



31.03.2021

## POST-DOCTORAL RESEARCH FELLOWSHIP

# The Design and Operation of High Performance Buildings in an *Uncertain World*

The Building Decisions Research Group (BDRG), previously the ETA Lab, is a research team at UBC, based at the Centre of Interactive Research on Sustainability (CIRS) and part of the University's School of Architecture and Landscape Architecture and Department of Mechanical Engineering. The BDRG seeks to develop and test state-of-the-art computational, data-driven techniques to reduce the cost, and improve the design, construction, and operation of high-performance buildings. Overarchingly, its focus is to inform how we make decisions on building & energy system design and operation, and how uncertainty and risk is factored into those decisions. The BDRG is directed by Dr. Adam Rysanek, Assistant Professor of Environmental Systems. Find out more about the BDRG at <http://bdrq.io>.

The Group is seeking a full-time postdoctoral research associate to lead independent research on one or several research topics aligned with the Group's mission. Desired research interest areas are listed, but are not limited to:

- Overall lifecycle performance and post-occupancy evaluation of Passive House buildings, specifically multi-unit residential buildings (MURBs)
- Data-driven forecasting of the impact of climate change on thermal comfort and building energy performance in Canada
- Indoor environmental quality monitoring and analysis from the perspective of overall health & wellbeing (i.e., physical health, mental health, and productivity)
- Cost, carbon, and operating concerns of the post-pandemic office, whether it's a home-office or a real building
- Load disaggregation, visualization, and analysis of building data, particularly residential building energy use
- Machine learning-based methods for combined assessment of air quality, environmental quality, and building performance data
- Optimum integration of electric vehicle charging systems with building energy systems
- Hybrid building performance simulation modelling techniques using data-driven surrogate models



## Research opportunities for post-docs at the BDRG

The BDRG engages actively with research partners across UBC, Canada, and internationally. The group is a participant on the recently awarded [Rapid Air Improvement Network \(RAIN\)](#) project, which will be responsible for developing and deploying \$3m in air quality sensors for rapid indoor and outdoor environmental quality assessment. In mid-2021, the research phase of [EVOLVE / MURB 2030](#) research project will begin, and will be led by the BDRG. This will establish a 5-year research program on the comparative assessment of a 6-storey Passive House MURB in Vancouver alongside an adjacent typical code-compliant MURB constructed simultaneously. The BDRG is also a contributing member to the [International Energy Agency Annex 79](#) research collaboration on occupant-centric building design. The successful candidate will be invited to develop research projects that are aligned with any of these initiatives underway, as well as co-supervise up to three graduate research students in support of this work. The successful candidate will have ample opportunities to develop first author research publications, publish (and attend) conference proceedings, attend international research meetings, and (if applicable) contribute to undergraduate and graduate teaching activities.

### Specific duties:

The work scope of this project is primarily independent research and development of research projects (as above). Up to 20% of the expected workload will involve three specific duties, primarily in regards to the MURB\_2030 project:

- Assist with the supervision and mentoring of graduate students in the BDRG
- Oversee the EVOLVE / MURB\_2030 project budget (\$500k)
- Coordinate necessary annual reports and assist with knowledge dissemination activities regarding the EVOLVE / MURB\_2030 project

### Desired qualifications:

Candidates must hold a recent (within 5 years) Ph.D. degree in an engineering discipline, architecture, or a related field. It's expected the candidate will possess deep technical and theoretical knowledge in building science or energy systems analysis in the built environment context. Expertise in on aligned topics of machine learning-based research methods, data visualization, uncertainty analysis, and particularly Bayesian methods for inference and prediction is desired. Programming expertise in Python and/or R is essential. Excellent communication skills in English are required, including a track record of high-quality peer-reviewed journal publications.

### Further information and application deadline

For further information regarding the position, or to submit a CV and cover letter, please write to Dr. Adam Rysanek ([arysanek@sala.ubc.ca](mailto:arysanek@sala.ubc.ca)). The position's application deadline is April 30th, 2021 and the desired start date is Sept. 1<sup>st</sup>, 2021 (negotiable).



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## About UBC and Vancouver

The University of British Columbia is consistently ranking among the 40 best globally, and now places among the top 20 public universities in the world. UBC strives to create an exceptional learning environment that fosters global citizenship, advances a civil and sustainable society, and supports outstanding research to serve the people of British Columbia, Canada and the world. The Metro Vancouver area is an internationally-renowned city and the 3<sup>rd</sup> largest in Canada. Consistently ranked one of the world's most livable cities, it is where snow-capped mountains meet the ocean, breathtaking views greet you around every corner, and a diversity of communities, cultures, and ethnicities meet you at its core.



*The University of British Columbia, Vancouver campus*