

GREENING HISTORIC BUILDINGS: A study of Heritage Protection and Environmental Sustainability



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i. Executive Summary

Generally a major theme - for one reason or another - captures the concerns of a generation. The 1940s were dominated by war, the 1950s by recovery, and the 1960s by the civil rights movement and rebellion against mainstream culture. In the early 2000s we find climate change and environmental sustainability dominating a large proportion of political, social and economic discussion. Discussions of Environmentally Sustainable Design (ESD) -- which many erroneously perceive as a 'new' conversation -- are equally ripe in heritage related industries.

This report explores issues currently experienced in heritage related industries (with a focus on built fabric), related to making historic buildings perform more sustainably - a concept popularly termed Greening Historic Buildings. The information presented is a culmination of research, interviews, site visits, workshops, conference papers and round table discussions in which the Fellow participated while in New York City as a participant of the 2013 Association for Preservation Technology International's (APTi) conference on 'Preserving the Metropolis'. The APTi conference themes included:

- Material Conservation in Urban Environment;
- Balancing Change, Preservation, and Development;
- Building Types, Districts and Infrastructure; and
- Energy Use and Conservation: Exploring the Potential.

This conference was focused on investigating both traditional and innovative ways of "protecting urban cultural heritage in the 21st century by exploring best practices and viable solutions from New York and around the world"¹. The purpose for the Fellow was to attend as many paper sessions, workshops and site visits as possible, as well as meet experts and other professionals concerned with the issues of sustainable preservation in order to explore how information learned overseas can be adapted to the Australian context.

After analyzing information gained in New York, the Fellow compared what she learned overseas to the Australian context and has thus included as part of this report a series of recommendations. These recommendations focus on ways in which Australia can partner with international organizations and benefit from an already well founded but growing industry in sustainable preservation whilst adapting information to become leaders in the Australasian region.

The Fellow began this journey by searching for solutions to problems which dominate discussions of heritage protection in Australia. Often these discussions are negatively framed, revolving around 'inhibitors' and 'inconveniences' that preservation seemingly poses on contemporary development. What the Fellow discovered in New York was a predominantly positive discourse around the benefits of historic buildings and sites, especially in regard to inherent and potential ESD features which can be harnessed via both traditional and contemporary methods. In addition to providing practical solutions and offering helpful resources for further information, the Fellow hopes the material and recommendations provided as part of this Fellowship (and the dissemination sessions subsequently provided) help to positively influence preservation practices in Australia. The Fellow aims to encourage more camaraderie between heritage professionals and other building professions so they can work more efficiently and innovatively toward the common goal of creating a more sustainable and culturally rewarding built environment for future generations.

¹ Association for Preservation Technology. "NYC 2013 - Preserving the Metropolis - Agenda" 2013. Website: http://www.apti.org/index.php?src=gendocs&ref=Preserving_the_Metropolis_NEW&category=APT_2013_Conference_NEW

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ii. Abbreviations/Acronyms

AABC	Register of Architects Accredited in Building Conservation
AIA	Australian Institute of Architects
APT(i)	Association for Preservation Technology (international)
ARB	Architect's Registration Board
BCA	Building Code of Australia
BIM	Building Information Modelling
CHNA	Cooperative National Heritage Agenda
CPD	Continuing Professional Development
DOCOMOMO	Documentation and Conservation of Buildings, Sites and Neighbourhoods of the Modern Movement
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities.
ESD	Environmentally Sustainable Design / Ecologically Sustainable Development
HV	Heritage Victoria
HO	Heritage Overlay
ICOMOS	International Council on Monuments and Sites
Low-E	Low Emissivity
LCA	Life Cycle Assessment
MAS-NYC	Municipal Art Society of New York City
MEM	Micro Erosion Meters
MHS	Minnesota Historical Society
PCBs	Polychlorinated biphenyls
POPs	Persistent Organic Pollutants
SE	Skill Enhancement
TMEM	Traversing Micro-erosion Meters
TCSP	Technical Committee on Sustainable Preservation
UK	United Kingdom
USA	United States of America
WCED	World Commission on Environment and Development (WCED)
ZNE	Zero Net Energy

iii. Definitions

Cultural Sustainability

The following definitions have been reproduced directly from ICOMOS' Burra Charter 2013 ¹:

Place means a geographically defined area. It may include elements, objects, spaces and views. Place may have tangible and intangible dimensions.

Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects.

Places may have a range of values for different individuals or groups.

Fabric means all the physical material of the place including elements, fixtures, contents and objects.

Conservation means all the processes of looking after a place so as to retain its cultural significance.

Maintenance means the continuous protective care of a place, and its setting. Maintenance is to be distinguished from repair which involves restoration or reconstruction.

Preservation means maintaining a place in its existing state and retarding deterioration.

Restoration means returning a place to a known earlier state by removing accretions or by reassembling existing elements without the introduction of new material.

Reconstruction means returning a place to a known earlier state and is distinguished from restoration by the introduction of new material.

Adaptation means changing a place to suit the existing use or a proposed use.

Use means the functions of a place, including the activities and traditional and customary practices that may occur at the place or are dependent on the place.

Compatible use means a use which respects the cultural significance of a place. Such a use involves no, or minimal, impact on cultural significance.

Setting means the immediate and extended environment of a place that is part of or contributes to its cultural significance and distinctive character.

Related place means a place that contributes to the cultural significance of another place.

Related object means an object that contributes to the cultural significance of a place but is not at the place.

Associations mean the connections that exist between people and a place.

Meanings denote what a place signifies, indicates, evokes or expresses to people.

Interpretation means all the ways of presenting the cultural significance of a place.

¹ ICOMOS Australia "The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance, 2013." 2013. Website: <http://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf>

iii. Definitions

Environmental Sustainability

The following definitions have been reproduced directly from the AIA's Environment Design Guide on 'Ecologically Sustainable Development – Glossary of ESD terms'²:

Acid rain: precipitation (in the form of rainwater, snow, fog) containing concentrations of sulphuric (particularly sulphur dioxide) and nitric acids (such as nitrogen oxide) and nitric acids (such as nitrogen oxides), falling to the earth; air pollution from the burning of fossil fuels is the major cause of acid rain; usually forms high in the clouds where sulphur dioxide and nitrogen oxides react with water, oxygen and oxidant forming a mild solution of sulphuric acid and nitric acid and sunlight increases the rate of most of these reactions; can harm/destroy forests/wildlife, cause corrosion of buildings/cars and affect human health.

Brownfield sites: land in urban areas which has already seen development and is lying vacant; abandoned, idled, or under-used industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination.

Building Code of Australia (BCA): the national performance based building code, produced and maintained by the Australia Building Codes Board (ABCB) on behalf of the Australian Government and State and Territory Governments; has the status of building regulations by all Australian States and Territories.

Building envelope: commonly understood as the skin (external walls, glazing, roofs etc) of a building that enclose interior and/or conditioned spaces and through which thermal energy may be transferred to and from the exterior; critical to achieving sustainable design and operational outcomes, with respect to orientation and shape, thermal efficiency of envelope (including thermal bridging), shading, high performance glazing, daylighting, natural ventilation, level of exposed internal thermal mass, reflectance of internal surfaces, infiltration, lifts/stairs, and landscaping.

Built environment: urban systems providing a collection of life support systems for human settlement.

Cellulose materials: vegetable fibres; in building materials can include bamboo, cotton, flax, hemp straw, thatch and timber are considered renewable materials.

Cradle-to-cradle: design, industrial, management and economic activities which together ensure that materials and products are considered and accounted for throughout their life cycle, such that once their current useful life is complete they are returned to new use lives or functions rather than being relegated to the waste stream.

Ecologically sustainable design: the use of design principles and strategies which help reduce the ecological impact of buildings and strategies which help reduce the ecological impact of buildings e.g. by reducing the consumption of energy and resources, or by minimising disturbances to existing vegetation.

Embodied energy: the energy required directly and indirectly to produce a product (which may be a physical entity or service); at a specific point in the life cycle of a product/material, accounts for all energy expended in production processed, transportation and maintenance of that product/material ready for use at that point in time.

Holistic design: an integrative and comprehensive design approach that considers the interrelatedness of a project's parts, components, systems, and subsystems, in order to optimize energy and environmental performance during the whole-of life of a project.

² Environment Design Guide, "Ecologically Sustainable Development – Glossary of ESD Terms" by Anthea Fawcett, Natasha Palich and Lorina Nervagna. May 2006. Not 11, Pg1-22. Website: <http://www.environmentdesignguide.com.au/media/NOT11.pdf>

iii. Definitions

Life cycle assessment (LCA): a technique for assessing the environmental aspects and potential impacts associated with a product or process, by compiling an inventory of relevant inputs and outputs; evaluating the potential environmental impacts associated with those inputs and outputs; and interpreting the results of the inventory analysis and impact assessment phases in relation to the objectives (scope, boundaries and levels of detail) of the study.

Refurbishment: the remodeling, refashioning and general renovation of a building, site, product or social and community infrastructure.

Stack effect ventilation: the draught that is created by warm buoyant air as it rises in a tall confined space such as a chimney, stairwell, atrium or lift shaft; a means of naturally ventilating and cooling a building e.g. the use of a building element, such as a stairwell or shaft, with a top vent used to extract hot air out and induct cool fresh air at a lower level (usually) ground level.

1. Acknowledgements

Ruth Redden would like to thank the following individuals and organisations who gave generously of their time and their expertise to assist, advise and guide her throughout the Fellowship program.

Awarding Body – International Specialised Skills Institute (ISS Institute)

The International Specialised Skills Institute Inc is an independent, national organisation that for over two decades has worked with Australian governments, industry and education institutions to enable individuals to gain enhanced skills and experience in traditional trades, professions and leading-edge technologies.

At the heart of the ISS Institute are our Fellows. Under the **Overseas Applied Research Fellowship Program** the Fellows travel overseas. Upon their return, they are required to pass on what they have learnt by:

1. Preparing a detailed report for distribution to government departments, industry and educational institutions.
2. Recommending improvements to accredited educational courses.
3. Delivering training activities including workshops, conferences and forums.

Over 200 Australians have received Fellowships, across many industry sectors. In addition, recognised experts from overseas conduct training activities and events. To date, 22 leaders in their field have shared their expertise in Australia.

According to Skills Australia's 'Australian Workforce Futures: A National Workforce Development Strategy 2010':

Australia requires a highly skilled population to maintain and improve our economic position in the face of increasing global competition, and to have the skills to adapt to the introduction of new technology and rapid change.

International and Australian research indicates we need a deeper level of skills than currently exists in the Australian labour market to lift productivity. We need a workforce in which more people have skills, but also multiple and higher level skills and qualifications. Deepening skills across all occupations is crucial to achieving long-term productivity growth. It also reflects the recent trend for jobs to become more complex and the consequent increased demand for higher level skills. This trend is projected to continue regardless of whether we experience strong or weak economic growth in the future. Future environmental challenges will also create demand for more sustainability related skills across a range of industries and occupations.

In this context, the ISS Institute works with Fellows, industry and government to identify specific skills in Australia that require enhancing, where accredited courses are not available through Australian higher education institutions or other Registered Training Organisations. The Fellows' overseas experience sees them broadening and deepening their own professional practice, which they then share with their peers, industry and government upon their return. This is the focus of the ISS Institute's work.

For further information on our Fellows and our work see <http://www.issinstitute.org.au>.

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1. Acknowledgements

Fellowship Sponsor: The George Alexander Foundation

The George Alexander Foundation (GAF) is a valued sponsor of the ISS Institute. The Fellow sincerely thanks them for providing funding support for this Fellowship. In 1972, George Alexander AM (1910 - 2008) set up an independent philanthropic foundation as a way of sharing his wealth and giving back to the community.

Today, the main focus of The George Alexander Foundation is access to education for promising young people, particularly students with financial need and those from rural and remote areas. The George Alexander Foundation (GAF) Scholarship Programs form the core of the foundation's work, operating in partnership with major tertiary institutions, while our Fellowships and other education grants provide a variety of other unique and challenging educational experiences.

George Alexander believed in the notion of 'planting seeds and hoping they would grow into pretty big trees'. The programs supported by the Foundation endeavour to support this ideal and as GAF students graduate and go on to contribute to the community, George's legacy and spirit lives on through their achievements.

Supporters

- Alison Cleary, Victorian Chapter Manager, Australian Institute of Architects
- Donald Ellsmore, Australasia Chapter Convener, Association for Preservation Technology International (APTi)
- Dr. Jane Harrington, President, Australia ICOMOS
- Alexandra Hill, Advocate – Heritage Programs, National Trust of Australia (Victoria)
- Joan Whelan, Project Manager, Construction and Property Services Industry Skills Council

Mentors

- David Wixted, Principal Architect, Heritage Alliance (employer mentor)
- Donald Ellsmore, Australasia Chapter Convener, Association for Preservation Technology International (APTi) (industry mentor - conservation)
- Jane Toner, Director, Sustainable Built Environments (industry mentor - sustainability)
- Dr. Anne Harris, Senior Lecturer, Faculty of Education, Monash University (report writing mentor)

Employer Support

David Wixted, Principal Architect, Heritage Alliance

1. Acknowledgements

Organisations Impacted by the Fellowship

Government

- Heritage Victoria (Department of Planning and Community Development)
- Maribyrnong City Council
- Yarra City Council

Industry

- Australian Institute of Architects
- ICOMOS Australia

Professional Associations

- Association for Preservation Technology International (Australasia Chapter)

Education and Training

- University of Melbourne
- UNESCO Observatory

Community

- National Trust (Victoria)

2. About the Fellow

Name: Ruth Redden

Qualifications: B. Design, Deakin University, 2008

M. Architecture, Melbourne University, 2010

Short courses: Summer course in the Conservation of Traditional Buildings,
Heritage and Conservation, Canberra University, 2013

Memberships: Australian Institute of Architects – Heritage Committee
Association for Preservation Technology International
National Trust of Australia (Victoria)

Current Position: Architect, Heritage Alliance

Heritage Advisor - Maribyrnong City Council and Yarra City Council

Biography

Redden is a registered architect with experience in various architectural roles including design, conservation, documentation and administering contracts. She grew up in Alice Springs and has a passion for cultural and environmental sustainability.

In addition to working on large commercial projects, the Fellow has been involved with the master-planning of Parliament House (Melbourne), conservation and repair works to Kensington Town Hall (Kensington), the design and construction of new residential buildings on the site of state heritage-listed and National Trust property Labassa Conservatory (Caulfield North), and numerous Conservation Management Plans (CMPs) including recent CMPs for the state-heritage listed Glass Terrace (Fitzroy) and ten cottages on Perrins Street (South Melbourne).

The Fellow has sought experience and mentoring specifically in the field of built heritage and conservation, joining a new generation of architects in Victoria with specialist conservation skills. She has always had a keen interest in ecological, cultural and social sustainability, heritage protection and adaptive re-use. Redden's heritage planning experience is drawn from her role as heritage advisor for Yarra City Council and Maribyrnong City Council.

She is currently a Project Architect at Heritage Alliance (Conservation Architects and Heritage Consultants) and previously worked with UNESCO Observatory at Worawa Aboriginal College (Healesville, Victoria) and in Manila, Philippines. Redden is passionate about preserving cultural and environmental sustainability in all its forms, from the deserts of Alice Springs to the high-rises of Melbourne and New York City.

3. Aims of the Fellowship Program

AIM 1: To educate a new generation of conservation architects in the materials and science of conserving and protecting historic buildings and sites.

BENEFIT: There are a limited number of early career architects in Australia actively seeking expert skills in areas of historic conservation. Educating a new generation of conservation architects will ensure expertise is not lost with retiring generations. Educating the next generation of conservation architects will provide a linkage with other new generation professionals and community members who are responsible for making decisions about the future of heritage places in Australia.

Training architects specifically will ensure conservation skills are sustained amongst those who work closest with historic buildings (second to builders and trades people). Alternatively the future of maintaining Australia's historic fabric is left solely in the hands of managers and planners who may not have the technical expertise required to make best practice, long term or economically efficient decisions about managing heritage properties.

AIM 2: To ensure conservation architects are trained to specify traditional trades and that they work closely with builders and crafts people.

BENEFIT: Ensuring that the new generation of conservation architects are familiar with traditional trades will result in them specifying work for people practicing traditional trades - thus sustaining an important sector of Australian culture, history and industry.

Ensuring the sustainability of traditional trades will also prevent unsympathetic repair works from occurring to historic sites, thus ensuring restoration funds are more efficiently allocated and to greater success.

AIM 3: To challenge conservation architects to step beyond traditional techniques of conservation and consider introducing innovative, environmentally sustainable and economically efficient techniques to Australia.

BENEFIT: Employing traditional techniques will always play an important role in conserving historic buildings. However there may be contemporary ways in which those techniques can be implemented, making conservation practice more environmentally or economically sustainable. Australia should benefit from research and funding already allocated overseas to discovering and developing these methods.

AIM 4: To meet international experts and investigate progressive methods for approaching conservation in a holistic manner which considers ecological, social, cultural and economic sustainability.

BENEFIT: Keeping pace with international best practice in all tiers of sustainability will ensure Australia is well placed to showcase world-best practice in conservation and innovation as the Asia-Pacific region continues to develop dramatically. Meeting international experts personally helps to maintain global connections for Australian professionals, which is often difficult without funding due to geographical distances.

3. Aims of the Fellowship Program

AIM 5: To ensure conservation architects are trained to look beyond individual heritage sites and are familiar with the ways in which heritage buildings can contribute to the sustainable growth of a world-class city like Melbourne.

BENEFIT: Cities like Melbourne are especially popular for their collection of diverse CBD and inner city neighborhoods. Draw points to these areas include unique buildings, laneways, parks, streets, utility systems and other purposefully designed or ad-hoc elements which are utilised in traditional and contemporary ways. Training conservation architects to discover innovative ways in which these sites can contribute to everyday life in the metropolis and perform sustainably will ensure Melbourne's continued growth without losing its cultural value.

4. The Australian Context

4.1 SWOT Analysis

Strengths

- Australia ICOMOS' Burra Charter is a world-class document for management of culturally significant sites.
- Relatively well-developed principles and guidelines for cultural heritage management.
- High demand from general public for Ecologically Sustainable Development (ESD) initiatives.
- High number and good variety of historic building stock retained in Melbourne.
- Marginal recognition in Melbourne of ESD benefits in adapting existing buildings.
- Conservation related 'checkpoints' in Victorian local and state planning scheme which requires the expertise of heritage professionals to monitor, thus sustaining career opportunities for heritage professionals such as planners and architects.

Weaknesses

- Declining interest from new generation of architects and general public in preservation of built heritage.
- Lack of mainstream focus on amalgamating conservation of built heritage and ESD.
- Lack of focus on preservation technologies and opportunities. More focus on bureaucratic systems that weave a web of red tape, making heritage protection undesirable for the building owner.
- Weak guidelines for adapting historic structures to meet ESD standards.

Opportunities

- Engage new generation of architects and encourage specialisation in heritage conservation.
- Engage new generation of traditional trades people and encourage specialisation in heritage conservation.
- Provide positive experiences and opportunities to building owners and managers of historic sites.
- Introduce innovative, sustainable and conservation-friendly products to the Australian market.
- Support and training opportunities for new ESD-focused industries.
- Engage mainstream Australia to conserve and green historic buildings.
- For Australians to become experts in the Asia Pacific region on greening historic buildings.
- Re-examine conservation policies at local, state and federal levels to include provision for ESD and contemporary design.

Threats

- High-cost of introducing new products to the Australian market.
- Lack of support from local, state or federal government due to political incentives and heavy mining-focused policies and initiatives.
- Undermining of well established, best practice conservation principles.
- Loss of built heritage fabric during teething process of adapting conservation policies.
- Creation of examples / projects which do not work, yet get used as precedent for greening historic buildings.

4. The Australian Context

4.2 What is a Conservation Architect?

The European model for conserving historic buildings and sites in Australia is a relatively new concept. Where in England the birth of formal conservation practices as recognised today can be traced back to as early as 1596 when protestors fought the demolition of Clifford's Tower in York because it was "an ornament to the City and a landmark along with the Minster"¹, the European model of conservation in Australia is generally traced to the formation of the National Trust in Sydney in 1945², some 359 years later. According to ICOMOS (International Council on Monuments and Sites) USA, a [non-indigenous] conservation movement was occurring in the United States in the early 19th century, with the movement making its first big political waves in the 1920's.

In all three of these countries, the conservation industry was born from grassroots community desires to preserve places and objects of cultural heritage significance for future generations to enjoy. At a meeting of Australia ICOMOS in Burra, South Australia in 1979, the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance was adopted as the leading document to guide the preservation of places of cultural significance in Australia. The document is known in brief as the Burra Charter and was revised in 1999 and again in 2013. It is well established that in Australia the Burra Charter and its accompanying guidelines are considered the best practice standard for cultural heritage management in Australia. Due to its strong focus on cultural heritage management and the inclusion of non-tangible heritage, the Burra Charter is also used internationally as a guide for best practice conservation principles. For example, in the Department of Architecture, Planning and Conservation at Columbia University in New York City, the Burra Charter is used as the main teaching document for best practice cultural heritage management.

The successful conservation of built structures in Australia necessitates the involvement of many professionals: historians, archeologists, engineers, planners, horticulturalists, trades people, architects and many more who specialise in the area of cultural heritage management. Architects play an important role in the conservation industry in that with the right training they can be involved in all facets of the conservation process. Conservation architects can identify necessary restoration or maintenance works; prepare conservation management plans, works briefs and technical specifications; design for adaptation and contemporary use and are capable of managing construction projects. Architects have the benefit of working closely and regularly with trades people and due to the nature of their work, architects understand the complexities of balancing conservation needs with the plethora of town planning and building regulations; contemporary design and living standards; and more recently client and policy driven requirements for environmental sustainability.

There is no specific degree or qualification that an architect can obtain to legally practice as a Conservation Architect, however in Australia it is illegal to call oneself an architect if they are not registered with the Architect's Registration Board (ARB) of the state in which they practice. So at minimum an experienced conservation architect will have a degree in architecture, be registered with the ARB and have some proven background experience in implementing best practice conservation principles. As the conservation industry in Australia matures, it is becoming more apparent that a regulatory body is required to protect the historic built environment from damaging interventions devised by people not skilled in built heritage conservation. Australian heritage professionals are looking internationally for guidance for such a system, perhaps one similar to the Register of Architects Accredited in Building Conservation (AABC), which was set up in the UK in 1999.

In lieu of an AABC register, Heritage Victoria (HV) has established a Consultants and Contractor's Directory. To be included in this directory a professional must show to have proven experience on at least three conservation or heritage related projects and provide references. Architects are listed as either "Architects – Conservation" or "Architects – Contemporary Design" and inclusion on the list is entirely at the discretion of Heritage Victoria.

¹ English Heritage, 2013, "Practical Building Conservation – Conservation Basics", Ashgate Publishers, England, 2013. Pg.8

² Productivity Commission, 2006, "Conservation of Australia's Historic Heritage Places, Report No. 37", Canberra, Pg.2, Website: http://www.pc.gov.au/_data/assets/pdf_file/0011/92369/heritage.pdf

4.3 Why train Conservation Architects?

The need for additional conservation skills within the architecture industry is due to a number of factors. Firstly, in the past three years grants from Heritage Victoria for works to historic properties went from \$2.355M in the period 2009-2010 to \$1.131M in 2011-2012³. With less funding available, and more onerous conditions set in funding applications, owners of historic properties require more from heritage professionals than just advice at inception of a project. Heritage professionals should be involved with a conservation project throughout all stages of the project, which can be costly and as such they should have as many skills as possible to assist the property owner in achieving good conservation and design outcomes.

On smaller budgets where heritage professionals are not included past achieving a permit to carry out works, property owners are likely to hire people who charge less money to do conservation works and may have less experience, if any at all. The result is private or public money being spent on interventions that do more damage than good and end up costing the building owner more money in the long term - or in the complete loss of significant historic fabric.

For example if an owner of a State-listed heritage property wants to convert the building into a modern living residence, that owner might engage a heritage consultant to provide advice on planning restrictions as set by Heritage Victoria and possibly local planning scheme policies. Or the owner might not have the money to invest in such advice and might just hire an architect or building designer with no experience with heritage properties. It's likely that the outcome of the former situation will be that the designer's plans get rejected in the planning process – once, twice or a number of times before a mutual resolution is met achieving both the client's objectives and Heritage Victoria's objectives. This can be a costly process and now there is not enough money to hire sufficiently trained trades people to undertake the conservation works. Had the owner hired a conservation architect with planning and heritage experience from the outset, the application to Heritage Victoria might have been approved on first attempt and the conservation architect is likely to know professional trades people who are experienced in working with heritage buildings, or at least is able to write a clear specification for a less experienced trades person. A qualified conservation architect is also able to ascertain which conservation works are most urgent and if necessary how works can be staged over a number of years to help ease financial pressures.

Managing heritage issues is just one requirement of adapting or renovating a historic property. The owner will also need to fulfill current building regulations, some of the most challenging being related to disability access and ecologically sustainable design. In many cases a conservation architect will have experience in these areas, thus saving the applicant financially and time wise from having to engage further professional advice. If the architect anticipated all of these requirements, the result should be a holistic design, which considered the above factors from the beginning, eliminating the need for major redesign. In short, some of the most tedious phases of a building project revolve around addressing heritage and ESD issues, and the more conservation architects are trained to find holistic solutions to these matters, the more likely it is that the building owner won't have to compromise an otherwise innovative and exciting design project that doesn't burn a hole in the proverbial pocket.

Secondly the need to train architects in the field of building conservation is related to the fact that many conservation architects practicing today were trained in the 1970's and 1980's when the conservation industry in Australia had gained momentum⁴. As specialising in ESD or BIM (Building Information Modelling) is widely promoted in universities and as a career choice today, specialising in the conservation of built heritage was a more popular choice for Australian university students and professionals in the 1970's and '80's. As such in 2014 many of the architects who trained in the '70's

³ Department of Transport, Planning and Local Infrastructure – Heritage Grants. Website (accessed 2013): <http://www.dpcd.vic.gov.au/heritage/grants>

⁴ For example in 1974 Australia signed the World Heritage Convention and in 1975, under the federal Australian Heritage Commission Act the 'Register of the National Estate' and associated 'National Estate Grants Program' funding was established.

4. The Australian Context

and '80's are considering reducing the amount of work they do in the field or even possible retirement. It's crucial that those who trained in conservation and have years of practical

experience train the new generation of conservation architects. It is also crucial that all conservation architects (despite their level of experience) understand how to adapt their conservation knowledge to work with current ESD requirements.

4.4 What does ESD have to do with cultural sustainability in Australia?

In October 1987 the World Commission on Environment and Development (WCED) released the Brundtland Report entitled "Our Common Future" which became the defining document around the world for best practice use of the term Sustainable Development. The Brundtland Report defines contemporary concepts of sustainability and the notion that it is the current generation's responsibility to improve environmental and living standards globally, not only in the short term, but in the long term for "future generations" ⁵ to enjoy. The Brundtland Report has been adopted as the guiding document for ecologically sustainable development in Australia, including at a National level by the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC). The DSEWPC defines sustainability as

"Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased".⁶

While sustainable is to be "able to be maintained at a certain rate or level" ⁷, the term "green" or "greening" has become synonymous with ecologically sustainable development – not as a consequence of any well-established "green paradigm" or other academic reason, but because the word lends itself to easy everyday and marketing uses. Nevertheless the term "green" or "greening" has rooted itself in the ESD discussion and will be used in this report to describe certain approaches to ecologically sustainable development.

The area of ecological sustainability deals primarily with restoring and maintaining the natural environment to a particular level – primarily the natural level prior to being detrimentally impacted by humans, especially in the race for prosperity. However the Brundtland Report explains that the race to prosperity has affected humans economically, politically and socially and that ecological sustainability cannot be separated from economic, political, social or cultural requirements.⁸

It is in this overlap between ecological, economic and social sustainability that conservation philosophy is born and as such many of the core philosophies of cultural heritage protection ⁹ mirror the core philosophies of ecological sustainability: preserving items of value at a certain rate or level for the benefit of future generations to enjoy

⁵ UN Documents, "Report of the World Commission on Environment and Development: Our Common Future", Transmitted to the General Assembly as an Annex to document A/42/427 - Development and International Co operation: Environment. Website (accessed 2013): <http://www.un-documents.net/wced-ocf.htm>

⁶ Australian Government Department of Environment, "National Strategy for Ecologically Sustainable Development - Part 1 Introduction. Prepared by the Ecologically Sustainable Development Steering Committee Endorsed by the Council of Australian Governments December, 1992". Website: <http://www.environment.gov.au/about/esd/publications/strategy/intro.html>

⁷ Oxford Dictionaries [online]. Website: <http://oxforddictionaries.com/definition/english/sustainable?q=sustainable>. Accessed 2013.

⁸ Yates, Joshua J. "Abundance on Trial: The Cultural Significance of "Sustainability", The Hedgehog Review: Vol. 14, No.2 (Summer 2012). View 2013. Website: http://www.iasc-culture.org/THR/THR_article_2012_Summer_Yates.php

⁹ Author's note: Physical fabric such as buildings fall within the category of 'cultural heritage'. The following definition of 'cultural heritage' is from the Donald Horne Institute for Cultural Heritage "... the things, places and practices that define who we are as individuals, as communities, as nations or civilisations and as a species. It is that which we want to keep, share and pass on." Website: <http://www.dpcd.vic.gov.au/heritage/about/heritage-council-of-victoria/hc-strategic-plan/what-is-cultural-heritage>

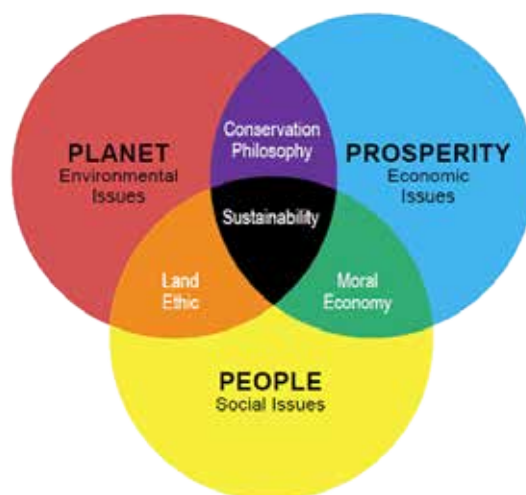


Figure 1: diagram showing the inter-relationship of environmental, economic and social sustainability and where conservation philosophy fits into the ideas as set out in the Brundtland Report. Image source: http://www.iasc-culture.org/THR/THR_article_2012_Summer_Yates.php

Furthermore, overlaps between cultural and environmental sustainability are not restricted to philosophies or core values - there are practical overlaps too. Many historic buildings, especially those built pre-1940's were designed without mechanical heating, cooling or ventilation. As such they were carefully designed to work with the natural environment. At the basic level heavy stone, masonry and even timber buildings were built with vented sub-floors, rooms and roof spaces. Larger (often institutional buildings) often employed highly technical yet passive systems for ventilation and even water reticulation. Usually buildings were orientated to maximize solar gain and wind paths and the importance of thermal mass was recognized for heating and cooling properties. Many of the techniques that are passionately embraced for environmental reasons today (especially healthy indoor air quality and reducing energy consumption) were employed out of necessity in many buildings now deemed historic.

4.5 How was the need for additional skills in Greening Historic Buildings recognized?

Whilst it's been established that the conservation of built heritage in Australia is a relatively young industry, it has been around long enough that rigorous policies, guidelines and organisations (both government and private) have been created to help people achieve best practice conservation goals. One example of this is that in the past 20 years local municipalities all over Australia have reviewed and documented the historic character of their neighborhoods and where appropriate have helped to protect significant buildings or neighborhood features with Heritage Overlays (HO). When a new development or major change is proposed for a property or site within an HO area, a permit application is triggered and most councils will engage a heritage consultant to review the plans for the development and seek comment on the extent of impact from a heritage perspective. This advice is then considered

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by a town planner against all other considerations such as Res Code neighborhood character or more recently, ESD requirements.

As an 'industry' ecologically sustainable development is even younger and it is only in the last decade or so that equally rigorous policies, guidelines and organisations have been established to help people achieve a higher level of ESD initiatives. This includes significant changes to the Building Code of Australia in 2009 with the inclusion of Section J. Section J outlines requirements for energy efficiency of new builds or renovations to more than 50% of an existing building. While competing BCA regulations and heritage best practice have been discussed at length in Australia in regard to structural stability, fire safety, natural light and disability access,¹⁰ there has been less discussion (impacts, solutions and guidelines) in regard to BCA requirements for energy use (or environmental sustainability) and the impacts on heritage fabric.

As such building owners are not only faced with sometimes bureaucratic heritage impediments, but now they must also achieve ESD benchmarks that they might not have otherwise considered. The difference is, however, that at this point in time ESD or 'green' initiatives are generally viewed more favorably by society than heritage initiatives and when push comes to shove (usually in the financial or aesthetic sense) heritage best practice is sacrificed for ESD requests. For example, if the owner of a single fronted Victorian-era dwelling in a heritage overlay area in Victoria applies for a permit to retrofit the interior of the property, demolish the rear section, and build a double storey addition at the rear, they are likely to be renovating more than 50% of the existing dwelling. Given the popularity for 'green design' the typical property owner is likely to be somewhat supportive of the idea that the front of the house (that part which is visible from the street front) should retain its historic character, but the owner will also insist that the rest of the property functions to a modern standard – including performing sustainably.

In order to meet the objectives mentioned above and also new BCA standards, the owner may want to make changes that have a negative impact on the heritage significance of the building. Some of the most common examples of these negative changes are when original windows get replaced with contemporary double glazed units, when buildings which were originally designed to 'breathe' are hermetically sealed, or when numerous solar panels are mounted on the front of a house.

When such applications are run past the council's heritage advisor, the heritage advisor is unlikely to support the application for replacing windows, raising floor levels to block sub floor ventilation and adding solar panels to the front roof of the property. However, unless the heritage advisor is aware of alternative solutions that will enable the building owner to meet BCA and ESD regulations, it's most likely that the responsible authority will approve the application as requested, and the integrity of the historic place is ultimately lost. In order to avert these scenarios (and the associated frustration created between applicants, planners, heritage advisors, and building surveyors) heritage advisors in Australia need to be up-skilled so they not only better understand contemporary ESD initiatives, but are able to help building owners adapt their historic properties in modern and contemporary ways whilst practicing heritage best practice techniques.

In part, achieving the above requires heritage professionals to be up-skilled and educated about current Australian standards for ecologically sustainable design. However being aware of the requirements is only half of the answer, in addition to an Australia-specific pool of practical solutions to dealing with some these issues. Solutions will be in the form of early intervention, strategic and innovative thinking and good product knowledge. Early intervention will require heritage professionals to educate planners and people who deal closest with applicants to remind them that all stages of a design – especially the early stages – should consider building conservation and ESD in order to achieve a cohesive and well resolved design. Strategic and innovative thinking will require heritage professionals to put

¹⁰ Peter Phillips and Don Truman, "Conservation Guidelines for Building Surveyors – Final Report", Australia ICOMOS, Victoria, Australia, viewed 2013, http://stateheritage.wa.gov.au/docs/lg-research-resources/australia_icomos_conservation_guidelines_for_building_surveyors.pdf?sfvrsn=2

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themselves in the applicant's shoes and preempt some of the issues that may occur as a result of the heritage advice provided. Product knowledge is essential to helping applicants find economically viable solutions that meet both heritage and ESD requirements.

4.6 Benefits in obtaining the skills and/or the threat of not obtaining them

Many of the benefits of training conservation architects in sustainable preservation are outlined in Section 3 - Aims of the Fellowship Program. In contrast, not training a new generation of conservation architects would be taking a step backward for the conservation movement in Australia and much of the hard work and worthy outcomes that have been achieved since the early 20th century would be lost. Training a new generation of conservation architects will help to re-energize the conservation industry at a time when the general public are weary of heritage professions or outdated conservation policies that conflict with new requirements for ESD. Conservation architects need to be up-skilled and educated around the ways in which ESD and heritage protection can be amalgamated, for after all the two areas are born of the same philosophies and one should not eliminate the possibility of the other – which is often the case in Australia currently. The desire for adapting historic buildings to meet contemporary living standards whilst maintaining historic integrity is strong and represents a growing market in Australia. However if the number of working conservation architects continues to decline, or practicing conservation architects are not familiar with current international standards and products, then people will tire of trying to achieve good conservation outcomes and historic fabric will be sacrificed for 'greener' products.

The culture of the conservation industry in Australia will stagnate if graduate professionals don't join the industry and if professionals don't up-skill in part by looking to programs, initiatives, ideas and products that are being developed internationally.

Research and policy adoption that encourage successful sustainable preservation is core to Australia's international status in the conservation profession. Just as Australia took the principles of the Venice Charter and adapted them for the South-Pacific context, resulting in the world class Burra Charter, conservation architects should investigate overseas ideas, policies and products that can be adapted to modern Australia to make historic structures environmentally sustainable. The result may be innovative and exciting developments that would again put Australia on the international map for contemporary standards in heritage best practice.

5. Identifying the Skills and Knowledge Enhancements Required

There are examples of areas in Australian industries where there are weaknesses in innovation, skills, knowledge, experience, policies and/or formal organisational structures to support the ongoing successful development and recognition of individuals and the particular sector.

The focus of all ISS Institute Fellowships is on applied research and investigation overseas by Australians. The main objective is to enable enhancement and improvement in skills and practice not currently available or implemented in Australia and the subsequent dissemination and sharing of those skills and recommendations throughout the relevant Australian industry, education, government bodies and the community.

Specific skill enhancement areas addressed through the Fellowship were as follows:

Skills Enhancement Area 1: Expert skills in adapting heritage properties so they are environmentally sustainable and contribute to the sustained growth of metropolitan areas.

- The Fellow identified an opportunity to meet experts in the area of balancing metropolitan growth with building conservation and environmental sustainability. The Association for Preservation Technology International (ATPi) is an international, cross-disciplinary organization dedicated to promoting the best technology for conserving historic structures and their settings. There is an Australian chapter and members have the opportunity to convene with international associates annually at an APT conference, which includes workshops, site visits and trade shows. The theme for the 2013 conference was “Preserving the Metropolis”, and was held in New York City – an exemplary city for how heritage sites can be protected and celebrated in a major urban context. Themes for the conference included: Materials conservation in the Urban Environment; Balancing Change, Preservation, and Development; and Energy Use and Conservation.

ACTION: Attended the conference with specific goals to engage in current discourse around sustainable preservation; investigate innovative conservation techniques, new and traditional technologies; visit exemplary sites; and meet experts in the area of conservation and environmental sustainability – especially in the context of growing metropolitan cities.

ACTION: Engage with fellow Australian APT members (from Victoria and NSW) and other industry professionals to discuss how learned information can be adapted to the Australian context.

Skills Enhancement Area 2: Repairing, maintaining and adapting historic fabric in a manner that considers all tiers of sustainability – especially cultural and environmental sustainability.

- The Fellow identified international standards and methods of integrating environmental sustainability with heritage buildings and sites.

ACTION: Document and assess a number of international methods of retrofitting historic buildings in environmentally sustainable ways.

ACTION: Make recommendations for aligning Australian standards of retrofitting historic buildings with current international best practices regarding environmental, social, cultural and economic sustainability.

ACTION: Present the findings in a way that is practical to both architects and policy makers.

5. Identifying the Skills and Knowledge Enhancements Required

Skills Enhancement Area 3: Innovative techniques for the repair and conservation of historic buildings.

- The Fellow identified new technologies and practices used internationally for the repair and conservation of historic buildings.
- The Fellow investigated the costs and benefits of these technologies or practices.

ACTION: Identify whether findings are feasible and appropriate to the Australian context and if not, how new information can improve traditional conservation practices in Australia.

ACTION: Identify whether Australia has the skills capacity to meet requirements.

Skills Enhancement Area 4: New generation of conservation-architects trained in the materials and science of building conservation.

- The Fellow identified a lack of training opportunities for heritage professionals in Australia.

ACTION: Identify relevant training opportunities, attend presentations, workshops, site visits and international organisations to develop conservation skills through hands on learning.

ACTION: Meet other conservation architects and discuss how the industry is energised and sustained in other countries.

ACTION: Develop initiatives for invigorating young professionals in the conservation industry in Australia.

6. The International Experience

Destination 1: Graduate School of Architecture, Planning and Preservation at Columbia University, New York, New York, USA

Two day workshop: Conservation of Metal Finishes in Modern Architecture (1940-1970)

Presenters:

- Adam Jenkins, Project Conservator, Materials Conservation Company, Philadelphia, USA.
- Dr. Alan W. Pense, Professor of Engineering and Materials science, Leigh University, Pennsylvania, USA.
- John Scott, Heritage Conservation Contracting, Consulting, and Education, New York and Pennsylvania, USA.
- Joseph Sembrat, President of Conservation Solutions, Inc., Washington, USA.
- Kyle Normandin, Senior Project Specialist at the Getty Conservation Institute (GCI), Los Angeles, USA.
- Mark Rabinowitz, Fellow of the American Institute for Conservation of Historic & Artistic Works, and American Academy, Rome, Italy.
- Executive Vice President of Conservation Solutions, Inc., Washington, USA.
- P. Andrew Lins, Chairman and Senior Conservator of Decorative Arts and Sculpture, Philadelphia Museum of Art, Philadelphia, USA.
- Richard Pieper, Principal and Director of Preservation, Jan Hird Pokorny Associates Inc., and
- Professor of Architectural Metals, Columbia University Graduate School of Architecture, Planning and Preservation, New York City, USA.
- Rosa Lowinger, President and Chief Conservator, RLA Conservation of Art and Architecture, Los Angeles, USA.
- Thomas Jester, Project Manager and Associate, Quinn Evans Architects, Washington, USA.
- Xsusha Flandro, Senior Architectural Conservator, Jablonski Building Conservation, New York City, USA.

Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
Understand how finishes contribute to the aesthetic and functional role of metals in modern buildings (for example on windows, interior fixtures, curtain walls, etc).	SE04
Identify how finishes are produced by fabricators.	SE04
Learn diagnostic approaches to identifying finishes on modern architectural metals, including copper alloys, aluminium alloys, stainless steel alloys, and carbon steel/iron, and weathering steel alloys.	SE02, SE03, SE04

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Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
Identify common condition issues on modern metal finishes and learn to discern the difference between a problem of the metal and a problem of the finish.	SE01,SE04
Identify strategies for cleaning, re-integration, removal or replacement of each of these finishes, including theoretical discussions of when it is more appropriate to refinish than to conserve	SE01, SE02, SE03, SE04
Introduction to the use of lasers for cleaning modern metal finishes.	SE01, SE02, SE03, SE04

Outcomes

The Fellow chose to attend this two-day workshop because it dealt primarily with the conservation of 20th century architecture. By attending the workshop at Columbia University the Fellow was able to learn and practice in a lab setting and discuss issues with renowned experts in metals conservation. New York City is an ideal location to learn about conserving metals, as the city hosts numerous world famous 20th century buildings such as the Chrysler Building (1930), Empire State Building (1931), Seagram Building (1958) and thousands of metal shop fronts, and shop/apartment interiors.

As part of the workshop, the fellow learned about specific projects in New York City that had to be retrofitted to become more environmentally sustainable. Often with 20th century buildings this involves replacing single pane glass curtain walls with double glazing. Such projects include the United Nations Headquarters General Assembly Building (1952) and Lever House (1952). Other types of buildings were also discussed, including metal clad, prefabricated homes designed by architects and firms - such as Frank Lloyd Wright; Sears, Roebuck & Co.; Walter Gropius and Adolf Myer; Buckminster Fuller - all between 1900 and 1950.

A variety of conservation best practice interventions were discussed, including retention and repair versus replacement of materials; insulating existing fabric and introducing ventilation and fresh air to buildings that were often designed to be hermetically sealed and mechanically heated and cooled.

The Fellow learned valuable information on how to insulate badly performing metal clad buildings and create healthier internal living/work spaces, but of surprise to her was the heated debate regarding replacement of glass curtain walls with double glazing. The fellow learnt that when retrofitting a significant glass curtain wall building, conservationists must carefully consider whether replacing the glass in the building is going to change the overall appearance of the building and thus potentially compromise the original architect's intent for the structure.

Dramatic changes in the overall appearance of a curtain wall building can be the result of new glass colour (especially when introducing coloured Low-E glass); new frames (sometimes a new system needs thicker frames, which on a large scale can be quite obvious) and new fixings. While these changes might appear minimal on a sample piece of glass, the overall change can be dramatic on a large-scale building.

As part of the workshop, specialist conservators gave presentations on buildings, bridges and sculptures they had worked on and talked about the techniques involved in maintaining and restoring metal elements. Before a conservator can restore metal elements, they need to be able to identify what metals they are working with. In this workshop there was a strong focus on learning how to identify aluminium, nickel silver, monel, stainless steel and composite materials such as Haskelit PlyMetal.

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Historic metals cannot always be identified without close inspection because they may have coloured in such a way that they look completely different to when they were first installed decades earlier. Having the skill to identify metals involves knowing when certain types of metals were invented and popularly used; what alloys were used to create them; how metals react to environmental conditions, etc. Whilst this type of learning can take a lifetime to master, the Fellow learned basic skills in identifying metals and learned that many of the metals used in buildings in the United States and around the world (both for decorative and structural purposes) were the result of extensive funding put toward spacecraft, aircraft and military research, and global economic events in the decades from 1900-1960. Learning some of this history has helped the Fellow gain skills in dating metals and knowing where to find information on metals that were produced in the early 20th century – many of which are early steel-fabricator product catalogues from companies such as Alcoa who are still around today.

Many of the presenters showed examples of what chemicals, tools and techniques were used to clean and repair metals, and again there was much discussion about the original architect's intent for the material. For example: conservators must consider how much to clean a metal – did the architect understand the properties of the metal and know that it was going to patina in such a way? Was Mies van der Rohe's Seagram Building (375 Park Avenue, New York City) intentionally designed to have a reddish-brown façade (eventually), or was the architect's intent for the building to be a shiny bronze colour? If the rusty patina is to be retained, how can contaminated water be contained so it doesn't stain the area around a building when run off after a heavy rain or clean? Some solutions to the latter involve landscaping with sands, gravels and rocks which soak up the water and can be replaced over time.

Innovative Technology: Laser Cleaners

As part of the workshop Adam Jenkins and Andrew Lins brought in one of only three known privately owned laser cleaners in the United States. Jenkins and Lins presented on the pros and cons of laser cleaning as an innovative alternative to cleaning significant fabric, including metals. Through hands on demonstrations and exercises, workshop attendees were able to use the laser cleaners.

Due to the relatively small market for laser cleaners, it's extremely expensive to buy units for conservation work. However as the benefits of laser cleaning (speed, precision, lack of harmful chemicals released into the environment) become more apparent, laser cleaners are slowly becoming more affordable.

Some issues to think about when using a laser cleaner on significant fabric:

- The laser cleaner must be a pulse laser. Continuous beam lasers will cut through and damage materials.
- The darker the soil, the easier it will be to clean off. Lasers work by materials absorbing light to 'explode' particles. Lighter materials will reflect more light and laser cleaning won't be as effective. Copper has a low absorbency rate.
- When cleaning off metals, they will heat up, blast off and land somewhere near by. These metals should be cleaned straight away (within the hour) or they will meld to the surface on which they landed.
- Sometimes lasers will burn a coating. If this is likely and not desirable, water spraying may be a better alternative.

Some benefits of laser cleaners:

- Relatively fast, depending on the size of area to be cleaned.
- Depth of cleaning can be adjusted by adjusting beam energy. This is useful if only wanting to strip back to a particular paint layer to reveal a scheme at a particular time. Or, if wanting to clean steel whilst retaining the aluminium coating.

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- After cleaning a seam with a laser cleaner, the process is so fast that a welder can come in and weld the seam straight away, eliminating chances for corrosion.
- Laser cleaners can get into the finest crevices and cracks.
- Unlike other more abrasive cleaning methods (such as sand blasting), laser cleaning is relatively unobtrusive which is especially useful for worn metal.
- Unlike other wet cleaners, laser cleaning results in less chemical waste. It is a non-contact and dry process.
- Laser cleansers can also fix micro cracks in metals.

Other tools/material/products discussed in workshop

- Portable x-ray fluorescence (XRF) device: portable and non-destructive device to help identify metal types. Useful when objects are too delicate to take off a sample piece of metal, or too large to take into a lab for close inspection.
- iPhone mounted field microscope: Can achieve up to 100x magnification. Many versions available. A very popular one is the ProScope by Bodelin: <http://www.bodelin.com/proscope/proscope-micro-mobile>
- Scanning Electron Microscope (SEM) and X-ray Detector (EDS): High powered microscopes that produce 3D images of particles for identification.
- Holiday Detectors: Porosity detectors used to determine thickness of materials. Identifies voids (holidays) in coatings and can be so accurate that it can detect pinholes in a material.
- Cortec: Environmentally safe, metal corrosion inhibitor.
- Sea2Sky: Environmentally safe paint remover.
- Jewel-head water jetting: less abrasive than using an orifice shaped head on hose when water jetting a material clean.
- Hot Patina: Applied to copper-based alloys (such as bronze) with a brush or spray. See YouTube video of artisans at "Grand Light" in New York applying patina to historic New Haven Courthouse exterior lights <http://youtu.be/Owk9MJc8gVM>
- Soy-based cleaning wipes for aluminium.
- Brush or Selective Electroplating: metal plating using a hand held tool.
- Gilding and Thermal Spraying (spraying a hot metal).

The main focus for the two-day workshop was on modern (post WWI) metals. Across the globe numerous significant buildings have been built and decorated with metals and in recent years many of those buildings have required repair and/or restoration. In order to sustain the growth of conservation architects in Australia, the new generation of architects need to be familiar with the issues and techniques involved in maintaining and restoring these types of buildings. By doing this workshop at the Graduate School for Architecture, Planning and Conservation at Columbia University, the Fellow was able to meet other early-career conservationists, including architects.

Other highlights from the workshop include:

- Meeting staff and experiencing the facilities at the Graduate School of Architecture, Planning and Preservation at Columbia University for two days. As a result of attending the workshop, the Fellow met with Xsusha Flandro (senior architectural conservator) and Helen M. Thomas-Haney, (associate architectural conservator) from Jablonski Building Conservation, Inc. and discussed how university

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programs and local and state heritage policies and legislation affect working opportunities for conservation architects to practice in the field.

- Meeting a range of other conservation architects from Australia, USA and Europe.
- Walking tour of New York City to see some of the most significant 20th c buildings. Tour included access to interiors of buildings that are not usually accessible to the general public.



Figure 2: Conservator at Columbia University demonstrating equipment used to identify metals on historic fabric. Photo: Ruth Redden



Figure 3: Art deco foyer at 570 Lexington Avenue, New York. Photo: Ruth Redden

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Figure 4: Aluminium façade of 666 Fifth Avenue, New York. Photo: Ruth Redden

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Destination 2: APT Conference, Presentation Session 1

Presentation theme: The Sustainable Choice: Historic Preservation and Development?

Session chair: Jean Caroon, from Goody Clancy Architects, Boston, MA, USA.

Presentation 1:

'Historic + Sustainable: Best Practices for How Preservationists Can Embrace Sustainability in Historic Structures', by Nakita Reed and Roger Chang, from Encore Design, Fort Washington, MD, USA.

Presentation 2:

'From Preservation and Development Plan to Construction: Boston University's School of Law Tower Rehabilitation and Addition', by Henry Moss, from Bruner/Cott Architects and Planners, Cambridge, MA, USA.

Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
1. Learn ways in which historic buildings may already perform sustainably.	SE01
2. Learn ways in which historic buildings can be upgraded to perform more efficiently.	SE01
3. Learn ways in which historic buildings can be expanded and adapted for additional space and modernisation without compromising historic integrity.	SE01, SE04
4. Learn the value of combining preservation and development plans for an institution with a coherent mid-century modern campus.	SE02
5. Learn to compare the different agendas of building occupants (users), university administration (owners), preservation advocates (agencies) and architects charged with modernization and expansion.	SE01
6. Learn how technical considerations can affect planning for internal flexibility and major additions to significant mid-century modern buildings.	SE04

Outcomes

In this paper session chaired by Jean Corroon who is well known for her work in this area, the Fellow was able to hear from, and ask questions of, architects who have been recognised for their work in successfully greening historic buildings.

Both presentations were heavily focussed on new systems and technologies that helped the example buildings reach required energy ratings (both regulatory and owner driven). These systems/technologies can be categorised into:

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- Rainwater harvesting:
 - » Underground, slimline and under-floor rainwater collectors. Water then used for toilets/gardens etc...
- Stormwater harvesting:
 - » Swales, wetlands, green roofs, drought resistant landscaping...
- Decreasing water usage:
 - » Low-flow plumbing fixtures, dual flush toilets...
- Energy usage:
 - » Triple glazing, low-energy light bulbs, skylights...
- Waste collection:
 - » Recycling construction and daily operational waste...
- Clean energy:
 - » Wind, geothermal and solar produced energy...
- Heating:
 - » Ground sourced geothermal heat pumps, natural gas boosted hydronic heating...
- Cooling:
 - » Chilled beams, operable windows, cross-ventilation...

Many other ways of making a building operate more efficiently were discussed, however the Fellow learned that a lot of additional energy and material waste can be spent in purchasing new products to 'green' an existing building. Unfortunately many of these products are bought and implemented simply to get certification by rating systems that don't acknowledge inherently sustainable features of historic buildings such as thermal mass, embodied energy and life cycle assessment.

It's beyond the scope of this report to go into detail about general ESD concepts, but many of the notions and ideas listed below were discussed throughout the presentations and are worth investigating for anyone working in the area of sustainable preservation:

- | | |
|-------------------------------|-------------------------------|
| • Embodied energy | • Carbon Neutrality |
| • Embodied carbon | • Zero Net Energy (ZNE) |
| • Durability | • Recycling and Down-cycling |
| • Indigenous Materials | • Cradle to Cradle |
| • Repairability | • Rapidly Renewable Resources |
| • Passive Survivability | • Biomimicry Design |
| • Long Life/Loose Fit | • Regenerative Design |
| • Life-Cycle Assessment (LCA) | • Smart Growth |

What the Fellow found most valuable about these presentations was the discussion around the fact that there are so many ESD products available on the market for greening new and existing buildings, but the result is often what has been dubbed the Khazzoom-Brookes postulate: increased material and energy consumption, in the name of sustainable development. Instead a more sustainable approach would be to encourage a culture of reuse, repair and renewal, a way of thinking that has long been established as heritage best practice as they also fulfil the need to preserve significance fabric.

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Newer ESD related technologies have not been around long enough to know their ultimate impact on historic fabric, or to know how long they last or if they are repairable. However reusing, repairing and renewing historic fabric (which has already proven to work for decades and even hundreds of years) is not only more environmentally sustainable, but culturally sustainable as the process nourishes traditional trades and cultural heritage.

At times it will be appropriate to buy and implement many of the environmentally sustainable options mentioned above – especially solar panels and other clean-energy producing technologies. Important factors for heritage professionals to consider:

- a. Be familiar with what is available on the market. This is constantly changing so preservationists should always be on the look out for products that are ...
- b. Non-destructive technologies - equipment that results in the least destruction of significant fabric when installed and is most recessive so as not to detract from the heritage features of a property.
- c. Reversible – as technology is constantly upgraded, there should be an allowance made for replacing systems with the least possible damage to and/or removal of historic fabric in the future. This will require...

A holistic approach to design. Understand that each initiative may have positive and negative effects, and that one initiative (such as adding heavy-backed curtains and adding pelmets) may eliminate the need for another (like replacing historic windows with double glazing).

Given the speed in which technology is constantly changing, and the ever growing demand for green design, it is important that the new generation of conservation architects are familiar with current ESD trends and technologies and that they are constantly asking: ‘How can ESD and heritage best practice work hand in hand?’ With continued discussion and investigation this ideal equilibrium should be achievable.

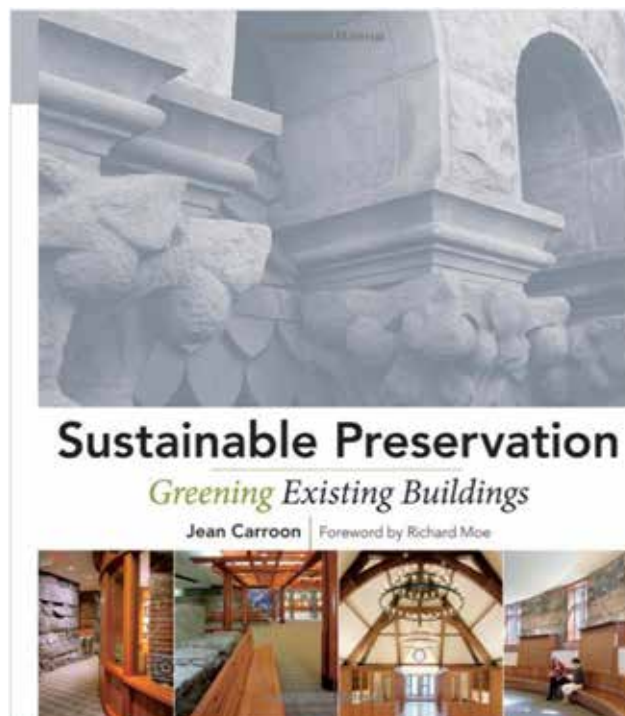


Figure 5: Cover of Jean Carroon's book, "Sustainable Preservation: Greening Existing Buildings". Image source: Amazon.

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Destination 3: APT Conference, Presentation Session 2

Presentation theme: Historic Windows and Energy Efficiency

Session chair: Erin Tobin, Preservation League of New York State, Albany, NY, USA.

Presentation 1: 'Polychlorinated Biphenyl (PCBs): A New Hazard for Historic Buildings', Emily Sinitzki, Columbia University, New York, USA.

Presentation 2: 'Historic Windows in the Era of Super-Efficient Buildings: Where Do We Stand?', Mariachiara Faliva, Thornton Tomasetti, London, UK.

Presentation 3: 'Restoration of Historic Windows: Balancing Sustainability and Preservation Goals', Mathew Haberling, WJE Engineers, Architect & Material Scientists, New York, NY, USA.

Presentation 4: 'Preserving Our Stained Glass Heritage While Meeting New Energy Code Requirements', Arthur Femenella, Femenella Associates, Branchburg, NJ, USA.

Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
1. Learn which buildings (and from which time periods) are likely to contain PCB-contaminated caulking.	SE02, SE04
2. Learn to identify potential sources of PCBs in historic structures.	SE01, SE04
3. Learn how to locate resources to assist in the removal of materials that may contain, or may have been contaminated with PCBs.	SE03, SE04
4. Learn methods of analysis to assess window thermal performance.	SE02, SE03, SE04
5. Learn ways of retrofitting different types of windows.	SE02, SE03
6. Learn about different approaches to dealing with historic windows in the UK and USA.	SE03
7. Understand the relative environmental benefits of restoring existing historic fabric -vs- replacement with new.	SE01

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Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
8. Identify methods of improving the thermal performance and reducing air/water infiltration of typical wood window types found in historic buildings (ie double or sing hung, fixed, casement, awning and pivot windows).	SE04
9. Identify historically appropriate repair methods, including consolidation, dutchman repair, and improving the installation of perimeter of sealant without impacting the appearance of the window.	SE02, SE04
10. Learn about different types of protective glazing systems, including their advantages, disadvantages, and responsiveness to new energy codes.	SE01, SE03
11. Understand how a protective glazing system or the introduction of typical energy saving technology can inadvertently create a detrimental microenvironment that may adversely affect the window it is intended to protect.	SE04
12. Become conversant on the benefits that isothermal glazing systems can provide and the considerations that are important when designing said systems.	SE01, SE02

Outcomes

In this session the Fellow learned of the hazardous chemicals Polychlorinated biphenyls (PCBs). PCBs are found either as oily liquids or solids and in regard to buildings dated 1950-1980 the chemical is most commonly found in caulking, especially around windows. The chemicals were used in caulking because they are fire-resistant and provide good thermal values. The importation of PCBs was banned in Australia in 1975. The [Australian] National Pollutant Inventory states:

PCBs are amongst a broader group of harmful persistent organic pollutants (POPs) that are toxic, persist in the environment and animals, bioaccumulate through the food chain and pose a risk of causing adverse effects to human health and the environment.¹

PCBs can affect building occupants who may be breathing in the chemicals or are in direct contact with them by touching contaminated surfaces. Contractors such as cleaners and tradespeople are most at risk due to the amount of exposure they can have with PCBs while cleaning contaminated areas or removing them during building works. Over a period of time PCBs can be absorbed by other parts of the building that are in direct contact with the caulking. For example, brick ledges below a window, including the mortar between bricks. As more buildings from the mid-late 20th century become recognised for their historic significance, it is no longer acceptable to just tear out and replace materials that may be contaminated by PCBs (because doing so not only removes original significant fabric, but could also completely alter the appearance of a building). Instead these materials and adjoining surfaces have to be carefully assessed, cleaned and tested to eliminate health risks both to

¹ Author's note: for more information on PCBs see website: <http://www.npi.gov.au/resource/polychlorinated-biphenyls-pcbs>

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humans and to the environment with which the chemicals come into contact. The PCB problem is a modern building's equivalent to removing hazardous materials such as lead paint from earlier historic structures. It's not impossible to do, but precautions need to be taken so that removal is done in a sensitive manner and does not result in hazardous chemical wastes in water streams. Professionals such as Emily Sinitzki (Columbia University, New York) are researching the most effective and sensitive ways of removing PCBs from historic buildings without negatively impacting historic fabric or the presentation of significant buildings. It was important for the Fellow to learn about such health risks and to learn where to get further information on dealing with and handling PCBs.

Through these presentations the Fellow also learned that in the USA and UK extensive research has gone into analysing and documenting the thermal properties and behaviours of historic windows. Techniques used for data collection include thermal imaging and airtightness tests.

Infrared thermography or thermal imaging essentially involves recording heat levels on a building. Images of the building including zones such as windows are coloured according to their temperature variants. The coolest spots are thus identified, indicating sections of most heat loss either through fabric or via draughts. The levels of heat loss can then be compared to other properties with new or upgraded windows.

The airtightness test involves sealing all openings in a building (doors, windows, vents, chimneys etc). A door is then temporarily fitted with a fan that is used to depressurise the building by sucking all of the air out of it. This creates a pressure difference between the inside and outside of the building of approximately 50 Pascals. The airtightness around the building can then be measured and non-toxic smoke sticks used to identify draughty windows (doors or other openings).

Computer modelling programs such as "Therm" and "Window" ² are being used to analyse collected data and to model potential success of proposed solutions – before any money is spent on interventions that may be ineffective, or worse, result in the permanent loss of significant building fabric.

Much of the data and analysis shows that:

- a. Single glazed historic windows don't always perform as badly as one would expect them to ³, and
- b. There are many non-destructive and sympathetic ways to reduce the amount of heat or cold that is gained or lost through historic windows.

Many of the non-destructive interventions mentioned in the presentations are further explained in Marianne Suhr and Roger Hunt's latest book 'Old House Eco Handbook: A practical guide to retrofitting for energy efficiency and sustainability'. Again, a full description of these interventions is beyond the scope of this report, however concepts include (in order of least – most destructive or visible):

- Curtains, blinds and shutters
 - » Thermal blinds (Honey Comb Blinds)
 - » Heavy insulated curtains
 - » Shutters (internal and external)
- Draught proofing
 - » Repair rotted timber sashes
 - » Rubber or brush compression seals, wiper seals or brush pile seals

² Author's note: See "Design Builder Software, Website: <http://www.designbuildersoftware.com/therm.php>, accessed 2013."

³ Marianne Suhr and Roger Hunt, 'Old House Eco Handbook: A practical guide to retrofitting for energy efficiency and sustainability', Francis Lincoln Limited 2013, UK., Page 78

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- » Caulk edges of metal frames
- » Stick-on solutions
- Secondary Glazing
 - » Sliding secondary glazing
 - » Single panel lift out secondary glazing
 - » Plastic Options: clear polystyrene, cast acrylic, polycarbonate
- Double Glazing
 - » Slim-profile double glazed-units
- Low-E Glass
 - » Coloured options versus clear

When retrofitting an existing historic window it is important for conservationists to consider:

- **Condensation:** Will the proposed solution trap condensation and if so will this be easy to clean and maintain? If not the system may lead to accelerated rotting of timber windows.
- **Visibility:** How visible is the intervention going to be and is it going to change the overall appearance of the windows? For example, changing frames and mullions to accommodate double-glazing usually involves making them bigger and using wider glazing bars which come in a variety of colours. Or adding a secondary glazing panel involves choosing a complementary colour for the additional frames, alignment of glazing bars, and glass colour.
- **Usability:** How often is the window going to be used? If it is a window that doesn't get used that often, a less invasive lift-out option may be appropriate. These systems are generally cheaper than converting to say slim-profiled double-glazing, which might be more appropriate for a window that is frequently used.



Figure 6: Scene from APT conference attended by Fellow at Marriot Hotel, New York City. Photo: Ruth Redden

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Destination 4: APT Conference, Presentation Session 3

Presentation theme: Insulation and Ventilation for Historic Buildings

Session chair: Dan Worth, from BVH Architects.

Presentation 1: 'Climate Change: An increasing Challenge in Stone Material Conservation', Rachel Cusimano, from Femenella Associates, Branchburg, NJ, USA.

Presentation 2: 'Evaluating Prospective Energy Improvements to Historic Multi-Wythe Masonry Walls', by Susan Knack-Brown, Simpson Gumpertz & Heger Engineers, New York, New York, USA.

Presentation 3: 'Case Study: Lightweight Insulating Concrete at a Roof in Tribeca North Historic District Condominium Conversion', Anne Hinsman, Walter B. Melvin Architects, New York, New York, USA.

Presentation 4: 'Field Monitoring and Analysis of a Vented Drying Airspace Incorporated in a Historic Masonry Building', Ekaterina Tzekova, University of Toronto, Toronto, Ontario, Canada.

Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
1. Understand current environmental/climate activity.	SE01
2. Understand the changes in stone decay based on current and future climate activity.	SE04
3. Understand methods of measuring these changes and associated technologies.	SE03
4. Discuss the benefits of insulating historic masonry walls in comparison to other potential building energy improvements.	SE02, SE03, SE04
5. Describe the potential performance changes as a result of incorporating an air barrier, vapour retarder, or insulation on historic masonry walls.	SE01, SE04
6. Learn evaluation tools to determine the impacts of adding an air barrier, vapour retarder, or insulation on historic masonry walls.	SE03

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Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
7. Discuss the insulative and waterproofing benefits of using a lightweight insulating concrete roofing system at a late 19th century building located in the Tribeca North Historic District.	SE01, SE02, SE03, SE04
8. Learn the process of designing and installing a modern roofing system at an historic building.	SE01
9. Learn construction details that are particular to the late 19th century warehouse type buildings.	SE04
10. Understand the types of durability problems historic buildings can experience when undergoing energy retrofit measures.	SE01, SE04
11. Learn what a Vented Masonry Retrofit (VMR) is and how it differs from standard retrofits commonly carried out in historic buildings	SE02, SE03
12. Understand how a vented airspace behind a solid masonry wall promotes drying as well as how it can reduce the likelihood of freeze-thaw damage and sun driven moisture.	SE01, SE04

Outcomes

Part of understanding how heritage protection and environmentally sustainable design can work together is in recognising and understanding the shared challenges the two areas face when dealing with the impacts of climate change. Whilst much consideration has been given to reducing material waste, energy and water usage in a building (new and existing), other factors need to be considered also. Such factors include managing the impacts on a heritage building associated with a polluted environment or increasingly extreme weather conditions.

One traditional material that is particularly susceptible to the damaging effects of pollution and extreme weather events is stone. In particular the effects of acid rain (pollutants such as sulphur dioxide being absorbed into the air and deposited back to land, or on buildings, via rainfall) are especially damaging. Calcium carbonate is found in stones associated with historic buildings (limestone, sandstone, marble, granite...) and when combined with sulphur dioxide a hard gypsum layer is created over the face of the material. This hard layer prevents the natural “breathing” process (water being absorbed by the stone and drying out again) required to maintain its structural stability. When non-hygroscopic materials (such as hard gypsum or more contemporary acrylic paints) prevent the stone from breathing, moisture in the stone cannot dry out thus creating crystals behind the face of the non-hygroscopic material. These crystals then multiply and ultimately “shatter” the face of the stone. The process is called spalling. Initially the problem may seem small and more of an aesthetic issue but left untreated the spalling increases and exposes more of the stone to increasingly intensifying natural events and ultimately compromises the structural stability of the material. To learn more about this process and how it can be mitigated, see ISSI Fellow Jenny Dickens’ Report ⁴ on conserving stone.

⁴ Author’s note: Dicken’s report is due for publication in 2015. See International Specialised Skills Institute ‘reports’ website: <http://www.issinstitute.org.au/fellowships/fellowship-reports/>

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Spalling is detrimental to historic stone structures both for aesthetic and structural reasons and though there are techniques to consolidate damaged stones, preference is to intervene before the stone is damaged (perhaps irreversibly). From this presentation the Fellow learned of different technologies being used to monitor spalling on stone, such as using Micro Erosion Meters (MEM) and traversing micro-erosion meters (TMEM). MEMs and TMEMs enable a user to measure and record at a micro scale any erosion occurring on a rock surface. The instrument is placed in exactly the same location on the rock face a certain number of times and over a certain period of time. A probe in the device measures the depth of the surface from a permanent reference point and from this information the rate of erosion can be deduced.⁵ Because permanent reference points need to be attached to the stone, it is important that they are located in discrete locations. However the reference 'plates' are not large and can be removed with minimal damage to the significant fabric. By monitoring the amount of erosion on a stone face with MEMs and TMEMs, preservationists are able to intervene before permanent damage is made to the significant fabric. MEMs and TMEMs also provide very precise data which can be used to analyse and research the effects of acid rain and other weather related events on historic buildings, of which appear to be getting more intense as a result of global warming and climate change.

Other topics discussed in this session included issues around insulating brick cavity walls and retrofitting historic sites for new uses such as apartments. Insulating historic brick cavity walls can be problematic because the cavity was incorporated in the design to allow the structure to breathe. When wall faces are exposed to long periods of wet (e.g. rain, a leaking pipe etc.), the cavity enables the bricks to dry out more quickly than if two skins of bricks are laid without separation. Filling the cavity to improve the thermal performance of the wall can inhibit this drying process, leaving the bricks damp and at risk of becoming soft and structurally unsound. The first question to ask is whether the benefits of filling the cavity are worth risking damage to the walls. Perhaps some other measure can be taken to improve the energy performance of the building? If the cavity must be filled it is important to investigate options for insulation. In general the more natural the material, the more hygroscopic it's likely to be and likely to have the added benefit of being a more renewable resource. Such materials include:

- sheeps' wool (bought as batts/boards or rolls);
- hemp (batts/boards or rolls);
- or cellulose (loose fill or rolls in the form of recycled newspapers or cotton).

What became apparent to the Fellow throughout this presentation is that a seemingly large amount of research is being conducted in the United States and in Europe regarding the impact of insulating historic brick cavity walls. Grants are being awarded for research into product availability, innovative construction detailing and for extensive data collection to record and analyse the true impacts of insulating a cavity wall. Whilst Australian conservation professionals can benefit from this research, we are at a disadvantage in that much of the research is focused on performance in North American and European extreme winter weather conditions where snow, ice and below freezing temperatures cause major problems. Further targeted research to the Australian climate is needed so interventions are specific to the Australian climate and appropriate for Australian materials.

The use of lightweight concrete as a roofing system was also discussed within this session. Architect Anne Hinsman presented a historic Tribeca District warehouse conversion project as a case study for this topic and outlined the benefits and challenges of using lightweight concrete. By using such a system for the roof of the building, the architects were able to retain (and expose) original warehouse roof beams which otherwise would have been unable to carry the load of the new roof, which also doubled as the floor to a rooftop terrace. In order to make the terrace trafficable and accessible for building occupants, heavy concrete pot-plant structures were cast and fixed to specific locations to help distribute the load across the new roof. Hinsman discussed the types of water barrier systems

⁵ Smith, D.I., "The micro erosion meter: its application to the weathering of rock surfaces. Conservation of Rock Art", Proceedings of the International Workshop on the Conservation of Rock Art, Perth, September 1977 (1978), pp. 44-53. Accessed 2013. Website: <http://www.aiccm.org.au/aiccm-publications/conference-proceedings/micro-erosion-meter-its-application-weathering-rock>

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used with the lightweight concrete, the methods for pouring and curing and noted that in addition to contributing to the successful conversion of an historic warehouse into modern apartments, the lightweight concrete provided excellent thermal qualities for insulating the apartment ceilings and internal spaces.

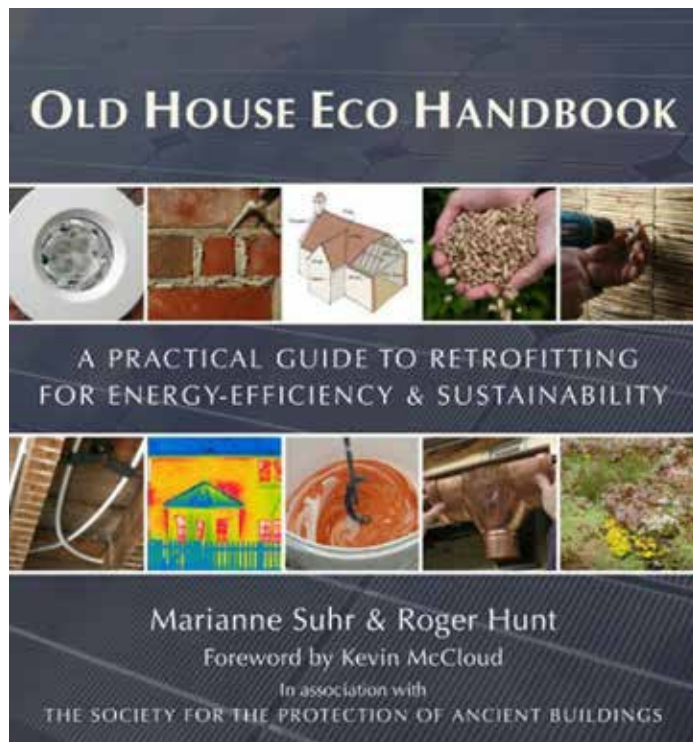


Figure 7: Cover of Marianne Suhr and Roger Hunt's book, "Old House Eco Handbook: A Practical Guide to Retrofitting for Energy-Efficiency & Sustainability", a practical and useful resource for this topic. Source: Amazon.

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Destination 5: 'APT Technical Committee on Sustainable Preservation', meeting at Marriot Hotel, New York City, New York, USA

Committee Chairs:

- Mark Brandt – Committee Co-Chair
- Nancy Rankin – Committee Co-Chair

Subcommittee Chairs:

- Hugh Miller – Education and Research subcommittee co-chair
- Susan Ross – Education and Research subcommittee co-chair
- Dima Cook – Climate Change subcommittee co-chair
- Nancy Rankin – Climate Change subcommittee co-chair
- Cory Trembath Rouillard – OSCAR subcommittee co-chair
- Roy Malcolm (Jed) Porter, Jr. – OSCAR subcommittee co-chair
- Walter Sedovic – TC•SP Book Club chairperson

Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
1. Understand current environmental/climate activity and the pressures that extreme weather puts on historic fabric.	SE04
2. Understand what activities and research the APT Technical Committee on Sustainable Preservation are undertaking and if there is scope for contribution from Australian professionals.	SE01, SE03
3. Meet likeminded people who are working on the issue of heritage protection and environmental sustainability.	SE04

Outcomes

The Fellow joined the annual APT Technical Committee on Sustainable Preservation (TCSP) meeting where committee subgroups reported on their developments of the past year and discussed the direction of future projects. APT TCSP subgroups include:

Education and Research focus group: members focus on collating available research and information on heritage protection and environmental sustainability and disseminating that information to APT members. The Education and Research focus group collaborate closely with the Publications & Outreach Focus Group and the TCSP Book Club.

OSCAR focus group: members focus on building the On-line Sustainable Conservation Assistance Resource (OSCAR). OSCAR is a web-based tool that assists conservationists in selecting the right methods and materials for carrying out specialist conservation work and directs them to other useful resources specific to the work they are performing.

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Climate Change focus group: members focus on being up to date with the latest research in climate change and sustainability issues, particularly in regard to historic structures. The group also maintains links with other networks in preservation and green building stakeholders.

The TCSP is composed of APT members from around the globe and it became apparent to the Fellow that worldwide there is growing interest and concern around sustainable preservation issues. Conservationists in Europe and North America are experiencing similar challenges to Australians in the wake of new energy codes, impacts of climate change and the lack of practical advice available for professionals. However in the Fellow's experience one difference is that Europe and North America have been discussing these issues for some time now (at least since the 1980's⁶) and have since dedicated extensive funding to research for the area. Much of the research in Europe and North America has been quantitative and it appears now that, armed with hard data, groups like the TCSP are helping the conservation industry develop innovative, best practice, practical examples on how to address the issues.

Inspired by the energy and organisation of the TCSP the Fellow volunteered to join the Online Sustainable Conservation Assistance Resource (OSCAR) subcommittee. From Australia the Fellow will be able to email, research and conference call with fellow subcommittee members. By joining the subcommittee and contributing to the research that's being incorporated in the tool, the Fellow hopes that OSCAR can include practical information that will be useful to the Australasian region and not just Europe and North America.



Figure 8: Scene from APT Technical Committee on Sustainable Preservation committee meeting at Marriot Hotel, New York City. Photo: Ruth Redden

6 Maddex, D. (ed.) 1981, "New energy from Old Buildings", The Preservation Press – National Trust for Historic Preservation, Washington, USA.

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Destination 6: APT Field Session: Contemporary Methodologies in Restoration of the Empire State Building.

Field session conducted by:

- Edwin Rambusch, from Rambusch Preservation Designers, Craftspeople and Engineers, New York, New York, USA.
- Frank Prial, from Beyer Blinder and Belle: Architects and Planners, New York, New York, USA.
- Jeff Greene, from EverGreene Architectural Arts, New York, New York, USA.

Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
1. Understand the importance of research for appropriate, accurate restoration.	SE03, SE04
2. Compare the methods and results of traditional craftsmanship and modern technologies, including contemporary interpretations of historic designs.	SE02, SE03
3. Observe the sensitive and successful integration of contemporary office building requirements such as life safety detection and annunciation, security and vertical transportation.	SE01, SE02

Outcomes

This tour of the Empire State Building explored the use of contemporary design and conservation technologies in the restoration of original hand-crafted finishes, fixtures and systems in the lobby of the Empire State Building. Attending the field session afforded the Fellow an opportunity to access areas of the famed deco building that are not normally accessible to the general public.

When completed in 1931, the Empire State Building made construction history not only as the tallest building in the world, but also for the revolutionary construction techniques and delivery systems born of the ambitious project. Innovative practices and procedures were required to design and construct 'approximately 80 storeys' (as was the loose design brief) in 1 year and 8 months. More than 100 people worked on the building day-and-night to deliver 4.5 floors of the building every week. The Empire State Building was completed on time, with an additional 22 storeys added resulting in a total height of 102 storeys.⁷

In 2011 Beyer Blinder Bell Architects were commissioned by the new owners of the Empire State Building to refurbish and restore the major public lobbies, halls and corridors.⁸ As part of this work a new master plan was developed to address planning and design issues regarding the lobby, street entrance, corridor, retail and elevator bank areas. As a historically listed building, not only did the public areas have to appear original, but they also had to address current day security requirements.

⁷ CBS Forum, "Empire State Building – A Landmark", accessed 2013, website: <http://www.cbsforum.com/cgi-bin/articles/partners/cbs/search.cgi?template=display&dbname=cbsarticles&key2=empire&action=searchdbdisplay>

⁸ Author's note: restoration works were part of a complete upgrade program for the whole building, including making The Empire State Building run more efficiently and sustainably. See Empire Building Website for more information: <http://www.esbnyc.com/esb-sustainability>

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Restoration works included removing an unsympathetic drop panel ceiling which had been added in the 1960s; reproducing 12,000 linear feet of original glasswork; reinstating original lighting schemes including recreating new pendant lamps from original drawings and restoring original marble cladding which was originally sourced from the Middle East. Head architect Frank Prial spoke to the group about the challenges faced in meeting post September 11 security requirements and how his team worked closely with artisans and craft people from EverGreene Architectural Studios to painstakingly reinstate gold-leaf ceilings and other mural work. Jeff Greene went into detail about the restoration process and invited the group back to the EverGreene Studios to meet with and watch artisans at work in the Chelsea based studios.

EverGreene Architectural Arts is a conservation practice with over three decades worth of experience in restoring, conserving and creating specialist architectural arts. The company is highly experienced in managing architectural restoration projects which range from small to commercial scale projects. The practice is based in a converted warehouse in Chelsea (New York). Studios are spread over three levels, with a floor dedicated to business administration, another to architectural projects and another purely for artisans. On the artisan level a number of conservation projects can be seen in various stages of completion: mural restoration, plaster moulding, metal work etc.

By attending this field session the Fellow was able to see in detail the craftsmanship and quality involved in the restoration of the Empire State Building lobby. She was able to talk to and ask questions of the people who lead the restoration projects and gain an understanding of what's involved in restoring a building of such enormous scale and cultural importance. Visiting EverGreene Studios after the field session inspired the Fellow to imagine practices of such quality being established in Australia. She was able to see how those practices might operate and what kind of infrastructure and personnel are required to run a truly integrated architecture, traditional trades and restoration company or organisation.



*Figure 9: Recently restored foyer of Empire State Building, New York.
Photo: Ruth Redden*

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Figure 10: Edwin Rambusch from 'Rambusch Preservation Designers, Craftspeople and Engineers' showing model of custom made lighting based on original drawings for Empire State Building. Photo: Ruth Redden

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Destination 7: Trade Demonstrations, EverGreene Architectural Arts Studios, New York, New York, USA.

EverGreene Architectural Arts is a conservation practice with over three decades worth of experience in restoring, conserving and creating specialist architectural arts. The company has extensive experience in managing small to commercial scale architectural restoration project. As part of the APT Conference, EverGreene Architectural Arts Studios hosted experts in the trades that are most commonly required in the restoration of buildings in New York and other metropolitan cities. The Fellow attended the following trade demonstrations which each ran for approximately 1 hour:

- Ornamental Plaster by Richard Barrow, from EverGreene Architectural Arts Studio, New York, New York, USA.
- Carpentry by Rudy and Emma Christian, from Christian & Sons.
- Metal/Tin Knocking by Cameron Forbes, from Heather & Little.

Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
1. Learn how to cast a copy of an ornamental mould.	SE03, SE04
2. Learn how to mix plaster and how to achieve suitable lime mixes.	SE03, SE04
3. Learn how to run cornices and other decorative features.	SE03, SE04
4. Learn how repair wood using traditional fabrication techniques.	SE03, SE04
5. Learn which tools are the most useful and important when doing traditional carpentry.	SE03, SE04
6. Learn how to identify different carpentry techniques and thus how to date construction.	SE03, SE04
7. Learn how to restore and clean historic tin metal.	SE03, SE04
8. Learn how to patch historic tin metal.	SE03, SE04

Outcomes

Through this series of workshops the Fellow was able to watch traditional restoration techniques up close and in person, with the opportunity to ask questions in a small group setting. Though some of the information was North American based (e.g learning to identify traditional North-American wood working techniques), the Fellow still found this learning experience informative. Workshop participants had the opportunity to take up tools and work on timber, which is a worthwhile exercise especially for architects who often specify work from behind a computer but may not have a full understanding of the material they are aiming to restore. The studios at EverGreene Arts are so well equipped that workshop participants were able to study a variety of materials, techniques and processes. In the plaster workshop participants were able to watch the process of mixing and applying a silicone mould

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to an existing ornament, then mixing lime plaster to cast a copy of the ornament from the newly made mould. In the tin knocking workshop participants learned about appropriate tools and methods for restoring tin from large areas to small, decorative elements and learned different techniques for ensuring the long term conservation of the material.

Participating in the workshops not only gave the Fellow the opportunity to learn hands-on practical skills, but to see in action the benefits of having traditional crafts people work alongside (or in the same building at least) as architects and other conservation professionals.



Figure 11: Ornamental plaster workshop, EverGreene Architectural Arts Studio, New York. Photo: Ruth Redden



Figure 12: Woodworking workshop, EverGreene Architectural Arts Studio, New York. Photo: Ruth Redden

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Destination 8: APT Conference, Presentation Session 4

Presentation theme: Energy Efficiency and Historic Buildings: American and European Perspectives.

Session chair: Amalia Leifeste, Clemson University, Clemson, South Carolina, USA.

Presentation 1: 'The Heritage Value of Welfare State Architecture in the United Kingdom and its Suitability to Modern Needs', Caroline Engel, University of Edinburgh, Edinburgh, Lothian, Scotland.

Presentation 2: 'Best Practice for Energy Efficiency in Heritage Buildings of Europe', Peter Cox, President, ICOMOS Scientific Committees on Energy and Sustainability

Presentation 3: 'A Data Driven Approach to Sustainability at Historic Sites', Shengyin Xu, Minnesota Historical Society, St. Paul, Minnesota, USA.

Presentation 4: 'Bath Abbey Footprint Project: Updating the Oldest Building in a World Heritage City', Geoff Rich, Feilden Clegg Bradley Studios, Bath, United Kingdom

Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
1. Discuss the controversies faced by conservation professionals in Britain in regards to post-war modern architecture.	SE02
2. Compare the differences of Welfare State modern architecture in Britain to the commercially driven modern architecture of America.	SE04
3. Learn and discuss many of the prominent conservation projects of the last 10 years in Britain and the theories behind the conservation principles applied to them.	SE02, SE03, SE04
4. Information on the top research on best practice in Europe on energy efficiency interventions in heritage buildings.	SE01, SE02, SE03, SE04
5. Working across nations: buildings ranging from 12th century in very different climatic conditions.	SE03
6. Seeing first hand detailed case studies on practical solutions to marrying heritage value to energy efficiency.	SE01, SE02, SE03, SE04
7. Understand the relationship between sustainability and the stewardship of history.	SE04

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Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
8. Identify a sample of existing sustainability evaluation methods with particular focus on green house gas emissions inventories.	SE03, SE04
9. Identify the key issues in selecting sustainability tracking method for an organization.	SE03, SE04
10. Understand the benefits and challenges of integrating sustainability metrics into history organizations, including a case study of the application of metrics in the Minnesota Historical Society.	SE02
11. Understand and discuss the conservation strategy for the floor of a medieval building.	SE03, SE04
12. Appreciate and discuss responses to a UK perspective on development within a historic city centre.	SE01, SE02
13. Discuss issues of thermal modelling and energy efficiency for a large communal historic building.	SE03

Outcomes

Presentations in this session covered a range of topics, including the conservation and adaptive re-use of post-war Modern buildings, and the stigma associated with many significant structures in the UK which are associated with (often unkempt) social housing and thus retain negative connotations to many people. Where historical recognition and heritage protection of built fabric is being afforded to more post war buildings in countries like the USA and Australia, the task is harder for preservationists in Britain where much of the architecture reminds citizens of difficult and often sad times. Despite this resistance, there are interesting restoration projects being carried out on post-war buildings in the UK, including some controversial Brutalist buildings such as the Southbank complex on the Thames River in London.

Throughout the course of the conference, but especially during this session, it became apparent to the Fellow that British heritage departments and historical societies have been allocating a significant amount of money to researching the effects of retrofitting historic buildings to make them more energy efficient. Peter Cox, president of ICOMOS International's Committee on Energy and Sustainability presented on this topic, highlighting numerous studies that have been completed on this topic. It appears that Historic Scotland are leaders in researching sustainable preservation with many research papers and technical notes being produced by the organisation. Of particular interest is the amount of quantitative data being collected by British researchers, creating invaluable resources of hard data for architects and preservationists worldwide who might be wondering which methods and techniques are most practical and sensitive when dealing with historic structures. This information is often hard to come by in an area which is still emerging – the concept of 'greening historic buildings' really only having gained momentum in the past 5-10 years. One of the points Peter Cox made, however, is that data collected and recommendations made for one region (e.g the UK) does not directly translate or

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cannot be considered appropriate for another region such as the USA or Australia. For this reason it's extremely important that local organizations fund similar research in their own localities and not only rely on the work being produced overseas.

This point was further emphasised by Shengyin Xu in her presentation on the studies being carried out by the Minnesota Historical Society (USA). Since 2012 the MHS have been running their Institutional Sustainability Project, monitoring and assessing 26 of the organisation's historic buildings and implementing measures to ensure the buildings operate more efficiently. The MHS studies are very data driven, producing fascinating quantitative information which highlights the most (and least) effective techniques employed by the organisation, ensuring only the highest impact sustainability strategies are employed.

One of the most fascinating presentations of the APT conference was Geoff Rich's presentation on his office's work at Bath Abbey (England), the oldest building in a world heritage listed city⁹. Bath Abbey continues to be used as a place of worship, but it also caters for modern activities such as concerts and public events. The £15,000,000.00 retrofit is currently underway (expected to be finished in 2017) and what became obvious in Rich's presentation is the important role that technology plays in assessing existing conditions at the site and in modelling proposals to see what modifications are going to have the biggest impact. By employing technology such as thermal imaging and energy modelling, the project team are better equipped to ensure their modifications are in fact going to produce the desired results. This is an important consideration in any retrofit project, not only from a financial or embodied energy point of view, but especially in historic building where the utmost care has to be taken to ensure changes don't have a negative impact on the significance of the building. In the case of Bath Abbey one of the most important considerations by conservation architects was how to make use of the centuries old underground thermal springs to naturally heat the building, whilst keeping in tact the Roman burial ground under the Abbey's floor.

As a result of these presentations the Fellow was made acutely aware of the benefits in investing the time and money into collecting empirical data, modelling proposals and assessing and sharing information. The initial cost of carrying out these activities might not only save money and unnecessary material waste, but might also prevent undesirable and irreversible outcomes from occurring without much benefit to the overall operation of the building.



Figure 13: Artist impression of works at Bath Abbey. Image from architect's website: <http://fcbstudios.com/work/view/bath-abbey>

⁹ Author's note: There have been three significant incarnations of the Bath Abbey, the earliest being built in 757AD.

6. The International Experience

More for the Mission

The Evolving Relationship between Historic Preservation and Green Building

A popular mantra among historic preservationists is "The greenest building is the one that is already built." (source 1) But to what degree is this true? On one hand, existing buildings contain embodied energy, generate less construction and demolition waste, and support smart growth. On the other hand, older buildings not properly maintained over time may have inefficient mechanical systems, leaky windows, and degraded materials, like roofing and insulation; these are all causes of high energy consumption. Historic preservation and sustainable building practices have not always worked together, but this relationship is evolving. This brief blog highlights a few of these changes.



Figure 14: Screenshot from Minnesota Historical Society, "More for the Mission" sustainability project. Image from MHS website: <http://blogs.mnhs.org/node/167>

6. The International Experience

Destination 9: APT Conference, Presentation Session 5

Presentation theme: Industrial Structures and Urban Infrastructure: Preservation for Use and Re-Use.

Session chair: Ilene Tyler, Quinn Evans Architects, Washington DC, USA.

Presentation 1: 'Wells Street Bridge Rehabilitation: A Moveable Monument Renewed', Carolyn Andrews, Johnson Lasky Architects, Chicago, Illinois, USA.

Presentation 2: 'Historic Waterfronts As Playgrounds of the Future: Meeting Fire Protection and Life Safety Upgrade Challenges in Adaptive Re-Use', David Jacoby, Simpson Gumpertz & Heger, Waltham, Massachusetts, USA.

Presentation 3: 'Cobbles and Warehouses find a Second Life', Andrea Smith, University of Mary Washington, Fredericksburg, Virginia, USA.

Presentation 4: 'Rust-Oration: Preserving the Significance of De-industrialisation and Decay in Rust Belt Cities', Sophie Reich, Savannah College of Art and Design, Atlanta, Georgia, USA.

Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
1. Identify American codes and standards applicable to historic buildings.	SE01
2. Understand the industry approach to performance based design alternatives to maintain the desired level of safety while minimizing impact to the historic fabric.	SE01, SE03
3. Identify common fire and life safety issues with existing/historic structures.	SE03
4. Understand factors influencing brownfield re-use.	SE01, SE02
5. Apply lessons learned from a case study to other situations.	SE03
6. Make connections between preservation and other goals in urban planning.	SE02
7. Learn the significance of deindustrialisation and decay in Rust Belt cities as a character defining feature.	SE01

6. The International Experience

Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
8. Learn how restorations currently being utilized in Detroit, MI and other Rust Belt cities do not accurately reflect the significance of deindustrialisation.	SE02
9. Discuss through the use of case studies other possible treatments for the preservation of buildings heavily decayed as the result of deindustrialisation.	SE03

Outcomes

This paper session focussed on the challenges of adapting existing industrial sites, an issue that the Fellow has observed in Melbourne especially around areas such as Docklands, Fishermans Bend and the Maribyrnong region.

Topics covered included the challenges of restoring historic bridges, which were required to continue operating during the works; upgrading the fire standards of large sites where expedient egress can be a challenge due to the length or location of buildings (e.g on a wharf where the only point of exit is into the water); finding appropriate uses for deindustrialised sites which are often hard to convert without degrading the significance of the site as an industrial one; and ensuring the long term financial success of adapting such large areas that are often contaminated with industrial waste.

Sophie Reich presented on her Master's work, which investigates the types of uses that buildings in Detroit City are being converted into. Reich argues that though demolition of historic structures is not desired, simply retaining a building and converting it for a completely new use is not necessarily a good heritage outcome either. If the site has been recognised for its industrial significance, there are negative impacts associated with converting the building into, say, an apartment complex. Often in these situations, and especially if only the façade is being retained, the integrity of the site is lost in the conversion. However these concerns have to be balanced with other factors, such as the financial success of the site. In a city like Detroit, "home to the largest municipal bankruptcy in American history"¹⁰, urban renewal may be the best way of protecting the region as a whole and in order to conserve any historic fabric innovative thinking and some leniency must be taken on certain sites.

As the chair of the Department of Historic Preservation at the University of Mary Washington and with a background in architecture and urban planning, associate professor Andrea Smith is well versed on this topic. Smith presented on what she believes is a successful urban renewal project – the conversion of the Eastern edge of Paris (France) from a wine bottling, industrial area to a gentrified region of civic buildings and landscapes, developed with preserving historic fabric as one of its core driving principles.

¹⁰ Uberti, D. 2014, "The death of a great American city: why does anyone still live in Detroit?", The Guardian (USA), 14 April 2014, viewed 2014, website: <http://www.theguardian.com/cities/2014/apr/03/the-death-of-a-great-american-city-why-does-anyone-still-live-in-detroit>

6. *The International Experience*

Converting brownfield sites and adapting existing industrial buildings for new uses can be a great way to invigorate old buildings and landscapes, rather than creating new ones. This paper session highlighted for the Fellow some of the difficulties governments, urban planners, architects and preservationists face when dealing with de-industrialised sites. In cities like Melbourne where city fringe industrial suburbs are experiencing fast rates of gentrification, much can be learned from cities that have already gone through this transition. Detroit is a good example of a city at one end of the development scale where money is one of the biggest concerns, whereas the eastern edge of Paris is at the other end of the scale where conservation played a major role in gentrifying the area.

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Destination 10: APT Conference, Presentation Session 6

Presentation theme: New Directions in Preservation Education.

Session chair: David Woodcock, Texas A&M University, College Station, Texas, USA.

Presentation 1: 'Teaching Sustainability in a Larger Context: Climate Change and Cultural Landscapes', Robert Melnick, University of Oregon, Eugene, Oregon, USA.

Presentation 2: 'Sustainable Preservation: Mapping an Emerging Discipline', Meghan Kleon, University of Texas, Austin, Texas, USA.

Presentation 3: 'A Master of Science in Preservation Engineering: One Curriculum', Kelly Streeter, Vertical Access LLC, New York, New York, USA.

Presentation 4: 'Preserving the Preservation Trades: New York City's Mather Building Arts and Craftsmanship High School', Stephen Spaulding and Naomi Kroll, National Park Service, Northeast Region, Philadelphia, Pennsylvania, USA.

Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
1. Discuss how climate change studies affect our understanding of, and attention to, cultural landscapes.	SE02, SE04
2. Discuss how climate change studies, as taught in a field that combines science and art, directly or indirectly relates to increasing student awareness of heritage protection, regardless of their academic majors.	SE04
3. Discuss the challenges in applying the teaching of climate change to cultural resources when so much of the field is based on natural resource evidence.	SE02, SE04
4. Discuss how some of the traditional issues in historic preservation programs (e.g., isolation, separation from other academic fields, limited or no design component, etc.) impede the incorporation of sustainability in these programs, and how these issues might be addressed. Discuss why this matters and what impact it might have on valued cultural resources.	SE02, SE04
5. Learn about the development of the field of sustainable preservation in the United States, and the different groups shaping the field.	SE04

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Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
6. Discuss the conflicts and opportunities for collaboration between the fields of historic preservation (heritage conservation) and sustainable architecture through sustainable preservation.	SE02
7. Describe how sustainable preservation might fit within the larger field of architecture, into architectural design programs, and into existing professional associations.	SE02, SE04
8. Learn about the Career and Technical Education (CTE) model, and how it relates to historic preservation.	SE02
9. Learn about the relevance of secondary preservation trade education to the contemporary city.	SE01, SE04
10. See examples of a core curriculum skills and knowledge for one of the preservation trades, and specific ways that these can be integrated with academic study.	SE04

Outcomes

This paper session focussed on training the new generation of conservationists and ensuring that environmental sustainability is incorporated into future learning programs. From university to primary school level, organisations are beginning to acknowledge a lack of integration between teaching conservation and environmental sustainability, but are also finding the logistics of setting up such programs challenging. Conservation in general is already a relatively broad subject. The question stands: should it be taught from architecture schools, social sciences, history department, and so on. The added impact of climate change on historic structures makes curriculum planning harder, particularly as it can be a very science based subject.

In fact, it appears that a whole new discipline of Sustainable Preservation may be emerging from this area. Robert Melnick from the University of Oregon believes that looking to the Landscape Architecture programs is a good start for conservationists wanting to learn about the impacts of climate change on historic structures. However he also acknowledges that issues of cultural awareness and history are better covered in other programs. Meghan Kleon outlined how the University of Texas is mapping this emerging discipline of Sustainable Preservation and in her opinion the field relates most directly with built fabric (including a component of design) and thus should be taught from architecture departments. Kelly Streeter spoke about a program being run from the University of Vermont which is providing a Master of Preservation Engineering.

It seemed to the Fellow that the conversation of establishing a Sustainable Preservation course is ahead of conversations being had in Australia. In Australia there are a limited number of building conservation courses as it stands, let alone broadening those programs to include issues of climate change and the impacts on significant built fabric. Another major difference between programs being taught in the UK, USA and Australia is that overseas there are more building conservation courses being taught which have a strong focus on material sciences and the repair of historic buildings,

6. The International Experience

whereas in Australia courses are very focussed on arts, architectural or social history. This results in graduates finishing university with little or no practical experience of restoring building fabric, or even a theoretical understanding of the properties of the materials that make up the building. This can be a challenge in the workplace where recommendations being made by heritage professionals may not reflect the reality of the building materials' properties or associated requirements, often causing angst between heritage advisors, tradespeople and clients.

One of the most inspiring programs is being taught from the Stephen T. Mather Building Arts and Craftmanship High School in New York City. Mather is a public high school developed by the Department of Education in partnership with the National Park Service¹¹. The school provides hands-on education in the areas of carpentry, landscape management, decorative finishes, masonry and plastering as well as a college preparatory academic curriculum. Graduates of the Mather School depart with a Regents Diploma, CTE Endorsement, and real-world employable skills. Traditional tradespeople and experts in the area are involved in developing the school program and there's a strong emphasis on environmental sustainability and heritage protection throughout the program.

In any field educating the new generation is crucial to keeping the discipline alive, innovative and sustainable. To date professionals in a wide range of disciplines (engineering, architecture, planning, history, academia, etc.) have specialised in heritage protection, but there isn't a specific profession one can choose, or course to study in order to work in the field of building conservation. In fact, many heritage professionals find themselves unintentionally specialising in the area as a result of simply working on conservation projects over a period of time. Formalising an education in building conservation would not only help to ensure that heritage best practice techniques are being applied to the some of the world's most important built fabric, but it would also open up a space for innovation and inspiration as often occurs at the high school and university level of any discipline or subject topic.

Figure 15: Stephen Spaulding presenting on New York City's Mather Building Arts and Craftmanship High School curriculum. Photo: Ruth Redden

Figure 16: Screenshot from New York City's Mather Building Arts and Craftmanship High School's website. Image from: <http://www.matherhsnyc.org/pathways.html>



¹¹ Author's note: in the USA the National Park Service is responsible for protecting and regulating historic sites and structures of state and national significance.

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Destination 11: 'Greening the Glass Box',

Round table, with experts in the field to discuss urgent preservation issues in East Midtown Manhattan.

Location: Marriott Hotel, New York, New York, USA.

Sponsored by: DOCOMOMO New York/Tri-State and The Municipal Art Society

Facilitated by: Angel Ayón, AIA, Historic Preservation Consultant, Israel Berger & Associates; and Nina Rappaport, Vice President, DOCOMOMO NY/Tri-State, New York, USA.

Round table speakers:

- Gordon Smith – Gordon H. Smith Corporation (New York, New York, USA)
- Robert Heintges – Heintges Building Envelope and Curtain Wall Consultants (New York, New York, USA)
- Israel Berger – Israel Berger and Associates (New York, New York, USA)
- Pamela Jerome – Graduate School of Architecture, Planning and Preservation, Columbia University (New York, New York, USA)

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Objectives	Relevant Skill Enhancement (SE) as outlined in Section 5.0
1. Understand the pros and cons of listing historic buildings and whole neighbourhoods.	SE01
2. Discuss the environmental and safety issues that affect post war Modern high-rise buildings with curtain wall construction.	SE01, SE03
3. Discuss appropriate ways to maintain and replace curtain wall structures on historic buildings whilst maintaining their integrity.	SE03
4. Understand what activities and research DOCOMOMO are undertaking in regard to sustainable preservation and if there is scope for contribution from Australian professionals.	SE01, SE04
5. Meet like-minded people who are working on the issue of heritage and environmental sustainability.	SE04

Outcomes

APT conference attendees were invited to participate in the DOCOMOMO New York/Tri-State and The Municipal Art Society round table discussion on urgent preservation issues in midtown Manhattan. Participating in the discussion gave the Fellow the opportunity to meet DOCOMOMO members also concerned with the effects of making significant post-war buildings operate more efficiently. As mentioned previously, post-war buildings are particularly hard to run efficiently as they were often designed with steel structures, no shade-providing awnings and large expanses of single glazed glass.

Attending the round table discussion afforded the Fellow an opportunity to discuss with building owners financial concerns associated with heritage listing and retrofitting an historic office tower – which more often than not in New York City refers to a building of 100+ storeys. Issues include ensuring lessees are attracted to renting offices without feeling restricted by onerous heritage constraints. Maintenance is also an issue on such large buildings, where even the smallest external works (maintenance or restoration) require sophisticated engineering and safety measures to be employed.

Controversial projects such as the retrofit of the United Nations Headquarters in New York were discussed. The south-facing glass façade of the iconic modernist building was replaced with a new double glazed curtain wall of a slightly different colour and different fixing mechanisms, altering the original presentation of the building.¹² Fascinating insights into these issues and more were provided by people who were directly involved with the project, such as façade consultant Robert Heintges.

Attending the round table discussion not only afforded the Fellow an opportunity to meet with stakeholders and caretakers of some of the world's most interesting post-war buildings, but also provided further opportunities to meet with other professionals concerned with the issue of greening historic buildings. The Fellow met with Peter Cox from ICOMOS' Scientific Committees on Energy and Sustainability (see summary of Destination 8) who is keen to gather an international contingent of professionals willing to share information and find solutions to many of the issues raised throughout the

¹² "Capital Masterplan", United Nations, accessed 2013. Website: <http://www.un.org/wcm/content/site/cmp/>

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conference.



Figure 17: Screenshot of United Nations Headquarters (New York) from Alfred Hitchcock's North-by-northwest. Image source: [http://commons.wikimedia.org/wiki/File:North_by_Northwest_movie_trailer_screenshot_\(13\).jpg](http://commons.wikimedia.org/wiki/File:North_by_Northwest_movie_trailer_screenshot_(13).jpg)

7. Knowledge Transfer: Applying the Outcomes

Attending the APT conference and so many of the associated workshops and site visits afforded the Fellow unique opportunities to network professionally with leaders in sustainable preservation; discover innovative projects, technologies, ideas and training programs; and become inspired by professionals from a range of generations and professions all working on the common task of creating - or improving - the sustainability of historic sites and buildings. Being an organisation focussed on technical research, training and practice, APT members are experts at using science and technology in both traditional and innovative ways to monitor the performance of existing structures, model proposed interventions and introduce change via non-intrusive methods.

The Fellow is now equipped to share this knowledge with conservation and design industries in Australia, not only by being a point of contact for a myriad of resources available overseas, but also by being able to consult on individual projects. The Fellow is now able to assist on improving the sustainability of historic buildings and recommend complementary solutions which aim to achieve best-practice conservation outcomes whilst meeting other modern-day building requirements. Solutions would be generated from the knowledge gained in hands-on workshops in New York City; by attending dozens of seminars on greening historic buildings (all demonstrated with real case studies from around the world); by meeting with experts in the area and discussing specific concerns; by learning where to find technical information required to design custom solutions; and by calling on professional contacts made all over the world. The Fellow will continue to expand her knowledge of the area, especially through working groups that she joined as part of the fellowship experience, such as the APT Technical Committee on Sustainable Preservation. As a member of the APT-TCSP the Fellow is helping to develop an interactive online resource where building professionals and homeowners alike can tailor environmentally sensitive solutions for conserving their buildings. The Fellow's contribution is bolstering the program's database and will help to ensure that solutions not only focus on North American or European climates and methodologies, but for the Australasian region as well.

Industry associations such as the Australian Institute of Architects will benefit from the Fellow gaining this knowledge, as she has since been invited to join the Institute's Heritage Committee. Through the Heritage Committee the Fellow is able to support the AIA in providing solutions to members who are grappling with issues of sustainable preservation. The Fellow aims to work more strategically within the Committee to promote the benefits of greening historic buildings, rather than simply responding reactively to issues as they arise. The Fellow also conducted a Dissemination Session, in the form of an AIA (Victorian Chapter) Continuing Professional Development (CPD) event. The topic for the event was "Heritage and Sustainability" and co-presenters included fellow Heritage Committee member and Associate Director at Lovell Chen Architects & Heritage Consultants, Anne-Marie Treweek, and Environmentally Sustainable Design Advisor, Euan Williamson. The target audience for the presentation was predominately architects and the aim of the session was to share practical solutions to issues which often arise when renovating an historic building. The Fellow focussed specifically on technical information (such as products and construction detailing, many of which were learned in New York as part of the Fellowship experience) whilst Treweek focussed on Section J requirements, and Williamson on presenting successful case studies. The Fellow hopes that by sharing her fellowship experiences with the architecture industry she can help to positively influence the dialogue around heritage protection in Victoria, which is often based around topics of restriction and limitation, rather than innovation and celebrating significant cultural values.

Local councils will benefit from the knowledge gained and information produced by the Fellow, for in her capacity as a heritage advisor she is able to assess town planning applications and provide recommendations on how applicants can meet BCA Section J or Green Star requirements whilst maintaining the historic features of their building. When it comes to issues of heritage planning, it's not uncommon for animosity to arise between applicants, town planners and heritage advisors as a result of frustrating headlocks and a lack of practical solutions around protecting historic sites and introducing new ESD initiatives. The Fellow hopes to work with local councils to develop guidelines

7. Knowledge Transfer: Applying the Outcomes

and/or technical notes to distribute within the municipality and help applicants consider best practice conservation and ESD from the inception of a project (rather than subsequently and as an add-on when the opportunity to finesse the design has passed). The Fellow also plans to run Dissemination Sessions with town planners at Maribyrnong and Yarra City Councils to share her experience and help planners understand issues around greening existing buildings. Town planners are some of the first points of contact in a building project and armed with the right knowledge they are in a position to positively influence a restoration project and ensure applicants are implementing heritage best practice and ESD principles. The first of these dissemination sessions for local council will be run at the Maribyrnong City Council, department of Urban Planning's 'Planning Day' in November 2014.

Community organisations such as the National Trust will benefit from the Fellow's experience as she is able to help promote the organisation and some of the ways in which the National Trust are leaders in greening historic buildings. As an example National Trust property Rippon Lea Estate is one of the best examples of a Victorian-era building that was originally built to include passive means of improving the building's operation and care for the associated gardens. Building owners and developers are often hesitant to implement innovative ideas until they witness examples of the ideas working successfully. The Fellow is proud to promote the work of the National Trust who understand many of the inherent ESD qualities of historic buildings and have also embraced modern technologies which help buildings function in modern ways yet are sympathetic to historic fabric. The Fellow is helping to promote the work of the National Trust by using buildings such as Rippon Lea as case studies for her Dissemination Sessions.

Educational institutions will benefit from the Fellow's research as she plans to present to Architecture students in design studios on the environmental benefits of adapting existing and historic buildings. The Fellow understands that training the next generation of architects and conservationists to consider ESD and heritage protection as complementary paradigms is key to achieving best practice outcomes on future conservation projects, and to ensure ideas are implemented in the earliest stages of a project. History also shows that it's in universities where some of the most innovative ideas in any field have been generated. In order to reinvigorate the conservation industry it's important that university students become part of the conversation in greening historic buildings.

Using information learned as part of the Fellowship experience, the Fellow hopes to work with government, community and educational institutions to develop clear and practical guidelines, technical notes and resources that can be readily available for all stakeholders involved in greening historic buildings.

8. Recommendations

Recommendation for government (federal):

Allocate additional funding to research that proposes using well known and/or innovative technology to empirically measure the sustainability of historic buildings. A range of building types and geographic locations should be included in the study, and a high number of buildings studied to gather data. Applicants should demonstrate what technology and equipment are required for the study and why, and whether the equipment is readily available or requires purchasing (locally or internationally). Note: Similar studies have been carried out by RMIT University's Sustainable Building Innovation Laboratory and adopted by the Cooperative National Heritage Agenda (CHNA). However more large scale studies of this kind need to be commissioned.

Allocate funding to investigate the potential of setting up vocational training programs specific to preserving historic buildings (see recommendation 8.7). Examples of existing Australian programs in other industries includes "Aviation High School, Queensland" in Clayfield (Queensland) where students from years 8 – 12 are provided direct pathways for careers in the aviation and aerospace industries in Queensland. Vocational programs are popular in the Netherlands and have been successfully run there for some time. Research should be focussed on programs which have been running for some time and have been following the progress of graduates from the school. Note: Partnerships between private companies and vocational training programs is a controversial and complex issue which needs to be explored in any study related to setting up a vocational training program for conservation practice in Australia.

Recommendation for government (state):

Develop practical guidelines in the form of a manual for building professionals working on greening historic buildings. The manual should include specific technical information, for instance the best types of insulation for historic buildings and how to detail insulation to avoid thermal bridges and the build-up of condensation. Guidelines can be grouped according to building type: Victorian-era timber buildings, Victorian-era brick buildings etc. An example of such a manual is the "Greening NYC's Historic Buildings Green Rowhouse Manual" developed by the Municipal Art Society of New York (MAS-NYC). Note: The Fellow acknowledges the 'Heritage places and sustainability guidance sheets' recently published by Heritage Victoria. However the recommended manual would be a more substantial document, outlining specific construction details.

Integrate hands on training and/or the study of material sciences into professional development days such as heritage advisors' annual meeting. Make sure to include studies related to the conservation of metal, as Modern buildings will constitute many of the buildings requiring restoration in the next decade and beyond.

Recommendation for government (local):

Allocate funding to the production of guidelines/information sheets outlining the benefits of sustainable preservation, helpful resources and steps for integrating sustainability and heritage protection into a project from its inception. Ensure staff members (planning officers, heritage advisors, city design staff etc.) are trained to understand the document and are able to assist applicants in achieving desired outcomes. These information sheets should be similar to the manual mentioned in recommendation 8.2 in that they should include specific construction details and provide sources for further construction information.

8. Recommendations

Recommendation for industry:

Relevant industry organisation such as the Victorian Building Authority, Australian Building Codes Board, Housing Industry Association etc. should allocate funding for a manual as described in 8.2.

Industry organisations should include in their agendas, strategic plans and marketing campaigns ways of promoting traditional trades and sustainable preservation as a complementary sector of the building industry. Will help to change the negative discourse around heritage protection.

Recommendation for professional associations:

Relevant professional organisations (Australian Institute of Architects, ICOMOS Australia, APTi-Australasia, etc) should partner up and apply for funding to produce the manual recommended in 8.2. The creation of the manual by professional associations will be crucial to ensuring the manual is practical and reaches its target audience: architects and people who specify works to historic buildings. Including professional associations in the development of the manual will ensure that crucial information required to specify works and detail construction drawings is included.

Professional organisations should aim to promote the benefits of building conservation, especially as a way of engaging with ecologically sustainable design. This can be done via articles in Architect Victoria, presentations at CPD events and awarding sustainable preservation projects.

APTi Australasia should provide information sessions on sustainable preservation. This could be achieved by partnering with other organisations such as the National Trust or Heritage Victoria. APT members are unique in that they can provide specific technical information as a means of protecting historic buildings and sites.

Recommendation for education (universities):

Apply for funding to do more empirical research into the efficiency of historic buildings. Studies should be specific to investigating ways in which historic buildings perform efficiently, which materials perform the best and how weaknesses in the performance of historic buildings can be rectified without compromising the historic integrity of the building.

Universities should introduce specific courses on sustainable building preservation (perhaps as an elective subject for an Architecture Masters or as a core subject in a Masters of Heritage Conservation). Given the broad range of topics that sustainable preservation can cover, the issues surrounding sustainable preservation should be covered in other subjects, such as engineering, material conservation, environmentally sustainable design etc.

Recommendation for education (Secondary education and TAFE):

Commission feasibility study on potential for an arts and crafts high school with curriculum links into TAFE or University Courses and/or accreditation for professional industries. Examples of such a school include the Mather School of Arts, New York City (see Destination 10).

8. Recommendations

Recommendation for community:

Community organisations like the National Trust should promote sustainable preservation and the use of innovative technologies such as laser cleaning. Organisations like the National Trust have the opportunity to exhibit potential benefits by adopting technologies for conservation work on their own properties. They should partner with industry organisations such as APTi Australasia and provide hands on workshops and presentations on sustainable preservation.

Recommendation for International Specialised Skills Institute:

Support applications for professionals proposing to study the conservation of Modern buildings. Modern buildings possess unique issues in regard to maintenance, retrofitting and repair compared to early 20th century buildings. Ideally applicants will study both theoretical components of the significance of Modern architecture and issues around their preservation, but also technical information on how to restore or retrofit buildings of this period.

Support applications for research into vocational training programs, especially in the area of building conservation. See 8.2 and 8.7.

Further Skills Enhancement

- Conservation of Modern buildings and their associated materials.
 - » What issues are associated with conserving Modern buildings versus buildings from pre-WWII?
 - » What skills are specific to conserving Modern buildings?

- Measuring, recording and analysing performance of historic buildings and presenting information in a way that is accessible to all professionals and stakeholders involved in preserving historic buildings.
 - » What tools and equipment are required?
 - » How are those tools and equipment used?
 - » What is the economic cost of purchasing equipment?
 - » What are the pros and cons of purchasing equipment?

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- Historic Scotland – Technical Conservation Knowledge Base: <http://conservation.historic-scotland.gov.uk/home/publications.htm>
- ICOMOS Australia: <http://australia.icomos.org>
- ICOMOS Australia – International Scientific Committee on Energy and Sustainability: <http://australia.icomos.org/get-involved/international-scientific-committees/isces-energy-sustainability/>
- International Specialised Skills Institute: <http://www.issinstitute.org.au>
- Mather Building Arts and Craftmanship Highschool: <http://www.matherhsnyc.org>
- Melbourne University - Melbourne School of Design Symposium, "Heritage Conservation as Environmental Conservation": <http://msd.unimelb.edu.au/heritage-conservation-environmental-conservation>
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