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VITAE

NINA J. BAIRD, PHD

Assistant Teaching Professor

Center for Building Performance & Diagnostics

Carnegie Mellon University School of Architecture

5000 Forbes Avenue, MMCH 415

Pittsburgh, PA 15213

Phone 412-268-5975

Email nbaird@cmu.edu

EDUCATION

2015 **Doctor of Philosophy in Building Performance & Diagnostics**

Carnegie Mellon University, Pittsburgh, PA

Dissertation: *A Critical Evaluation of the Environmental Performance of District Open Loop Geothermal Heat Pump Systems*

2005 **Master of Science in Sustainable Design**

Carnegie Mellon University, Pittsburgh, PA

Thesis: *Climatic Moisture in Building Design: Strategies for Moisture Zoning Introducing GIS-based Climate Mapper[®] Software*

1992 **Master of Science in Public Health**

Division of Environmental Science & Engineering

University of North Carolina, Chapel Hill, NC

Thesis: *A Retrospective Case Study of Chronic Xylene Exposure and Alcohol Consumption*

1978 **Bachelor of Arts in English with Honors**

Amherst College, Amherst MA

Thesis: *Feminist Literary Criticism: Theory & Application*

PROFESSIONAL APPOINTMENTS/PROFESSIONAL EXPERIENCE

2015 to Present **Assistant Teaching Professor**, School of Architecture, Carnegie Mellon University

Courses Taught:

48-432/48-655 *Enviro II: Design Integration of Active Building Systems* (undergrad/grad mechanical systems course, fall semester)

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48-752 *Zero Energy Housing* (grad course, spring semester)

48- 761/90-793 *Integrated Community Energy Systems* (new grad course launched spring 2017, cross-listed with Heinz School of Public Policy)

48-795 *LEED, Green Design & Building Rating in a Global Context* (grad mini course taught twice fall semester)

48-736 *Master's Independent Study* (varies with semester)

PhD Advisory Committees, Member

Sureka Tetali, PhD Candidate, CMU Architecture

Bokyoung Jun, PhD Student, CMU Architecture

James Katungyi, PhD Student, CMU Architecture

8/2008 to 5/2015 **Adjunct Assistant Professor**, School of Architecture, Carnegie Mellon University

Courses Taught:

1/2011 to 5/2015 48-795 *LEED, Green Design and Building Rating in a Global Context* (grad level mini, taught 2x/year)

8/2008 to 5/2015 48-752 *Zero Energy Housing* (grad level)

Funded Research

2/2012 to 4/2014 **Principal Investigator**, Center for Building Performance & Diagnostics, Carnegie Mellon

For the Pennsylvania Housing Finance Agency, with funding from the DOE Energy Efficient Buildings Hub (EEB Hub), evaluated the impact of ARRA-funded upgrades to 8,300 units of multifamily affordable housing. Funded work included database development, data analysis and final report of findings.

8/2012-5/2013 **Principal Investigator**, Center for Building Performance & Diagnostics, Carnegie Mellon

For Thar Geothermal LLC, with Product Innovation Grant funding from Pittsburgh's Green Building Alliance, developed a research protocol to evaluate the efficiency of their CO2-based direct exchange geothermal heat pump system: compressed heating, compressed cooling and pumped cooling. Implemented the protocol to evaluate compressed heating for air-based and radiant floor systems. Proposed system improvements and means to integrate their system with more conventional equipment. Prepared final report.

Spring 2006- 2008 **Teaching Assistant**, School of Architecture, Carnegie Mellon University

2008 *Building Systems Integration* (undergrad lecture + studio)

2007 *Advanced Building Systems* (grad lecture)

2006 *Advanced Buildings Systems/ Building Systems Integration* (undergrad/grad lecture + studio)

For each course above, TA responsibilities include lecture preparation, twice weekly

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meetings with Professor Hartkopf, occasional lecture delivery, development of project assignments and tests, and grading.

Funded Research

12/2007 to 12/2008 **Co-Principal Investigator**, with Vivian Loftness, FAIA, Professor, Center for Building Performance

With a Product Innovation Grant from Pittsburgh's Green Building Alliance and matching funds from Geothermal Energy Systems, Inc., installed a metering system for a new district geothermal system in Warren, PA and analyzed system performance and energy consumption in two mixed-use buildings on the system. Prepared a final technical report on current system performance and recommended upgrades.

1/2006 to 5/2007 **Researcher/Project Coordinator**, Center for Building Performance, Carnegie Mellon

Coordinated technical work and funding for contract with the Architect of the Capitol (AOC) in Washington, D.C. Developed energy and water conservation strategies for managed federal property (15 million square feet of building area and 174 acres of grounds). Worked directly with federal staff to complete FY06 Annual Report to Congress on Energy & Water Management and Conservation. This required analysis of energy consumption from FY03-FY06 and plans to reduce consumption in subsequent years. Continued this research through first two semesters of doctoral program (through 05/2007).

ADDITIONAL PROFESSIONAL EXPERIENCE

1996-Spring 2004 **Vice-President**, ATL International, Germantown, MD

Built the occupational safety and environmental health division in a start-up consulting firm in Washington DC area, from an initial \$25K purchase order in 1996 to \$2.5 million in contracts with federal OSHA in Spring 2004. Specialized in compliance assistance. Developed software tools to help employers comply with OSHA regulations; initiated and staffed OSHA's toll-free compliance line; drafted regulatory analysis and guidance, OSHA letters and speeches. Substantially involved in response to cleanup at World Trade Center and Pentagon, at Hart Congressional Office Building (anthrax release) and preparation of subsequent guidance.

1993-1995 **Senior Health Scientist**, ERG, Rosslyn, VA

Provided technical consulting to federal OSHA and DOE with a focus in hazardous waste site health and safety. Participated with OSHA in Superfund site audits and prepared audit reports. Analyzed toxicology and epidemiology data to support regulatory rulemaking. Assisted Brookhaven National Lab in analysis of toxicology data for draft DOE order on reproductive hazards. Proposed, managed and completed a series of journal articles and conference presentations to clarify health and safety practices on hazardous waste sites.

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1988-7/1989 **Director of Marketing & Public Relations**, American Bar Association, Chicago, IL

Directed marketing and public relations program for *ABA Journal*. Hired and directed work of ad agencies and independent designers and writers. Achieved \$1 million revenue increase (a 20% increase) in 18 months. Cut existing budget overrun by \$109K in first year and delivered second year promotions \$52K under budget.

1987 **Business Administrator**, National Trust for Historic Preservation, San Francisco, CA

Managed business operations for western regional office of national association, including budget and financial reports. Cleared 4-month backlog of public requests for information and establish system that reduced reply time to two weeks. Installed email and accounting software to increase efficiency and speed communications with national office.

1985-1986 **Project Manager/Editor**, Pacific Telesis/PacTel Publishing, Walnut Creek CA

Managed marketing and editorial development of two national start-up business directories in design/construction for Baby Bell subsidiary. Oversaw multiple vendor contracts and marketing budget. Analyzed market, implemented promotional strategy, and directed design and production work by in-house staff and outside vendors. Served as directory spokesperson at tradeshow and for press.

1980-1984 **Small Business Consultant**, Davis, CA and San Francisco, CA

Provided consulting in business management and promotion for a variety of small businesses and organizations. Improved customer service, organization and marketing. Developed work scheduling and staffing strategies. Standardized accounting practices.

1979 **Curriculum Development Specialist**, Central Oregon Community College, Bend, OR

Developed new curricula based on employment opportunities and college resources. Established effective communication with State Board of Education personnel; received State approval for new programs in paralegal training and early childhood education, and expanded offerings in computer training and foreign languages.

PRESENTATIONS

Baird, N., Metropulos, L. and Ralich, S. *Leveraging the Building Code for High Performance Multifamily Affordable Housing*, presentation at National Energy Codes Conference, July 18, 2017.

Baird, N. and Altschul, M. *CHP and Wastewater Reclamation & Reuse: Sustainable Infrastructure Options for CMU*, presentation for Allegheny County Green Action Team, June 27, 2017

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Sustainable District Energy Options for Pittsburgh, panel participant for Harvard Business Review-hosted conference, *Delivering Economic Resilience in the New Energy Paradigm*, Pittsburgh, PA. May 9, 2017.

Do You BTU? Panel Participant for Energy: Science, Society, and Communication course on building energy use and retrofit strategies, joint CMU/Univ. of Pittsburgh program funded by NSF Science & Engineering Ambassadors program, March 23, 2017.

Baird, N. *Geothermal Heat Pumps: Renewable Energy? A Race-to-Zero Strategy?* Pittsburgh Green Building Alliance *Race to Zero Energy Series* presentation, July 19, 2016.

Baird, N. and McCray, K. *NGWA Hydrogeologic Guidelines for Large Scale Geothermal Heat Pump Systems*, at Pennsylvania Ground Water Association Winter Conference, January 25, 2013.

Baird, N. and McCray, K. *NGWA Hydrogeologic Guidelines for Large Scale Geothermal Heat Pump Systems*, International Ground Source Heat Pump Association, October 4, 2012.

Baird, N., Loftness, V. and Mattern, G. *A Privately-Developed Community Open Loop Geothermal System: Operational Successes & Challenges*, International District Energy Association Campus Conference, February 2012.

Johnstone, H. and Baird, N. *Combined Heat and Power District Energy Screening Tool*, International District Energy Association Campus Conference, February 2012.

Baird, N. *Energy Efficiency in HUD Housing: EPA Energy Star Impact and Opportunities for HUD Program Innovation*, presentation for US Housing & Urban Development Multifamily Program Center, Pittsburgh, PA, September 2010.

Baird, N. *Energy and Water Conservation: Will Tenant Education Produce Savings?* Closing speaker for Pennsylvania Affordable Housing Managers Association Energy Conference, Warrendale, PA, July 2010.

Baird, N., Loftness, V. and Mattern, G. *Renewable Energy Infrastructure: Low Temperature District Systems*, GreenSense 2009: Beyond Buildings, Pittsburgh, PA, poster session, March 2009.

Loftness, V. and Baird, N. *District Energy: Low Temperature, High Performance System*, Pennsylvania Green Growth Forum, Hershey, PA, poster session, September 2008.

Garrahan, M., Turpin, R., and Baird, N. *When Multi-Agency Collaboration Works: EPA/Labor Superfund Health and Safety Task Force*, American Industrial Hygiene Conference and Exposition, San Diego, CA, platform session, June 2002.

Garrahan, M., Cook, E., Baird, N. and Jones, C. *Worker Protection at Brownfields and State Voluntary Cleanup Program Sites*. American Industrial Hygiene Conference and Exposition, New Orleans, LA, platform session, May 2001.

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Garrahan, M., Jones, C. and Baird, N. *OSHA Regulatory Compliance on Brownfields Sites: What is Required and How is it Accomplished?* American Industrial Hygiene Conference and Exposition, New Orleans, LA, training session, May 2001.

Garrahan, M., Keyes, D., and Baird, N. *How to Control Common Safety Hazards at Hazardous Waste Sites: Results of New Field Study.* American Industrial Hygiene Conference and Exposition, Orlando, FL, platform session. June 2000.

Cook, E., Ogden, C., Baird, N. *Improving Confined Space Safety Using New OSHA Software Program.* American Industrial Hygiene Conference and Exposition, Orlando, FL, platform session. June 2000.

Baird, N., Garrahan, M., Laferriere, R., and Duffield, C. *HAZWOPER Training for Marine Oil Spill Responders.* American Industrial Hygiene Conference and Exposition, Orlando, FL, poster session. June 2000.

Garrahan, M., Baird, N., Ogden, C. *Emergency Response Plans: How to Coordinate with Local Responders and Take Advantage of One-Plan Efficiencies.* American Industrial Hygiene Conference and Exposition, Toronto, Canada, platform session. June 1999.

PUBLICATIONS

Baird, N. and Rhyner, J., eds., 2015. *Hydrogeologic Guidelines for Large Scale Ground Source Heat Pump Systems*, National Ground Water Association. ISBN 1-5603-027-4.

Baird, N., Tetali, S. *et al.* 2014. *Analysis of Energy and Water Impacts from Pennsylvania Multifamily Affordable Housing Upgrades 2010-2012*, funded by US DOE Energy Efficient Buildings Hub.

Johnstone, H., Lam, K., Baird, N., Ramesh, S. 2014. "Urban Energy Information Modeling: High Fidelity Aggregated Building Simulation for District Energy Systems," in *Building Information Modeling: BIM in Current and Future Practice*, Wiley. ISBN: 978-1-118-76630-9.

Baird, N., Lasternas, B., and Li, D. 2013. *Next-Generation CO2 Geothermal Heat Pump Systems Evaluation of Thar's Direct Exchange Geothermal Heat Pump System*, under grant from Pittsburgh Green Building Alliance.

Baird, N., Lasternas, B., and Li, D. 2013. *Research Protocol for Evaluation of Thar's Direct Exchange CO2 Geothermal System*, under grant from Pittsburgh Green Building Alliance.

Baird, N. 2012. "Critical Sources for Sustainability: Geothermal Conditioning," in *Encyclopaedia of Sustainability Science and Technology: Science & Technology of the Sustainable Built Environment*, Springer Verlag, GmbH.

Baird, N. 2009. "Performance of the Breeze Point Landing District Geothermal Heat Pump System & Suggestions for Design Modifications" Green Building Alliance Product Innovation Grant, Final Research Report.

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Loftness, V., Baird, N., Snyder, M. 2007. "Annual Report to Congress, Energy & Water Management and Conservation for the Office of the Architect of the Capitol," prepared for the Architect of the Capitol under subcontract to Entech Engineering.

Baird, N., Cook, E., and Perry, W. 1996. *Sampling Surface Contamination at Hazardous Waste Sites*. Occupational Health and Safety, January 1996, <http://www.osha.gov/SLTC/hazardouswaste/surface2.html>.

Garrahan, M., Cook, E., and Baird, N. 1996. *Summary of Findings from EPA/Labor Superfund Health and Safety Task Force Audits*. ACGIH Journal, vol. 11, no. 6, pp 525-527, <http://www.trustrm.com/ectny/hazardouswaste/osha.html>.

Savitz, D., Brett, K., Baird, N., and Tse, C. 1996. *Male and Female Employment in the Textile Industry in Relation to Miscarriage and Preterm Delivery*. American Journal of Industrial Medicine, 30: 307-316, <http://www.ncbi.nlm.nih.gov/pubmed/8876799>.

Baird, N. 1995. *Emergency Response Compliance Study: CSHO Interview Study*. Prepared for OSHA Office of Health Compliance Assistance, under Contract No. J-9-F-3-0043.

Baird, N. 1995. *Emergency Response Compliance Study: Citation Statistics and Outreach Proposals*. Prepared for OSHA Office of Health Compliance Assistance, under Contract No. J-9-F-3-0043.

Garrahan, M., Cook, E., and Baird, N. 1995. *Correcting Common Safety and Health Deficiencies at Hazardous Waste Remediation Sites*. In: Proceedings of Superfund XVI Conference, Washington, D.C., <http://www.osha.gov/SLTC/hazardouswaste/osha.html>.

Savitz, D., Baird, N., and Dole, N. 1994. *Agreement on Textile Industry Exposures During Pregnancy Based on Work Description, Job Title, and Self-Report*. International Journal of Exposure Analysis and Environmental Epidemiology 4:513-524.

Baird, N. and Kent, M. 1993. *Chemical Hazard Classification and Information Regulations of Canada, Mexico, the European Economic Community, and the United States, and International Efforts toward Harmonization*. Prepared for OSHA under Contract No. J-9-F-0010.

Baird, N. and Kent, M. 1993. *Summary of Proposed European Economic Community Directive on the Regulation of Occupational Exposure to Physical Hazards*. Prepared for OSHA under Contract No. J-9-F-1-0010.

CAMPUS/COMMUNITY SERVICE

2015 to Present **Green Practices Committee**, Carnegie Mellon University, Member

2017 **Academic Chair**

Participate in regular Green Practices meetings and in a variety of GP initiatives and events. Served as Spring Carnival booth judge 2016 and 2017. In Spring 2016, proposed wastewater reclamation and reuse project on CMU campus and continue to work with Martin Altschul and other FMS personnel, faculty and staff to investigate

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the potential for this infrastructure on campus. Also working with FMS, the UC Director and student volunteers to redesign campus recycling room and have initiated work on CMU water plan.

11/2009 to 2013 **Energy Conservation Collaborative**, Technical Advisor

For an organization of multifamily affordable housing in Southwestern Pennsylvania, provided technical assistance on increasing sustainable property performance. Participation included bimonthly meetings, intermittent presentations and individual assistance. Initiated emphasis on metering and tenant feedback for individual dwellings to counter a trend toward master metering. Provided training on Energy Star program upgrades for HUD employees. Assisted with workshop on utility-installed community district systems.

6/2011to 4/2012 **Allegheny Riverfront District System Working Group**, Member

Invited by Urban Redevelopment Authority to participate in evaluating potential for district conditioning and energy system for large redevelopment area. Secured funding and technical support from the International District Energy Association and DOE for preliminary energy mapping. Assisted IDEA consultant with development of software screening tool to assess economic viability of district system development.

2010, 2011 **Graduate Student Teaching Awards Committee**, Reviewer

As the award winner in 2009, was asked to serve as a reviewer in 2010; continued to serve for 2011 awards.

2/2009-6/2009 **Pennsylvania Climate Change Advisory Committee**, Technical Analyst/Participant

Developed quantitative analyses of climate change issues associated with more effective water use (energy-water nexus) and more widespread use of ground source heat pumps for building conditioning. Participated in ongoing conference calls and drafting of Pennsylvania Strategic Plan.

05/2008, 05/2009 **Math Options Career Day**, Penn State Erie/The Behrend College

Keynote Speaker (2008) & Home Audit/Blower Door Workshop

For audience of 7th- & 8th-grade young women from Pennsylvania middle schools, used personal career experience to illustrate importance of math/science education. Presented hands-on workshop on air infiltration (blower door) test and residential building audit.

01/1999 - 05/2004 **Environmental Affairs Committee**, Committee Chair, 01/2002-05/2004, Gaithersburg, MD

Proposed a green building program in city of 55,000 residents and worked with citizen committee to realize that goal. Arranged for speakers to educate committee members and City staff. Developed proposal for Mayor and City Council, presented and accepted October 2001. Attended State Green Building Network meetings with city staff to gain visibility for efforts. Organized green building tour for staff and elected officials from city and county. With City Manager's support, Gaithersburg

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became first city of its size to join US Green Building Council; city architect received LEED training, and requests for bids altered to include criteria for green building experience. Applied for and received grant from Maryland Energy Administration to support LEED training for 60 municipal staff in Gaithersburg, Rockville, and several Montgomery County organizations. First LEED Silver building, the Gaithersburg Teen Center, opened in 2005.

2002-08/2004 **Habitat for Humanity Construction Committee**, Volunteer/Green Building Advocate, Montgomery Cty, MD

Introduced green building practices to Montgomery County Habitat for Humanity. Took Home Energy Rating System (HERS) training and with testing equipment loaned by Maryland Energy Administration, did blower door demonstrations for committee members and other community residents. Purchased blower door equipment and evaluated infiltration on renovated, new and under-construction Habitat homes. Worked with Habitat staff and volunteers to improve construction practices and with Habitat families to understand and reduce utility bills.

1993-1994 **Boys and Girls Homes of Maryland**, Volunteer Tutor/Career Mentor, Silver Spring, MD

Tutored weekly and arranged speaker series on career options.

1990-1992 **Landfill Siting Committee**, Orange County, NC

Represented University on new solid waste landfill siting committee.

HONORS & AWARDS

2009 **Graduate Student Teaching Award**, Carnegie Mellon University

Selected among all campus departments. Nominated by Head of School of Architecture and Head of Center for Building Performance, Carnegie Mellon University; supported by letters from students.

2007 **Teaching Assistant Commendation**, Carnegie Mellon University

Commendation at 2007 graduation ceremony from Master's Students in Sustainable Design.

1994 **Volunteer of the Year**, Boys & Girls Homes of Maryland

1991 **Outstanding Graduate Student in Environmental Science & Engineering**, University of North Carolina, Chapel Hill, NC

PROFESSIONAL MEMBERSHIPS

Since 2002 American Solar Energy Society

Since 2003 Society of Building Science Educators

Since 2007 ASHRAE

Since 2009 National Ground Water Association

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