

CIRS: Regenerative Sustainability

November 2013 – January 2014



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The concept behind regenerative sustainability is that we can create buildings that have a net-positive impact on their surrounding environments and the lives of their human inhabitants.

While constructing CIRS has added a 5,675-m² building to the UBC campus, CIRS was designed to reduce campus energy use, carbon emissions and potable water.

Vancouver, BC

Average
Conditions



NOV
6.2 °C

DEC
2.2°C

JAN
4.4°C



NOV
123mm

DEC
70mm

JAN
142mm

Honeywell

CIRS: Accelerate the Adoption of Sustainable Building Practices

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The CIRS building was designed as a living laboratory able to change over time, adapting to evolving space requirements and adopting new technologies and design strategies.

The lessons learned from CIRS performance data are being applied to the continual optimization of its building systems and documented as a reference for use in other projects.

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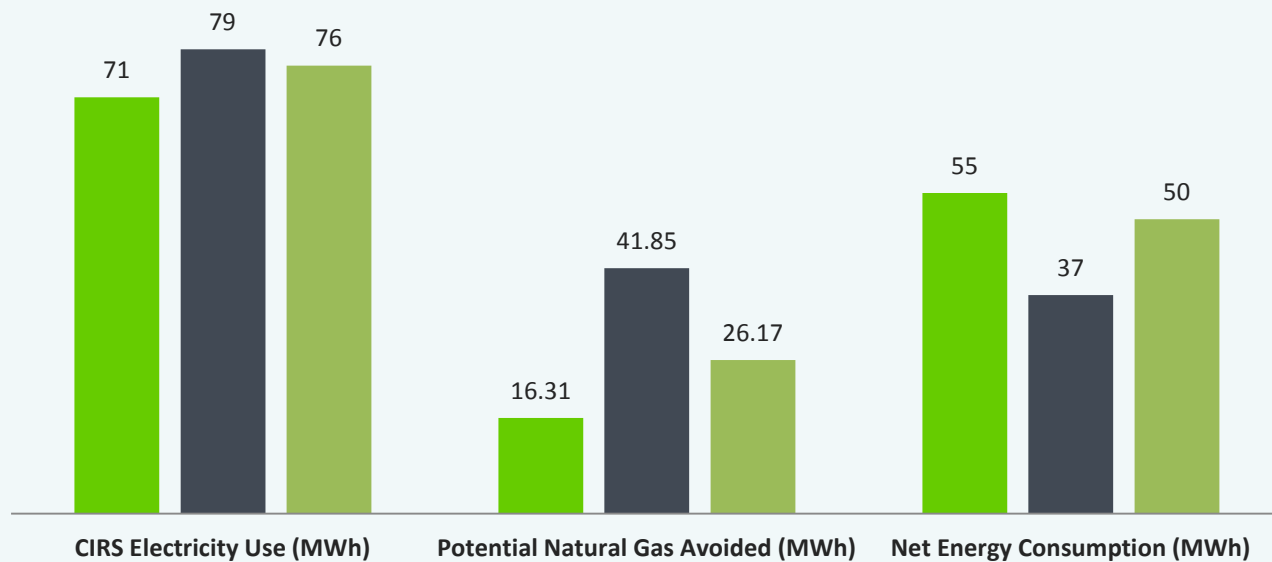
JAN
142mm





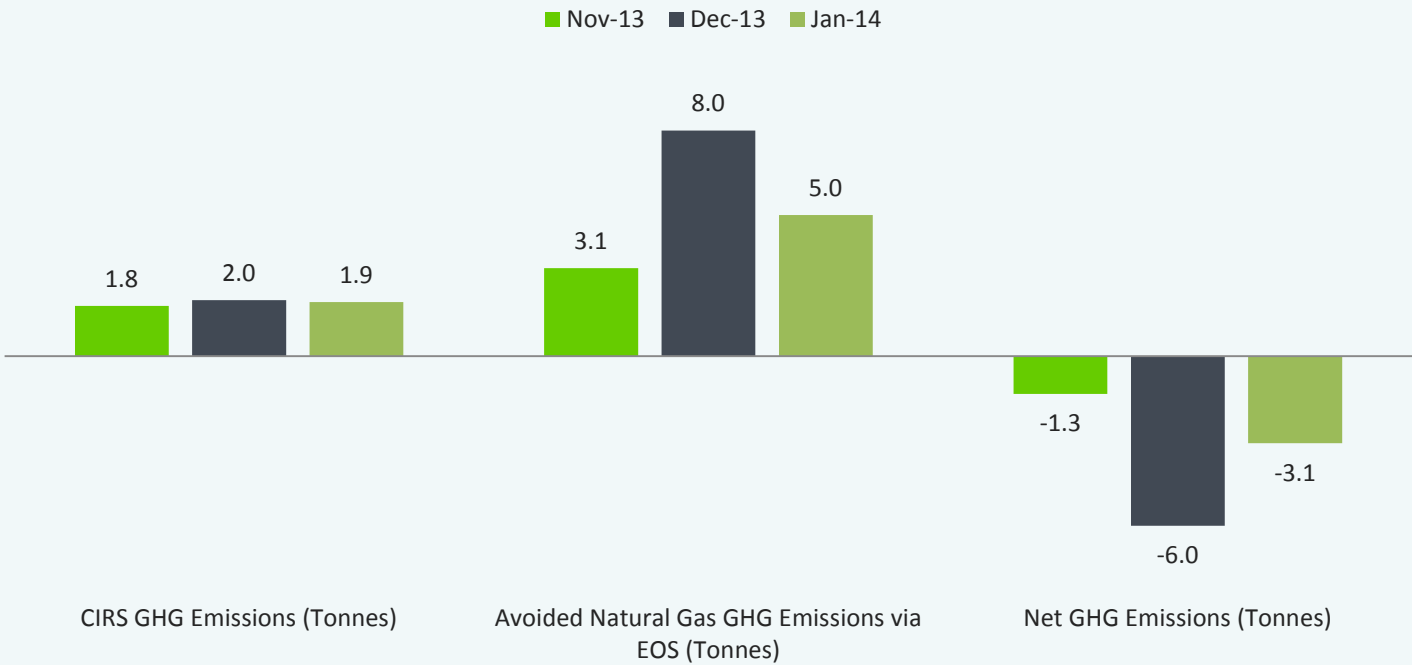
Energy Balance

■ Nov-13 ■ Dec-13 ■ Jan-14





Carbon Balance



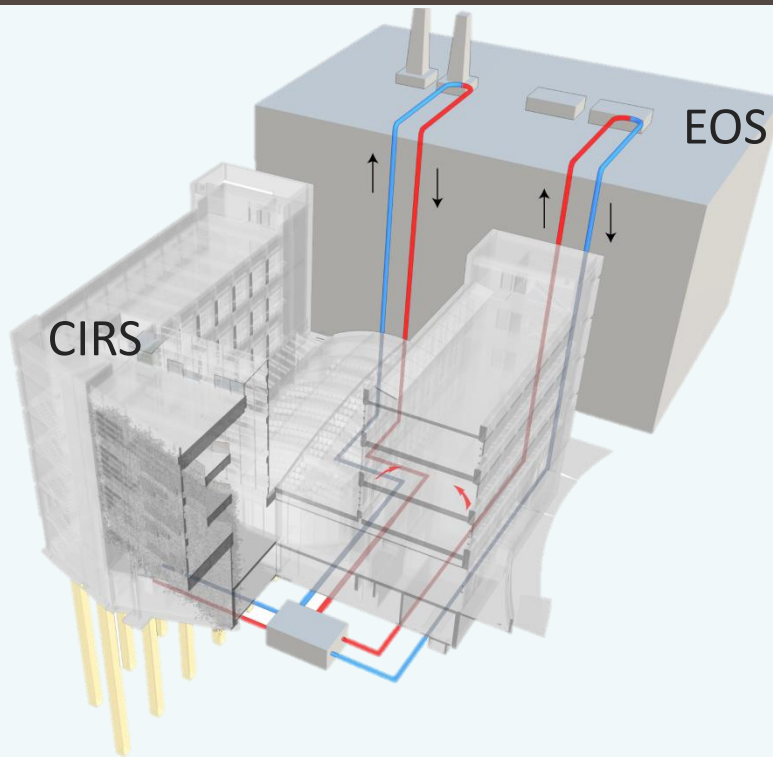
Energy Exchange

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Heat exchangers capture waste heat from the Earth and Ocean Sciences (EOS) building

A geo-exchange system captures heat from the ground in the winter and rejects heat to the ground in the summer

To meet space heating needs heat pumps upgrade heat extracted from EOS and the ground

CIRS uses a “hydronic” heating system with radiant slabs in the atrium and perimeter radiators in the rest of the building

CIRS can capture and upgrade more heat than it needs - excess heat is returned to EOS which results in natural gas savings and fewer GHG emissions

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Energy Exchange

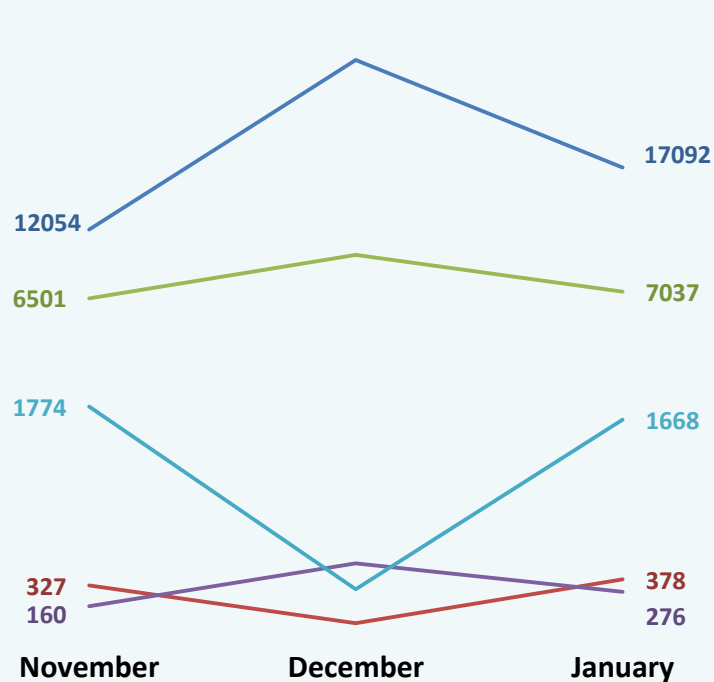
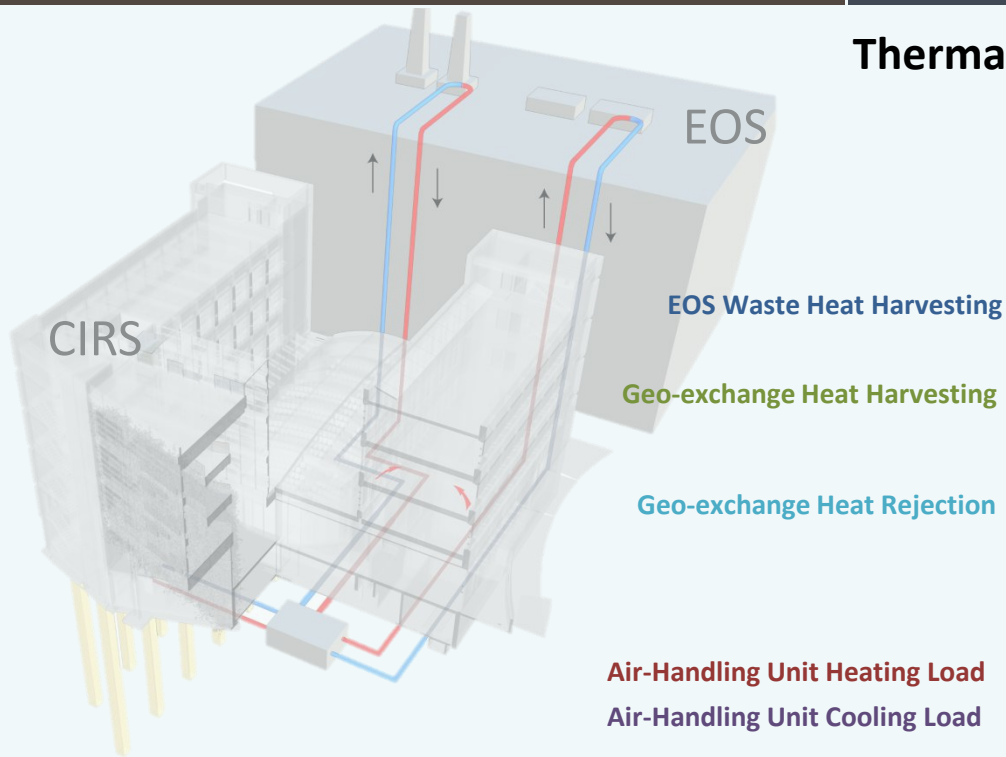
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Thermal Energy Exchange (kWh)



Vancouver, BC

Average Conditions



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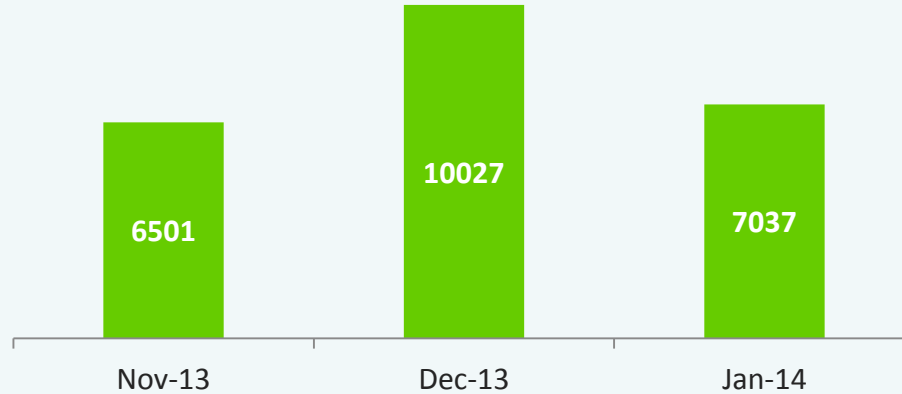
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Honeywell



Geo-exchange Heat Harvesting (kWh)



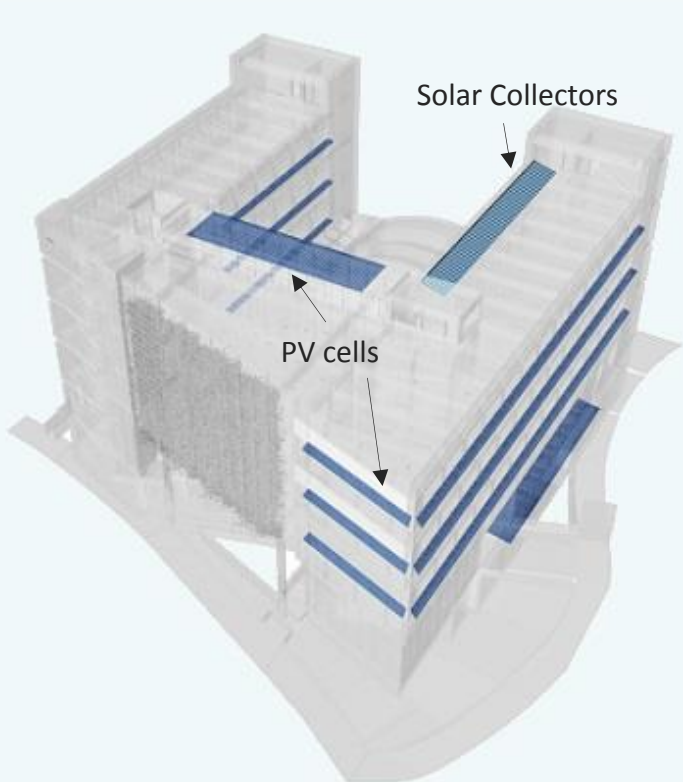
Solar Energy

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Photovoltaic panels on the atrium skylight and on window shades convert sunlight into electricity

Inverters transform direct current into alternating current that can be used by other building systems

Vacuum tube collectors on the south roof capture heat from the sun to heat water used in the building

Vancouver, BC

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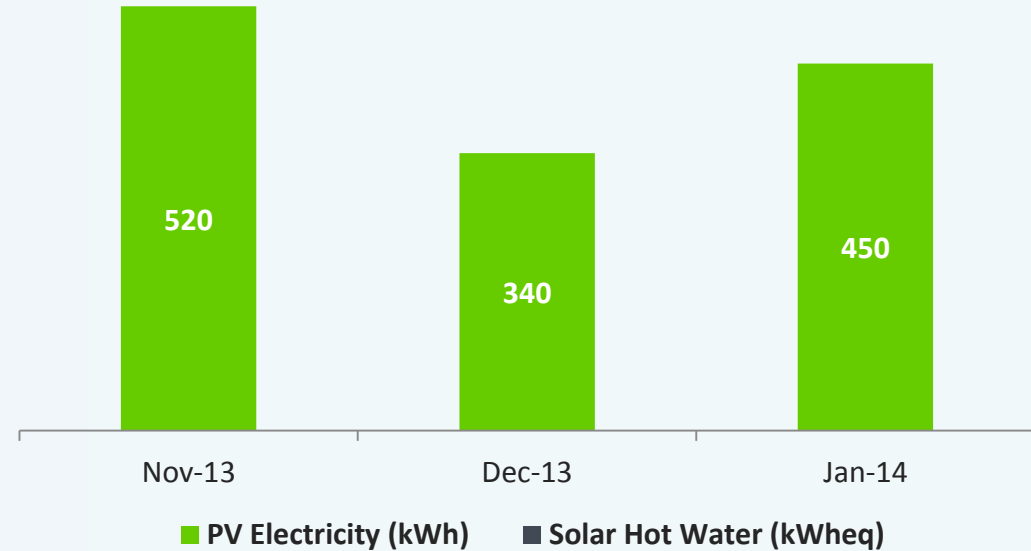
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Honeywell

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Solar Energy Harvesting



Solar Hot Water System Re-commissioning in progress

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Average
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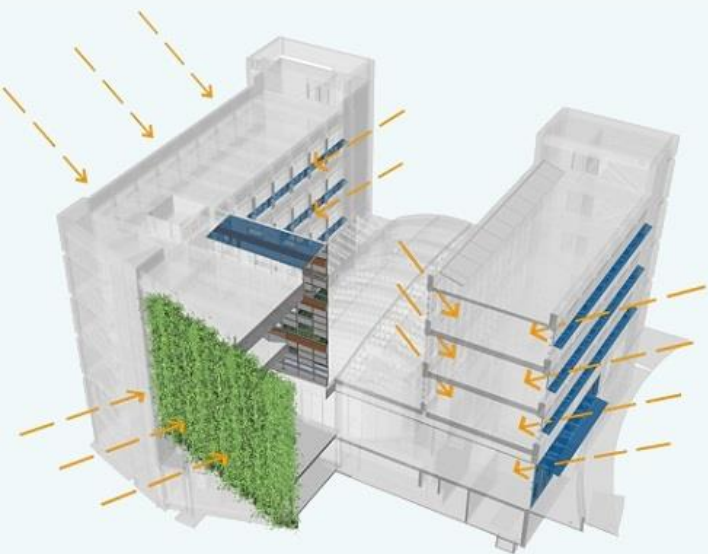
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All permanently occupied spaces have access to natural light and outside views

Window shades block excess glare and heat gains

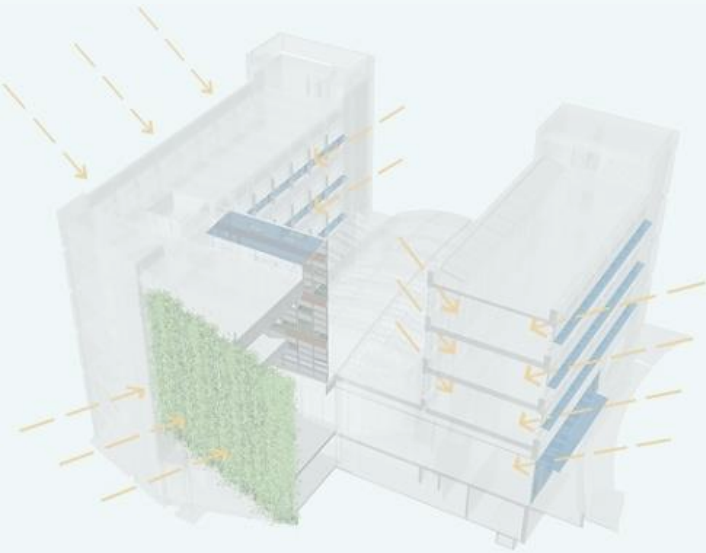
Tall windows allow natural light to reach the interior of the building

During the summer the living wall shades the CIRS atrium

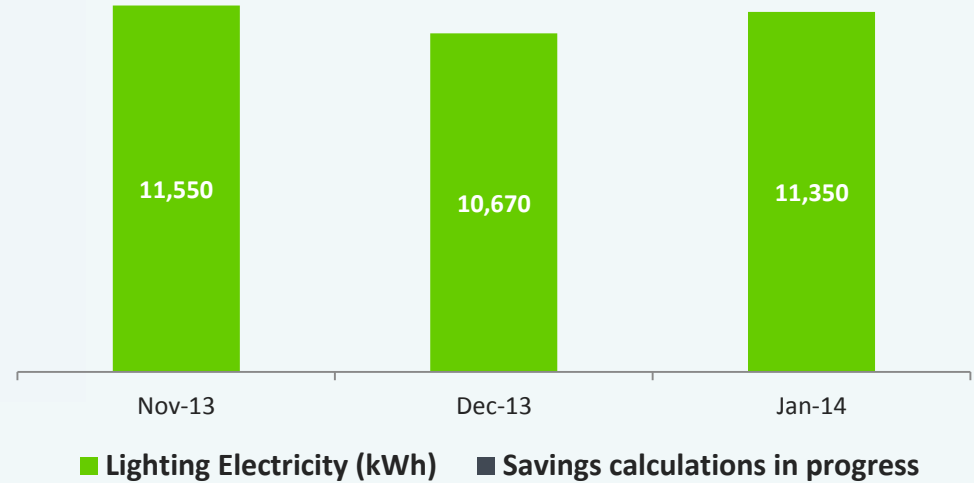
During the winter the vines in the living wall drop their leaves and allow natural light and heat into the building



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Lighting Energy



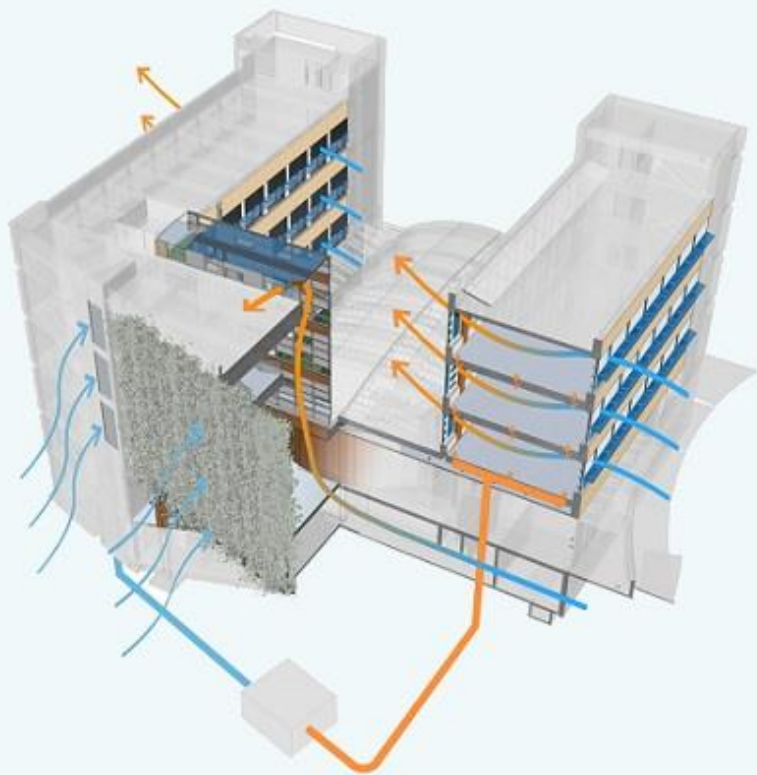
Heating, Ventilation, and Air-Conditioning System

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CIRS relies on natural ventilation when outside conditions allow it

When mechanical ventilation is needed, fresh air is supplied through an under-floor distribution system with manually adjustable diffusers

The central atrium relies on the “stack” or “chimney” effect enabled by automatic vents on the curtain-wall and skylight

Vancouver, BC

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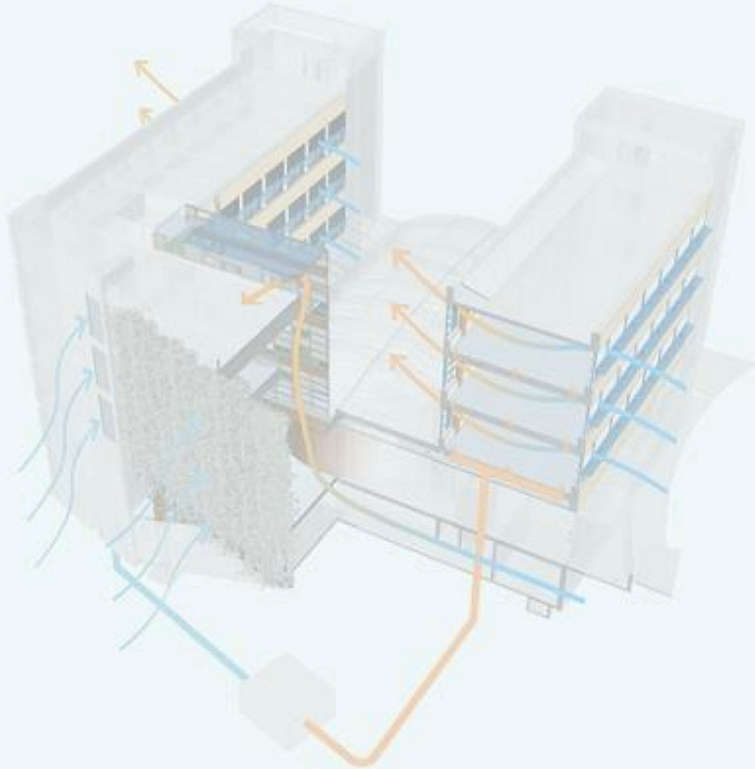
Heating, Ventilation, Air-Conditioning System

November 2013 – January 2014

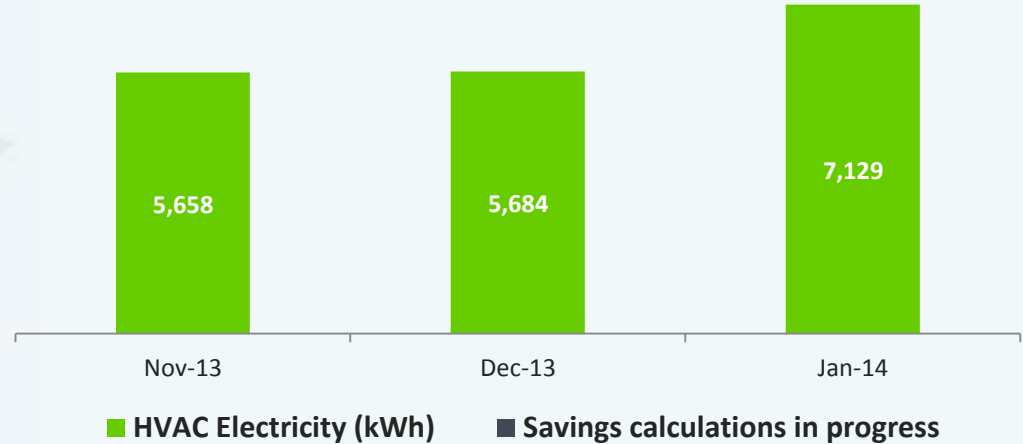


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Ventilation Energy



Vancouver, BC

Average Conditions



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Honeywell

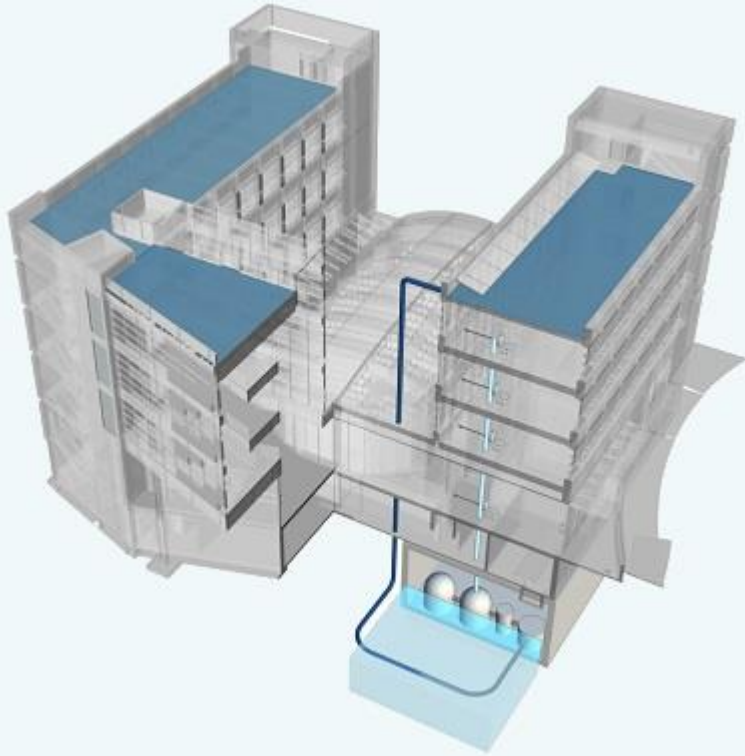
Rainwater

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Rainwater is collected on the upper roofs and atrium skylight

Captured rainwater is stored in a 90,000-litre tank

Rainwater is filtered and treated on-site to potable standards and distributed within building

Vancouver, BC

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Honeywell

Reclaimed Water

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Black-water (from toilets and urinals) and grey-water (from showers and sinks) is collected from fixtures in the building

The Solar Aquatics bio-filtration system uses naturally-occurring processes to treat the waste-water generated by CIRS and other buildings

Treated water is pumped back into CIRS (and eventually to other buildings) and used to flush toilets and landscape irrigation

Vancouver, BC

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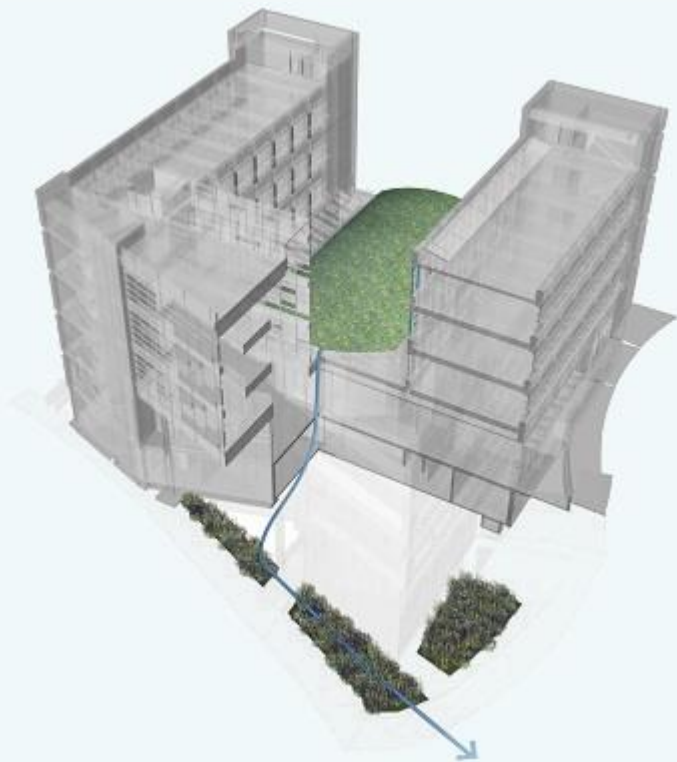
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Honeywell

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Storm-water is collected on the living roof and landscape areas and channeled to a drainage basin where it slowly filters into the local aquifer

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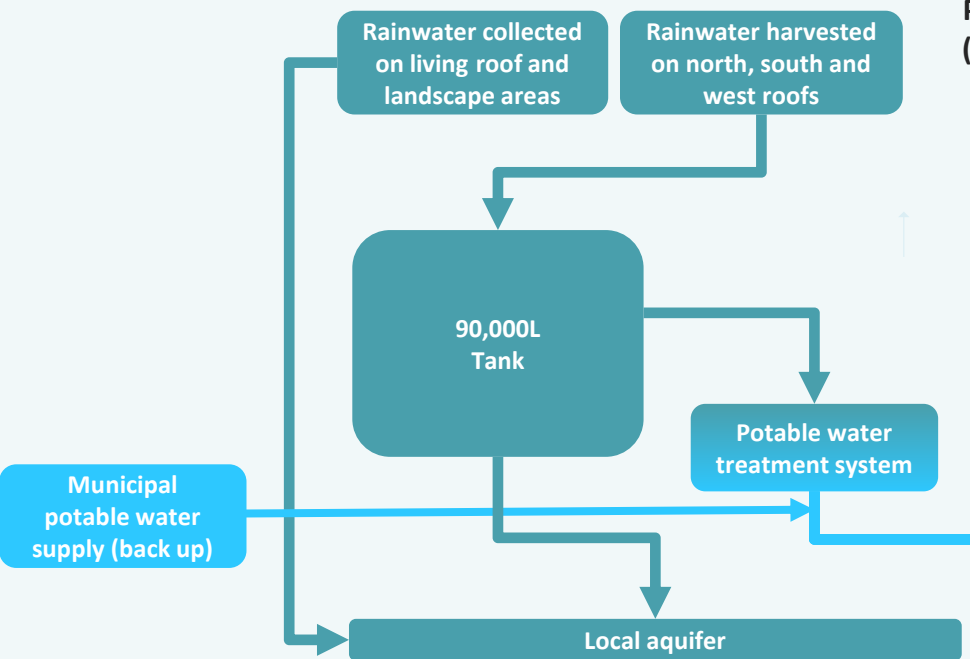
Water Systems



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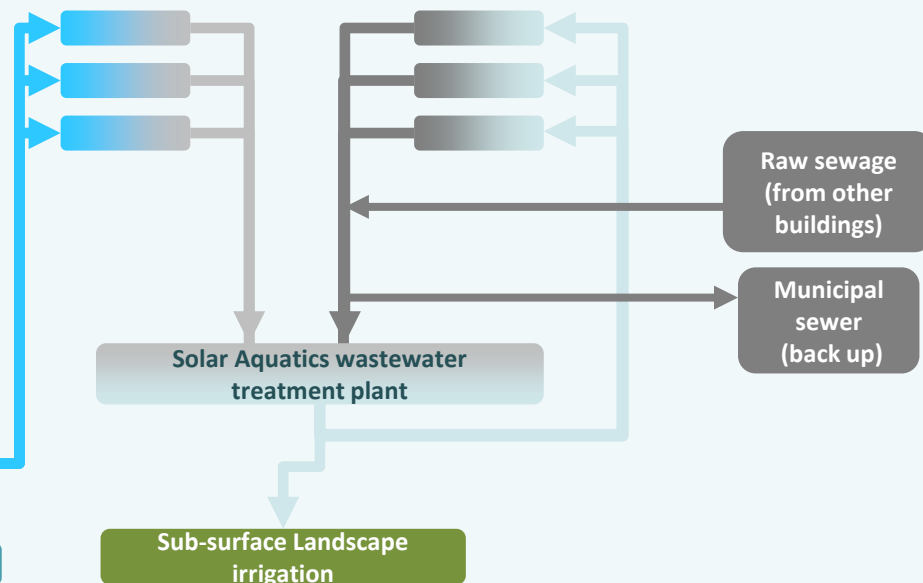
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Potable water loop (sinks and showers)

Reclaimed water loop (toilets, urinals and irrigation)



Vancouver, BC

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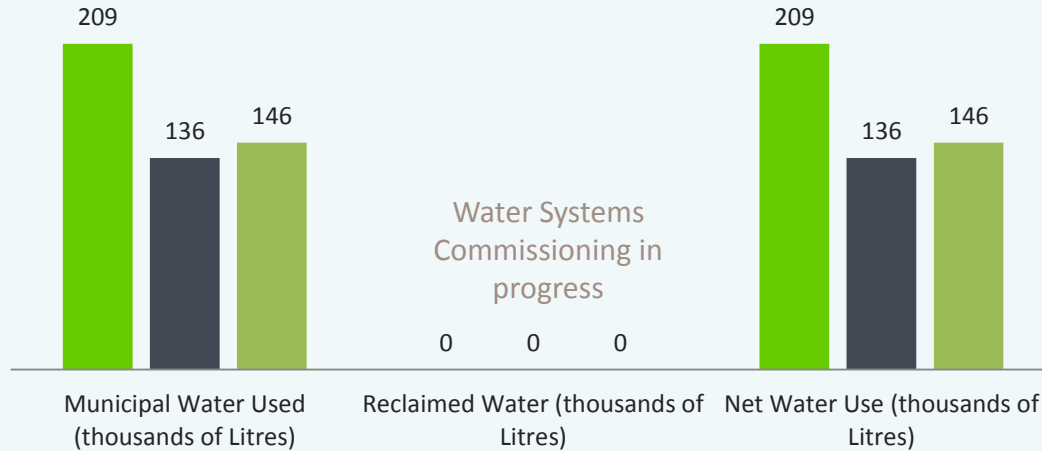
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Honeywell



Water Balance

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CIRS: Living Laboratory

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CIRS is a research centre dedicated to the integrated study of processes, strategies, policies and technologies for regenerative sustainability at the building, urban and regional scales.

CIRS' mandate is to accelerate the adoption of more sustainable practices in society by bringing the fruits of research into the public, private and civil society decision-making arenas through the implementation of partnerships.

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