



Manaaki Whenua
Landcare Research

Landcare Research's new facilities at the University of Auckland's Tamaki Campus.

Ventilation & Controlled Environments

The goal is to use natural ventilation wherever practicable, and to use low-impact technology to provide the controlled environments needed in some areas. The 'ECO-AIR' rooftop units recover heat from the ventilation systems for re-use elsewhere and so are a critical piece of technology for lowering energy consumption.

Windows

Most offices face the atrium so that almost all desks and work stations are within five metres of an opening window. Windows are double-glazed to ensure good insulation. However, the extra weight of double-glazing does limit the size of opening windows—we have used the optimal size for weight and insulating capacity. Windows must be closed at night and during temperature extremes to help maintain the desired temperature range.

On the north side of the atrium, sun-screens at a 30 degree angle shade the offices from excess direct heat and light.

Fume cupboards

The various laboratories and preparation rooms have a total of 11 fume cupboards. Fume cupboards (the equivalent of a very powerful extractor fan in an enclosed space) are used when handling vapourous chemicals or organisms that could irritate if inhaled. The considerable amount of air extracted of the buildings by these fume cupboards has to be replaced with external air. Operating the fume cupboards and replacement air systems represents the heaviest energy-use for the whole building.

Selected fume cupboard exhaust is circulated through a sealed heat-exchanger in the two rooftop 'ECO-AIR units' to recover waste heat energy before the air is discharged. 100% outdoor air is also drawn in through these units, and is warmed / cooled and partially dehumidified by the heat from the outgoing air.

Fresh-air tempered ventilation system

Each ECO-AIR unit incorporates an innovative heat-reclaim system to provide energy-efficient heating /cooling with some dehumidifying capacity. The units draw in fresh outside air, which is warmed or cooled, as needed, to maintain temperatures of 17–25 °C all year round for laboratories and workrooms. This extended temperature range allows the thermal mass of the building to contribute to the heating and cooling of the building. Humidity control is provided by the system using waste heat within the unit.



(The ECO-AIR units are manufactured in Australia. They are being used at the Charles Sturt University Herbarium, NSW; the Biological Resource Centre, University of NSW, Sydney; and Monash University's Mouse House, Melbourne. These centres have similar 'controlled environment' requirements to Landcare Research with this building.)

Air conditioning

Some office and laboratory areas required individual air-conditioning. In these areas, reverse heat-cycle heat pumps with variable refrigerant volume (VRV) technology have been used. This type of equipment provides flexibility for customising air-conditioning to meet the particular requirements of each area, but allows scope for optimising energy-efficient operation..

Controlled environments for the Collections

The New Zealand Arthropod Collection (1 million dried insects, spiders and relatives plus 5 million in ethanol), the fungal collection (72,000 specimens) and the International Collection of Micro-organisms from Plants (11,000 strains) are designated as 'Nationally Significant'. It is essential that they are maintained under cool, dry conditions of about 18 °C with 45% relative humidity. The ethanol room is maintained at 10–12 °C. Very high levels of insulation plus the thermal mass storage of the building help reduce the energy needed to maintain these conditions.

The refrigeration system provides energy-efficient dehumidification with waste heat available for heating offices.

Chilled-water cooling systems provide a backup to the refrigeration system.

Freezer/chiller rooms

The refrigeration technology uses a centralised system using R 404A refrigerant, which is the most energy- and greenhouse gas-friendly, and ozone-friendly refrigerant available. This is combined with thermostatic expansion-valves and head-pressure controllers at each evaporator to maximise the efficiency. Waste heat is re-used for piped base-board heating in offices.

For more information, contact

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