-36.
56. Sweeney, J., C. H. Culp. 2001. "Technology Enablers for Next-Generation Economic Building Monitoring Systems," *Proceedings of the First International Conference for Enhanced Building Operations*, Austin, TX, July, pp. 125-131.
57. Zhu, Y., A. Athar, K. Banks, C. H. Culp, W. D. Turner, B. Yazdani. 2001. "Continuous Commissioning: A Valuable Partner to Retrofit Projects," *Proceedings of the First International Conference for Enhanced Building Operations*, Austin, TX, July, pp. 1-8.
58. Haberl, J. S., B. Yazdani, C. H. Culp, W. D. Turner, D. E. Claridge, M. Myers. 2001. "Rebuild America Program in Texas: Update on the Brazos Valley Energy Conservation

- Coalition,” *Proceedings of IECEC’01, Thirty-Sixth Intersociety Energy Conversion Engineering Conference*, IECEC 2001-ES-49, Savannah, GA, July 29-August 2.
59. Yearly, M., B. Swan, J. Sweeney, C. H. Culp, L. Archer. 2001. “An Internet Based Power Measurement Technique,” *Proceedings of the IEEE Instrumentation and Measurement Technology Conference*, Budapest, Hungary, May 21-23.
60. Culp, C. H., S. Deng, J. S. Haberl, D. E. Claridge, W. D. Turner. 2000. “Continuous Commissioning of Texas A&M Campus Buildings,” *Proceedings of the Fifth Annual Joint Services Pollution Prevention and Hazardous Waste Management Conference*, San Antonio, TX, August 23.
61. Culp, C.H., G. Wei, J. S. Haberl, D. E. Claridge, W. D. Turner. 2000. “Sustainable Energy Strategies,” *Proceedings of the Fifth Annual Joint Services Pollution Prevention and Hazardous Waste Management Conference*, San Antonio, TX, August 24.
62. Claridge, D. E., W. D. Turner, J. S. Haberl, C. H. Culp, M. Liu. 2000. “Monitoring Buildings for Performance Assurance and Accounting,” *ABST 2000: Advanced Building Systems Technology Conference and Exposition*, Washington, DC, June 6-8, pp. 1.4.1 - 1.4.10.
63. Haberl, J. S., B. Yazdani, C. H. Culp, W. D. Turner, D. E. Claridge, M. Meyers. 2000. “Rebuild America Program in Texas: Update on the Brazos Valley Energy Conservation Coalition,” *Proceedings of the 2000 ACEEE Summer Study on Energy Efficiency in Buildings*, August, Vol. 4, p. 4.117 – 4.130.
64. Yazdani, B., J. S. Haberl, C. H. Culp, W. D. Turner, D. E. Claridge, M. Myers. 2000. “The Brazos Valley Energy Conservation Coalition. Part of the Rebuild America Program in Texas: Program Update,” *Proceedings of the Twelfth Symposium on Improving Building Systems in Hot and Humid Climates*, San Antonio, TX, May 15-17, pp. 207-215.
65. Claridge, D. E., C. H. Culp, S. Deng, W. D. Turner, J. S. Haberl, M. Liu. 2000. “Continuous Commissioning of a University Campus,” *Proceedings of Eighth National Conference on Building Commissioning*, Kansas City, MO, May 3-5, pp. 12.1 - 12.9.
66. Claridge, D. E., C. H. Culp, M. Liu, S. Deng, W. D. Turner, J. S. Haberl. 2000. “Campus-Wide Continuous Commissioning of University Buildings,” *Proceedings of ACEEE 2000 Summer Study on Energy Efficiency in Buildings*, Pacific Grove, CA, Aug. 20-25, pp. 3.101 - 3.112.
67. Haberl, J. S., B. Yazdani, C. H. Culp, W. D. Turner, D. E. Claridge, M. Myers. 2000. “Rebuild America Program in Texas: Update on the Brazos Valley Energy Conservation Coalition,” *Proceedings of ACEEE 2000 Summer Study on Energy Efficiency in Buildings*, Pacific Grove, CA, Aug. 20-25, pp. 4.117-4.130.
68. Culp, C. H., L. Carmichael, J. Flood, M. Sheldon. 1994. “Real Time Automated Building Control and Real Time Pricing: An Effective Combination,” *Proceedings of the 1994 DA/DSM Conference*, Orlando, FL, January 18.
69. Flood, J., L. Carmichael, C. H. Culp, S. Gable. 1993. “Automated Building Control and Real Time Pricing: A Perfect Match,” *Proceedings of the Second International Energy Efficiency and Demand Side Management Conference*, Stockholm, Sweden, September 21-23, pp. 73-79.
70. Culp, C. H., R. Mills. 1990. “Using An Expert System To Perform Preventative Maintenance And Diagnostics On Centrifugal Chillers,” *Proceedings of the Seventh Annual Symposium on Improving Building Systems in Hot and Humid Climates*, October.

71. Culp, C. H. 1975. "Threshold Switching in Hydrated Melanin," *Proceedings of the March Meeting of the American Physical Society*, Denver, CO.
72. Culp, C. H. 1974. "Switching Properties of Synthetic Melanin," *Proceedings of the Mid-West Solid State Conference*, Edwardsville, IL, October.
73. Culp, C. H., J. H. Weaver, D. W. Lynch. 1973. "Thermomodulation Spectra of V, NB, and TA at 310K and 90K," *Proceedings of the March Meeting of the American Physical Society*, San Diego, CA.
74. Culp, C. H., D. E. Eckles. 1971. "High Speed Photographs of Switching in Amorphous Semiconductors," *Proceedings of the Mid-West Solid State Conference*, Rolla, MO.

Invited Testimony

1. Texas Public Utility Commission – TPUC, June 24, 2008, Austin, TX, "Baseline Air Conditioner SEER Recommendations."
2. Texas Commission on Environmental Quality – TCEQ, September 15, 2003, Austin, TX, "Emissions Reduction Calculator."
3. DoD Installations Vision 2020 – March 16, 2001, Ft. Belvoir, VA, "Recommended DoD Energy Strategies."
4. Senate Natural Resources Committee – December 2, 2001, Houston, TX.
5. House Committee on Energy and the Environment – January 8, 2002, Austin, TX.

Other Professional Contributions (w/o substantial peer review, *Graduate Student)

1. Culp, C. H. 2017. "Research Background for ASHRAE's New Duct Calculator," ASHRAE Workshop, ASHRAE 2017 Winter Meeting, Las Vegas, NV, January 29.
2. Culp, C. H. 2016. "HVAC Energy Flow in Buildings," College of Architecture Symposium, College Station, TX, October 24.
3. Culp, C. H. 2016. "MMAC – Refrigerant-Free! Cool," University Startups Demo Day, Washington DC, September 20.
4. Culp, C. H. 2016. "Technology Council 2015-2016 Activities", ASHRAE Regional Conference, College Station, TX, April 29.
5. Culp, C. H. 2016. "Energy Efficiency with Partial Use – Partial Conditioning", College Station Rotary Club, College Station, TX, March 24.
6. Culp, C. H. 2015. "Residential Buildings with Energy Savings & Improved IAQ", ASHRAE Student Branch, College Station, TX, December 2.
7. Culp, C. H., A. Ugursal*. 2008. "HVAC Duct Efficiency, ASHRAE Research Project 1333," Invited Talk, ASHRAE Austin Chapter Meeting, Austin, TX, May 15.
8. Culp, C. H., S. Andolsun*. 2008. "Reducing Base Load Energy Use in Residential Architecture," ASHRAE Seminar, ASHRAE 2008 Summer Meeting, Salt Lake City, UT, June 22.
9. Culp, C. H., T. Bou-Saada. 2007. "M&V for Determining ESCO Payments: A Case Study," ASHRAE Seminar, ASHRAE 2007 Summer Meeting, Long Beach, CA, June.
10. Ugursal, A.*, C. H. Culp. 2007. "CFD Calculations and Measured ΔP Data for 8 inch Flexible Duct," ASHRAE Seminar, ASHRAE 2007 Summer Meeting, Long Beach, CA, June.

11. Cantrill, D.*, C. H. Culp. 2007. "As Built ΔP Data for 12" Flex Ducts," ASHRAE Seminar, ASHRAE 2007 Summer Meeting, Long Beach, CA, June.
12. C. H. Culp. 2007. "Energy Code Driven Emissions Reductions," ASHRAE Seminar, ASHRAE 2007 Winter Meeting, Dallas, TX, January.
13. C. H. Culp. 2007. "M&V for Persistence of Commissioning Savings," ASHRAE Seminar, ASHRAE 2007 Winter Meeting, Dallas, TX, January.
14. Culp, C. H., T. A. Adams. 2007. "Decentralizing Elmendorf's Boiler Plant," Air Force Civil Engineer, Vol. 15, No. 1, pp. 26-27.
15. Culp, C. H. 2005. "Measuring the Savings," Air Force Civil Engineer, Vol. 13, No. 2, pp. 11.
16. Culp, C. H. 2004. "Improving Residential HVAC Energy Efficiency," Moderator, ASHRAE Public Session, ASHRAE Winter Meeting, Anaheim, CA, January 26.
17. Culp, C. H. 2003. "Residential and Small Building Humidity and Mold Control," Moderator, ASHRAE Public Session, ASHRAE Winter Meeting, Chicago, IL, January 26.
18. Culp, C. H., D. LaPointe, S. G. Brandt. 1990. "Knowledge Based Systems and Control Applications," *Proceedings of the Honeywell Controls Workshop*, May.

Reports (*Graduate Student)

1. Culp, C. H., D. Claridge, "December 2018 Q11 Report, Research Technical Progress Report, Molecular Membrane Air Conditioner/Dehumidifier DE-AR0000650", ARPA-E Quarterly Report.
2. Culp, C. H., D. Claridge, "September 2018 Q10 Report, Research Technical Progress Report, Molecular Membrane Air Conditioner/Dehumidifier DE-AR0000650", ARPA-E Quarterly Report.
3. Culp, C. H., 2018. "Liz and Nelson Mitchell Professorship in Residential Design Report for FY2018.
4. Culp, C. H., D. Claridge, "June 2018 Q9 Report, Research Technical Progress Report, Molecular Membrane Air Conditioner/Dehumidifier DE-AR0000650", ARPA-E Quarterly Report.
5. Culp, C. H., D. Claridge, "March 2018 Q8 Report, Research Technical Progress Report, Molecular Membrane Air Conditioner/Dehumidifier DE-AR0000650", ARPA-E Quarterly Report.
6. Culp, C. H., D. Claridge, "December 2017 Q7 Report, Research Technical Progress Report, Molecular Membrane Air Conditioner/Dehumidifier DE-AR0000650", ARPA-E Quarterly Report.
7. Culp, C. H., D. Claridge, "September 2017 Q6 Report, Research Technical Progress Report, Molecular Membrane Air Conditioner/Dehumidifier DE-AR0000650", ARPA-E Quarterly Report.
8. Culp, C. H., D. Claridge, "June 2017 Q5 Report, Research Technical Progress Report, Molecular Membrane Air Conditioner/Dehumidifier DE-AR0000650", ARPA-E Quarterly Report.
9. Culp, C. H., D. Claridge, "March 2017 Q4 Report, Research Technical Progress Report, Molecular Membrane Air Conditioner/Dehumidifier DE-AR0000650", ARPA-E Quarterly Report.

10. Culp, C. H., D. Claridge, "December 2016 Q3 Report, Research Technical Progress Report, Molecular Membrane Air Conditioner/Dehumidifier DE-AR0000650", ARPA-E Quarterly Report.
11. Culp, C. H., D. Claridge, "September 2017 Q2 Report, Research Technical Progress Report, Molecular Membrane Air Conditioner/Dehumidifier DE-AR0000650", ARPA-E Quarterly Report.
12. Culp, C. H., D. Claridge, "June 2016 Q1 Report, Research Technical Progress Report, Molecular Membrane Air Conditioner/Dehumidifier DE-AR0000650", ARPA-E Quarterly Report.
13. Culp, C. H., K. D. Weaver, D.*, Cantrill*. 2010. "RP-1333, HVAC Flexible Duct Efficiency Measurements, Final Report – ASHRAE", ASHRAE Research Final Report.
14. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2004. "Infrared Heating," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, December.
15. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2004. "Steam Traps," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, December.
16. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2004. "Plate Heat Exchanger," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, December.
17. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2004. "Heat Pump," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, December.
18. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2004. "FM Control Systems," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, December.
19. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2004. "Building Envelope," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, December.
20. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2004. "Propane-Air," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, December.
21. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2004. "HVAC Controls," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, December.
22. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2004. "Thermal Storage," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, December.
23. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2004. "Chiller Plant," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, June.
24. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2004. "Cooling Tower," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, June.
25. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2004. "Central Heating Plant Decentralization," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, June.
26. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2004. "Energy Management and Control System," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, April.
27. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2004. "Boiler Replacement," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, February.
28. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2003. "Constant Speed High Efficiency Motors," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, December.

29. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2003. "Lighting," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, October.
30. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2003. "Variable Speed Drives," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, September.
31. Culp, C. H., M. Davis, C. McDonald*, M. Cross. 2003. "Chiller Replacement," HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL, February.
32. Haberl, J. S., C. H. Culp, B. Yazdani, T., Fitzpatrick, J., Bryant, and W. D. Turner. 2003. "Energy Efficiency / Renewable Energy Impact in the Texas Emissions Reduction Plan (TERP)," Volume I, II, ESL Report No. ESL-TR-03-12-03.
33. Culp, C. H. 2003. "Final Report for Graduate Student in Residence," Bell Helicopter, Research Report, August.
34. Culp, C. H., G. Wei. 2003. "Engineering Assessment Report for Terminal B at Dallas/Fort Worth International Airport," May.
35. Culp, C. H. 2003. "Continuous Commissioning Walk-Through Audit Data Collection," TAC-Americas, September.
36. Culp, C. H. 2003. Eighteen (18) Technical Reports for the USAF on M&V applied to several Energy Conservation Methods including: Central Heating Plant Decentralization M&V, Lighting M&V, Constant Speed Motor M&V, Variable Speed Motor M&V, Chiller M&V, Boiler M&V, Chiller Plant M&V.
37. Culp, C. H. 2003. "M&V Final Report for Beale AFB," USAF – Air Force Civil Engineering Support Agency, Research Report, Contract F08637-00-F-A090, Task Order 16, May.
38. Culp, C. H. 2003. "M&V Final Report for Mountain Home AFB," USAF – Air Force Civil Engineering Support Agency, Research Report, Contract F08637-00-F-A090, Task Order 19, September.
39. Culp, C. H. 2003. "M&V Final Report for Hickam AFB," USAF – Air Force Civil Engineering Support Agency, Research Report, Contract F08637-00-F-A090, Task Order 20, November.
40. Culp, C. H. 2003. "Final Report and Technical Recommendations for M&V at Elmendorf AFB," USAF – Air Force Civil Engineering Support Agency, Contract F08627-01-F-0107, Task Order 02, Research Report, May.
41. Culp, C. H. 2003. "Final Report and Technical Recommendations for M&V Methods for Vandenberg AFB," USAF – Air Force Civil Engineering Support Agency, Contract F08627-01-F-0107, Task Order 04, Research Report, May.
42. Culp, C. H. 2003. "Final Report and Technical Recommendations for M&V Methods for Wright-Patterson AFB," USAF – Air Force Civil Engineering Support Agency, Contract F08627-01-F-0107, Task Order 07, Research Report, May.
43. Culp, C. H. 2003. "Final Assessment Report on US Army's Measurement and Verification Methods of Energy Performance Contracts," US Army Environmental Policy Institute, Office of the Assistant Secretary of the Army Installations and Environment, Delivery Order DACA 01-00-F-0214, June 13.
44. Culp, C. H., D. E. Eckels. 1976. "A Computer Controlled Data Measurement and Analysis System Used for Measuring Switching Parameters of Semiconductors," U. S. ERDA, Report No. IS-3691.

45. Culp, C. H. 1975. "A High Voltage Double Pulse System for the Study of Threshold Switching Materials," U.S. ERDA, Report No. IS-3459.
46. Culp, C. H., R. Volker, J. Cairns, G. Karas. 1973. "Final Report," Iowa State University Teaching Assistants Orientation Seminar (TAOS), Ames, IA.

Conference Presentations / Invited Talks (w/o substantial peer review, *Graduate Student)

1. Culp, C. H. 2018. "Improving Health and Systems Efficiency in Indoor Environments." Invited talk. Texas A&M University Chemistry Department, College Station, Texas, December 14.
2. Culp, C. H. 2018. "Research Background for ASHRAE's New Duct Calculator," Invited talk, Carrier Corporation Conference, Hilton Conference Center, College Station, Texas, November 21.
3. Culp, C. H. 2018. "Innovation." InventNOW Student Organization, Texas A&M University, Invited talk, College Station, Texas, February 21.
4. Culp, C. H. 2018. "Improving Health and Systems Efficiency in Indoor Environments." Invited talk, Energy Institute Seminar." College Station, Texas, September 27.
5. Culp, C. H. 2016. "Technology Council 2015-2016 Activities," Invited talk, ASHRAE Region 8 Conference, Tyler, Texas, April 29.
6. Culp, C. H. 2016. "Reducing Energy Use in Residential Buildings," Invited talk, ASHRAE Region 8 Conference, Tyler, Texas, April 29.
7. Culp, C. H. 2016. "Partial Use – Partial Conditioning Energy Efficiency," Invited talk, College Station Rotary Club, College Station, Texas, March 24.
8. Culp, C. H. 2015. "Residential Buildings with Energy Savings and Improved IAQ," Invited talk, ASHRAE Branch, Texas A&M University, December 12
9. Culp, C. H. 2015. "Reducing Energy Use in Residential Buildings," Invited talk, College of Architecture Symposium, Texas A&M University, October 8.
10. Culp, C. H. 2015. "HVAC Energy Flow in Buildings," Invited talk, ARPA-E, Portland, Oregon, May 22.
11. Culp, C. H. 2015. "Reducing Energy Use in Residential Buildings," Invited talk, Energy Club, Texas A&M University, April 22.
12. Culp, C. H. 2015. "Flexible Ducts," Invited talk, ASHRAE Winter Meeting, Orlando, January 23.
13. Culp, C. H., V. Negandhi, S. Andolsun. 2015. "Airflow Perception and Draught Rating for Varying Thermal Conditions," Invited talk, ASHRAE Winter Meeting, Seattle, January 27.
14. Culp, C. H. 2014. "Continuous Commissioning® for Generation Park," Invited talk, Houston, Texas, November 21
15. Culp, C. H., A. Ugursal, L. Tassinary. 2014. "Reducing Energy Use in Residential Buildings," Invited talk, College of Architecture Symposium, Texas A&M University, October 27.
16. Culp, C. H. 2013. "Transformation of a Baseline Habitat for Humanity House into a Partially Conditioned Atrium House," Invited talk, College of Architecture Symposium, October 21.

17. Culp, C. H. 2013. "Energy Systems Laboratory," Invited talk, North Texas Association of Energy Engineers, October 18.
18. Culp, C. H. 2013. "ASHRAE – Director at Large," Invited talk, ASHRAE Region VIII CRC meeting, April 19.
19. Culp, C. H. 2013. "Energy Systems Laboratory Overview," Invited talk, ASHRAE Region VIII CRC meeting, April 19.
20. Culp, C. H. 2011. "Continuous Commissioning for Existing Buildings[®]," Invited talk, AIA+2030 Session 9, December 14.
21. Culp, C. H., T. Bou-Saada. 2010. "Energy Management and Control Systems," Invited talk, GovEnergy 2010, Dallas, TX, August 16.
22. Bou-Saada, T., C. H. Culp. 2010. "Ensuring Long-Term Energy Savings for a Major Texas State Agency Performance Contracting Initiative," Invited talk, GovEnergy 2010, Dallas, TX, August 16.
23. Culp, C. H. 2008. "HVAC Duct System Study," Invited talk, Air Distribution Institute, Spring Meeting, San Antonio, TX, April 14.
24. Culp, C. H. 2006. "M&V in the ESCO Industry," Invited talk, State Agency ESPC Workshop, Austin, TX, November 2.
25. Ugursal, A.*, C. H. Culp. 2006. "CFD Modeling of Rigid Ducts and Compressed Flexible Ducts," ASHRAE Seminar, Invited talk, ASHRAE 2006 Summer Meeting, Quebec-City, Canada, June.
26. Culp, C. H., 2006. "Why's, What's and How's of M&V in Industry," Invited talk, TAC-Americas Corporate Headquarters, March 8.
27. Haberl, J. S., C. H. Culp. 2005. "Calculating Creditable NO_x Emissions Reductions from Energy Efficiency and Renewable Energy Projects in Texas," Invited talk, US Environmental Protection Agency, 2005 Air Innovations, Chicago, IL, August 23-25.
28. Haberl, J. S., C. H. Culp. 2005. "The Art of Measurement and Verification (M&V)," Invited talk, 12th Annual E Source Energy Manager's Roundtable, Charleston, SC, April 25-26.
29. Culp, C. H., K. Weaver*. 2005. "HVAC Duct Efficiency Study - 2005," Invited talk, Air Distribution Institute, Las Vegas, NV, April 11.
30. Culp, C. H., D. E. Claridge, W. D. Turner. 2005. "Retro-commissioning Training," ASHRAE 2005 Winter Meeting, Orlando, FL, February 5-9.
31. Culp, C. H., J. S. Haberl, D. E. Claridge, W. D. Turner. 2004. "Continuous Commissioning[®], How to Get the Most from Energy Efficiency and Renewable Energy," Invited talk, Emissions Reductions and Energy Leadership Summit, San Antonio, TX, December 15-16.
32. Haberl, J. S., C. H. Culp, B. Yazdani, T. Fitzpatrick. 2004. "How to Get the Most from Energy Efficiency & Renewable Energy," Invited talk, "Emissions Reductions and Energy Leadership Summit", San Antonio, TX, December 15-16.
33. Fitzpatrick, T., C. H. Culp, J. S. Haberl, D. Gilman, B. Yazdani. 2004. "An Easily Accessible Web Based Emissions Reductions and Energy Savings Calculator," Invited talk, National Association of Energy Service Companies, Anaheim, CA, November 16-19.
34. Culp, C. H. 2004. "Performance Study of Enhanced Auto-Associative Neural Networks," Invited talk, ASHRAE Student Chapter Meeting, October 7.

35. Culp, C. H. 2004. "Air Duct Measurement System for Computing Losses," Invited talk, Air Distribution Institute, Chicago, IL, September 20.
36. Culp, C. H. 2004. "Emissions Reductions and Energy Savings Calculator - Web Accessible," Invited talk, 2004 Air Innovations Conference, Sponsored by the US Environmental Protection Agency, Chicago, IL, August 10-11.
37. Culp, C. H., G. Wei, B. Yazdani, T. Bates, J. Dennis. 2004. "Retro-Commissioning: DFW Airport Terminal B," ASHRAE Seminar, ASHRAE 2004 Summer Meeting, Nashville, TN, June 26-30.
38. Haberl, J. S., C. H. Culp, D. Gilman, B. Yazdani, T. Fitzpatrick, W. D. Turner. 2004. "Calculating NO_x Emissions Reductions from Energy Conservation and Renewable Energy Projects (EE/RE)," Industrial Energy Technology Conference, Houston, TX, (April 19-21, 2004).
39. Culp, C. H. 2004. "Specifying Data Logger Functionality in EMCSSs," ASHRAE Seminar, ASHRAE 2004 Winter Meeting, Anaheim, CA, January 24-28.
40. Culp, C. H., W. D. Turner, K. Q. Hart, S. Berry-Lewis. 2003. "Central Heat Plant Energy Baseline," International Conference for Enhanced Building Operations, Berkeley, CA, October 13-15.
41. Culp, C. H., W. D. Turner, D. E. Claridge, J. S. Haberl. 2003. "Energy Efficiency Using Continuous Commissioning," Invited talk, Building Energy Performance Improvement Through Advance Technologies, Smart Organization and Financing – Industry Workshop, Sponsored by US Army – CERL, DoD, ASHRAE, San Antonio, TX, October, 7.
42. Culp, C. H., J. S. Haberl, D. E. Claridge, W. D. Turner. 2003. "Cost Effective M&V for the DoD," Invited talk, Building Energy Performance Improvement Through Advance Technologies, Smart Organization and Financing – Industry Workshop, Sponsored by US Army – CERL, DoD, ASHRAE, San Antonio, TX, October, 7.
43. Haberl, J. S., C. H. Culp, B. Yazdani, T. Fitzpatrick, W. D. Turner. 2003. "The Texas Emissions Calculator and NO_x Emissions Reductions from Implementation of the 2000 IECC/IRC Conservation Code in Texas," Texas Energy Partnership, Austin, TX, September 16-17.
44. C. H. Culp, K. Q. Hart, W. D. Turner, S. Berry-Lewis. 2003. "Energy Consumption Baseline: Fairchild AFB's Major Boiler Retrofit," ASHRAE Seminar, ASHRAE 2003 Annual Meeting, Kansas City, MO, June 30.
45. Culp, C. H., J. S. Haberl, W. D. Turner. 2003. "Achieving Energy Efficiency in HVAC," Invited talk, US Army CERL Annual Meeting, San Antonio, TX, June 12.
46. Culp, C. H., J. S. Haberl, W. D. Turner. 2003. "Energy Drivers in HVAC," Invited talk, Air Distribution Institute Semi-Annual Meeting, Santa Fe, NM, April 28.
47. Culp, C. H., B. Yazdani. 2002. "Faith Based Economic Development and Energy Efficiency," Invited Talk, Black Ministers Meeting, College Station, TX, August 8.
48. Culp, C. H. 2002. "SB5, Statewide Energy Code: Overview of Energy Use in Buildings," Houston Environmental Technology Seminar, University of Houston, May 21.
49. Culp, C. H., B. Yazdani. 2002. "Energy Efficiency in Small and Medium Hard to Serve Areas," Invited talk, National Conference of Black Mayors, Jackson, MS, April 25.

50. Culp, C. H., J. S. Haberl. 2002. "Preparing and Evaluating Measurement and Verification Plans," Invited talk, ASHRAE Student Chapter Meeting, College Station, TX, March 7.
51. Culp, C. H., W. D. Turner, D. E. Claridge, J. S. Haberl. 2001. "Why Measurement and Verification Is Necessary," Invited talk, Federal Utility Partnership Working Group, Federal Energy Management Program, October 11.
52. Culp, C. H. 2001. "Why Is Measurement and Verification Important," Invited talk, US Air Force Civil Engineering Agency, Worldwide Energy Managers Meeting, Orlando, FL, June 27.
53. Culp, C. H. 2001. "Preparing and Evaluating Measurement and Verification Plans," Invited talk, US Air Force Civil Engineering Agency, Worldwide Energy Managers Meeting, Orlando, FL, June 27.
54. Culp, C. H. 2001. "Applying Continuous Commissioning," Invited talk, Pacific Northwest Laboratory, Richland, WA, May 20.
55. Culp, C. H., B. Yazdani. 2001. "Preparing and Evaluating Measurement and Verification Plans for Guaranteed Energy Savings Contracts," Invited talk, Denver Regional Peer Exchange Forum, Hyatt Regency Austin at Spring Lake, Austin, TX, (May 7-9, 2001).
56. Culp, C. H. 2001. "Recommended DoD Energy Strategies," Invited talk, Installations Vision 2020 Forum, Office of the Deputy under Secretary of Defense, Fort Belvoir, VA, Invited testimony, March 16.
57. Culp, C. H. 2001. "The Energy Systems Lab," Invited talk, US Army Corps of Engineers Research Laboratory, Champaign, IL, January.
58. Culp, C. H. 2000. "Continuous Commissioning Saves Energy," Invited talk, Worldwide Environmental and Energy Conference, Atlanta, GA, December 4-7.
59. Culp, C. H. 2000. "Opportunities for Reducing Facility Energy Use," Invited talk, Facility Management Industry Advisory Council, College Station, TX, November 9.
60. Culp, C. H., G. Wei, J. S. Haberl, D. E. Claridge, W. D. Turner. 2000. "Sustainable Energy Strategies," Invited talk, Fifth Annual Joint Services Pollution Prevention and Hazardous Waste Management Conference, San Antonio, TX, August 24.
61. Culp, C. H., S. Deng, J. S. Haberl, D. E. Claridge, W. D. Turner. 2000. "Continuous Commissioning of Texas A&M Campus Buildings," Invited talk, Fifth Annual Joint Services Pollution Prevention and Hazardous Waste Management Conference, San Antonio, TX, August 23.
62. Culp, C. H., W. D. Turner, D. E. Claridge, J. S. Haberl. 2000. "Effective Operations and Maintenance Using Continuous Commissioning," Invited talk, Energy 2000, Pittsburg, PA, August 22.
63. Culp, C. H., W. D. Turner, D. E. Claridge, J. S. Haberl. 2000. "Why Affordable Measurement and Verification Is Necessary," Invited talk, US Air Force Energy Managers Conference, Kansas City, MO, July 17.
64. Culp, C. H. 1993. "Real Time Pricing at the Marriott's Marquis and Moscone Hotels," Invited talk, Future Build '93, Intelligent Buildings Institute, Chicago, IL October 25.
65. Culp, C. H. 1993. "Advanced Technology in Building Applications," Invited talk, Honeywell Professional Engineers Meeting, Chicago, IL, October.

66. Culp, C. H. 1993. "Advanced Energy Modeling and Data Exploration Technology," Invited talk, Honeywell Facility Planners Meeting, Atlanta, GA, August.
67. Culp, C. H. 1992. "Results of Building Simulation for Lighting Control," Invited talk, Massachusetts Institute of Technology, Cambridge, MA, November.
68. Culp, C. H., and G. Shavit. 1992. "Control of Large Buildings," Invited talk, Canadian Automated Building Association, Ottawa, Canada, November.
69. Culp, C. H. 1991. "Expert Systems for Maintenance and Operations," Invited talk, ASHRAE Hospital Design Conference, Washington, DC, March.
70. Culp, C. H. 1991. "The Impact of Digital Technology on Energy Resources," Invited talk, ASHRAE Annual Meeting, New York, NY, January.
71. Culp, C. H., R. Mills. 1990. "Using An Expert System To Perform Preventative Maintenance And Diagnostics On Centrifugal Chillers," Invited talk, Seventh Annual Symposium on Improving Building Systems in Hot and Humid Climates, October.
72. Culp, C. H. 1988. "Expert Systems and Technology Transfer," Invited talk, Midwest Honeywell Users Group, Lake Geneva, WI, November.
73. Culp, C. H. 1988. "Increasing Utilization of Artificial Intelligence in Buildings," ASHRAE Seminar, The Place of Knowledge Based Systems in HVAC Control, ASHRAE Annual Meeting, Ottawa, Canada, June.
74. Culp, C. H. 1987. "Artificial Intelligence," Invited talk, Midwest Honeywell Users Group, Oak Brook, IL, October.
75. Culp, C. H. and T. R. Edman. 1987. "An Expert System for Maintenance and Diagnostics of Centrifugal Chillers," ASHRAE Seminar, ASHRAE Annual Meeting, Nashville, TN, June.
76. Culp, C. H., and S. C. Spielman. 1984. "Power Line Carrier Communications In Buildings," Invited talk, Honeywell Communications Conference.

Software Developed (w/o substantial peer review, *Graduate Student)

1. Davis, C.*, K. Christman, S. O'Neal, C. H. Culp. 2012. "WinAM, Release 4.3," Energy Systems Laboratory, Texas A&M University.
2. O'Neal, S., K. Christman, C. H. Culp. 2012. "Opportunity Assessor Release 1.1," Energy Systems Laboratory, Texas A&M University.
3. O'Neal, S., K. Christman, C. H. Culp. 2012. "Implementer Release 1.0," Energy Systems Laboratory, Texas A&M University.
4. Davis, C.*, C. H. Culp. 2010. "Windows Air Model – Weather, Release 1.0," Energy Systems Laboratory, Texas A&M University.
5. Davis, C.*, C. H. Culp. 2009. "Windows Air Model – WinAM, Release 4.0," Energy Systems Laboratory, Texas A&M University.
6. Davis, C.*, C. H. Culp. 2007. "Windows Air Model – WinAM, Release 3.0," Energy Systems Laboratory, Texas A&M University.
7. Gilman, D., J. S. Haberl, C. H. Culp. 2007. "eCalc: Version 1.1.9.9," <http://ecalc.tamu.edu>, Emissions and Energy Calculator, Energy Systems Laboratory.
8. Linder, M.*, C. H. Culp. 2005, 2006. "Windows Air Model - WinAM," Energy Systems Laboratory, Texas A&M University.

9. Gilman, D., J. S. Haberl, C. H. Culp. 2005, 2006. "eCalc," Energy Systems Laboratory, Texas A&M University.
10. Haberl, J. S., C. H. Culp, M. Ahmed.* 2002. "Code-traceable DOE-2 Input File for the Texas Residential Emissions Reduction Calculator," Energy Systems Laboratory, Texas A&M University, Version IECC1103.INP.
11. Haberl, J. S., C. H. Culp, V. Yu, M. Ahmed*, P. Im. 2002. "Texas Residential Emissions Reduction Calculator," Energy Systems Laboratory, Texas A&M University, eslsb5ec.tamu.edu.

Technical Interviews for Magazine Quotation

1. Culp, C. H. 2004. "Alternative Energies: New Options for Your Home," *What's Up Magazine*, October 26.

PATENTS

United States Patents

1. Claridge D. E., C. H. Culp, J. S. Haberl, W. Liu. 2014. "Systems and Method for Efficient Multi-Stage Air Dehumidification and Liquid Recovery," US Patent No. 8,685,145, Issued April 1.
2. Claridge D. E., C. H. Culp, J. S. Haberl, W. Liu. 2014. "Systems and Method for Efficient Air Dehumidification and Liquid Recovery," US Patent No. 8,685,144, Issued April 1.
3. Claridge D. E., C. H. Culp, J. S. Haberl, W. Liu. 2014. "Systems and Method for Efficient Air Dehumidification and Liquid Recovery with Evaporative Cooling," US Patent No. 8,685,142, Issued April 1.
4. Claridge D. E., C. H. Culp, W. Liu. 2014. "Systems and Methods for Multi-Stage Air Dehumidification and Cooling," US Patent No. 8,641,806, Issued February 4.
5. Claridge D. E., C. H. Culp, W. Liu. 2013. "Systems and Methods for Air Dehumidification and Cooling With Membrane Water Vapor Rejection," US Patent No. 8,500,848, Issued August 6.
6. Culp, C. H., D. E. Claridge, W. Liu. 2013. "Systems and Methods for Air Dehumidification and Sensible Cooling Using a Multiple Stage Pump," US Patent No. 8,496,732, Issued July 30.
7. Culp, C. H., D. E. Claridge, J. S. Haberl, W. D. Turner. 2011. "System and Method for Remote Monitoring and Controlling of Facility Energy Consumption," US Patent No. 7,962,536, Issued June 14.
8. Culp, C. H., D. E. Claridge, J. S. Haberl, W. D. Turner, M. Lui. 2009. "System and Method for Diagnostically Evaluating Energy Consumption Systems and Components of a Facility," US Patent No. 7,552,033, Issued June 23.
9. Culp, C. H., D. E. Claridge, J. S. Haberl, W. D. Turner. 2008. "System and Method for Remote Monitoring and Controlling of Facility Energy Consumption," US Patent No. 7,356,548, Issued April 8.
10. Culp, C. H., D. E. Claridge, J. S. Haberl, W. D. Turner. 2007. "System and Method for Remote Identification of Energy Consumption Systems and Components," US Patent No. 7,225,089, Issued May 29.

11. Culp, C. H., D. E. Claridge, J. S. Haberl, W. D. Turner. 2006. "System and Method for Remote Retrofit Identification of Energy Consumption Systems and Components," US Patent No. 6,996,508, Issued February 7.
12. Culp, C. H., D. E. Claridge, J. S. Haberl, W. D. Turner. 2005. "System and Method for Remote Identification of Energy Consumption Systems and Components," US Patent No. 6,937,946, Issued August 30.
13. Culp, C. H., et al. 1999. "Compressor with Protection Module," U.S. Patent Number 5,975,854, Issued November 2.
14. Culp, C. H., G. Shavit. 1996. "Load Control for Partially Increasing/Decreasing Load Power Usage," U.S. Patent Number 5,543,667, Issued August 6.
15. Culp, C. H., G. A. Takach. 1990. "Portable Computer Maintenance System," U.S. Patent Number D308,516, Issued June 12.
16. Culp, C. H., G. A. Takach. 1990. "Tripod Mounted Computer," U.S. Patent Number D319,221, Issued May 14.
17. Culp, C. H. 1990. "Add/Shed Load Control Using Anticipatory Processes," U.S. Patent Number 4,916,328, Issued April 10.
18. Culp, C. H., G. A. Takach. 1989. "Portable Computer System and Stand for Use Therewith," U.S. Patent Number 4,830,328, Issued May 16.
19. Culp, C. H., et al. 1987. "Addressing System for Simultaneously Polling Plural Remote Stations," U.S. Patent Number 4,667,193, Issued May 19.
20. Culp, C. H. 1986. "Energy Management Load Leveling," U.S. Patent Number 4,612,619, Issued September 16.
21. Culp, C. H. 1985. "Adaptive Optimum Start/Stop Control System," U.S. Patent Number 4,522,336, Issued June 11.
22. Culp, C. H., D. J. Downar. 1985. "Add/Shed Load Control According to Multiple Add/Shed Sequences," U.S. Patent Number 4,510,398, Issued April 9.

China Patents

1. Culp, C. H., D. E. Claridge, 2015. "Systems and Methods for Air Dehumidification and Sensible Cooling Using a Multiple Stage Pump," China Patent Number ZL201180062274, Issued April 1.
2. D. E. Claridge, Culp, C. H., Haberl J. S., 2016. "System and Method for Efficient Air Dehumidification and Liquid Recovery with Evaporative Cooling," China Patent Number ZL201180062662, Issued May 4.

Japan Patents

1. D. E. Claridge, Culp, C. H., Haberl J. S., 2016. "System and Method for Efficient Air Dehumidification and Liquid Recovery with Evaporative Cooling," Japanese Patent Number 6,042,341, November 28.
2. Culp, C. H., D. E. Claridge, 2014. "Systems and Methods for Air Dehumidification and Sensible Cooling Using a Multiple Stage Pump," Japan Patent Number 5,651,247, November 21.

3. Culp, C. H., et.al. 1989. "Add/Shed Load Control Using Anticipatory Processes," Japanese Application Number 317903/1989, December 8.
4. Culp, C. H. 1983. "Adaptive Optimum Start/Stop Control System," Japanese Application Number 232627/1983, December 9.

South Korea Patents

1. Culp, C. H., D. E. Claridge, 2019. "Systems and Methods for Air Dehumidification and Sensible Cooling Using a Multiple Stage Pump," Republic of Korea Patent Number 10-1939416, January 10.
2. D. E. Claridge, Culp, C. H., Haberl J. S., 2019. "System and Method for Efficient Air Dehumidification and Liquid Recovery with Evaporative Cooling," Republic of Korea Patent Number 10-1939417, January 10.
3. Culp, C. H. 1989. "Add/Shed Load Control Using Anticipatory Processes," Republic of Korea Korean Application Number 89-18259, December 8.

Hong Kong Patents

1. Culp, C. H., D. E. Claridge, 2016. "Systems and Methods for Air Dehumidification and Sensible Cooling Using a Multiple Stage Pump," Hong Kong Patent Number 1,188,280, February 19.
2. D. E. Claridge, Culp, C. H., Haberl J. S., 2017. "System and Method for Efficient Air Dehumidification and Liquid Recovery with Evaporative Cooling," Hong Kong Patent Number 1,188,279, August 4.

Mexico Patents

1. Culp, C. H., D. E. Claridge, 2014. "Systems and Methods for Air Dehumidification and Sensible Cooling Using a Multiple Stage Pump," Mexico Patent Number 324,896, October 29.
2. Culp, C. H., D. E. Claridge, 2017. "Systems and Methods for Air Dehumidification and Sensible Cooling Using a Multiple Stage Pump," Mexico Patent Number 347,879, May 16.
3. D. E. Claridge, Culp, C. H., Haberl J. S., TBD. "System and Method for Efficient Air Dehumidification and Liquid Recovery with Evaporative Cooling," Filed and in progress.

Indonesia Patents

1. Culp, C. H., D. E. Claridge, 2016. "Systems and Methods for Air Dehumidification and Sensible Cooling Using a Multiple Stage Pump," Indonesian Patent Number IDP000041479, June 9.
2. D. E. Claridge, Culp, C. H., Haberl J. S., 2018. "System and Method for Efficient Air Dehumidification and Liquid Recovery with Evaporative Cooling," Indonesian Patent Number IDP000052998, August 21.

Thailand Patents

1. Culp, C. H., D. E. Claridge. 2016. "Systems and Methods for Air Dehumidification and Sensible Cooling Using a Multiple Stage Pump," Thailand Patent Number 65765, September 8.

2. D. E. Claridge, Culp, C. H., Haberl J. S., TBD. "System and Method for Efficient Air Dehumidification and Liquid Recovery with Evaporative Cooling," Thailand Patent Number TH 324,896, September 8.

Canada Patents

1. Culp, C. H. 1989. "Add/Shed Load Control Using Anticipatory Processes," Canadian Application Number 2,004,836, December 7.
2. Culp, C. H. 1987. "Adaptive Optimum Start/Stop Control System," Canadian Patent Number 1,210,341, January 6.

Europe Patents

1. Culp, C. H., D. E. Claridge, 2018. "Systems and Methods for Air Dehumidification and Sensible Cooling Using a Multiple Stage Pump," European Patent Convention Number EP2637331, May 30.
2. D. E. Claridge, Culp, C. H., Haberl J. S., 2016. "System and Method for Efficient Air Dehumidification and Liquid Recovery with Evaporative Cooling," European Patent Convention Number EP2637332, March 21.
3. Culp, C. H. 1989. "Add/Shed Load Control Using Anticipatory Processes," European Application Number 89312770.4, December 7.
4. Culp, C. H. 1984. "Adaptive Optimum Start/Stop Control System," European Application Number 83307357.0, January 9.

India Patents

1. Culp, C. H., D. E. Claridge, TBD. "Systems and Methods for Air Dehumidification and Sensible Cooling Using a Multiple Stage Pump," Filed and in progress.
2. D. E. Claridge, Culp, C. H., Haberl J. S., TBD. "System and Method for Efficient Air Dehumidification and Liquid Recovery with Evaporative Cooling," Filed and in progress.

Brazil Patents

1. Culp, C. H., D. E. Claridge, TBD. "Systems and Methods for Air Dehumidification and Sensible Cooling Using a Multiple Stage Pump," Filed and in progress.
2. D. E. Claridge, Culp, C. H., Haberl J. S., TBD. "System and Method for Efficient Air Dehumidification and Liquid Recovery with Evaporative Cooling," Filed and in progress.

Registered Marks

1. Culp, C. H., D. E. Claridge, J. S. Haberl, W. D. Turner. 2005. United States Patent and Trademark Office, Registration Serial No. 2,992,740 entitled "PCC," September 6.
2. Culp, C. H., D. E. Claridge, J. S. Haberl, W. D. Turner. 2004. United States Patent and Trademark Office, Registration Serial No. 2,840,676 entitled "CC," April.
3. Culp, C. H., D. E. Claridge, J. S. Haberl, W. D. Turner. 2003. United States Patent and Trademark Office, Registration Serial No. 2,673,913 entitled "Continuous Commissioning," September.

Internal Patent Disclosures

1. Culp, C. H., M. McDermott. 2004. "High Performance Fuel Air System," Disclosed, February.
2. Culp, C. H., M. McDermott. 2004. "IC Diagnostics," Disclosed, February.
3. Culp, C. H., M. McDermott. 2004. "IC Advanced Starter," Disclosed, February.

RESEARCH PROJECTS

\$10,715,286 as PI, from 1999 to Present

\$23,113,915 Total Project (including PI and Co-PI), from 1999 to Present

CONTRACTS AND GRANTS AWARDED

Industry Awards

- 2010 Air Diffusion Institute (ADI). "Duct Energy Efficiency Study," C. H. Culp, PI, Supports graduate students, extended to December 31, 2010. I am the sole PI on this effort. This is the final funding for the duct efficiency project. The results are used in the ASHRAE Handbook and were also used for ACCA's Manual D (ANSI Standard).
- 2010 Air Conditioning Contractors of America (ACCA). "ACCA Manual D Update," C. H. Culp, PI, Extended to December 2010. I am the sole PI on this effort. This is an extension for ACCA's funding to allow wrap up tasks to be completed. The results are used in the ASHRAE Handbook and were also used for ACCA's Manual D (ANSI Standard).
- 2009 Bell Helicopter. "Graduate Student in Residence III," C. H. Culp, PI, Supports a graduate student, extended to December 2010. I am the sole PI on this effort. This represents on-going funding for solving real problems in industry. This project is currently developing effective methods to improve the efficiency of the air compressors used in 2 of Bell's factories (over 2,000 HP) and also studying a dual duct system to improve the energy efficiency of the air handling system and an optimization of a chiller/tower system.
- 2009 ASHRAE. "Duct Efficiency Study," C. H. Culp, PI, Supports graduate student and undergraduate student, extended to December 2010, \$50,000. This study was in partial support of the flexible duct study previously discussed.
- 2008 Frontier Associates. "Renewable Energy Assessment for the State of Texas," D. E. Claridge, C. H. Culp, B. Yazdani, J.E. Haberl, PIs, January 1, 2008 to May 31, 2009, \$5,000.
- 2008 Texas Utilities. "Air Distribution Duct Efficiency Study Extension," C. H. Culp, PI, Supports graduate student and undergraduate student, January 2007, extended to December 2009, \$49,000. I am the sole PI on this effort. This funding used in the duct efficiency study.
- 2008 Bell Helicopter. Graduate Student in Residence III," C. H. Culp, PI, Supports graduate student, extended to December 2009, added \$40,000.
- 2008 Texas Utilities. "Effects of Duct Leakage and Evaporator Air Flow on the Performance of Air-Conditioners Study," C. H. Culp, PI, M. Davis, Co-PI. Supports staff and undergraduate student, extended to December 2009, \$106,000. I was the lead co-PI on this research effort to determine the effective efficiency in-situ for split system air conditioners in the Dallas area. The Texas Public Utility Commission (PUC) specified SEER 13 for the baseline calculations for rebates to end users. This was discouraging upgrades from older systems. This work convinced the PUC to modify their "effective baseline" to a lower value and this reinvigorated the utility rebate program, which encouraged increased SEER values to 15/16.
- 2008 Air Conditioning Contractors of America (ACCA). "ACCA Manual D Update," C. H. Culp, PI, Supports graduate student and undergraduate student, December 2009, \$5,000.
- 2008 Texas Utilities. "Air Distribution Duct Efficiency Study," C. H. Culp, PI, Supports graduate student and undergraduate student, extended to December 2009, \$30,000.
- 2007 Dallas Fort Worth Airport Board. "Continuous Commissioning Assessment of DFW Airport Energy Plaza and Terminal D," B. Yazdani, W. D. Turner, G. Wei, J.E. Haberl, S. Deng, C. H.

- Culp, PIs, Supports graduate student and undergraduate student, October 1, 2007 to September 30, 2008, \$7,750.
- 2007 Texas Utilities. "Air Distribution Duct Efficiency Study Extension," C. H. Culp, PI, Supports graduate student and undergraduate student, January 2007 to December 2007, \$49,000.
- 2006 Boston Society of Architects. "Time-Dependent Thermal Comfort Variables," C. H. Culp, PI, A. Ugursal, GAR, January 2007 – December 2008, \$9,900. Over 80 proposals were submitted and 8 were funded. This funding was used to build the equipment being used for studying transitory comfort.
- 2006 Bell Helicopter. "Graduate Student in Residence III," C. H. Culp, PI, Supports graduate student, January 2006 to December 2007, \$70,000.
- 2005 TAC Americas. "Continuous Commissioning Assessment, M&V Review and Technical Assistance Proposal," W. D. Turner, C. H. Culp, G. Wei, PIs, Supports graduate student, September 5, 2005 to June 30, 2006, \$62,838.
- 2005 ASHRAE. "Duct Efficiency Study," C. H. Culp, PI, Supports graduate student and undergraduate student, October 2004 to December 2005, \$50,000.
- 2004 Texas Utilities. "Effects of Duct Leakage and Evaporator Air Flow on the Performance of Air-Conditioners Study," C. H. Culp, PI, Supports staff and undergraduate student, October 2004 to December 2005, \$106,000.
- 2004 Texas Utilities. "Air Distribution Duct Efficiency Study," C. H. Culp, PI, Supports graduate student and undergraduate student, October 2004 – December 2005, \$30,000.
- 2004 Northrop-Grumman. "Evaluation of VSD M&V – Task 3," C. H. Culp, PI, Supports graduate student and undergraduate student, October 2004, \$3,000.
- 2004 Northrop-Grumman. "Evaluation of VSD M&V – Task 2," C. H. Culp, PI, Supports graduate student and undergraduate student, June 2004, \$3,000.
- 2004 Northrop-Grumman. "Evaluation of VSD M&V – Task 1," C. H. Culp, PI, Supports graduate student and undergraduate student, April 2004, \$3,000.
- 2004 Bell Helicopter. "Graduate Student in Residence II," C. H. Culp, PI, Supports graduate student, January 2004 to December 2005, \$124,000.
- 2003 TAC-Americas. "Continuous Commissioning with Measurement and Verification for Five Facilities," W. D. Turner, C. H. Culp, PIs, November 2003 to November 2004, \$97,088.
- 2003 Air Diffusion Institute (ADI). "Duct Energy Efficiency Study," C. H. Culp, PI, Supports graduate students, January 2004 to December 2005, \$250,000. I was the sole PI on this effort to determine the impact of installed flexible duct on the pressure loss under varying conditions. I assembled a consortia of companies, ASHRAE, ACCA and a major electrical utility to fund this investigation. The results are changing the industry standards (ASHRAE and ACCA).
- 2001 Bell Helicopter. "Graduate Student in Residence," C. H. Culp, PI, Supported graduate student, June 2001 to August 2003, \$124,000.
- 2000 Sempra Energy Solutions. "Continuous Commissioning for a Hospital," C. H. Culp, PI, August 1, 2000 to December 31, 2000, \$15,700. I was the PI on this effort which studied air system efficiency in a hospital.

State Awards

- 2009 State of Texas Legislature. "Senate Bill 5, Texas Emissions Reduction Plan," C. H. Culp, B. Yazdani, and J. S. Haberl, Co-PIs, September 1, 2009 to August 30, 2010, \$960,000.
- 2009 Texas Commission on Environmental Quality (TCEQ). "Emissions Reduction Calculator," US Environmental Protection Agency (US EPA) contract passed through TCEQ, B. Yazdani, J. S. Haberl, C. H. Culp, D. E. Claridge, J. C. Baltazar, and D. R. Gilman, PIs, September 1, 2009 to August 31, 2011, \$383,899.
- 2009 Texas State Energy Conservation Office (SECO). "Residential and Commercial Energy Code Training to Architects, Engineers, City Building Officials, State Agencies, Institutions of Higher Education, School Districts, Local Governments, and the General Public," B. Yazdani, D. E. Claridge, C. H. Culp and J. S. Haberl, PIs, February 20, 2009 to January 10, 2010, \$66,750.
- 2009 Texas State Energy Conservation Office (SECO). "Development and Support of a Texas Local Government Initiative on Clean Energy and Clean Air," B. Yazdani, J. S. Haberl and C. H. Culp, PIs, August 1, 2008 to April 30, 2009, \$180,000.
- 2008 State of Texas Legislature. "Senate Bill 5, Texas Emissions Reduction Plan," C. H. Culp, B. Yazdani, and J. S. Haberl, Co-PIs, September 1, 2008 to August 30, 2009, \$960,000.
- 2008 Texas Commission on Environmental Quality (TCEQ). "Emissions Reduction Calculator," US Environmental Protection Agency (US EPA) contract passed through TCEQ, J. S. Haberl, C. H. Culp, and B. Yazdani, Co-PIs, September 2008 to August 2009, \$208,000.
- 2007 State of Texas Legislature. "Senate Bill 5, Texas Emissions Reduction Plan," C. H. Culp, B. Yazdani, and J. S. Haberl, Co-PIs, September 1, 2007 to August 30, 2008, \$960,000.
- 2007 Texas Commission on Environmental Quality (TCEQ). "Emissions Reduction Calculator," US Environmental Protection Agency (US EPA) contract passed through TCEQ, J. S. Haberl, C. H. Culp, and B. Yazdani, Co-PIs, September 2007 to August 2008, \$208,000.
- 2007 Texas Health and Human Services Commission. "Technical Assistance Proposal During Phase VII Construction and Post-Retrofit Performance," G. Wei , C. H. Culp, W. D. Turner, PIs, Supports graduate student, April 25, 2007 to June 30, 2009, \$12,130.
- 2007 Texas Health and Human Services Commission. "Phase V: Utility Efficiency for Lufkin State School ," G. Wei , C. H. Culp, W. D. Turner, PIs, Supports graduate student, February 15, 2007 to December 31, 2008, \$15,584.
- 2007 Texas Health and Human Services Commission. "Phase V: Utility Efficiency for Rusk State Hospital & Terrell State Hospital," G. Wei , C. H. Culp, W. D. Turner, PIs, Supports graduate student, February 15, 2007 to December 31, 2008, \$44,334.
- 2006 State of Texas Legislature. "Senate Bill 5, Texas Emissions Reduction Plan," C. H. Culp, B. Yazdani, and J. S. Haberl, Co-PIs, September 1, 2006 to August 30, 2007, \$960,000.
- 2006 Texas Commission on Environmental Quality (TCEQ). "Emissions Reduction Calculator," US Environmental Protection Agency (US EPA) contract passed through TCEQ, J. S. Haberl, C. H. Culp, and B. Yazdani, Co-PIs, September 2006 to August 2007, \$208,000.
- 2005 State of Texas Legislature. "Senate Bill 5, Texas Emissions Reduction Plan," C. H. Culp, B. Yazdani, and J. S. Haberl, Co-PIs, September 1, 2005 to August 30, 2006, \$952,019.
- 2005 Texas Commission on Environmental Quality (TCEQ). "Emissions Reduction Calculator," US Environmental Protection Agency (US EPA) contract passed through TCEQ, J. S. Haberl, C. H. Culp, and B. Yazdani, Co-PIs, November 2005 to August 2006, \$208,000.

- 2004 State of Texas Legislature. "Senate Bill 5, Texas Emissions Reduction Plan," C. H. Culp, B. Yazdani, and J. S. Haberl, Co-PIs, September 1, 2004 – August 30, 2005, \$960,000.
- 2004 Texas State Energy Conservation Office. "Dallas Fort Worth Airport Commissioning Assessment," W. D. Turner, B. Yazdani, C. H. Culp, S. Deng, M. Verdict, and D. E. Claridge, PIs, 1 research engineers/research associate, 1 grad student, 8/31/04 to 12/31/04, \$98,801.
- 2003 Texas Commission on Environmental Quality. "Texas Energy Efficiency Calculation Project - 2003," J. S. Haberl, and C. H. Culp, Co-PIs, November 2003 to August 2004, \$250,000.
- 2003 State of Texas Legislature. "Senate Bill 5, Texas Emissions Reduction Plan," Texas Legislature Funding for Energy Systems Laboratory, C. H. Culp, B. Yazdani, and J. S. Haberl, Co-P.I's, September 1, 2003 to August 30, 2004, \$950,421.
- 2002 Texas State Energy Conservation Office. "Rebuild – Model Communities," B. Yazdani, C. H. Culp, J. S. Haberl, and W. D. Turner, Co-PIs, November 2002 to August 2003, \$100,010.
- 2002 State of Texas Legislature. "Senate Bill 5 Energy Program," C. H. Culp, J. S. Haberl, B. Yazdani, and W. D. Turner, Co-PIs, September 2002 to August 2003, \$285,000.
- 2002 Texas Mental Health Mental Retardation. "Assistance for Measurement and Verification of Performance Contracting," C. H. Culp, PI, September 2002 to September 2003, \$30,000.
- 2001 State of Texas Legislature. "Senate Bill 5, Texas Emissions Reduction Plan," Texas Legislature Funding for Energy Systems Laboratory, C. H. Culp, B. Yazdani, and J. S. Haberl, Co-PIs, Supports graduate students, September 2001 to August 2002, \$181,855.
- 2001 California Energy Commission through ADM and Associates. "Buildings-Related Energy Efficiency RD&D," J. S. Haberl, W. D. Turner, K. Sylvester, and C. H. Culp, Co-PIs, 1 graduate student, Texas A&M University, June 2001 to April 2005, \$91,313.
- 2001 Texas State Energy Conservation Office (sponsored by the US-DOE). "Rebuild Texas Plus," B. Yazdani, C. H. Culp, J. S. Haberl, and W. D. Turner, Co-PIs, supports research engineer, research associate, May 2001 to July 2002, \$190,000.
- 2000 Texas State Energy Conservation Office. "Technical Assistance to State Energy Conservation Office," W. D. Turner, D. E. Claridge, C. H. Culp, and J. S. Haberl, PIs, two research associates, 2 research assistants, 9/01/00 to 8/31/02, \$282,200.
- 2000 "East Austin Development – Rebuild America." State Energy Conservation Office (Texas), B. Yazdani, and C. H. Culp, Co-PIs, Sept. 1, 2000 to July 31, 2001, \$25,000.

Federal Awards

- 2019 ARPA-E. "Molecular-Membrane Air Conditioner/Dehumidifier," C. H. Culp, PI, D. E. Claridge and M. Pate, Co-PIs, Extension. April 6, 2019 through April 5, 2020, No-cost extension.
- 2018 ARPA-E. "Molecular-Membrane Air Conditioner/Dehumidifier," C. H. Culp, PI, D. E. Claridge and M. Pate, Co-PIs, Extension. October 6, 2018 through April 5, 2019, No-cost extension.
- 2018 ARPA-E. "Molecular-Membrane Air Conditioner/Dehumidifier," C. H. Culp, PI, D. E. Claridge and M. Pate, Co-PIs, Extension. April 6, 2018 through October 5, 201, No-cost extension.
- 2016 ARPA-E. "Molecular-Membrane Air Conditioner/Dehumidifier," C. H. Culp, PI, D. E. Claridge and M. Pate, Co-PIs, April 6, 2016 through April 5, 2018, \$4,017,684.

- 2012 Dallas-Fort Worth International Airport Board. "TRIP: Commissioning (Cx) Services for Terminal A," B. Yazdani, J. Martinez, C. H. Culp, Co-PIs, through 3/31/13, \$895,521.
- 2011 ADMA Products, prime for an ARPA-E contract with PNNL and the Texas A&M Engineering Experiment Station (TEES), Energy Systems Laboratory as sub-recipients. "High Efficient, On-Line Membrane Air Dehumidifier Enabling Sensible Cooling for Warm and Humid Climates," D. E. Claridge, PI, C. H. Culp, co-PI, \$4,094,531 total budget, \$344,531 TEES budget.
- 2010 US Environmental Protection Agency. "Technical Assistance to Advance Quantification of Energy and Environmental Benefits from Energy Efficiency and Clean Energy," B. Yazdani, J. S. Haberl, and C. H. Culp, PIs, extended to August 31, 2010, \$100,000.
- 2009 US Environmental Protection Agency. "Technical Assistance to Advance Quantification of Energy and Environmental Benefits from Energy Efficiency and Clean Energy," B. Yazdani, J. S. Haberl, and C. H. Culp, PIs, December 20, 2006 to August 31, 2009, \$100,000.
- 2006 US Department of Energy. "Solar Decathlon," P. Fisk, PI, C. H. Culp, and J. S. Haberl, Co-PIs, January 2006 to December 2007, \$200,000.
- 2004 Carnegie Mellon University. "Advanced Building Efficiency Test Bed Initiative," D. E. Claridge, PI, M. Verdict, C. H. Culp, J. S. Haberl, and W. D. Turner, Co-PIs, 1 research associate, 1 research assistant, 8/31/04 to 12/31/06, \$223,200.
- 2003 US Department of Energy funding through the State of Texas - State Energy Conservation Office. "Energy Efficiency Study for Airport Gate Areas," C. H. Culp, W. D. Turner, and B. Yazdani, Co-PIs, January 2003 to September 2004, \$125,000.
- 2002 California Energy Commission through Lawrence Berkeley National Laboratory. "Phase II, High Performance Commercial Building Systems: Element 5 - Integrated Commissioning and Diagnostics," D. E. Claridge, PI, W. D. Turner, and C. H. Culp Co-PIs, Supported a graduate student, \$65,000. My part of this project researched methods to perform sensor fault detection using neural networks. A method was developed to find faults in chiller systems when the neural network could be trained with recent data. This method could successfully find and adjust a single sensor error and also determine if one or more sensors were faulty or drifting from calibrated values. The work resulted in an MS thesis for a graduate student assigned to the project.
- 2001 United States Air Force Civil Engineering Support Agency. "Cradle to Grave M&V Analysis and Assistance," C. H. Culp, and K. Heinemier, Co-PIs, Supports graduate students, September 29, 2001 to March 31, 2006, \$625,077.
- 2001 United States Air Force Civil Engineering Support Agency. "Develop Standardized M&V Approaches," C. H. Culp, PI, Supports students, September 14, 2001 to September 30, 2004, \$122,575. The original effort on specific US Air Force installations let do this project to standardize 18 M&V approaches that would be used by the Air Force personnel.
- 2000 U.S. Dept. of Energy – "The Brazos Valley Energy Conservation Coalition." B. Yazdani, and C. H. Culp, Sept. 1, 1999 to July 31, 2001, \$189,498.
- 2000 United States Air Force Civil Engineering Support Agency – "Bolling AFB M&V Evaluation." C. H. Culp, PI, Sept. 1, 2000 to August 31, 2001, \$34,773.
- 2000 United States Army Energy Policy Institute – "Fence to Fence Energy Study." C. H. Culp, PI, September 1, 2000 to August 31, 2001, \$68,425.

- 2000 United States Air Force Civil Engineering Support Agency – “World-Wide M&V Plan Evaluation.” C. H. Culp, and S. Mills, Co-PIs, Supports graduate students, October 1, 2000 – March 31, 2006, \$491,256. I was the co-PI on this effort to develop measurement and verification (M&V) to determine what savings occurred on numerous contracts that the US Air Force had with various vendors in their installations around the world. This effort and other subsequent contracts changed the methods that vendors determined savings from stipulated to performing measurements and then using the developed methods to determine savings.
- 2000 US GSA – “Monitoring Energy at the GSA’s Cabell Building.” C. H. Culp, PI, October 10, 2000 to January 31, 2001, \$12,782 (with an additional \$25,000 outside contract).
- 2000 California Energy Commission through Lawrence Berkeley National Laboratory – “High Performance Commercial Building Systems: Element 5 - Integrated Commissioning and Diagnostics.” D. E. Claridge, PI, W. D. Turner, and C. H. Culp Co-PIs, Supported graduate students, February 2000 to July 2003, \$930,000.

TEACHING ACTIVITIES

- 1999 TO PRESENT** **ARCH 643–601** “Software Development for Building Design,” Spring 2010, Spring 2012, Spring 2013, Spring 2014 Spring 2015, Spring 2016, Spring 2018, Spring 2019.
This is an interdisciplinary course which combines teams of two Ph.D. students doing simulation and CFD with one undergraduate architecture or master of architecture student designing the building that they are simulating. Course also focuses on writing and presentations.
- ARCH 421–500** “Energy and Sustainable Architecture,” Fall 2005, Spring 2006, Fall 2006, Spring 2007, Fall 2007, Spring 2008, Fall 2008, Spring 2009, Fall 2009, Spring 2010, Spring 2011, Fall 2011, Spring 2011, Fall 2011, Spring 2012, Fall 2012, Spring 2013, Fall 2013, Spring 2014, Fall 2014, Spring 2015, Fall 2015, Spring 2016, Fall 2016, Spring 2017, Fall 2017, Spring 2018, Fall 2018, Spring 2019 Fall 2019.
This course covers the USGBC’s LEED 3.0 rating system. Students assess a building and achieve a LEED rating. Energy systems and simulation are covered in detail. Course also focuses on writing and presentations.
- ARCH 435–500** “Integrated Studio - Systems,” Fall 2009, Fall 2010, Fall 2011, Fall 2012, Fall 2013, Fall 2014, Fall 2015, Fall 2016, Fall 2017, Fall 2018, Fall 2019.
This course combines the studio with structures and building systems. The student’s design must consider the envelope and building systems which impact heat load, water, electricity, transportation, cooling/heating (including distribution). Course also focuses on writing and presentations.
- ARCH 689-601** – “Special Topics – Principles of Low Energy Buildings,” Spring 2009.
ARCH 689-603 – “Special Topics - Energy and Sustainable Architecture,” Spring 2009.
ARCH 334 – “Environmental Design II,” Fall 2004, Spring 2005, Fall 2005, Spring 2006, Fall 2006, Spring 2007, Spring 2007, Spring 2008, Fall 2008.
MEEN 665 – “Application of Energy Management,” Spring 2011.
MEEN 401 – “Introduction to Mechanical Engineering Design,” Fall 2002, Spring 2003, Fall 2003, Fall 2004.
MEEN 402 – “Intermediate Design,” Spring 2004, Spring 2005.
MEEN 437 – “Principles of Building Energy Analysis,” Fall 2002.
MEEN 445 – “Mechanical Engineering Design II,” Fall 1999, Fall 2000, Fall 2001.
MEEN 446 – “Mechanical Engineering Design III,” Spring 2000, Spring 2001, Spring 2002.
- TEXAS A&M UNIVERSITY, COLLEGE STATION, TEXAS
- 1990 TO 1993** **ENGINEERING PHYSICS I, II AND III**, Calculus based three semester Physics core curriculum.
WILLIAM HARPER COLLEGE, PALATINE, IL
- 1973 TO 1975** **MODERN ELECTRONICS AND LAB**, Wrote course material and taught this elective course for Physics majors while a Ph.D. student at Iowa State.
IOWA STATE UNIVERSITY, AMES, IA

1970 TO 1973 **TA FOR PHYSICS I, II AND III** Calculus based three semester Physics core curriculum.
Taught recitations.
IOWA STATE UNIVERSITY, AMES, IA

STUDENT RESEARCH ADVISING

Ph.D. Thesis

Chair / Co-Chair of Ph.D. Committee

1. Losch, Ryan. "TBD," ME Department. Expected Graduation 2024
2. Nelson, W. Alexander. "TBD," ME Department. Expected Graduation 2023
3. Moghaddasi, Haleh. "TBD," Architecture Department. Expected Graduation 2022
4. Ogunyemi, Olugbenga A. "TBD," Architecture Department. Expected Graduation 2022
5. Shahsavari, Fatemeh. "TBD," Architecture Department. Expected Graduation 2022
6. Shajahan, Amreen. "TBD," Architecture Department. Expected Graduation 2020
7. Eluvathingal, Sebastian. "Performance Rating and Fault Diagnostics of Air Terminal Units Using Intelligent Methods," Architecture Department. Expected Graduation 2020
8. Nemer, Hala. "Modeling and Optimization of Chiller and Cooling Tower Systems," Mechanical Engineering Department. Expected Graduation 2020
9. Yousif, Shermeen. "A K-Medoids-Based Shape Clustering Method And Its Applications In Generative Design And Optimization Systems," Architecture Department. 2019
10. Davis, Clinton. "Building Energy Analysis Using Constrained Optimization," Mechanical Engineering Department. 2019
11. Negandhi, Vanita. "Modeling and Control of Passive Chilled Beams with Underfloor Air Distribution of Ventilation in Office Buildings in Humid Climates," Architecture Department. Currently an Assistant Energy Manager with CBRE, Baylor Health Care System. 2015
12. Nelson, Ian. "Dynamic Optimization of Chiller and Cooling Tower Control Functions," Mechanical Engineering Department. Currently a senior engineer with the Energy Systems Laboratory. 2012
13. Dixit, Manish. "A Method to Determine Embodied Energy in Architectural Materials," Architecture Department. Currently an Assistant Professor with Texas A&M University, Construction Science Department. 2012
14. Andolsun, Simge. "Analysis of Energy Savings Features in Commercial Buildings," Architecture Department. Currently an Associate Director of Technical Energy Modeling at the Alliantgroup in Texas. 2012
15. Ugursal, Ahmet. "Transient Comfort Analysis Using Contact and Non-contact Sensors," Architecture Department. Currently a senior engineer with the Energy Systems Lab. 2010

Masters Thesis

Chair / Co-Chair of M.S. Committee

1. Kaneb, Charles. "Coil Condensation Detection for Humidity Control," Mechanical Engineering Department. Currently a design engineer for Chrysler in Detroit, MI. 2014

2. Yang, Ying. "A Study of Predicted Energy Savings and Sensitivity Analysis," Department of Architecture. Currently a design engineer in Shanghai, China. 2013
3. Cantrill, David. "Pressure Loss Measurements in 10", 14", and 16" Nonmetallic Flexible Ducts," Mechanical Engineering Department. Currently the Branch Manager at CxGBS in Mississippi. 2013
4. Weaver, Kevin. "CFD Modeling and Air Flow Optimization for Configurations of Rigid and Flexible Ducts," Mechanical Engineering Department. Currently the Energy Services Manager, Building Business for Schneider Electric. 2011
5. Davis, Clinton. "A Quasi-Static Packetized Building Simulation Methodology," Electrical Engineering. Currently the President of Davis Building Solutions. 2011
6. McDonald, Christopher. "Framework for A Visual Energy Use System," Architecture Department. Currently with the U.S. Department of State as an electrical engineer in communications. 2007
7. Singh, Harkirat. "Development and Implementation of an Artificially Intelligent Search Algorithm for Sensor Fault Detection Using Neural Networks," Mechanical Engineering Department. Currently a software engineer with Sanofi-Pasteur. 2004
8. Ahmad, Mushtaq. "Systematic Time-Based Study for Quantifying the Uncertainty of Uncalibrated Models in Building Energy Simulations," Mechanical Engineering Department. Currently with Nexus, Inc. as a senior project manager. 2003
9. Graves, Rhett. "Thermodynamic Modeling and Optimization of a Screw Compressor Chiller and Cooling Tower System," Mechanical Engineering Department. Currently a mechanical engineer with the US Army Corps of Engineers. 2003
10. Najafi, Massieh. "Use of Auto-Associative Neural Networks for Sensor Diagnostics," Mechanical Engineering Department. Went into industry and then earned a PhD in ME from UC Berkeley. Currently the Vice-President of Analytics at Guardian Analytics. 2003

Masters of Architecture

Chair / Co-Chair of MAR Committee

1. Stone, Bradford Kyle. "An Optimized Multidimensional Building Commissioning Data Base," Architecture Department. 2010

Ph.D. Thesis

Member of Ph.D. Committee

1. Liao, Jiajun. "An Optimized Plant for a District Heating And Cooling System Using Low Grade Geothermal Fluids". Architecture Department. 2019
2. Ruffin, Alaina, "A Comprehensive Evaluation of the Impact Of Continuous Commissioning[®]," Mechanical Engineering Department. 2019
3. Keshavarz, Mohammadreza, "Experimental and Numerical Study of Behavior of Full Scale Deep Foundation under Cyclic Thermal Loading in High Plasticity Clay," Civil Engineering Department. 2018
4. Oh, Sukjoon. "Quantifying the Energy Saving Benefits of Smart Meters and Home Automation Devices for Single Family Residences". Architecture Department. 2017

5. Masuda, Hiroko. "Development of a Data-Driven Model-Based Anomaly Detection Method for Whole Facility Level Energy Use Data By Using the Energy Balance Load Variable," Mechanical Engineering Department. 2017
6. Paulus, Mitch. "Active Remote Setpoint Optimization Utilizing Bas Trend Data," Mechanical Engineering Department. 2017
7. Chen, Wei-Jen. "An Investigation of Optimal Pressurization for Buildings in Hot and Humid Climates," Mechanical Engineering Department. 2016
8. Asl-Rahmani, Mohammad. "BIM-Based Parametric Building Performance Multi-Optimization," Architecture Department. 2015
9. Tanskyi, Oleksandr. "Zeolite Membrane Water Vapor Separation for Building Air-Conditioning and Ventilation Systems," Mechanical Engineering Department. 2015
10. Davis, Georgina. "Optimizing Design and Energy Efficiency in an Extreme, Remote Environment: McMudro Station, Antarctica," Architecture Department. 2015
11. Lin, Guangling. "Development of New Whole Building Fault Detection and Diagnosis Techniques for Commissioning Persistence," Mechanical Engineering Department. 2015
12. Tanskyi, Oleksandr. "Zeolite Membrane Water Vapor Separation for Building Air-Conditioning and Ventilation Systems," Mechanical Engineering Department. 2015
13. Do, Sung Lok. "Development and Application of a Ground-Coupled Heat Pump Simulation Model for Residential Code-Compliance Simulation in Texas," Architecture Department. 2014
14. Kee Han Kim. "Development of an Improved Methodology for Analyzing Existing Single-Family Residential Energy Use," Architecture Department. 2014
15. Mukhopadhyay, Jaya. "An Analysis of Energy Consumption in Grocery Stores in Hot and Humid Climates," Architecture Department. 2013
16. Kota, Sandeep. "Developing and Testing an Improved Thermal and Daylighting Model to Study High Performance Commercial Office Buildings," Architecture Department. 2013
17. Kim, Hyojin. "Methodology for Rating a Building's Overall Performance Based on the ASHRAE/CIBSE/USGBC Performance Measurement Protocols for Commercial Buildings," Architecture Department. 2013
18. Elliott, Mathew Stuart. "Distributed Control of HVAC&R Networks", Mechanical Engineering Dept. 2013
19. Bynum, John. "Thermodynamic Modeling of a Membrane Dehumidification System," Mechanical Engineering Department. 2012
20. Zadeh, Rana. "The Impact of Windows and Daylight in Healthcare Setting on Caregivers' Physiological, Psychological, and Behavioral Health and on Medication Errors," Architecture Department. 2012
21. Xiaodong, Xuan. "Exploring the Effectiveness Of LEED Certification in LEED Certified Healthcare Settings in Climate Zone 2 and 3," Architecture Department. 2012
22. Islam, Saiful. "A Study on Zoning Regulations' Impact on Thermal Comfort Conditions in Non-Conditioned Apartment Buildings in Dhaka City," Architecture Department. 2011

23. Zhang, Zhiqin. "Methodology for Determining the Optimal Operating Strategies for a Chilled Water Storage System," Mechanical Engineering Department. 2010
24. Im, Piljae. "Methodology for the Preliminary Design of High Performance Schools in Hot and Humid Climates," Architecture Department. 2009
25. Malhotra, Mini. "An Analysis of Off-Grid, Off-Pipe Housing in Six U.S. Climates," Architecture Department. 2009
26. Cho, Soolyeon. "Development of an Easy-to-Use Tool for Designing High-Performance Office Buildings in Hot and Humid Climates," Architecture Department. 2008
27. Gong, Xiangyang. "Investigation of a Radiantly Heated and Cooled Office with an Integrated Desiccant Ventilation Unit," Mechanical Engineering. 2007
28. Baltazar, Juan Carlos. "Development of an Automated Methodology for Calibration of Simplified Air-Side HVAC System Models and Estimation of Potential Savings from Retrofit / Commissioning Measures," Mechanical Engineering Department. 2006
29. Zhu, Yiwen. "A Methodology to Pre-Screen Commercial Buildings for Potential Energy Savings Using Limited Information," Mechanical Engineering Department. 2005
30. Song, Suwon. "Development of a Methodology for Evaluating the Energy Performance of New Commercial Buildings," Architecture Department. 2006
31. Sung, Yong Hoon. "Development of a Comprehensive Community NO_x Emissions Reduction Tool," Architecture Department. 2004

Masters of Science, Thesis

Member of M.S. Committee

1. Wang, Linyan, "Use the Building Load Energy Ratio to Measure the Whole Building HVAC Systems Energy Efficiency", Mechanical Engineering Department. 2015
2. Brown, Corey, "Advanced Exergy and Exergoeconomic Analysis of the Major Components of a Combined Cycle Power Plant", Mechanical Engineering Department. 2015
3. Morelli, Franco. "Electrical Demand Analysis Software Tool Suite and Automatic Report Generation for Energy Audits", Mechanical Engineering Department. 2014
4. Tanskyi, Oleksandr. "Analysis of Innovative HVAC System Technologies and Their Application for Office Buildings in Hot and Humid Climates," Mechanical Engineering Department. 2011
5. More, Chandrajit Bhagwant. "TBD," Construction Science Department. 2010
6. Liu, Jingjing. "Improvements and Applications of the Methodology for Potential Energy Savings Estimation from Retro-Commissioning/Retrofit Measures," Mechanical Engineering Department. 2010
7. Christman, Kevin. "Methods for Rapid Estimation of Motor Input Power in HVAC Assessments," Mechanical Engineering Department. 2009

8. Dixit, Manish. "Towards a Consistent and Translatable Information Database of Embodied Energy in Building Materials," Co-Sci Department. 2009
9. Kota, Sandeep. "Integrating Thermal and Daylight Simulation Tools to Perform an Accurate Energy Simulation of Buildings," Arch. Department. 2009
10. Zadeh, Rana. "TBD". Architecture Department. 2010
11. Klima, John. "Optimized Fan Control in Variable Air Volume HVAC Systems Using Static Pressure Resets: Strategy Selection and Savings Prediction," Mechanical Engineering Department. 2009
12. Shaw, Mihir. "TBD," Mechanical Engineering Department. 2009
13. Hicks, David. "Development of a Pre-Screening Methodology To Aid in Determining Potential Energy Savings in Commercial Buildings," Mechanical Engineering Department. 2009
14. Elliott, Matt. "Decentralized Model Predictive Control of a Multiple Evaporator HVAC System," Mechanical Engineering Department. 2008
15. Engan, Kenneth. "A Comparison of Commissioning Savings Determination Methodologies and the Persistence of Commissioning Savings in Three Buildings," Mechanical Engineering Department. 2008
16. Farzana, Sultana. "Sustainable Rainwater Harvesting Solution for Multistoried Residential Apartments in Dhaka, Bangladesh: Solution Through 3D Visualization," Construction Science Department. 2008
17. Michaels, Kevin. "Green Technologies: Effects on New and Existing Buildings," Landscape Architecture and Urban Planning. 2008
18. Negi, Pallav. "Artificial Immune System Based Urban Traffic Control," Mechanical Engineering Department. 2006
19. Malhotra, Mini. "An Analysis of Maximum Residential Energy-Efficiency in Hot and Humid Climates," Architecture Department. 2006
20. Mukhopadhyay, Jaya. "Analysis of Improved Fenestration for Code-Compliant Residential Buildings in Hot and Humid Climates," Department of Architecture. 2005
21. Xu, Chen. "Hydraulic Modeling of Large District Cooling Systems for Master Planning Purposes," Mechanical Engineering Department. 2005
22. Sinvhal, Swapnil. "Mapping Textures on 3D Terrains: A Hybrid Cellular Automata Approach," Computer Science Department. 2005
23. Shao, Jesse Xiaojie. "Use of Energy Balance as a Data Screening Tool for Building Energy Data," Mechanical Engineering Department. 2005
24. Painter, Frank. "Co-Generation Optimization for Waste Water to Fertilizer Processing," Mechanical Engineering Department. 2005
25. Dooley, Brandon. "Effects of System Cycling, Evaporator Airflow, and Condenser Coil Fouling on the Performance of Residential Split-System Air Conditioners," Mechanical Engineering Department. 2004
26. Bensouda, Nabil. "A Procedure for Calibrating Building Energy Simulation Programs," Mechanical Engineering Department. 2003

27. Giebler, Tim. "Energy Conservation Measures for Dual Duct Air Conditioning System Operation in Hot and Humid Climates," Mechanical Engineering Department. 2003
28. Im, Piljae. "Evaluation of Energy Savings and NOx Emissions Reduction from the Adoption of the 2000 International Energy Conservation Code (IECC) To New Residences," Architecture Department. 2003

Master of Science, Professional Study

Member of M. S. Committee

1. Hallowell, Ryan A., "Professional Paper," Energy Institute 2018
2. Thomas, Michele. "Professional Paper," Construction Science Department. 2015
3. Bhagwant, Chandrajit. "Professional Paper," Construction Science Department. 2010
4. Tipton, Shannon. "Professional Paper," Construction Science Department. 2009
5. Luthra, Siddharth. "Professional Paper," Construction Science Department. 2009
6. Masuda, Hiroko. "Professional Paper," Mechanical Engineering Department. 2008
7. Chapman, John. "The Impact of Responsibility Issues on the LEED Certification Process," Construction Science Department. 2006

Master of Architecture

Member of M. Arch. Committee

1. Calvillo, Rafael, 2019, Architecture Department.
2. Hoermann, Justin. "TBD," Architecture Department. 2017
3. Hsu, Chia-En. "TBD," Architecture Department. 2017
4. Ilges, Andrew. "TBD," Architecture Department. 2017
5. Thetford, Alan. "TBD," Architecture Department. 2013
6. Sanders, Matthew V. "TBD," Architecture Department. 2012
7. Henson, Matthew Wayne. "TBD," Architecture Department. 2011
8. Hasse, Sara Dawn. "TBD", Architecture Department. 2011
9. Batten, Quinton Floyd. "The Qurna, a Sustainable, Independent Living Facility," Architecture Department. 2011
10. Su, Yuan. TBD", Architecture Department. 2010
11. Krebs, Julie. "Public Library Design: One Program, Two Sites," Architecture Department. 2009
12. Wren, Claire. "THRIVE: North-Central Austin Health and Wellness Community," Architecture Department. 2009
13. Tarpley, Shaun. "Sustainable Dormitory Using Solar and Sustainable Methods," Architecture Department. 2009
14. Hale, Jon. "Sustainable Office and Hotel with a Condominium Tower," Architecture Department. 2009
15. Islam, Saiful. "TBD," Architecture Department. 2009
16. Davis, Georgiana. "Off-Grid Lodge in Alaska," Architecture Department. 2008

17. Hale, Jon. "The Tower Hotel and Condominium, a Sustainable Addition," Architecture Department. 2004

Undergraduate Research Advising

1. Losch, Ryan, "A High Efficiency Energy Ventilator Recovery Test" Mechanical Engineering Department. 2017-2018
2. Patapoff, Jacob. "A Tactile Device for a LED Monitor Screen" Architecture Department. 2013-2014
3. Breedlove, Colin, Matt Krezinski, Joe McDonough and James Thorpe, "Low Energy Heat Recovery Ventilator." Senior project. Won ASHRAE funding of \$4,100 and won 1st place in TAMU's "Most Likely to be Commercialized" competition. 2013-2014
4. Gonzales, Miseal. "Next Generation Living, an Undergraduate Research Scholars Thesis." Won 2nd Place, University Honors Thesis, Architecture Department. 2013
5. Vaughn, Caroline. "Next Generation Living, an Undergraduate Research Scholars Thesis," Won 2nd Place, University Honors Thesis, Architecture Department. 2013
6. Rowe, Jack. "Next Generation Living," Architecture Department. 2013
7. Fain, David. "Passive Chilled Beam Research Project," Department of Mechanical Engineering. 2010
8. McGarity, Ashley. "Define a Method Using Building Information Modeling Technology to Establish the Utility Bill and Mortgage Cost of a Single-Family Home", Department of Architecture. 2010
9. Perez, Isaura. "Low Energy Buildings", Department of Architecture. 2010
10. Salinas, Erica. "Low Energy Buildings", Department of Architecture. 2010
11. Weldy, Zach. "Ultra-Low Energy Use Residential Structure with Atria – Design Four," Department of Architecture. 2010
12. Kunkel, Kris. "Affordable Residence with Very Low Energy Use," Department of Architecture. 2009
13. Farr, Peter. "Affordable Residence with Very Low Energy Use," Department of Architecture. 2009
14. Hurst, Patrick. "Ultra-Low Energy Use Residential Structure with Atria – Design Three," Department of Architecture. 2009
15. Lampard, Peter. "Ultra-Low Energy Use Residential Structure with Atria – Design Two," Department of Architecture. 2009
16. Rizzato, Gary. "Ultra-Low Energy Use Residential Structure with Atria – Design One," Department of Architecture. 2009
17. Anderson, Tony. "Energy Management Control System Prototype," Department of Electrical Engineering. 2008
18. Peavey, Erin. "Transitory Effects on Human Comfort," Department of Architecture 2008
19. Wallace, Nick. "Energy Management Control System Prototype," Summer Intern, Department of Electrical Engineering. 2007

20. Stockard, Brian. "CFD Analysis in Air Moving Ducts," Department of Aerospace Engineering. 2007
21. Jon. Hale, "Measurement of Pressure Loss in Flexible Ducts and Fittings," Department of Architecture 2006
22. Davis, Clinton. "Energy Analysis Software Development," Department of Electrical Engineering. 2006
23. McDonald, Christopher. "Energy Analysis Software" and "M&V Software Development," Computer Engineering. 2006
24. Bushman, Natalie. "Study of Pre-1900 Residential Design for Energy Impact," Department of Architecture. 2005
25. Morales, Albert. "Non-engineering Orientated Creativity," Department of Architecture. 2005

Student Design Projects

1. Sponsor – 3M, Sponsor Provided \$5,000 plus Professor Salaries for 3M Designs, Title: "High Intensity Street Lighting with Heat Rejection by Pool Boiling," MEEN 402 Spring 2005
2. Sponsor – 3M, Title: "Telecommunications Switching Design," MEEN 402 Spring 2005
3. Sponsor – 3M, Sponsor Provided \$5,000 plus Professor Salaries for 3M Designs, Title: "High Intensity Street Lighting with Heat Rejection by Pool Boiling," MEEN 401 Fall 2004
4. Sponsor – 3M, Title: "Telecommunications Switching Design," MEEN 401 Fall 2004
5. Sponsor – 3M, Sponsor Provided \$5,000 plus Professor Salaries for 3M Designs, Title: "Transmission Line Communications Coupler Prototype Design," MEEN 402 Spring 2004
6. Sponsor – 3M, Title: "Simple On-site Fiber Optic Ferrule Termination Prototype Design," MEEN 402 Spring 2004
7. Sponsor – 3M, Sponsor Provided \$5,000 plus Professor Salaries for 3M Designs, Title: "Fiber Optic Splicer Prototype Design," MEEN 401 Fall 2003
8. Sponsor – 3M, Sponsor Title: "Simple On-site Fiber Optic Ferrule Termination Prototype Design," MEEN 401 Fall 2003
9. Sponsor – 3M, Title: "Transmission Line Communications Coupler Prototype Design," MEEN 401 Fall 2003
10. Sponsor – 3M, Title: "Broadband Communications Over 10,000 Volt Power Lines Prototype Design," MEEN 401 Fall 2003
11. Sponsor – Johnson Space Center, NASA, Sponsor Provided \$5,000, Title: "Mars Rover Prototype Design," MEEN 401 Spring 2003
12. Sponsor – Trane, Title: "Comfort Control Testing System Prototype Design," MEEN 401 Fall 2002
13. Sponsor – Trane, Sponsor Provided \$5,000 for two Designs, Title: "Thermostatic Control Evaluation System Prototype Design," MEEN 401 Fall 2002

14. Sponsor – American Orthodontics, Sponsor Provided \$5,000 for Fall 2001, Spring 2002 Designs, Title: “Self-Ligating Orthodontia Bracket with Active and Passive Control Prototype Design,” MEEN 401 Fall 2002
15. Sponsor – Kvaerner, Inc., Title: “Sub-Sea Pin-Plug Assembly and Testing Vessel Prototype Design,” MEEN 446 Spring 2002
16. Sponsor – Kvaerner, Inc., Title: “Electrically Insulating Flat-Faced Seal and High-Pressure, High-Temperature Test Rig Prototype Design,” MEEN 446 Spring 2002
17. Sponsor – Kvaerner, Inc., Title: “Gate Valve Locking Mechanism Prototype Design,” MEEN 446 Spring 2002
18. Sponsor – Kvaerner, Inc., Title: “Ultrahigh Pressure Thermal Actuator Prototype Design,” MEEN 446 Spring 2002
19. Sponsor – Kvaerner, Inc., Sponsor Provided \$5,000 for two Fall 2001, Spring 2002 Designs, Title: “Electrical Interconnection for an Independently Retrievable Tubing Hanger-Tree System Concept Design,” MEEN 445 Fall 2001
20. Sponsor – Kvaerner, Inc., Sponsor Provided \$5,000 for two Fall 2001, Spring 2002 Designs, Title: “Design of an Electrical Sub-Sea Gate Valve Actuator Concept Design,” MEEN 445 Fall 2001
21. Sponsor – Halliburton, Title: “High Tolerance Well Pipe Screen Production Machine Prototype Design” and “Well Pipe Screen Tolerance Measurement System Prototype Design,” MEEN 446 Spring 2001
22. Sponsor – ABB VetcoGray, Title: “Tilting Keel Joint Prototype Design” and “Spring Pipe Keel Prototype Design,” MEEN 446 Spring 2001
23. Sponsor – Halliburton, Sponsor Provided \$5,000 for Fall 2000, Spring 2001 Designs, Title: “Separation of Particulates from an Oil and Gas Well Flow Concept Design,” MEEN 445 Fall 2000
24. Sponsor – ABB VetcoGray, Sponsor Provided \$5,000 for Fall 2000, Spring 2001 Designs, Title: “Keel-Riser Strain Relief Concept Design,” MEEN 445 Fall 2000
25. Sponsor – Ford Motor Company / Visteon, Title: “Instrument Panel, Pedals and Steering Drive By Wire Prototype,” MEEN 446 Spring 2000
26. Sponsor – Ford Motor Company / Visteon, Sponsor Provided \$5,000 for Fall 1999 / Spring 2000 Designs, Title: “Vehicle Drive By Wire Concept Design,” MEEN 445 Fall 1999

Student Competition Advising

1. Advisor – InventNOW TAMU Student Organization. Fall 2017 through Spring 2019
2. Advisor – Hyperloop Competition. HyperWhoop Team selected to go forward in first stage competition. Second stage occurs on January 29, 2016. Fall 2015
3. Advisor – ASHRAE Student Design Competition. Fall 2015
4. Advisor – ASHRAE Student Project Competition. Team won \$4,500 to build a novel heat recovery ventilator. Fall 2013 – Spring 2014
5. Advisor and Designer – Competition from Austin Energy for Electrical Line Reliability and Beautification. Won \$50,000 Second Prize. . Fall 2008

6. Advisor – Department of Energy’s Solar Decathlon. Students won first place AIAS Design Award and seventeenth place in DOE competition. Fall 2007
7. Advisor – Student Design Wireless Energy Monitoring Product. Students completed this design as part of a design class. Fall 2006
8. Advisor – Student Design Team for Wall Moisture Detection Product. Students won internal \$500 Design Award. Fall 2003
9. Advisor - 2001 DOE Future Energy Challenge Competition for Low Cost Fuel Cell Power Inverter. Student team won Energy Challenge \$50,000 Grand Prize in competition with university teams from most major universities. Fall 2001

PROFESSIONAL AFFILIATIONS

American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), Fellow, 1980 – Present.

- Publication and Education Committee (standing), Research Journal Subcommittee, Member, 2019 to present.
- Technology Council, Elected to Member at Large, 2015 – 2019.
- Residential Building Committee, Member, 2015 – 2018, Chair – Technical Subcommittee.
- Presidential AdHoc “1B-ASHRAE Value” Committee Chair, 2015-2017.
- ASHRAE Life Member’s Club, Member, 2013 – Present, Executive Committee, 2018 – Present.
- ASHRAE, Board of Directors, Director at Large, 2012 – 2015.
- ASHRAE, College of Fellows, President 2010-2011, President-Elect 2009-2010, Member, 2006 – Present.
- Technical Activities Committee, Member, 2008 – 2012, Special Activities 2008 -2010, Vice-Chairman 2010-2011, Chairman 2011-2012.
- Sustainability Committee, “High Performance Building Certification,” Test writer, 2007 – 2008.
- Research Advisory Panel, Vice-Chairman, 2004 – 2005; Member, 2001 – 2005.
- SP102, “Advanced Energy Design Guide: Small Office Buildings,” Reviewer, 2004 – 2005.
- TC-1.5 Computer Applications, Member, 1987 – Present, Secretary, 1989, Vice-Chairman, 1991, Chairman 1992 – 1994.
- ASHRAE Journal / Insights Editorial Standing Committee, Member, 1989 – 1993, Vice-Chairman 1992, Chairman 1993.
- TC-1.7 Operations and Building Management, Member 1986 – 1990.
- TC-4.7 Energy Calculations, Corresponding Member, 1991 – 1994.
- TC-7.6 (Previously TC 9.6) Systems Energy Utilization, Member, 1989-1996, 2002-2006.
- TC-7.9 Commissioning, Member, 1999 – Present.
- TC-8.8 Refrigerant System Controls and Accessories, Member 1996 – 1997, Corresponding Member, 1998.
- TC-9.5 Residential and Small Building Applications, Member, Program Sub-Committee Chair, 2001 - 2007, Vice-Chairman, 2002 – 2005, Chairman, 2005 – 2007, Research Sub-Committee Chair, 2007 – 2009.

Charles H. Culp - *Curriculum Vitae*

- TC-9.6 Handbook Subcommittee (Systems Energy Utilization), Chairman, 1993 – 1995.
 - GPC14P – Guideline Project Committee, Member, 1990 – 95, Corresponding Member 1996-2000, Member 2000 – 2003.
 - TG9-RSBC Task Group, Residential and Small Buildings, Vice-Chairman, Program Subcommittee Chairman, 2001 – 2007.
 - TG9-MMB Task Group, Moisture Control in Buildings, Corresponding Member, 2002 – 2007.
- Center for Health Systems Design, TAMU College of Architecture, Fellow, 2010 - Present.
- American Society of Distinguished Patent Holders, Member, 1991 to Present.
- Sigma Xi, Member, 1974 to 2017.
- Southern Building Code Congress International, Professional Member, 2001 to 2010.
- U. S. Green Building Council, Member, 2004 to Present.
- Green Building Initiative, Member, 2006 to 2012.
- Green Building ANSI Standard – Energy Committee, Member.

PROFESSIONAL OUTREACH / SERVICE

- ASHRAE Research Advisory Panel, Vice-Chairman, Meeting, Sponsored by American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE), Denver, CO, June 28, 2005.
- American Council for an Energy-Efficient Economy, 2005 to Present. Invited membership – State Technology Advancement Collaborative (STAC) Project Advisory Committee.
- ASHRAE Research Advisory Panel, Vice-Chairman, Meeting, Sponsored by American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE), Atlanta, GA, October 1-2, 2004.
- ASHRAE Research Advisory Panel, Member, Meeting, Sponsored by American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE), Washington, DC, June 11-14, 2004.
- “Cost Effective M&V Workshop,” Sponsored by TAC-Americas, Richardson, TX, May 19, 2004.
- Design Charrette, Bryan, TX, September 2003, participated in the design for the Rotary Plaza.
- “Measurement and Verification Techniques Workshop,” sponsored by the Texas State Energy Conservation Office, Corpus Christi, TX, June 2003 (w/ J. S. Haberl).
- “Measurement and Verification Techniques Workshop,” sponsored by the Texas State Energy Conservation Office, Houston, TX, October 2002 (w/ J. S. Haberl).
- “Measurement and Verification Techniques Workshop,” sponsored by the Texas State Energy Conservation Office, Houston, TX, May 2002 (w/ J. S. Haberl).
- “Measurement and Verification Techniques Workshop,” sponsored by the Texas State Energy Conservation Office, Austin, TX, July 2001 (w/ J. S. Haberl).
- Design Charrette, San Antonio, TX, November 28, 2000, participated in the design of facilities next to a major bat cave, conducted by Solar San Antonio and Rebuild America.

DEPARTMENT OF ARCHITECTURE SERVICE AND UNIVERSITY SERVICE

- TAMU Faculty Advisory Board for Commercialization, 2019 to Present.
- Department of Architecture, Chair, SyTechArch Committee, 2020 to Present.

InventNow Faculty Advisor, Texas A&M Student Organization, 2017 – 2020.
Promotion and Tenure Committee, Department of Architecture, 2017 – 2020.
Energy Institute, Member, Faculty Steering Committee, 2015 – Present.
Department of Architecture MS-PhD Committee, 2004 – Present.
ASHRAE Student Branch Faculty Advisor, 2006 – Present.
Aggie Rotaract Faculty Advisor, Texas A&M Chapter, 2000 – Present.
Promotion and Tenure Committee, College of Architecture, 2014 – 2017.
Department of Architecture Technology Committee, Chair, 2014 – 2017.
College of Architecture, IT Committee, member, 2011 – 2017.
Search Committee for Head, Department of Architecture, College of Architecture, 2015 to 2016.
Department of Architecture Academic Committee (DAAC), Member, 2014 – 2016.
Department of Architecture, Design Focus Committee, Member, 2014 – 2015.
Promotion and Tenure Committee, Department of Architecture, 2008 – 2014.
Research Track Committee, Department of Architecture, 2008 – 2014.
Technology Caucus Committee, 2006 – 2014.
College Research and Interdisciplinary Council, 2008 – 2011.
College Research Advisory Committee, 2007 – 2011.
Emerging Green Builders Chapter Faculty Advisor, 2006 – 2013.
Faculty Search Committee, Member, Department of Architecture, 2006 – 2008.
Department Head Search Committee, Department of Architecture, 2007.
Master of Architecture Committee, 2007.
Architecture Department Accreditation Committee, 2006 – 2007.
Visualization Department Head Search, 2006 - 2007.
Research Advisory Committee, 2006 – 2007.
Academic Affairs Committee, Member, Department of Architecture, 2004 – 2007.
Committee to Form a Department of Visualization, 2006.
Caudill Fellowship Committee, 2004 – 2006.
Finance Committee, Member, Department of Architecture, 2004.

COMMUNITY ACTIVITIES

National Academy of Science Advisory Panel on Energy Standards, 2019-2020.
Rotary, Member of the College Station Rotary Club, 1999 – Present.
Architectural Control Committee, Nantucket Preservation Association, Chairman, 2004 – 2006,
Member 2003 – 2006.
Iowa State University Mechanical Engineering Advisory Council, Member, 1997 – 1999.
Rotary, Member of the Marshalltown Rotary Club, 1997-1999.
Boy Scouts of America, District Commissioner, 1998 – 1999.
Twenty-First Century School Committee, Marshalltown, 1997 – 1999.

Charles H. Culp - *Curriculum Vitae*

Gadget Room Founding Member, Marshalltown Middle Schools, 1997 – 1999.

Marshalltown Schools Technology Committee Member, 1997 – 1999.

School Board Member, Troy, OH, 1996 – 1997.