



## PERFORMANCE DATA APR 2015 / MAR 2016

The Centre for Interactive Research on Sustainability (CIRS) has an ongoing monitoring process to document and analyze the building's resource consumption through a state-of-the-art building management system (BMS) and a network of close to 3,000 sensors.

The performance monitoring data improves understanding of the building sub-systems, supports the implementation of continuous optimization of protocols, and substantiates research projects.

This report presents the data acquired between April 2015 and March 2016.

During this period several units of the photovoltaic panels were intermittently offline, resulting in decreased overall PV energy production compared to previous years.

Spikes in water consumption can be attributed to the use of municipal water by the building's irrigation systems as the rainwater and reclaimed water systems continue to undergo recommissioning.

## GREEN HOUSE GAS EMISSIONS

The total greenhouse gas emissions for the period of April 2015 and March 2016 were -1.66 tCO<sub>2</sub>e, demonstrating that the building is net positive in terms of operational emissions.

	Energy Use (MWh)	GHG Emissions (kg of CO <sub>2</sub> e)
Electricity from the grid	712	7591
Electricity from PV panels	8	-86
EOS-CIRS heat exchange (heat used by EOS)	43	-9163
<b>TOTAL</b>	<b>763</b>	<b>-1658</b>

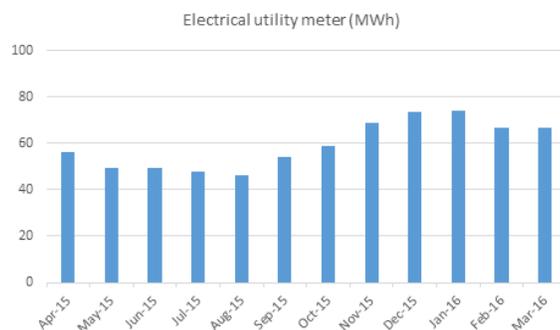
The conversion factors considered for the GHG emissions calculation were the values defined by the British Columbia Ministry of Environment for natural gas and electricity produced by BC Hydro in the 2016 B.C. Best Practices Methodology for Quantifying Greenhouse Gas Emissions.

This calculation took into account the 85% efficiency of the UBC district energy system, but did not consider the system's use of biomass for 25% of energy production.

## ELECTRICITY USE

The energy consumed by CIRS from the electrical utility provider between April 2015 and March 2016 was 711 MWh, resulting in a building EUI of 125 kWh/m<sup>2</sup>.

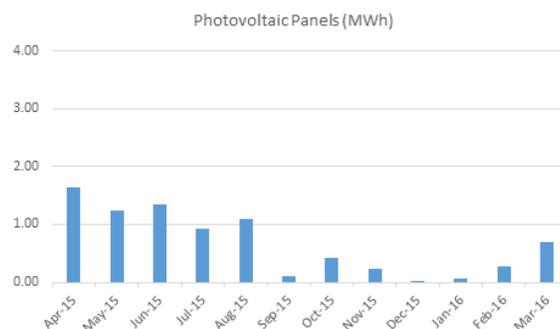
The building EUI calculation does not consider the reductions in energy gained through the exchange of excess heat with the EOS building.



## PHOTOVOLTAIC PANELS

The energy produced by the building's photovoltaic panels between April 2015 and March 2016 was 8 MWh. This met 1% of the building's electricity needs during the same time period.

The production peak for the building's photovoltaic system was 2.17 MWh, and occurred in July 2013. The lowest production value, 0.02 MWh, occurred in December 2015.

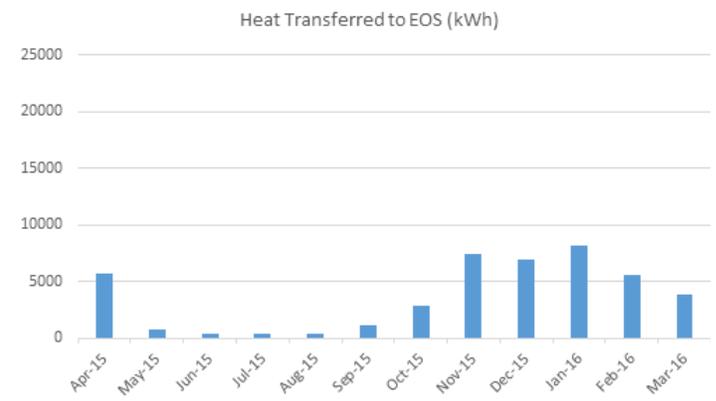
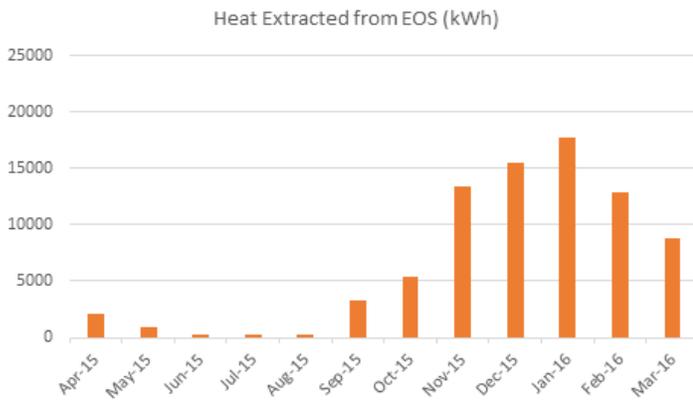


# APR 2015/MAR 2016

## EOS/CIRS HEAT EXCHANGE

The annual heat extracted from the exhaust ventilation of the EOS building was 81 MWh, and the annual heat transferred back to EOS from CIRS was 43 MWh. The heat returned to EOS displaces the use of natural gas by the District Energy System, reducing the campus-wide emissions of GHGs.

The energy meters fail to account for the transit time in the heat exchange loop, leading to a slightly exaggerated amount of total heat from the system. This measurement error was not recognized in previous reports and has been corrected in the current analysis.



## GEOHERMAL FIELD

Between April 2015 and March 2016, the total heating energy extracted from the geothermal field was 35 MWh. During the same time period, the heat transferred to the geothermal field to cool the building was 39 MWh.

## WATER USE

Between April 2015 and March 2016, the measured total water use for CIRS was 1,302,200 L. This demand was met by the municipal water supply due to regulatory and operational issues that have thus prevented the use of the rainwater and reclaimed water systems. A recommissioning project for the water systems has been undertaken as of June 2015.

