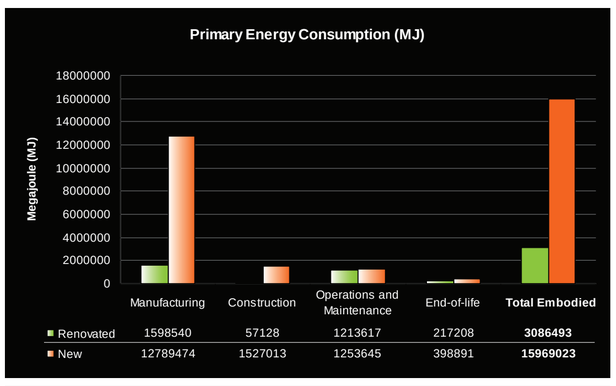
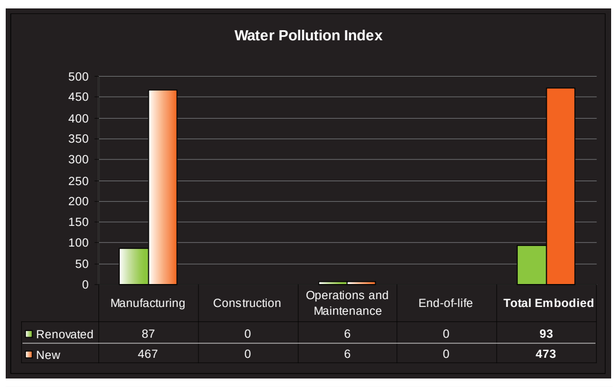
HONORABLE MENTION FOR HOLISTIC LIFE CYCLE ANALYSIS QUANTIFYING THE BENEFITS OF RENOVATION

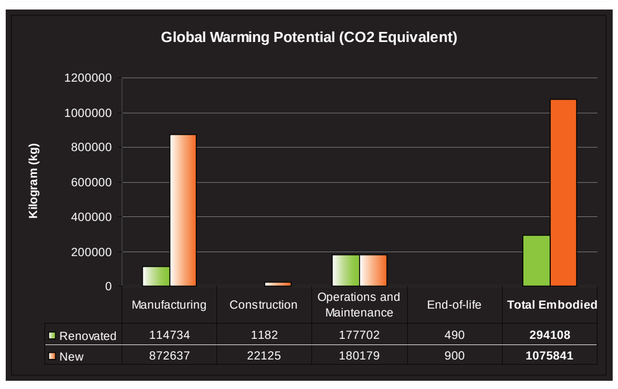
Life Cycle Building Challenge 2

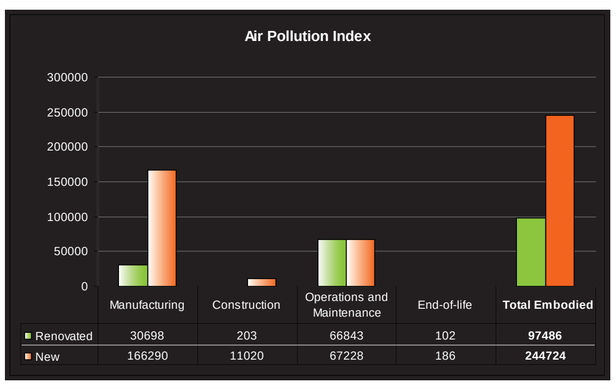
Buchanan Building D

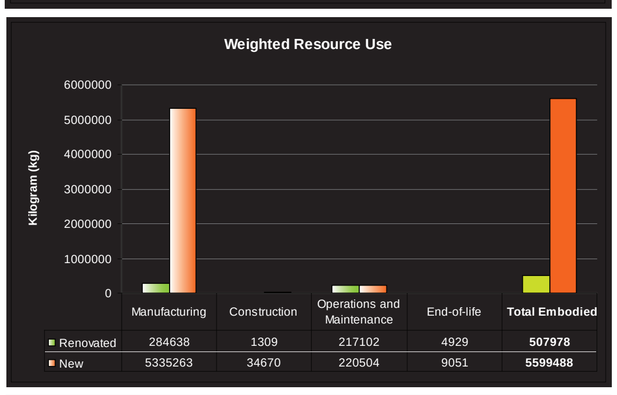
VANCOUVER, BC

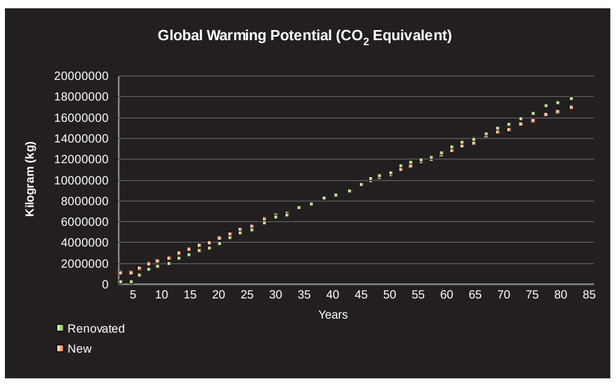


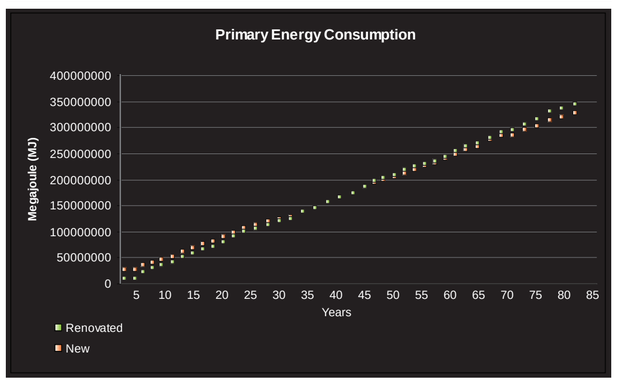












Comparison Graphs between Renovated Building versus New Building Schemes

Project Team

Busby Perkins+Will Architects
Altus Heylar Group
University of British Columbia

Originally built in 1960 as a multi-purpose classroom, Buchanan Building D (5,090 sm) has been renovated under the University of British Columbia's (UBC) Renew Program. The goals of the project are to meet the current and future academic needs, and optimize space to improve learning and research, while addressing the university's deferred maintenance debt. As part of the project, UBC commissioned Busby Perkins+Will and Altus Helyar to complete a post-mortem life cycle assessment and salvage value cost estimate study using the Athena Environmental Impact Estimator tool.

The project included 4 design objectives: provide public space and a connection to the outdoors, provide a healthy working environment, provide ease of operation, and utilize a triple bottom line / ecological footprint / life cycle analysis (LCA) as a basis for design decisions.

This analysis was instrumental in the decision to retain the Buchanan Block D and adapt it to future needs as well as create a business case for maintaining, re-using and adapting other buildings on the UBC campus which could result in a significant cost effective solution and reduce the life cycle impact of existing and future campus buildings. This study set the ground work for future UBC Renew Phases; helped the University to fully understand the magnitude and scope of up and down stream environmental implications and the trade-offs of renovating versus constructing a new building; and challenged the design team to find creative ways to adapt existing buildings for future usage.

The campus comprises of nearly 255 academic buildings, with close to 60% being more than 30 years old. The University's Renew mandate is to retain existing foundations, structures, and overall footprints, but otherwise completely revitalize the buildings including seismic, mechanical, electrical and building envelope to current code requirements. The Renew is a multi-phase initiative, and is the result of a funding partnership with the Provincial Government with a budget of $120 million for Phase 1.

When Phase 1 of the UBC Renew program is completed, it will have:

- produced 10 renewed buildings;
- eliminated $77.4 million from the University's accumulated deferred maintenance debt;
- saved nearly $89 million in construction costs as compared to new construction; and
- prevented an estimated 6,000 tonnes of GHG from being released into the atmosphere.

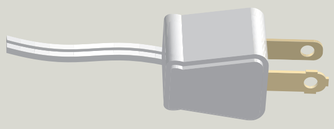
Resources saved by retaining the existing building

As a stand-alone exercise of assessing the avoided environmental impacts related to the manufacturing, construction, operations and maintenance, and end-of-life life cycle stages of retaining major structural and envelope components of Building D, the University of British Columbia has prevented (as per the comparison graphs above):

- 218,919 kg of solid waste from being sent to local landfills or recycling facilities;
- 3.5 million litres of water being consumed;
- 773,248 kg of CO_2 equivalent emissions from being released into the atmosphere. However, when operating energy is considered, the new building scenario over a 80 life span would emit 5% (969,671 kg) less CO2 equivalent emissions but not until it has been operating for 40 years (as shown in the comparison graphs above); and
- 12.3 million megajoules of primary energy from being consumed during the manufacturing, construction and end-of-life stages, the equivalent of 300,000 litres of heavy fuel. Similar to the project's global warming potential, the new building scenario would consume less primary energy than the renovated building but not until 40 years of operation (as shown in the comparison graphs above).
- In sum, an estimated **$8,472,000** has been saved by choosing to renovate rather than construct a new building.

774 tonnes of CO_2e not released into the atmosphere

3.5 millions litres of water saved



12.3 million MJ energy saved (equivalent of 300,000 litres of heavy fuel saved)

219 tonnes of solid waste diverted from local landfills or recycling facilities

the collaborative for high performance schools

AIA

BMRA Building Materials Reuse Association

United States Environmental Protection Agency

west coast green

Southface

Green Building in Alameda County

Poster printed on recycled paper and mounted on 100% recycled cardboard