

Dr Ralph Evins, MEng EngD CEng MCIBSE
Assistant Professor, Energy in Cities group, Civil Engineering, University of Victoria, Canada

Dr Evins' current research projects will deliver improved building energy analysis software for use by academics and practitioners. The **'Climate mitigation and adaptation solutions for municipalities' project (PI, PICS Opportunities Project, \$180k, 2020-2023)** is helping the City of Victoria to find pathways to meet its carbon targets. The **Modular Optimization and Simulation of Energy Systems project (PI, NSERC Discovery Grant, \$130k, 2017-2022)** is investigating the modularisation of building simulation and optimization processes. The **Building and Energy Systems Optimization and Surrogate-modelling project (PI, CANARIE, \$225k, 2018-2020)** is developing an online portal to help academics to access current building energy simulation and machine learning tools. The **Net-Zero Navigator project (PI, Natural Resources Canada, \$750k, 2019-2022)** is building a set of online tools to help industry to design high-performance buildings. In a related area of building energy research, the project **'Sustainability and energy independence for Indigenous communities in BC' (PI, Mitacs Accelerate Grant, \$60k, 2018-2020)** is applying building simulation tools to design housing for First Nations communities.

Since his doctorate Dr Evins has been developing advanced computational solutions to address high-impact problems in the field of building energy use. Much of his work has been in conjunction with industry, including **5 years with the engineering consultants Buro Happold (London, UK)**, giving him an excellent grounding in the types of solutions that are of use to practitioners. His academic work has advanced the development of computational methods in the building design domain, and this project will continue to push this boundary. His work has encompassed building design and optimization, urban-level systems analysis, and the process of academic software development in engineering disciplines. He has worked in three countries and two continents, and retains a wide network of international connections to research groups in these areas.

Dr Evins has authored 20 journal papers and 40 peer-reviewed full-length conference papers related to these research fields. These span the areas of optimization of low-energy buildings; urban energy systems optimization; improving the modelling of buildings and urban areas; the application of machine learning techniques to the building energy domain; and improved processes for academic software development. His work has received a total of 1276 citations, of which 1247 were in the last 5 years and 396 were in 2018. His current h-index is 15. He won the **Best Paper Award at the Building Simulation and Optimisation Conference in 2014 and 2016**, and was shortlisted for the Outstanding Young Contributor award of the International Building Performance Simulation Association in 2015.

The most significant and relevant contributions of Dr Evins include: a review paper that summarizes the current state of the field, analyzing trends in the rapid growth of the field, addressing gaps in existing work and commenting on possible future directions; development of a simulation platform for building and urban energy systems modelling; exploration of the application of machine learning models to building energy data; and the first application of a statistical emulator for building energy modelling.

Dr Evins serves on the Board of Directors of the Canadian Chapter of the International Building Performance Simulation Association, on the University of Victoria Campus Sustainability Fund committee, and as Chair of the Civil Engineering Department Computing Committee. He will be the **Scientific Chair of the eSim conference in Vancouver in 2020**.

In his previous appointment as senior scientist and group leader at the Empa research institute (part of the ETH domain) in Switzerland, Dr Evins led projects on similar topics. The Synergistic Energy and Comfort through Urban Resource Effectiveness project (co-principal investigator, Swiss Competence Centre for

Energy and Mobility, \$227k CAD, 2014-2017) bridged energy use in buildings and districts, the urban microclimate, solar and climate analysis, and optimization. The Future Energy Efficient Buildings & Districts project (task leader, Swiss Competence Centres for Energy Research, \$1.3M CAD, 2013-2016) developed the new national energy strategy, for which Dr Evins led the development of a Holistic Urban Energy Simulation platform (HUES). He previously held a European Union Marie-Curie CoFund Fellowship at Empa (\$132k, 2013-2015) investigating urban-level energy systems.

Dr Evins completed an Engineering Doctorate (2008-2012) jointly between the Systems Center at the University of Bristol, UK and the engineering consultancy firm Buro Happold titled "Multi-objective optimisation as an aid to design space exploration for low-carbon buildings". He is a Chartered Engineer with the Chartered Institution of Building Services Engineers, UK. He holds an MEng (combined bachelors and masters) in Civil and Environmental Engineering (2003-2007) from Imperial College London, UK.

Dr Evins is a member of the following entities at the University of Victoria that provide a highly suitable multi-disciplinary research environment. The newly-created Matrix Institute for Applied Data Science is a cross-campus initiative to bring together knowledge and applications of newly-emerging computational methods. The recently-founded Civil Engineering department is striving to be the greenest such department in Canada, bringing new approaches to the oldest engineering discipline to help deliver a sustainable future. The Integrated Energy Systems center is a long-established multi-disciplinary group of researchers developing pathways to sustainable energy systems, including the built environment.

