Heritage and Sustainability
- a national response

Jim Gard'ner
Heritage Victoria

Victoria
The Place To Be
Department of Planning and Community Development

Heritage
VICTORIA

Embodied Energy - UK

=

200,000 km

Embodied Energy - US

=

1,344,000 aluminium cans

Embodied Energy - UK

=

35 tonnes CO_2

Victoria's response to date

Heritage Council Policy Note: *Heritage and Sustainability*
April 2008

The retention and conservation of heritage places has an important part to play in our actions to protect the environment, creating vibrant communities and sustaining local economies.

Heritage and Sustainability

Policy

The retention and conservation of heritage places has an important part to play in our actions to protect the environment, creating vibrant communities and sustaining local economies.

Background

The conservation of heritage places makes an important contribution to environmental, social and economic sustainability. The environmental sustainability benefits afforded by the retention of heritage places (through conservation and appropriate maintenance) include the substantial reduction in building, demolition and new construction waste, and the conservation of embodied energy in the existing buildings.[1]

Embodied energy is the energy consumed by all of the processes associated with the production of a building. The energy embodied in existing building stock is equivalent to ten years of the total energy consumption for the entire nation.[2] While it has been recognised as a global priority to continue to use existing heritage building stock, their energy efficiency can be improved.[3] Existing building stock has been regarded as a significant source of wasted energy in relation to energy consumption.[4] Actions to improve energy efficiency for heritage places – either as a particular goal for environmental reasons or as part of an alteration or adaptation – should optimise traditional building performance by reducing and monitoring energy usage and complying with relevant legislation.

Environmentally sustainable heritage conservation

Sustainable development is integral to heritage conservation. Retaining heritage places amounts to a substantial environmental and financial saving in embodied energy, without the need for replacement building materials or the creation of waste. Recurring embodied energy savings increase dramatically once a building reaches over 50 years in age.[5] The reuse of building materials generally provides a 95% saving of embodied energy that would otherwise be wasted.[6]

Retaining building materials *in situ* has a much higher embodied energy saving than their removal and reuse. Some materials including bricks and tiles can suffer damage losses up to 30% in reuse.[7] Consideration should be given to the many simple and cost effective actions that can be undertaken to improve the energy efficiency of heritage places, including, where appropriate, the introduction of insulation and double or secondary glazing.

HERITAGE COUNCIL

Heritage

Victoria

Victoria The Place To Be

Department of Planning and Community Developr

Heritage VICTORIA

Victoria's response to date

Technical Note: *Heritage Buildings and Sustainability*
February 2009

Promotes environmental and sustainable measures for heritage buildings:

- embodied energy
- optimising building performance
- reducing energy and water consumption

TECHNICAL LEAFLET

Heritage Buildings and Sustainability

Purpose

To promote environmental and sustainable performance measures for existing heritage buildings without adversely impacting their cultural heritage significance.

Objectives

To increase awareness of the contribution of heritage conservation to sustainability, through:

- developing an understanding of the attributes of heritage buildings
- considering the options available for the improvement of environmental performance (in particular reducing energy and water consumption) and evaluating whether these measures are appropriate to heritage buildings
- identifying the main issues which need to be addressed in optimising the performance of heritage buildings.

Introduction

It is recognised that the retention of heritage buildings has environmental sustainability benefits. Conserving heritage buildings reduces energy usage associated with demolition, waste disposal and new construction, and promotes sustainable development by conserving the embodied energy in the existing buildings. Life-cycle analyses of building fabric, structure, envelope, interior elements and systems – and ongoing management and use – need to be considered as part of the conservation process to achieve optimum energy efficiency outcomes.

St Vincent Place (DPCD)
Conserving heritage buildings reduces energy usage associated with demolition, waste disposal and new construction

This Technical Leaflet gives a basic understanding of how sustainability may be optimised and energy and water consumption reduced in existing buildings, and how sustainability practices may be maximised when new work is proposed. The information is performance-based and is intended to provide a basic guide to sustainable building. More detailed research and assessment on the modelling of embodied energy, building performance and energy efficiency calculations specific to heritage buildings is currently being undertaken on behalf of the Heritage Council of Victoria and Heritage Victoria.

Victoria The Place To Be
Department of Planning and Community Developr

Heritage Victoria

Victoria's response to date

Technical Note: *Heritage Buildings and Energy Efficiency Regulations*

February 2009

Provides guidance on meeting the performance requirements of the BCA including Deemed-to-Satisfy Provisions and Performance Assessment Report for Alternative Solutions.

TECHNICAL LEAFLET

Heritage Buildings and Energy Efficiency Regulations

Purpose

To develop appropriate design strategies for the improvement of energy efficiency in heritage buildings to achieve the integration of sustainability and heritage conservation.

Objectives

To provide guidance on formulating design solutions for heritage buildings in order to satisfy the performance requirements of the Building Code of Australia (BCA) through:

- understanding how the energy efficiency requirements for different classes of buildings may be applied to heritage buildings
- recognising that the *BCA* Deemed-to-Satisfy Provisions may not be appropriate to heritage buildings
- understanding the scope for flexibility and employing innovative design solutions to achieve compliance
- considering cultural heritage significance in developing sustainable design solutions
- identifying solutions that optimise the traditional building performance
- including information on the Performance Assessment Report as part of an Alternative Solution
- incorporating Sustainability Measures as part of the Alternative Solution.

Water conservation (Brad Sirois, DSE)
Placing tanks underground enhanced the energy efficiency without having an adverse impact on significant fabric.

Introduction

In an effort to promote sustainable development, there are legislative requirements for building energy efficiency and water conservation in the *Building Regulations 2006*. The Regulations reference the *Building Code of Australia (BCA)* which contains many of the technical provisions that affect sustainable building work.
Any new building work (which includes alterations and additions) to a heritage building will have to comply with the Regulations. In some instances, where the building work exceeds 50% of the volume of the existing building, the existing building may also need to be brought into compliance.

Generally, the Regulations provide the Relevant Building Surveyor with discretion as to how these requirements are applied.

Just as changes to heritage buildings often require imaginative design solutions to retain their cultural significance, it is possible to develop alternative design strategies to the *BCA* prescriptive measures provided they meet the required level of performance.

This Technical Leaflet provides a basic understanding of the relevant parts of the Building Regulations and the *BCA* relating to energy efficiency, and ways in which alternative performance-based assessments may be achieved when carrying out building work on heritage buildings in Victoria.

National Projects

Heritage and Sustainability – Domestic Project

- how retention of heritage buildings contributes to environmental sustainability
- identify embodied energy in typical domestic buildings
- information for building designers to maker better decisions
- provide evidence for building surveyors on Alternative Solutions under the BCA
- to test industry standard modelling methodology on heritage buildings
- encourage innovative design solutions

National Projects

Heritage and Sustainability – Domestic

National Projects

Heritage and Sustainability – Domestic Project

National Projects

Heritage and Sustainability – Commercial

- review policy and regulation
- how retention of heritage buildings contributes to environmental sustainability
- identify embodied energy in typical commercial building types
- information for building designers to maker better decisions
- provide evidence for building surveyors on Alternative Solutions under the BCA
- encourage innovative design solutions

National Projects

Heritage and Sustainability – Commercial

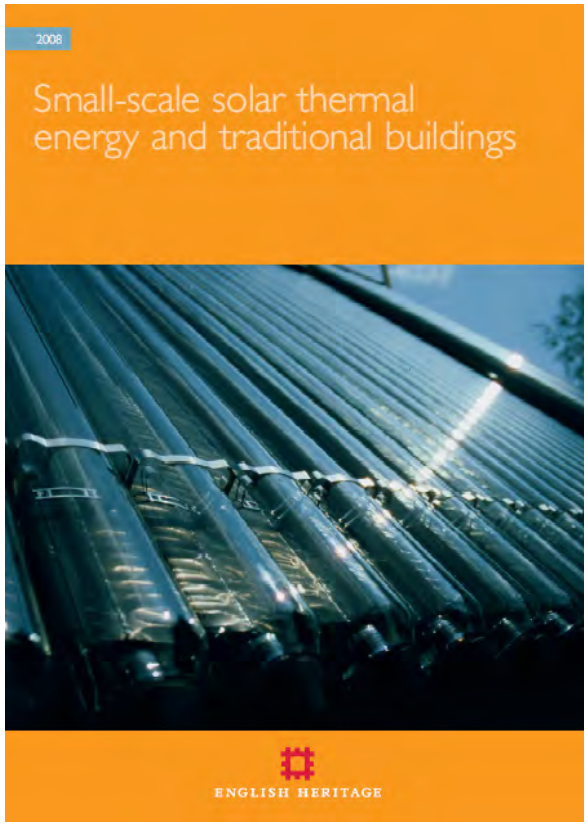
National Projects

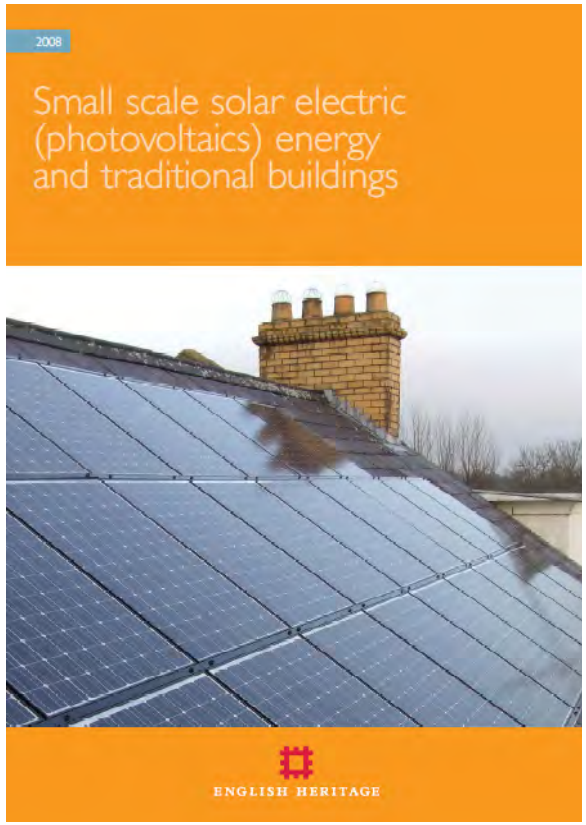
Heritage and Sustainability – Summary

- identified embodied energy
- analysed energy and water in-use
- modelled common energy efficiency measures
- drawn conclusions on cost effectiveness
- provide evidence for building surveyors on Alternative Solutions under the BCA
- encourage innovative design solutions
- publish case studies to raise public awareness
- contribute to the WHIT? Online interactive

Where to next?

Micro-generation and other new services





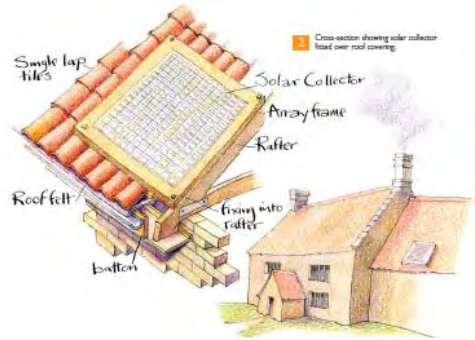
Where to next?

Micro-generation and other new services

Horizontal-axis wind turbine. (Photograph courtesy of Renewable Devices Swift Turbines Limited) & Vertical-axis wind turbine. (Photograph courtesy of Quiet Revolution Limited)

Wind turbine wall brackets. (Photograph A courtesy of Renewable Devices Swift Turbines Limited; photographs B and C courtesy of Eclectic Energy Limited)

5 Turbines mounted on a flat roof



3 Cross-section showing solar collector fitted over roof covering

Top left: Close up of PV slate installation. Top right: Individual PV slate. Bottom: Roof covered with PV slates. (Top left and bottom: Photographs courtesy of Sunslates Limited. Top right: Photograph courtesy of Solar Century.)

Where to next?

Micro-generation and other new services

Solar thermal hot water

- solar thermal panels may be acceptable in a concealed location such as a central valley roof or behind a parapet

Photovoltaic panels

- may be acceptable in a concealed location or a rear elevation consider locating on a separate structure to avoid damage to historic building
- choose panels fitted over roof tiles, avoiding a permanent change to the roof
- avoid the loss or damage of historic fabric such as natural slate tiles or clay pantiles

Wind turbines

- these may not be suitable for listed buildings, or in sensitive parts o conservation areas
- need to consider noise and vibration
- consider general amenity issues such as impact on neighbours and surrounding area

Victoria
The Place To Be

Department of Planning
and Community Development

Heritage
VICTORIA