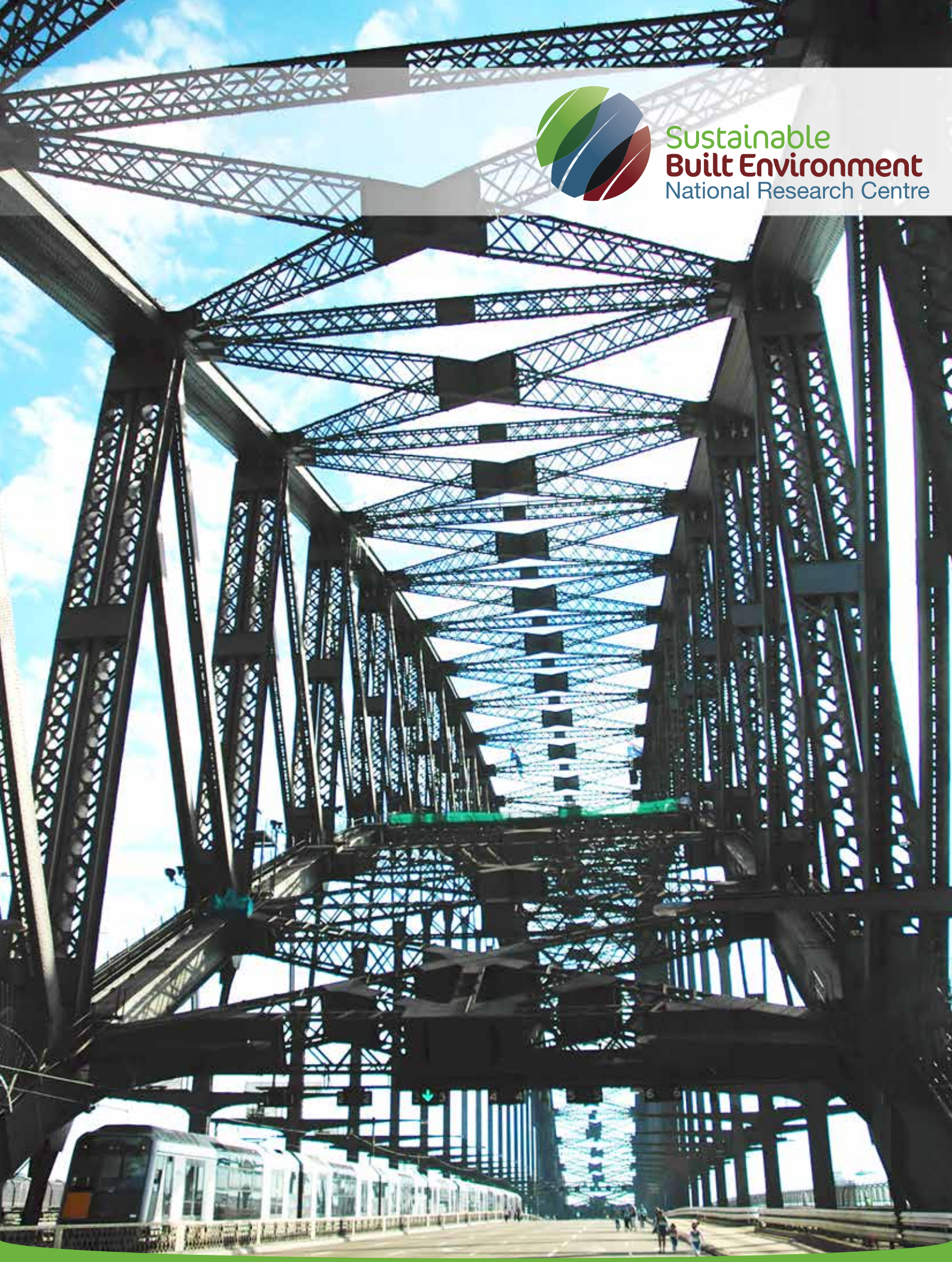


Sustainable
Built Environment
National Research Centre

2013 Annual Report

sbenrc.com.au

Sustainable Built Environment National Research Centre (SBEnrc)

Executive Summary

A vibrant and innovative construction industry is critical to Australia's future. We depend on a healthy construction industry to build and maintain our homes, roads, hospitals, schools, retail and recreational facilities, in addition to our mines and industrial facilities; these underpin our quality of life.

However the industry has challenges: it must improve productivity and e□ciencies, reduce contributions to land□ll and wastewater; and improve workplace safety. Initiating the changes to solve these problems takes courage; delivering the innovations that will transform the industry requires conviction; and advancing the built environment can only be achieved through collaboration.

Our Centre aims to be an enduring world-class research and knowledge broker in sustainable infrastructure and building design, construction and management. In 2013 we began the second three-year phase of our Centre – building on the reputation of our predecessor the CRC for Construction Innovation and embedding lessons learned as an independent national research centre. We continued our commitment in collaborating with our core members, project associates and other industry stakeholders to grow the value of SBEnrc research for our partners and our industry.

Our challenge for the 2013-15 phase is to grow the value and impact of our applied research more deeply and broadly across Australia. In early 2013 we relocated our national headquarters to Curtin University, Western Australia to embrace the opportunities of continuity and growth. We have maintained our Brisbane o□ces to continue servicing and growing our Queensland, New South Wales and Victorian partners. The proven CEO-Chair partnership has been reinforced with Keith Hampson maintaining continuity in leadership as CEO and John V McCarthy AO re-committing as Chair of SBEnrc's Governing Board. Ross Guppy from Queensland Transport and Main Roads and Ryan Harry from John Holland very ably served in the pivotal role of Research and Utilisation Committee Chair.

2013 saw our Centre successfully expand our research network and the quality of research undertaken. This would not have been possible without our members' support, research leadership and the commitment of the industry, government and research collaborative teams involved in our three programs of activity:

- Program 1: Greening the Built Environment, led by Professor Peter Newman, Curtin University
- Program 2: People, Processes and Procurement, led by Professor Russell Kenley, Swinburne University of Technology
- Program 3: Productivity Through Innovation, led by Professor Xiangyu Wang, Curtin University.

We are delighted to have been able to con□rm on-going funding with a new round of industry-focussed projects starting following the Phase 1 2010-12 projects completing in late 2012.

The valuable research outcomes have largely been due to the commitment and support of our core members and we thank you wholeheartedly: Curtin University; John Holland; NSW Roads and Maritime Services; Queensland Transport and Main Roads; Queensland University of Technology; Swinburne University of Technology; Western Australian Government agencies: the Department of Commerce (Building Commission), the Department of Treasury (Strategic Projects), the Department of Finance (Building Management and Works) and Main Roads WA.

In December 2013 we said goodbye to Queensland University of Technology as a partner. We acknowledge our appreciation of the foundation support that QUT o□ered in serving as the institutional base for the CRC for Construction Innovation (2001-09) and for the □rst phase of our Sustainable Built Environment National Research Centre (2010-12) as we successfully transitioned from a CRC to an industry-funded national research centre. I would also like to thank QUT's professional team of researchers and their high level of research commitment.

Internationally, the SBEnrc is extending its reach as it matures through its projects and partnerships. SBEnrc continues to play an active role in the CIB - the International Council for Research and Innovation in Building and Construction. As our Governing Board Chair John V McCarthy AO stepped down after three active years of service as CIB Global President, SBEnrc and QUT co-hosted the triennial World Building Congress 2013 in May in Brisbane. A majority of SBEnrc projects were pro□led and the SBEnrc and its partners were well presented to the world. This Congress was acknowledged as a notable success with Australia's friendliness and professionalism a central contributor to this outcome.

In addition, the CEO has served as Coordinator for a number of CIB Task Groups this past seven years. The most recent engagement has been through TG85: R&D Investment and Impact. This TG has achieved considerable success in building valuable global collaborations and last year was acknowledged as making "the most remarkable contributions to the CIB from amongst all the Commission and Task Group Coordinators and Members".

SBEnrc values its relationships with international collaborators in Stanford University, University of Virginia, Hong Kong Polytechnic University, University of Salford, Centre Scienti□que Et Technique Du Batiment (CSTB), Constructing Excellence UK, VTT Technical Research Centre of Finland, and Chalmers University of Technology. These key relationships provide important global perspectives on our research as we share information and collaborate to improve the quality and application of our research.These relationships and others assist in diversifying the Centre's research funding sources, aid industry and academic dissemination and strengthen our Centre's research impact.

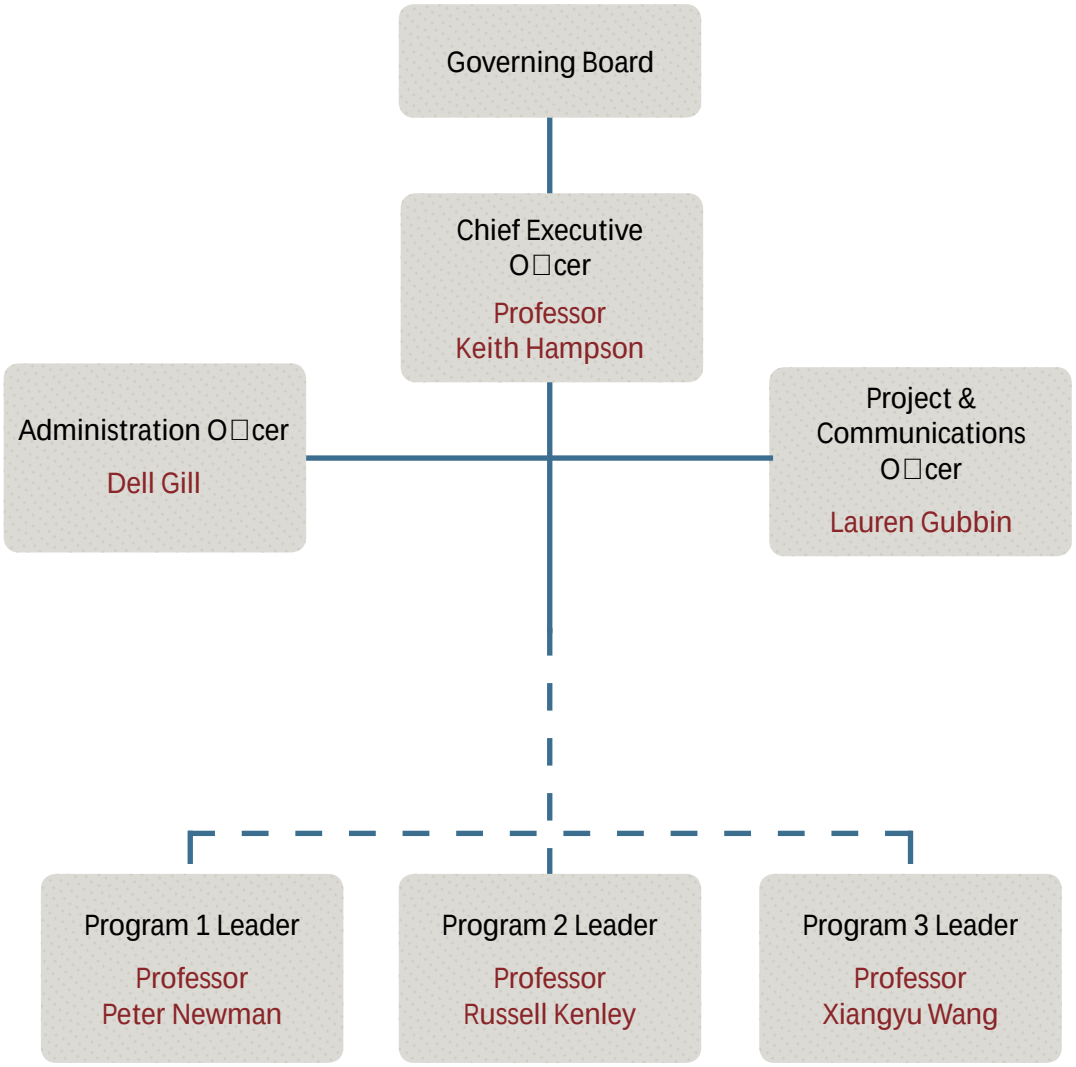
Our challenge is to continue growing the value and impact of our applied research more deeply and broadly across Australia and to secure a more durable □nancial base. The Sustainable Built Environment National Research Centre is acknowledged as an excellent example of a CRC that has graduated into an independent organisation delivering unique industry, government and research collaboration.

We look forward to maintaining our joint commitment and working with core partners, project associates and other industry stakeholders growing the value of SBEnrc research for our partners and Australia's built environment industry well into the future.

John V. McCarthy AO, Chairman

Keith D. Hampson, Chief Executive O□cer

Organisational Chart



Team Members

SBEnrc Governing Board

1. John V. McCarthy AO (Chair)
2. Ross Guppy, Queensland Transport and Main Roads (to March 2013)
   Neil Scales, Queensland Transport and Main Roads (March 2013 to October 2013)
   Matthias Schlotterbach, Queensland Transport and Main Roads (from November 2013)
3. Angelo Conte, John Holland
4. Richard Mann, Western Australia Department of Treasury
5. Charlie Thorn, Curtin University
6. George Collins, Swinburne University of Technology
7. Stephen Kajewski, Queensland University of Technology
8. Michael Veysey, NSW Roads and Maritime Services (to February 2013)
   Jim Peachman, NSW Roads and Maritime Services (February 2013 to October 2013)
   Chris Harrison, NSW Roads and Maritime Services (from November 2013)
9. Keith Hampson, CEO, SBEnrc

Research and Utilisation Committee

1. Ross Guppy, Queensland Transport and Main Roads - Chair (to March 2013)
   Narelle Dobson, Queensland Transport and Main Roads (from April 2013)
2. Angelo Conte, John Holland (to May 2013)
   Ryan Harry, John Holland - Chair (from May 2013)
3. John Byron, Curtin University (to August 2013)
   Tim Dolin, Curtin University (from September 2013)
4. Carolyn Marshall, Western Australia Department of Finance - Building Management and Works
5. Angela Heymans, Building Commission, WA Department of Commerce
6. Michael Veysey, NSW Roads and Maritime Services (to February 2013)
   Jim Peachman, NSW Roads and Maritime Services (February 2013 to October 2013)
   Chris Harrison, NSW Roads and Maritime Services (from November 2013)
7. Program 1 Leader: Peter Newman, Curtin University
8. Program 2 Leader: Russell Kenley, Swinburne University of Technology
9. Program 3 Leader: Xiangyu Wang, Curtin University
10. Keith Hampson, CEO, SBEnrc



Team Members

John V. McCarthy AO

Chair, Sustainable Built Enviornment National Research Centre

FRICS, FAPI, FREI

John is a recognised industry leader, with a breadth of experience across various commercial and industry disciplines. He served as inaugural Chair on the Australian Sustainable Built Environment Council (ASBEC), as Chair of the Australian Construction Industry Forum (ACIF), President of Property Council of Australia (PCA) and member of the Australian Building Codes Board (ABCB). He is Australia's first industry representative on the Board of the International Council for Research and Innovation in Building and Construction (CIB) - an organisation he served as global President from 2010-13.

Keith Hampson

CEO, Sustainable Built Environment National Research Centre

BEng (Hons), MBA, PhD, RPEQ

FIEAust, FAICD, FAIM

Keith is an energetic senior leader with a blend of strong technical and management skills and formal qualifications gained through international experience in industry, government and university environments. He is committed to building an internationally competitive Australia by promoting access to better education, technology and innovative practices. At the industry level, Keith is a registered civil engineer and project manager with extensive experience in operating in multi-disciplinary environments in planning, design, construction and maintenance.

Richard Mann

Western Australia Department of Treasury and Finance

BE, CPEng, FIEAust

Richard is a civil engineer with more than 25 years experience in building and infrastructure projects throughout Western Australia. He heads Treasury's Strategic Projects and Asset Sales division and oversees the delivery of an $8 billion portfolio of 20 major projects, including the $2.0 billion Fiona Stanley Hospital, $1.2 billion Perth Children's Hospital and $918 million new Perth Stadium.

Angelo Conte

John Holland

BE (Civil) (Hons), FIEAust, RPEQ

Angelo is the Strategic Development Director at John Holland and has had over 30 years experience in the construction industry. He has been involved in numerous projects throughout Australia in the civil, structural and mechanical disciplines. Angelo provides strategic advice to assist the Managing Director and Executive Management Team to formulate the strategic direction of the Company.

George Collins

Swinburne University of Technology

BSc(Hons I), PhD, Certified Materials Professional, Materials Australia FInstP, MAIP, GAICD

George began his appointment as Deputy Vice-Chancellor (Research & Development) in August 2012. In this capacity, he is driving Swinburne to become Australia's leading university in research innovation by creating a distinctive Research and Development environment that focuses on the application of research. George has more than 30 years experience in research and research management.
He has significant experience across the Australian research sector with a strong focus on the promotion of excellence in research and innovation.

Charlie Thorn

Curtin University

BSc (Agric) (Hons)

Curtin University recently appointed Australian Sustainable Development Institute (ASDI) Director, Charlie Thorn to the position of Director Research and Development. Charlie has more than 30 years experience in research management, commercialisation and technology transfer. During his time as ASDI Director he led, developed and grew Curtin's research in the areas of energy, climate change, water, sustainable resources, urban and regional development, sustainable communities and food.

Team Members

Matthias Schlotterbach

Queensland Transport and Main Roads

Matt is a senior manager with over 15 years experience in rail/transport project management and program delivery, strategy and policy reform across both Government and rail organisations. He is a key authority and expert on rail, developing key service agreements between the state and Queensland Rail for rail infrastructure services and analysing new investment options for public transport. He also Chairs various research project steering committees in the Rail CRC research program.

Chris Harrison

NSW Roads and Maritime Services

Chris has over 30 years experience in road, tra□c and transport areas. He held senior management positions in public and private sectors prior to taking up his present position of Group General Manager, Engineering Technology, NSWRMS. He was the Austroads Technology Program Manager (2009-13) oversighting national research and guideline development. Chris has managed major projects in Sydney as well as signi□cant road maintenance and construction projects in both urban and rural areas.

Russell Kenley

Swinburne University of Technology

BBldg (QS) (Hons), PhD, MAIB, AAIQS

Russell is Professor of Management at Swinburne University of Technology and Visiting Professor of Construction at Unitec, NZ. His research interests involve the built environment including: project □nancial management; lean management of production in construction; and strategic management of property portfolios. He has co-developed the location-based management system and is working with industry to introduce new model-based production systems to improve productivity.

Stephen Kajewski

Queensland University of Technology

BEng(Hons) , GDProjMgt, MBuiltEnv(ProjMgt), PhD

Professor Stephen Kajewski is Head of School, Civil Engineering & Built Environment, Science & Engineering Faculty at QUT.

Peter Newman AO

Curtin University

BSc (Hons), Dip.ES&T, PhD, FTSE

Peter Newman is the Professor of Sustainability at Curtin University and is the Leader of the Greening the Built Environment Program. He was appointed as a Lead Author for Transport on the next Intergovernmental Panel on Climate Change Report. He is on the Board of Infrastructure Australia and has published more than ten books and 200 academic publications. In 2011 he was awarded the Sidney Luker medal for his contribution to the science and practice of town planning.

Xiangyu Wang

Curtin University

PhD, MS, BS

Xiangyu holds the position of Curtin-Woodside Chair Professor for Oil, Gas & LNG Construction and Project Management, and is the Co-Director of the Australasian Joint Research Centre for Building Information Modelling (BIM). Professor Wang is an internationally recognised researcher in the □eld of Construction IT, BIM, Lean, Visualisation Technologies and Project Management having obtained over $5 million in research funds and published over 300 peer-reviewed technical papers. He is the Chair of the Australian National Committee of the International Society in Computing in Civil and Building Engineering.

Team Members

Carolyn Marshall

Building Management and Works , Western Australia Department of Finance
Architect, MA World Heritage
BArch

Carolyn is Assistant Director of the Building Research and Technical Services team in Building Management and Works, WA Department of Finance. Carolyn is a registered architect with post graduate quali□cations in building sustainability and heritage, and a Green Building Council of Australia Green Star Accredited Professional.

Angela Heymans

Building Commission, WA Department of Commerce
BSc

Angela is Principal Sustainable Buildings O□cer in the Building Commission, Department of Commerce. Angela is a graduate of Murdoch University in Sustainable Development and had a key role in the introduction of minimum standards for energy and water e□ciency in new housing in Western Australia.

Core Partners

Project Partners/Associates

Research Program 1

Greening the Built Environment

The Program objectives are to deliver improved environmental performance across the built environment industry through enhanced ecological e□ciencies. These include carbon emission reductions and climate change adaptation of new and existing infrastructure and buildings.

The □rst three years of SBEnrc saw Program 1 deliver a range of valuable outputs that support improvements in sustainability performance across the built environment sector. In working with industry and government partners, researchers have built a framework upon which has continued this work in the second stage of the SBEnrc.

Led by Professor Peter Newman of Curtin University, the program has delivered research outputs that focused on speci□c industry and government needs.

Project outcomes have delivered new knowledge and tools targeting:

- Commercial buildings, including cost savings for industry and government through energy savings; a reduction in costs for green retro□ts of infrastructure buildings; and increased worker productivity
- Biophilic urbanism, with increased productivity from sustainability designers and reduced water consumption and waste
- Mass haul, involving fuel and carbon savings on major earthworks in infrastructure and building projects
- The future of roads, with decreased greenhouse gas emissions in the built environment industry; the opportunity to reuse waste in road construction; and increased sustainability skills in the road industry.

The second phase of the SBEnrc has three new projects in Program 1 developed in close consultation with industry which are described in the information sheets following.

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Research Program 2

People, Processes and Procurement

The primary aim of Program 2 is to deliver improved operational and business outcomes. Social outcomes for workers will be delivered through more sustainable work practices and minimising environmental health and safety risks; new process models will capture bene□ts from future technologies, o□-site fabrication and mobile construction management, and business will bene□t from more integrated project environments.

Led by Professor Russell Kenley of Swinburne University, the program has provided public and private organisations with tools designed to improve sustainable construction practices, including:

- a cultural-change management program and implementation plan for industry employers nationally to manage the safety impacts of alcohol and other drugs in construction
- the O□ Site Manufacture Project Team Evaluation Tool which aids construction project teams in rating their o□-site manufacture (OSM) capability
- a strategic research and development roadmap based on a rigorous evaluation of Australia's R&D investment history and future industry needs

The second phase of the SBEnrc has two new projects in Program 2 which are described in the information sheets following.

Research Program 3

Productivity Through Innovation

Productivity Through Innovation will deliver economic bene□ts to the built environment industry through reductions in risks and costs and improved productivity associated with complex information management and procurement processes on infrastructure and building projects.

Phase one concentrated on the project 'Object Libraries Supporting the Facility Lifestyle'. This research aimed to increase construction industry e□ciency by reducing the duplication of e□ort in incorporating digitalisation in the design, construction, facility management process. Speci□cally, it relates to the development of digital object libraries containing products for use with CAD tools in construction projects.

Led by Professor Xiangyu Wang at Curtin University, phase two of Program 3 is focussed on maximising the potential of Building Information Modelling (BIM) in the actual construction and operation stages of the built environment.

The second phase of the SBEnrc has two new projects in Program 3 which are described in the information sheets following.

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