Sustainability Solutions
Geothermal

calibregroup.com

Turning Knowledge Into Value
Sustainability is at the heart of our purpose. Through our products and services, we help you make more sustainable choices; prioritising a cleaner, greener future.

We are sustainability leaders with extensive experience in sourcing and installing high quality energy generation and efficiency solutions Australia-wide.

Our objective is to achieve energy productivity and carbon reduction, ensuring all solutions are integrated to future proof the well-being of our communities.

Cover image: Geothermal systems air condition the new performing arts building at Mt Maria College in Brisbane.

This page: Precinct-wide geothermal installation at Frasers Property’s 6-Star Green Star Fairwater estate in Sydney.
About Us

Calibre is a diversified professional services, construction and maintenance specialist turning knowledge into value across multiple industry sectors and geographies.

At Calibre, we understand that it is not just the technical outcome that matters, but equally important is how clients experience our services.

Our extensive development knowledge and experience works to our client’s advantage, with over 1500 employees across Australia and New Zealand.

Calibre is dedicated to providing client-focused design and management solutions across engineering, consulting, project delivery, construction and asset management services.

Our goal is not only to deliver value – but to make the process of delivering your project a positive experience.

Values Driven

At our core, Calibre is a people-centric, values based organisation that strives to deliver the best, safest and most sustainable outcomes for our people, clients and community.

Our people live and breathe our four core values:

We care for people’s well-being
The health, safety and well-being of our people, contractors, clients and community is our first priority.

We go above and beyond
We put in the extra yard to deliver the best outcomes.

We succeed together
We believe that open communication, collaboration and partnerships are key to our success.

We do what we say
We follow through on our promises.
Our Approach

As a leading provider of sustainability solutions we engage with our clients for the entire lifecycle of a project, ensuring our project specific knowledge is utilised for the best value outcomes.

Our Aim is Energy Productivity

The Calibre team understands the importance of energy efficiency to sustainability strategies. With a focus on ensuring systems are as efficient and effective as possible, we can help your business transition to a cleaner energy future.

As energy costs continue to rise, and renewable energy targets are becoming mandated by governments, a provider with the experience and expertise in this rapidly evolving field will be crucial to ensure that upgrades and new investments are realised efficiently and cost-effectively.

Applying new technologies or retrofitting existing facilities can deliver medium and longer term savings which ultimately will make your business more competitive, sustainable and profitable.

Calibre works with clients to develop strategies, designs and technologies, as well as brokering clean energy funding.
Product Spotlight

Geothermal

Geothermal systems offer consistency in efficiency as they use the earth’s constant temperatures year round.

Conventional cooling and heating systems rely on air temperatures for heat transfer that vary on a daily basis whereas ground temperatures are a constant. Constant heat transfer provides both greater efficiencies and reliability in performance.

Cooling Mode

A geothermal system circulates a refrigerant vapour into the earth to absorb the heat in the naturally cooler, and stable, sub surface temperatures. With excess heat removed, the cooled refrigerant condenses into a liquid. This liquid expands through an expansion device, lowers the pressure, and causes the temperature to reduce even further.

Refrigerant is then circulated through the fan coil unit cooling your home, building or office, and absorbing the excessive heat from the interior air. This causes the refrigerant to expand back into a vapour. The cycle repeats.

Due to these much lower condensing temperatures, the heat pump achieves both an uplift in capacity as well as a reduction in energy consumption. This combination delivers excellent system efficiencies.

Heating Mode

When operating in heating mode, cold refrigerant is circulated within the geothermal loop. This absorbs the heat naturally supplied by the earth.

This heated refrigerant vapour is compressed, and circulated through the fan coil unit, heating the space. This removes the heat from the refrigerant, cooling it again. The cycle repeats.

Geothermal Heating & Cooling - How it Works

**COOLING MODE**

Ground Source Heat Pumps circulate a hot fluid into the geothermal loops to absorb the naturally cooler, and stable, sub surface temperatures

**HEATING MODE**

When operating in heating mode, cold fluid is circulated within the geothermal loop, absorbing the heat naturally supplied by the earth.
Geothermal energy can be used in many ways: for urban heating via heat networks, to heat individual houses and swimming pools to potable hot water which can be generated at no additional operating cost.

**Air Conditioning**
Geothermal systems offer more than standard reverse cycle air-conditioning. A geothermal system can be your standard ducted system, but we also offer options that remove the need for cooling towers and boilers. Your designs will benefit with the flexibility of choosing our geothermal configuration based on your project. We work with you to determine the most appropriate and cost effective configuration for your project.

**Central Plant**
A geothermal system can replace a conventional chiller with our central plant configuration. Modular in design, this system has high levels of flexibility in operation and efficiency. With automated controls integration, a central plant option is an excellent solution for medium to large projects.

**Pool Heating**
Heating swimming pools is easier and cheaper with a geothermal system. Through using either the primary heating or waste heat from an installed system, a geothermal system is a genuine pool heating solution regardless of project size and scale.

**Water Heating & Cooling**
A geothermal system can provide water heating and cooling for a variety of purposes. The system can be configured into a central plant primary heating for process or for potable water purposes.

**Potable Hot Water**
Using waste heat from a geothermal system, potable hot water can be generated at no additional operating cost. A geothermal system can also provide dedicated hot water plant where larger volumes are required.
How a Geothermal System Works

Much of the geothermal system installation is similar to traditional air conditioning, except the condensor loop is below ground and a heat pump replaces the conventional external unit.

System Control
The geothermal system can be controlled by a simple wall mounted thermostat or a more functional building management system. The controls offering is directed at providing the correct solution for your project.

Geothermal Loop
The main feature of the geothermal system is the geothermal loop installed underground. The geothermal system’s condenser loop is permanently buried and is fully encased with a specialised grout and requires no servicing or future maintenance.
How a Geothermal System Works

The Geothermal Advantage

Reduced Running Costs
The use of geothermal systems represents significant energy savings. Our testing data demonstrates savings of over 60% against conventional air source systems.

Reduced Carbon Emissions
The higher system efficiency of geothermal systems relative to conventional air source plant results in reduced grid consumption with a proportional reduction in carbon emissions.

Smart Building Design
Geothermal heat pumps can be installed in areas where conventional air conditioning systems are constrained. This allows more opportunity for integration of plant into the building design.

Reduced Plant Footprint
Geothermal heat pumps harness the earth for energy transfer which removes the need for large condenser fans and coils. This results in very compact equipment and smaller plant areas.

Acoustics
Geothermal systems do not have condenser fans and are therefore much quieter than conventional air conditioning equipment.

Removes Heat Islands
Conventional air conditioning condensers emit heat when operating. Systems installed in confined spaces, or multiple systems installed in an array, can result in ambient increases in air temperature. This issue is avoided completely using geothermal systems.

Improved Indoor Air Quality
Geothermal systems utilise ducted fan coil units for air delivery into the occupied space. The ducted fan coil units can accommodate higher efficiency air filtration improving in indoor air quality through removing airborne particulates, pollen, dust and spores from the air breathed by building occupants.

Reduced Electrical Infrastructure
The reduced electrical load requirements of geothermal systems translate to lower electrical infrastructure requirements offering potential upgrade savings.

Internal Works
Everything you already know applies because installing a geothermal system is no different from conventional ducted systems. A geothermal system provides an advanced heating and cooling system without having to change how the building operates.

Heat Pump
The geothermal heat pump is developed for local conditions. Compact and quiet, the geothermal heat pump is easily integrated into any design.
In 2018, Assisi Catholic College made the decision to air condition the entire campus. With climate change and rising energy costs at front of mind, the College was seeking the highest efficiency options that would future proof the school’s infrastructure.

Calibre were engaged by Brisbane Catholic Education and the College to undertake a complete review of mechanical and electrical infrastructure at the school with a focus on delivery of the highest efficiency solutions to reduce consumption, economic impact and environmental damage.

Due to existing infrastructure, it was determined that geothermal air conditioning be used to air condition the refurbished administration offices and school library. At the completion of these works, an additional 13 classrooms would benefit from the installation of geothermal air conditioning.

Brisbane Catholic Education’s forward-thinking sustainability program includes the installation of geothermal air conditioning in their schools across South East Queensland. Using the College as the pilot school, Brisbane Catholic Education engaged Calibre to undertake a complete review of mechanical and electrical infrastructure at the school.

The College commenced an air conditioning program for the entire campus and required a solution that would provide ongoing energy efficiency benefits. Geothermal air conditioning was selected for its high efficiency and reduction of peak load demands to the site.

**Project highlights include:**
- High efficiency system with potential cost recovery in approx. 4 years based on monitoring results.
- 13kW and 14kW ducted geothermal systems installed across two newly constructed buildings including a state-of-the-art performing arts block.
- In ground geothermal infrastructure was installed for an additional 16 classrooms and the school’s administration building and library.
Lone Pine Koala Sanctuary
Commercial

Lone Pine has implemented a variety of sustainability initiatives including over 90kW of rooftop solar, battery storage and geothermal heating and cooling across the Sanctuary with the aim to set a new standard in environmental wildlife management.

Many of the animals at Lone Pine require climate-controlled environments. This large demand for energy gave Lone Pine the impetus to source efficiency alternatives.

Geothermal heating and cooling systems were identified as a genuine alternative that would reduce the Sanctuary’s energy consumption thus reducing its carbon footprint and its reliance on fossil fuels.

Fairwater Residential

The Calibre team pioneered the use of geothermal in green field developments in Australia.

Frasers Property Australia has committed to installing geothermal air conditioning systems to each of the 800 new homes being built in its 38-hectare Fairwater residential development in Blacktown in western Sydney.

Project highlights include:

- 6-Star Green Star Communities rating from the Green Building Council of Australia - the first in New South Wales.
- Precinct-wide geothermal installation.
- Project commenced in September 2014 with a 6-year program.

Geothermal Benefits:

- Each homeowner will save on air conditioning runnings costs.
- The small external heat pumps enables installation where conventional systems would not have suited.
- The system alleviates sound issues with heat pumps operating at 51db.
- The absence of external fans removes potential safety risks.

Project highlights include:

- Geothermal systems installed at Amphibian & Reptile House and the Platypus House in 2015.
- Calibre were engaged to design the geothermal air conditioning system comprising a central duct distributing conditioned air via the geothermal technology with zone control for the new Brisbane Koala Science Institute research facility.
- In excess of 150kW of geothermal heating and cooling is now installed at Lone Pine offering constant and comfortable temperature control in a highly efficient means.
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