

Renewable Energy and Environmentally Sustainable Design Case Studies

Padua College

– Solar Cooling & Ventilation System

Site: Mornington

Dates:

- Design Phase Commencement: July 2004
- System Commissioning: August 2006

Client:

Hoban-Hynes Pty Ltd (Building Designers for the College).

Project Goals:

- ◆ Recommend passive design techniques and innovative technologies that demonstrate the principles of good design, energy efficiency and renewable technology.
- ◆ Identify best practice methods for water and energy use.
- ◆ Inform students, staff (and the wider community) on the rationale behind and the reasons for implementing positive changes.
- ◆ Demonstrate the client's commitment to the implementation of sustainable practices.

Project Features:

The key installed feature is a solar chimney with underground thermal mass storage system designed by Hoban-Hynes Pty Ltd with the assistance of Going Solar. The solar chimney connects an existing library with new IT Classrooms. A sophisticated energy monitoring system has also been installed.

Going Solar calculated the performance of the solar chimney, determining proportions for the height and length, and recommending a vertical exhaust system – which can operate regardless of wind direction.

The existing building was being heated 24 hours and 7 days for 6.5 months each year with gas hydronic floor coils. We anticipate that the solar heating system will reduce the gas energy input by 50%.

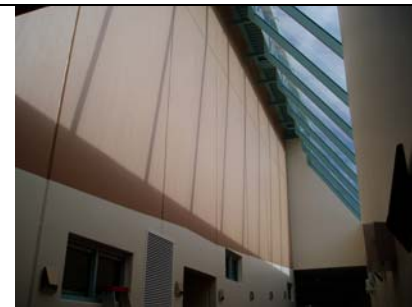
The Library was being cooled by seven roof mounted split air conditioners for eight hours on an average of 60 days each year. We anticipate that the solar cooling input will reduce the electrical energy input by 85%. Further benefits of the solar system include a reduction of greenhouse gas emissions of 78 tonnes/annum and an improvement in the health of staff and students within the building.



Solar chimney.



Solar chimney.



**Inside the solar chimney
(Note the sunlight on the wall
heating the thermal mass).**



**The lower air register
inside the solar chimney.**

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The system controls, sensors and data loggers are connected to a control program located in the Library/IT building. The chimney louvers and air handling equipment may be controlled remotely.

Sensors include rain, wind speed and direction, sunlight, ambient air temperature, internal air temperature, chimney air temperature and filter condition.

Data collected by the sensors is continuously recorded along with reductions in energy consumption. The information is fed into a building control program which is used as a teaching tool for students to experiment with settings of the system.

Project Team:

- Brendan Hoban, Director, Hoban Hynes Pty Ltd
- Lachlan Bateman, Project Manager, Going Solar
- Stephen Ingrouille, General Manager, Going Solar

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The upper air register inside the solar chimney.



The outside fresh air intake located low down on the south side of the building.



Inside the solar chimney.



Wall mounted monitor display.