

**2. FENDALTON LIBRARY/SERVICE CENTRE CO-LOCATION:
SOLAR HEATING**

RR 9537

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The purpose of this report is to report on the suitability of solar heating for the Fendalton Library/Service Centre co-location project.

INTRODUCTION

The 12 March 1999 Projects and Property Committee meeting requested that a report be prepared on the suitability of incorporating solar heating in the new building.

OPTIONS

The Council Energy Manager and the Mechanical Engineer for the project have advised as follows:

“Solar energy can be used for either:

- space heating*
- maximising the use of natural light*
- domestic hot water heating*

The best use of solar energy for space heating can be achieved by implementing the principles of “passive solar design”. These are architectural principles and include the optimum orientation of the building and the use of construction materials with high thermal mass which would accumulate solar energy. North and West facing glazing will provide good daylight and passive heating during winter.

The maximum use of natural light can be achieved by grouping all perimeter light fittings into separate electric circuits and controlling them by an illuminance sensor so that when the level of natural lighting is sufficient the artificial lights are off or dimmed (as has been done at the Canterbury Public Library). This option will be considered by the electrical consultant for the project.

The use of solar energy for water heating is the area where, under certain circumstances, proven technologies can be applied to make the installation of solar collectors and associated equipment an economically viable solution. These circumstances include residential or commercial situations where domestic hot water heating is a major contributor to the overall energy cost (about 35% in an average residential house) and hot water is consumed 7 days a week and 24 hours a day.

In such circumstances, the simple payback period for a solar water heating system is around 10 years. Hot water cylinders with conventional electric heating elements (or a gas burning heater) would still have to be provided to supply hot water during inclement weather. Therefore there would be additional capital costs for the solar water heating and additional maintenance costs for maintaining the pumps and controls, cleaning solar panels etc.

In the Fendalton Library/Service Centre building, the contribution of domestic hot water heating to the total energy consumption will be relatively small at about 3%, at a cost of approximately \$900 per year. Annual energy cost savings which would result from the use of solar energy would be around \$500. The payback period of solar water heating for this building would be longer than 10 years.

The Christchurch City Council Energy Efficiency Projects budget currently provides funding for projects with a payback period of up to 5 years. If funding from this budget was to be provided for the installation of solar heating at Fendalton Library/Service Centre, this would be at the expense of another energy efficiency project with better economic parameters. The Energy Efficiency and Conservation Authority (EECA) also doesn't provide its energy efficiency Crown loans for projects with payback periods longer than 5 years.

OTHER ENERGY EFFICIENCY FEATURES

The Fendalton Library/Service Centre project will be designed to meet the requirements of the Christchurch City Council Energy Strategy 2020. Special features being incorporated into the building design include:

- *Double glazing of windows;*
- *Thicker insulation to walls and ceilings;*
- *LPG supplementary heating;*
- *Economizers to the air conditioning system which will allow the use of free cooling by fresh outdoor air;*
- *Tinting of window glass and the use of canopies above the windows to provide shading.*

The design of the building's mechanical and electrical services will be reviewed by the Council's Energy Manager. Because of the energy efficient features being incorporated into the design, the Energy Manager will either make application for an EECA loan or provide funding from the Christchurch City Council's Energy Efficiency Projects budget."

Recommendation: That passive solar design be incorporated, and that solar water heating not be incorporated in the Fendalton Library/Service Centre Co-location Project.