SUBJECT	Board 4 Post Completion Report Bioenergy Research Demonstration Facility (BRDF) Expansion Phase 2, UBC Vancouver
SUBMITTED TO	Property Committee
MEETING DATE	June 2, 2025
SESSION CLASSIFICATION	Recommended session criteria from Board Meetings Policy: OPEN
REQUEST	For information only - No action requested
LEAD EXECUTIVE	Frank Laezza, Vice-President Finance & Operations
SUPPORTED BY	John Metras, Associate Vice-President Facilities Siu Tse, Director, Energy and Water Services Denise Brown, Director, Capital Planning & Development Michael White, Associate Vice-President, Campus & Community Planning Yale Loh, Treasurer

PRIOR SUBMISSIONS

The subject matter of this submission has been considered previously by the Property Committee on the following occasions:

1. April 18, 2019 (CLOSED SESSION) – Board 2 + 3 Approval, Funding release $18,661,000
   Action/Follow up: Proceed to construction and execute funding agreement with the Federal government.
2. December 4, 2018 (OPEN SESSION) – Board 2 Approval, Funding release $1,200,000
   Action/Follow up: Complete design and issue development permit.
3. December 5, 2017 (OPEN SESSION) – Board 1 Approval, Funding release $500,000
   Action/Follow up: Commence design.

The following Executive Summary provides a status update from the date of the most recent submission.

EXECUTIVE SUMMARY

In accordance with the Capital Projects Policy, this Board 4 post-completion report is provided as part of the project management process for construction projects over $10,000,000 following the construction, occupancy and warranty period on the Bioenergy Research & Demonstration Facility (BRDF) Expansion project. The aggregate estimated value of BRDF Expansion project was $20,361,000 at Board 3 and the final cost was $22,580,407. The project Board approvals were received in closed sessions to align with Federal Government funding requirements.

The BRDF Expansion project involved adding 12 megawatts (MW) of boiler capacity to the existing Bioenergy facility, increasing the full plant output to up to 18 MW. The project created additional capacity within the campus hot water heating system to keep up with increased projected energy demand as a result of campus growth. Biomass energy is not only lower cost than natural gas but also helps to reduce the University's greenhouse gas (GHG) emissions. The project also included required civil, structural, mechanical and electrical upgrades to support the addition of new boilers.

The final project cost was $22,580,407. The project was $2,219,407 over the Board-approved budget of $20,361,000. Final project funding sources are outlined in ***Appendix 1***.

A stakeholder meeting of UBC Energy and Water Services (EWS), Facilities and the project delivery team was held on January 9, 2025, to review project successes, constraints and lessons learned. The project revealed critical lessons that will inform future initiatives at the BRDF and across campus. Stakeholders agreed clear contractual roles and robust oversight are critical. Project procurement involved separate contracts for different components – Design-Bid-Build for fuel conveyors and hot water distribution and Design-Build for the boiler. This was done in part to satisfy government funding rules. The split contract approach, combined with additional complexities related to delivering projects during the COVID-19 pandemic and UBC staff resourcing changes, resulted in some poorly defined contractual responsibilities which ultimately led to significant design and implementation deficiencies, delays in the project completion and cost overruns. Equipment required significant modifications and recommissioning by internal UBC subject matter experts and operational personnel to meet operational requirements.

The design deficiencies and poor contractor delivery of the fuel conveyors also resulted in equipment not being commissioned properly and therefore not operating optimally on handover. While the design and construction challenges precluded the project from delivering a successful initial handover process, including operator training, stakeholders highlighted the importance of ensuring on future projects that UBC has the appropriate operational resources to support the design phase as well as efficient project execution and sustainable operations.

Despite its challenges, the project did achieve notable successes. The UBC project team successfully made the equipment operational after initial setbacks, contributing to decarbonization goals and effective hot water distribution on campus. A significant advancement that came from the project was the use of 3D modeling to facilitate precise equipment placement in constrained spaces, providing a valuable tool for future projects.

Lastly, infrastructure delivery is progressing towards meeting the operational output outlined at Board 3 of 9 – 12 MWs, with the expectation of a maximum continuous rating of 10.5 MW, typical of this type of facility. Since the expansion became operational, energy output and GHG reduction have both more than doubled and the facility is forecasted to achieve 90% of targeted GHG reduction in fiscal year 2027, as remaining issues are addressed (refer to ***Appendix 2***). These achievements, despite escalated costs and delays, underscore the team's resilience and the project's alignment with overarching sustainability goals.

APPENDICES

1. Final Project Funding Sources
2. Actual & Forecasted Performance

Appendix 1 – Final Project Funding Sources

The project was funded as follows:

BRDF Expansion Project	
Funding Sources	**Amount ($)**
Province of BC: Carbon Neutral Capital Program	7,418,555
UBC Match: Carbon Neutral Capital Program	2,472,852
Province of BC: Routine Capital	60,000
UBC Match: Routine Capital	20,000
Federal Government - Low Carbon Economy Fund	7,609,000
UBC Infrastructure Impact Charges Fund	5,000,000
Total Cost	**$22,580,407**

Appendix 2 – Actual & Forecasted Performance

BRDF Expansion Project: Actual & Forecasted Performance						
	Target	**FY23 Actuals**	**FY24 Actuals**	**FY25 Actuals**	**FY26 Forecast***	**FY27 Forecast***
Energy Delivered (MWh)	65,559	14,516	15,027	37,950	44,182	58,723
GHG Reduced	13,000	2,878	2,980	7,525	8,761	11,644
% of Target	100%	22%	23%	58%	67%	90%
Project % GHG Reduction from 2007	21%	5%	5%	12%	14%	19%

*BRDF reliability and efficiency are steadily increasing. The gradual increase in projected FY26 and FY27 GHG targets is due to completion of remaining optimization scope as well as planned maintenance/renewal activities in the facility.