

# Bianca Howard

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## EDUCATION

|            |                        |                                             |      |
|------------|------------------------|---------------------------------------------|------|
| <b>PhD</b> | Mechanical Engineering | Columbia University in the City of New York | 2016 |
| <b>MSc</b> | Mechanical Engineering | Columbia University in the City of New York | 2011 |
| <b>BSc</b> | Mechanical Engineering | University of Nebraska -- Lincoln           | 2009 |

## ACADEMIC POSITIONS

|                            |                         |                                                                                                         |                 |
|----------------------------|-------------------------|---------------------------------------------------------------------------------------------------------|-----------------|
| <b>Assistant Professor</b> | Columbia University     | Department of Mechanical Engineering                                                                    | 2022 -- present |
| <b>Senior Lecturer</b>     | Loughborough University | School of Architecture, Building and Civil Engineering<br><i>(Maternity leave Jul 2021 -- Jun 2022)</i> | 2021 -- 2022    |
| <b>Lecturer</b>            | Loughborough University | School of Architecture, Building and Civil Engineering                                                  | 2017 -- 2021    |
| <b>Research Associate</b>  | Imperial College London | Department of Civil and Environmental Engineering                                                       | 2015 -- 2017    |
| <b>Research Assistant</b>  | Columbia University     | Department of Mechanical Engineering                                                                    | 2010 -- 2015    |

## GRANTS AWARDED

| Amount                      | Role                   | Funder                                | Title                                                                                                                              | Year |
|-----------------------------|------------------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------|
| \$400,000 (BH: \$20,000)    | Co-Investigator        | NYSERDA                               | Characterizing Energy Insecurity and Energy Inequities Across New York State                                                       | 2026 |
| \$49,036                    | Principal Investigator | NYSERDA                               | Developing high-value Generative AI (GenAI) use cases for the commercial real estate sector                                        | 2025 |
| \$60,000                    | Co-Investigator        | Columbia Center for Political Economy | Industrial policy and its implications for the political economies of affordable housing and building stock decarbonization in NYC | 2024 |
| \$75,000                    | Principal Investigator | Columbia Data Science Institute       | One Size Doesn't Fit All: Developing Bespoke and Just Building Decarbonization Plans (2024-2025)                                   | 2024 |
| \$1,500,000 (BH: \$110,000) | Co-Investigator        | US DOE                                | Smart Energy Storage Integration and Management Platform for Buildings (SESIMP-B) (2024-2026)                                      | 2023 |
| \$85,000                    | Principal Investigator | Columbia Engineering                  | Illuminating the Cobenefits of Building Decarbonization (2023-2024)                                                                | 2023 |

|          |                        |           |                                                                                                  |      |
|----------|------------------------|-----------|--------------------------------------------------------------------------------------------------|------|
| £497,477 | Principal Investigator | UK EPSRC  | Innovation Fellowship FlexTECC: Flexible Timing of Energy Consumption in Communities (2018-2021) | 2018 |
| £1,500   | Principal Investigator | Santander | Mobility Travel Grant: Decentralized Electricity Provision in Haiti                              | 2018 |

## PENDING GRANTS

| Amount                    | Role            | Funder  | Title                                                                              | Year         |
|---------------------------|-----------------|---------|------------------------------------------------------------------------------------|--------------|
| \$546,872 (BH: \$203,088) | Co-Investigator | NSF STS | Civic Technoscience and Object-Centered Engagement in Affordable Housing Retrofits | Under Review |

## TEACHING

### Columbia University

Building Energy Modeling and Simulation | BS/MS Mechanical Engineering | 2022 -- Present

Role: Responsible Examiner

Student Evaluations: Course 4.3/5.0; Instructor 4.6/5.0 (2024)

Mechanical Engineering Lab II | BS Mechanical Engineering | 2025

Role: Professor

Student Evaluations: Course 3.7/5.0; Instructor 4.5/5.0 (2025)

### Loughborough University

Building Energy Modelling | MSc Energy Resilience in the Built Environment | 2019 -- 2021

Role: Responsible Examiner | Student Evaluations: N/A (COVID)

Controls & Commissioning | MSc Low Energy Building Services Engineering | 2018 -- 2021

Role: Co-Tutor | Student Evaluations: 4.5/5.0

Building Energy Supply Systems & District Heating Networks | MSc Low Energy Building Services Engineering | 2018 -- 2021

Role: Co-Tutor | Student Evaluations: 4.6/5.0

Collaborative BIM | BSc Architectural Engineering and Design Management | 2018 -- 2021

Role: Responsible Examiner | Student Evaluations: 4.3/5.0

Building Science | BArch Architecture | 2017 -- 2021

Role: Co-Tutor | Student Evaluations: 4.0/5.0

### Imperial College London

Urban Energy Systems | MSc Sustainable Energy Futures | 2016 -- 2018

Role: Tutor

## RESEARCH SUPERVISION

### Current

**Ryan Dubois** -- PhD, Columbia University (2023 -- present), Research Advisor

**Matthew Kerr** -- PhD, Columbia University (2022 -- present), Research Advisor

### Completed

**Argyris Oraopoulos** -- Research Associate (Postdoc), FlexTECC Fellowship (2019 -- 2021), Primary Supervisor. Now Postdoc, ETH Zurich.

**Rami El Geneidy** -- PhD, Loughborough University (2017 -- 2021), Primary Supervisor. **Thesis:** Engineering Energy Flexibility into Communities: Design and Implementation of Control Strategies for Demand Response. Now: Startup (Kapacity).

**Vincenzo Rossi** -- PhD, Loughborough University (2019 -- 2024), Primary Supervisor. **Thesis:** Long-term planning for retrofitting the UK building stock: Incorporating affordability constraints in large-scale multi-objective discrete optimizations. Now: Postdoc, University of Nottingham / UK BEIS.

**Riccardo Talami** -- PhD, Loughborough University (2019 -- 2022), Secondary Supervisor. **Thesis:** Evaluating the computational efficiency of simultaneous whole-building design optimisation. Now: Postdoc, NTU.

**Sidd Shahnewaz** -- PhD, University College Cork (2020 -- 2025), Secondary Supervisor. **Thesis:** Leveraging Data-Driven Decision Support to Enhance Flexibility Resources Adoption in Industrial Energy Systems. Now: ESB Networks.

**Heather Hou** -- PhD, Imperial College London (2018 -- 2021), Secondary Supervisor. **Thesis:** Methods for Incorporating the Influence of the Urban Environment on Building Occupancy Modelling. Now: Industry.

## EVIDENCE OF ESTEEM

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### Invited Talks

Syracuse University; University of Victoria; ICML 2025 Workshop on Computational Optimization of Buildings (CO-BUILD); Cadence 15; National Renewable Energy Laboratory / Colorado School of Mines; Columbia University; Autodesk Digital Construction Summer School; Cornell University; Stuttgart University of Applied Sciences; London South Bank University; ETH Zurich Colloquium on Smart Building Solutions; University of Texas Austin: Department of Civil and Environmental Engineering; International Building Performance and Simulation Association; University of Nebraska Lincoln: Department of Architectural Engineering; International District Energy Association Annual Conference.

### Advisory Committees

Multi-Perspective Analysis of Future Energy System Structures Advisory Group, US National Renewable Energy Laboratory, 2020 -- 2021; Flexibility Metrics Technical Advisory Group, US Lawrence Berkeley National Lab, 2019 -- 2021; Leicester Smart City Stakeholder Meeting, Leicester Council, 2019; London Energy Plan, Greater London Authority, 2015; CHP Working Group, NYC Long Term Planning and Sustainability, 2012 -- 2013.

### Reviewing

BuildSys Technical Program Committee 2023 -- 2026; Building Simulation Conference 2021/2025; Building Simulation and Optimization Conference 2020; Journal of Building Performance Simulation; Building & Environment; Applied Energy; Energy & Buildings; Journal of Industrial Ecology; Environmental Pollution; Cities; Utilities Policy; Renewable and Sustainable Energy Reviews; Nature Sustainability; IEEE Transactions on Energy Markets, Policy, and Regulation.

### Service to Professional Bodies and Organizations

PhD Forum Co-chair, ACM Sustainability Week (ACM E-energy and Buildsys), 2026; Co-organizer, UrbanAI Workshop, NeurIPS 2025; Session Chair, IBPSA Building Simulation Conference 2025, Buildsys 2025; Member, IBPSA-USA, 2024; Member, ASME, 2024; Board Member, Green Construction Board, Construction Leadership Council, 2020; Conference Chair, Building Simulation and Optimisation Virtual Conference 2020, IBPSA-England; Co-opted Board Member, IBPSA-England, 2019 -- 2021; Expert Member, IEA Energy in Buildings and Communities Annex 67; Expert Member, IEA Energy in Buildings and Communities Annex 82; Member, UK EPSRC Peer Review College; Reviewer Pool, US DOE Building Technology Office.

### Press

National Geographic, City of Lights, 2012; Elle Magazine, 2012 Genius Awards.

## LIST OF PUBLICATIONS

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### Journal Articles (supervised PhD students and postdocs underlined)

- [18] (In preparation) Kerr, M. and Howard, B. (2026) *Experimental Evidence on the Effect of Imprecise Training Models on Sim-to-Real Transfer of RL Agents for HVAC Control*. Energy and Buildings
- [17] (In preparation) Howard, B. and Kerr, M. (2026) *Understanding Transferability of Building Control Policies: Policy Sensitivity and Error Propagation in Linear Building Models*. Energy and Buildings
- [16] [Submitted] Dubois, R., Qian, T., McGovern, R., Howard, B. (2026) *Decarbonizing Building Portfolios: Evaluating socio-techno-economic pathways*. Energy and Buildings

- [15] Bhardwaj, A., Baiocchi, G., Carlson, H.J., Kennedy, B., Whitford, J., Howard, B. (2026) *Satisficing devices: Co-benefits in practice to decarbonize New York City's residential buildings*. Energy Research and Social Science, 131, 104512 DOI: [10.1016/j.erss.2025.104512](https://doi.org/10.1016/j.erss.2025.104512)
- [14] Rossi, V., Wright J., Howard, B. (2026) *Fuel-poverty-constrained retrofit optimization: a socio-technical approach to decarbonise the UK building stock*. Energy and Buildings, 351, 116628 DOI: [10.1016/j.enbuild.2025.116628](https://doi.org/10.1016/j.enbuild.2025.116628)
- [13] Talami, R., Wright J., Howard, B. (2025) *Evaluating the effectiveness, reliability and efficiency of a multi-objective sequential optimization approach for building performance design*. Energy and Buildings, 329, 115242 DOI: [10.1016/j.enbuild.2024.115242](https://doi.org/10.1016/j.enbuild.2024.115242)
- [12] Siddiquee, S., Agyeman, K., Burton, Howard, B., O'Sullivan, D. (2023) *A Data-driven Framework for Quantifying Demand Response Participation Benefit of Industrial Consumers*. IEEE Transactions on Industry Applications DOI: [10.1109/TIA.2023.3334218](https://doi.org/10.1109/TIA.2023.3334218)
- [11] Hou, H., Pawlak, J., Sivakumar, A., Howard, B. (2022) *Building occupancy modelling at the district level: a combined copula-nested hazard-based approach*. Building and Environment, 225, 109661 DOI: [10.1016/j.buildenv.2022.109661](https://doi.org/10.1016/j.buildenv.2022.109661)

#### *Columbia Affiliation Above*

- [10] Oraiopoulous, A., Howard, B. (2022) *On the accuracy of Urban Building Energy Modelling*. Renewable and Sustainable Energy Reviews, 158, 111976 DOI: [10.1016/j.rser.2021.111976](https://doi.org/10.1016/j.rser.2021.111976)
- [9] Siddiquee, S., Howard, B., Burton, K., Brem, A., O'Sullivan, D. (2021) *Progress in Demand Response and Its Industrial Applications*. Frontiers in Energy Research, 9 DOI: [10.3389/fenrg.2021.673176](https://doi.org/10.3389/fenrg.2021.673176)
- [8] Hou, H., Pawlak, J., Sivakumar, A., Howard, B., Polak, J. (2020) *An approach for building occupancy modelling considering the urban context*. Building and Environment, 183, 107126 DOI: [10.1016/j.buildenv.2020.107126](https://doi.org/10.1016/j.buildenv.2020.107126)
- [7] Junker, R., Kallesoe, C., Real, J., Howard, B., Lopes, R., Madsen, H. (2020) *Stochastic nonlinear modelling and application of price-based energy flexibility*. Applied Energy, 275, 115096
- [6] El-Geneidy, R. and Howard, B. (2020) *Contracted energy flexibility characteristics of communities: Analysis of a control strategy for demand response*. Applied Energy, 263, 114600 DOI: [10.1016/j.apenergy.2020.114600](https://doi.org/10.1016/j.apenergy.2020.114600)
- [5] Howard, B., Acha, S., Shah, N., Polak, J. (2019) *Implicit Sensing of Building Occupancy Count with Information and Communication Technology Data Sets*. Building and Environment

#### *Independent Researcher Above*

- [4] Howard, B., Waite, M., Modi, V. (2017) *Current and near-term GHG emissions factors from electricity production for New York State and New York City*. Applied Energy, 187, 255-271 DOI: [10.1016/j.apenergy.2016.11.061](https://doi.org/10.1016/j.apenergy.2016.11.061)
- [3] Howard, B. and Modi, V. (2017) *Examination of the optimal operation of building scale combined heat and power systems under disparate climate and GHG emissions rates*. Applied Energy, 185, 280-293 DOI: [10.1016/j.apenergy.2016.09.108](https://doi.org/10.1016/j.apenergy.2016.09.108)
- [2] Howard, B., Saba, A., Gerrard, M., Modi, V. (2014) *Combined heat and power's potential to meet New York City's sustainability goals*. Energy Policy, 65, 444-454 DOI: [10.1016/j.enpol.2013.10.033](https://doi.org/10.1016/j.enpol.2013.10.033)
- [1] Howard, B., Parshall, L., Thompson, J., Hammer, S., Dickinson, J., Modi, V. (2012) *Spatial distribution of urban building energy consumption by end use*. Energy and Buildings, 45, 141-151 DOI: [10.1016/j.enbuild.2011.10.061](https://doi.org/10.1016/j.enbuild.2011.10.061)

#### **Conference Papers and Presentations**

- [23] (Submitted) Dubois, R. and Howard, B. (2026) *Towards Prototype Free Urban Building Energy Modeling*. Buildsys 2026, Banff, Canada
- [22] (Accepted) Dubois, R. and Howard, B. (2026) *Do Large Multimodal Models Understand Construction Drawings? An Evaluation of Visually Grounded Workflows*. Buildsys 2026, Banff, Canada
- [21] Kerr, M. and Howard, B. (2025) *Using the steady-state heat loss coefficient to calibrate reinforcement learning training environments*. Building Simulation 2025, Brisbane, Australia (Poster)
- [20] Dubois, R., Qian, T., McGovern, R., Howard, B. (2025) *How building decarbonization pathways differ when considering energy burden and job creation*. Building Simulation 2025, Brisbane, Australia

- [19] Bhardwaj, A., Baiocchi, G., Carlson, H.J., Howard, B., Kennedy, B., Whitford, J. (2025) *Co-benefit conditions: Commensurating social, economic, and environmental value to decarbonize New York City's Residential Building Stock*. Eastern Sociological Society Conference, Boston
- [18] Kerr, M. and Howard, B. (2025) *Simulator Accuracy Requirements for RL-based Building Temperature Control*. E-Energy 2025, Rotterdam
- [17] Kerr, M. and Howard, B. (2024) *Evaluating Reduced Order Models for Training Reinforcement Learning Agents for Building HVAC Control*. ASME Energy Sustainability, Anaheim, CA
- [16] Siddiquee, S., Howard, B., Burton, K., O'Sullivan, D. (2022) *A Data-driven Assessment Model for Demand Response Participation Benefit of Industries*. IEEE TPEC 2022
- [15] Talami, R., Wright, J., Howard, B. (2021) *Performance robustness assessment of a sequential and a simultaneous whole-building optimization process*. Building Simulation 2021, Bruges
- [14] Rossi, V., Wright, J., Howard, B. (2021) *Evaluating the regional implications of income-aware building stock retrofit strategies through constrained multi-objective optimization*. Building Simulation 2021, Bruges
- [13] Rossi, V., Wright, J., Howard, B. (2020) *Incorporating social-demographic constraints in multi-objective building stock retrofit optimization*. USim2020, Edinburgh
- [12] Siddiquee, S., Howard, B., Bruton, K., O'Sullivan, D. (2020) *Demand Response in Smart Grid -- A Systematic Mapping Study*. 2nd International Conference on Smart Power and Internet Energy Systems, Bangkok
- [11] Oraopoulos, A. and Howard, B. (2020) *An automated workflow using stochastic time series modelling for building thermal dynamics forecasting*. IBPSA-England BSO 2020, Loughborough
- [10] El Geneidy, R., Allinson, D., Howard, B. (2020) *Energy flexibility potential of an English home: verifying use of adaptive data-driven models for model-predictive control*. IBPSA-England BSO 2020, Loughborough
- [9] Talami, R., Wright, J., Howard, B. (2020) *A Comparison Between Sequential and Simultaneous Whole-building Design Optimization*. IBPSA-England BSO 2020, Loughborough
- [8] El Geneidy, R. and Howard, B. (2019) *Delivery of Contracted Energy Flexibility from Communities*. IBPSA Building Simulation Conference 2019, Rome
- [7] Firth, S., Howard, B., Wright, J. (2018) *Open Science Building Stock Modelling: An Example Using gbXML, OpenBuilding and EnergyPlus*. uSim 2018, Glasgow
- [6] El Geneidy, R. and Howard, B. (2018) *Review of Techniques to Enable Community-Scale Demand Response Strategy Design*. uSim 2018, Glasgow
- [5] Howard, B., Acha, S., Shah, N., Polak, J. (2017) *Dynamic Scheduling of HVAC Systems using Access Control Data*. ASHRAE Annual Conference 2017
- [4] Howard, B., Acha, S., Shah, N., Polak, J. (2017) *Measuring Building Occupancy through ICT Data Streams*. ECEEE Summer Study 2017, Paper 5-412-17
- [3] Kucherenko, S., Abdoussi, F., Hirvoas, A., Howard, B. (2016) *Global Sensitivity Analysis of Non-Domestic Buildings Thermal Behaviour*. 8th International Conference on Sensitivity Analysis of Model Output
- [2] Howard, B., Waite, M., Modi, V. (2014) *Impacts on New York GHG Emissions from Distributed Combined Heat and Power*. ASME Energy Sustainability 2014, ESFuelCell2014-6623
- [1] Howard, B., Modi, V. (2012) *Potential for Combined Heat and Power in an Urban Environment*. ASME Energy Sustainability 2012, ESFuelCell2012-91452

### Invited Talks

- [25] Panel: AI-Powered Digital Twins (2026) *Digital Twins in Civil Infrastructure Systems Symposium, New York University & Carnegie Mellon University April 2026*
- [24] Designing for Building Decarbonization: Capital Planning and Intelligent Operations (2026) *Ocean and Climate Physics Seminar, Lamont Doherty Earth Observatory, Columbia University March 2026*
- [23] Developing Building Decarbonization Pathways for Diverse Stakeholders (2025) *Department of Civil Engineering, University of Victoria, Canada (Virtual) November 2025*
- [22] Building Energy Modeling for Policy and Control (2025) *Syracuse Center of Excellence in Environmental and Energy Systems, Syracuse University November 2025*
- [21] Panel: Fostering Collaboration: Dynamic Systems, AI, and Buildings (2025) *ICML 2025 Workshop on Computational Optimization of Buildings (CO-BUILD), Vancouver July 2025*



- [20] Building Physics, Optimization and AI for Building Decarbonization (2025) *NTU Athens -- Columbia University Workshop on Climate and the Built Environment, Athens* June 2025
- [19] Computer Vision for the Built Environment (2025) *Cadence 15, New York* May 2025
- [18] Income-aware residential building stock retrofit strategies through constrained multi-objective optimization (2024) *INFORMS Rocky Mountain Chapter, Colorado School of Mines* March 2024
- [17] Challenges in delivering efficient and flexible electric building energy systems (2022) *Smart Electric Energy Lecture Series, Columbia University* November 2022
- [16] FlexTECC: Flexible Timing of Energy Consumption in Communities (2020) *Columbia University Department of Mechanical Engineering Seminar Series (Virtual)* October 2020
- [15] The Pathway to FlexTECC (2020) *Inaugural Fellowship Lecture, Loughborough University (Online)* September 2020
- [14] Teaching Collaborative BIM for Design Management with Autodesk BIM360 (2020) *Autodesk Virtual Summer School (>100 Participants)* September 2020
- [13] FlexTECC: Flexible Timing of Energy Consumption in Communities (2019) *Cornell University Systems Engineering Seminar Series, Ithaca, NY* December 2019
- [12] Benefits of Intelligent Aggregation for Demand Response in Electrically heated homes (2019) *Energy Systems Catapult, Powerswarm, Birmingham, UK* October 2019
- [11] FlexTECC: Flexible Timing of Energy Consumption in Communities (2019) *US National Renewable Energy Laboratory, Golden, CO* July 2019
- [10] Modelling Energy Demands and Greenhouse Gas Emissions in New York City (2017) *CI-ENERGY Marie Curie Workshop, Stuttgart University of Applied Sciences, Geneva* September 2017
- [9] Future Smart Cities Research and Enterprise Forum (2017) *School of Engineering, London South Bank University* April 2017
- [8] Harnessing Data for Energy Savings in Facilities Management (2017) *Nebraska Building Environmental and Energy Research Group, University of Nebraska -- Lincoln* February 2017
- [7] Advancing Building Intelligence: From Strategic Planning to Systems Operation (2017) *Colloquium on Smart Building Solutions, ETH Zurich* January 2017
- [6] Towards the Next Era of Smart Building Solutions (2016) *Energy Futures Lab, Imperial College London* October 2016
- [5] Building Scale Combined Heat and Power in New York City: Implications for Greenhouse Gas Emissions (2015) *Department of Civil and Environmental Engineering, University of Texas -- Austin* February 2015
- [4] Building Integrated Combined Heat and Power Systems: Impacts on New York City (2014) *Durham School of Architectural Engineering and Construction PhD Symposium, University of Nebraska -- Lincoln* March 2014
- [3] Importance of Data Visualization (2013) *International Building Performance and Simulation Association -- New York Chapter* November 2013
- [2] Opportunities for District Heating in NYC (2012) *International District Energy Association Annual Conference, Chicago* July 2012
- [1] Thermal Energy in NYC: Implications and Opportunities (2012) *CHP in New York State: The Next Generation, NYSERDA and NECHPI, New York* July 2012