RDH Building Science
Energy & Sustainability and Building Enclosure Engineering Services
At RDH, we have a passion for making buildings better. Whether it’s as part of a design team for new construction projects or working with an organization to plan for the renewal of building systems over the life of their service, our focus is on helping clients make informed decisions that lead to durable, efficient, and low-carbon buildings.

Established in 1997, RDH is a privately-owned company with almost all of our employees being shareholders. Employee ownership translates into a commitment to quality and service and helps us attract talented staff. We currently have over 230 permanent staff members throughout our office locations in Vancouver, Victoria, and Courtenay, BC; Toronto and Waterloo, ON; Seattle, WA; Portland, OR; Oakland, CA, and Boston, MA.
Collectively, our team’s expertise and project experience allow us to support our clients and partners in the following areas:

- Energy Modelling
- Net Zero and Near-Net Zero Carbon Buildings
- Passive House Consulting and Certification
- Measurement & Verification
- LEED Consulting (with a preferred partner)
- Building Enclosure Engineering
ENERGY MODELLING

RDH has extensive expertise in whole-building energy modelling for commercial buildings, universities, and government buildings as well as small and large residential buildings. Our energy performance services include whole building modelling and code compliance assistance, as well as assistance with investigating energy savings/rebate programs.

We currently have 3 Building Energy Modelling Professionals (BEMP) on our team and we conduct energy modeling for many services including compliance with building codes and energy programs, such as LEED and Passive House. Our Energy Services group also focusses on energy efficiency research to inform policies for local governments and DSM programs developed by local utility organizations. In addition to operational energy analysis, we also evaluate embodied carbon through Life Cycle Assessments (LCA).

RDH has a dedicated team working on the lowest energy buildings, many of which are innovation centres, that achieve the most stringent energy performance targets in the market today. In particular, we work with design teams to integrate passive design concepts and a high-performance building enclosure with low-energy HVAC system concepts from an early design stage. We also work with building owners and their design team to determine appropriate energy use intensity targets given their energy performance design goals. To support this work, RDH has a unique combination of building science, building enclosure performance, HVAC and renewable energy system expertise.

CHILLIWACK MODULAR SUPPORTIVE HOUSING

ENERGY MODELLING FOR AFFORDABLE HOUSING

RDH is provided Energy Step Code modelling and airtightness testing for a three-storey building, with 46 apartment-style homes, located in Chilliwack, BC. The project is a modular building produced by Metric Modular. RDH is assisted this development with attaining compliance for Step 3 of the Step Code, as well as air leakage targets for Part 3 combustible buildings.

HUMBER COLLEGE

DEEP ENERGY RETROFIT

RDH was engaged to complete a calibrated energy model of an existing academic lab and office building. Calibration included utility bill analysis, submeter data analysis and consulting with occupants and building operators to understand the building occupancy patterns and process loads. The energy model will be used to analyze impacts of various energy efficiency measures and to recommend energy strategies which will assist in the achievement of Passive House EnerPHit certification.
NET ZERO AND NEAR-NET ZERO CARBON BUILDINGS

Our energy performances services will include pre-design and whole building energy modelling. We will use our expertise and energy modelling to guide the design team to achieve the Net Zero Energy Building (NZEB) goal, or at least as close as possible. We will work with your design team to determine NZEB strategies for the design, including evaluation of HVAC and enclosure upgrades using preliminary energy modeling. The energy model will produce whole building energy performance, that will inform design decisions related to annual energy consumption, annual energy cost and greenhouse gas emissions. We will also estimate the size of the on-site renewable energy generation needed to achieve Net Zero energy. The energy model will be updated through schematic design, design development and construction drawings. We will also provide design reviews to provide feedback to the design team regarding the design performance against any energy targets determined during Schematic design.

MOHAWK COLLEGE JOYCE CENTRE FOR PARTNERSHIP AND INNOVATION
CANADA’S LARGEST NET ZERO BUILDING

Mohawk College’s new Joyce Centre for Partnership and Innovation is certified to the CaGBC Zero Carbon Building standard, and the largest Net Zero Energy institutional building in Canada. The building is 5 stories and approximately 90,000 ft², containing a lecture theatre, learning commons space, classrooms and learning laboratories. The projects energy consumption will be offset through a 550 kWp PV array on an annual basis. Substantial completion was achieved in August 2018.

Achieving net zero required a holistic building design strategy starting with mitigating energy loads as much as possible through high performance enclosure design, and high performance ventilation design that attenuates the impact of weather on the building’s energy needs. RDH provided design and review services for the building enclosure that includes triple-glazed windows, a unique thermal break in the curtain wall design and high overall R-values through careful attention to reducing thermal breaks. RDH also lead the team in the selection of the HVAC system during schematic design. Early schematic design energy modeling was used to select the most appropriate system. Before design started RDH helped select the 75 ekWh/m²-yr energy consumption target, current the design is achieving 72 ekWh/m²-yr.

Postoccupancy, RDH will provide on-going measurement and verification services for the project to understand how the building will perform and provide guidance on addressing any performance deficiencies.
PASSIVE HOUSE CONSULTING

Passive House certification uses an enclosure-first approach to aggressively reduce a building’s heating demand. This approach requires innovative enclosure design that aligns well with RDH’s building enclosure consulting services. RDH is the most experienced firm specializing in large Passive House buildings. RDH is the only North American team that includes 3 PHI-accredited Building Certifiers, a PHI-trained Passive House Trainer, 13 Certified Passive House Consultants/Designers (CPHC/Ds), and a Certified Passive House Tradesperson. Because the RDH Passive House and building enclosure engineering teams are fully integrated, RDH can deliver an unrivaled level of design expertise, risk reduction, and cost minimization.

UBC OKANAGAN SKEENA RESIDENCE
PIONEERING STUDENT HOUSING

British Columbia (UBC), is developing a new student residence, referred to as Skeena Residence, on their Okanagan campus. This new residence will provide 220 beds in a modified traditional (shared bathroom) format for first year students beginning their studies at UBC. The building itself is proposed to be 74,907 sq. ft. and five storeys tall. Standard housing amenities including house lounges, informal study space, activity room, dining room, kitchen, and laundry facilities. Two city homes (two-bedroom self-contained apartments) will also be included to provide short term accommodation for visiting faculty or staff. The project is pursuing certification through the international Passive House Institute in addition to LEED Gold. RDH is providing both Passive House consulting and building enclosure consulting for the project.

NELSON STREET PASSIVE HOUSE
LARGEST PASSIVE HOUSE BUILDING IN THE WORLD

RDH is providing both Passive House and building enclosure consulting services for this 60-storey, 481,310 sq. ft., 485 unit tower pursuing Passive House certification. The project is pursuing ambitious design objectives: a luxury apartment tower that will be the tallest Passive House building in the world, the first tall Passive House residence to incorporate multiple balconies per floor, as well as incorporating multi-storey glazed atriums. Each of these objectives requires creative and detailed design solutions. RDH is also assisting this development with attaining compliance with the new City of Vancouver Green Buildings Policy for Rezoning.
MEASUREMENT & VERIFICATION

Measurement and verification (M&V) is the process of quantifying savings delivered by energy conservation measures. At RDH we complete M&V studies for a variety of project types, including verifying whole building savings for new buildings, and verifying system-level savings as part of utility demand side management projects or to test new products.

We have undertaken M&V projects in numerous homes and buildings including work on instructional building such as the Mohawk Joyce Centre for Partnership and Innovation and Red River College, as well a number of commercial buildings throughout the Pacific Northwest as part of an on-going Dedicated Outdoor Air Systems for Small Commercial Buildings Pilot Project with the Northwest Energy Efficiency Alliance.

DEDICATED OUTDOOR AIR SYSTEMS FOR SMALL COMMERCIAL BUILDINGS
AN INNOVATIVE PILOT PROGRAM

RDH was retained by the Northwest Energy Efficiency Alliance (NEEA) to manage and monitor a multi-year pilot project to test an HVAC system conversion concept in small existing commercial applications. The project will demonstrate the energy savings potential of a market shift toward systems that separate heating, cooling and ventilating functions, using high efficiency heat recovery ventilators and distributed heating and cooling. To date the project includes 11 pilot buildings in three Pacific Northwest climate regions. For each project, RDH is completing a calibrated energy model, assisting with system optimization, conducting pre- and post-conversion air leakage testing, and monitoring at hourly intervals of pre- and post-conversion indoor comfort, air quality and energy end use consumption. The measurement period for each project begins before the conversion and will continue for a minimum of one-year post-conversion. The monitoring data will be used to develop insight in to building performance trends and occupant behaviour changes due to the installation of the new HVAC system.

MOHAWK COLLEGE JOYCE CENTRE FOR PARTNERSHIP AND INNOVATION
M&V OF POST-OCCUPANCY RESULTS

RDH provided design and review services for the building enclosure of Mohawk College's new Joyce Centre for Partnership and Innovation, assisting the project team to certify the building to the CaGBC Zero Carbon Building standard, and to become a Net Zero Energy institutional building. Given the level of performance desired from the building, a comprehensive Measurement and Verification plan is was desired by the project team. To both verify that the building is performing as expected, and if it is not, to identify the areas, and possibly the reasons, it is falling short, including potential areas of corrective action. To achieve this, RDH is providing on-going measurement and verification services for the project to understand how the building will perform and provide guidance on addressing any performance deficiencies. This services includes the development of a measurement and verification plan, the installation of weather station, including measurement of solar radiation, and post-construction and post occupancy evaluation of the building performance.
LEED CONSULTING

At RDH we use whole building energy modeling to meet LEED energy prerequisites and credits, in addition to helping the team incorporate energy conservation strategies into the design to get LEED points. We can also manage the entire LEED certification process including advising the team on requirements and documenting credits for certification. RDH has 17 LEED APs or LEED AP BD+Cs and a LEED Fellow on our consulting team.

To support LEED Certification and building permit submission, we provide enhanced building enclosure commissioning (BECx). This allows us to work with design teams to develop energy performance objectives and provide high level strategies to meet these objectives.

TOM PATTERSON THEATRE AT STRATFORD
LEED CONSULTING FOR A STATE-OF-THE ART FACILITY

The scope on the project has centered around integrating energy efficiency strategies with a modern and durable building enclosure. The detailed enclosure was an element of the overall design, which included an energy efficiency target to assist the project’s pursuit for LEED Gold Certification. In the design phase, our team helped the project team deliver on many of the features included in the conceptual design, including a serpentine curtain wall. Our early analysis helped to optimize the mechanical and electrical systems design. We developed a detailed energy model to hone the design and focus on key drivers affecting energy efficiency. The building is expected to meet LEED Gold Certification when the project is complete in 2020.

RED RIVER COLLEGE
ENCLOSURE UPGRADE WITH AN ENERGY FOCUS

The Red River College project consists of the rehabilitation of the historic three-storey Scott Fruit Building and the connection of this building to a new four-storey building addition to become Red River College’s (RRC) Innovation Centre. The project intent includes improving retrofit insulation on the interior side of the exterior masonry walls. Understanding the potential impacts of an interior insulation retrofit is a prudent approach given the type of construction, deterioration risks, and nature of some enclosure assemblies and materials at this building. RDH is assessing strategies for achieving LEED v4 Gold Certification and near net-zero energy performance for the 100,000 ft² centre. RDH Building Science Labs also tested the suitability of the existing historic brick to receive an interior insulation retrofit.
BUILDING ENCLOSURE ENGINEERING

Between the building enclosure, energy performance, and ventilation strategies are assessed by our team. We also focus on the development of advanced and unique building facades, including the costs and constructability of these systems. Once the elements of the project and some of the strategies are better defined, we are better able to focus the scope of our services for the subsequent phases of work.

We provide Building Enclosure Consulting Services through the schematic design, design development, and construction documents stages with ongoing support through construction of the building including field review of building enclosure elements. As part of these services, we will work with the project team to provide input on the heat, air, and water performance of the building enclosure, as well as the appropriateness of materials, durability considerations, and input regarding constructability and detailing. We are also available to assist with detailed thermal performance assessments and whole building airtightness testing.

We have been the building enclosure consultant for hundreds of new commercial, institutional, and multi-unit residential projects throughout North America.

OAKRIDGE CENTRE
MODERNISTIC TOWN CENTRE

This redevelopment project combines extensive below grade and podium elements, office and retail spaces, residential towers, and the renewal of an existing office building. The overall development area excluding parkade and below grades support spaces is 4,515,817 sq. ft.