



SMART FUTURE CITIES 2015

*Energy, Transport & The Built Environment
Innovations for Future Cities*

NEWCASTLE, 1-3 OCTOBER



**1-3 OCTOBER
NEWCASTLE CITY HALL
NEWCASTLE, NSW, AUSTRALIA**



Office of
Environment
& Heritage



NSW Office of Environment and Heritage

The NSW Government is deeply committed to a clean energy future for the State. We are working with the broad community, in business, in schools, on farms and in factories across the State to help NSW be number one in clean energy and resource efficiency.

Dedicated staff right across the State are assisting the growth of community owned energy and the roll out of utility scale renewable energy. Government agencies and staff are providing professional advice and information to assist the growth of the economic, employment and environmental benefits that can arise from a clean energy industry.

We are proud to be a major sponsor of this conference, Smart Future Cities, and congratulate the Tom Farrell Institute and the University of Newcastle on their great work in organising this event.

We remain committed to a clean energy future through our Regional Clean Energy Program, Energy Efficiency Action Plan, Government Resource Efficiency Policy and through our work with communities and continued support of events such as this.

We commend to you a clean and energy efficient future and the Smart Future Cities conference.

Gordon Fraser

Regional Coordinator, Clean Energy - Hunter and Central Coast, Regional Operations Group,
Office of Environment and Heritage



**Office of
Environment
& Heritage**



Newcastle - Becoming a smart future city

Welcome to Newcastle! It is an honour for Newcastle City Council to be a partner in delivering Smart Future Cities 2015 and it could not be more appropriate given Newcastle's own Smart City Initiative.



We aim to bring people together to make better use of technology and creative opportunities, and to build the foundations of a city and region that are continually seeking new ways to enable our communities to grow and flourish.

Community members have many questions about the process of becoming a smart future city. What is a smart city? Can technology make our city more liveable? How will smart city technology affect our lives on a daily basis? How can we use technology and innovation to harness the potential of our region for economic growth, jobs and a higher quality of life?

It is exciting that some of the best minds across this topic will be addressing these questions and looking at practical applications for Newcastle and other cities across Australia. The conference is bringing together international and national experts, researchers and businesses to present their latest findings on how to grow a Smart City.

Councils across Australia must take a leadership role by embracing smart city technology and the opportunities it provides for our communities and businesses. Newcastle City Council acknowledges the role it must play in making our city a smart city and we are extremely proud to have launched our Smart City Initiative, in partnership with Newcastle NOW, Cisco, the University of Newcastle and the Hunter Institute (TAFE NSW). This conference provides a unique opportunity for us to talk as a community about what it means to be a smart city and to embrace the opportunities it will provide.

This ground-breaking conference is the first of its kind in Australia and Newcastle Council is proud to be part of it.

Councillor Nuatali Nelmes
Lord Mayor of Newcastle City
Council



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Clean Energy and Future Transport Conference 2015



Welcome

Welcome to our Smart Future Cities 2015 Conference. We set out on this journey at the Institute some five years ago with a view to putting our vision of “Regional solutions for a sustainable future” into practise. In 2010 it was clear that the coal export boom was putting huge amounts of wealth into the region but little was being done to look to a future when jobs and manufacturing disappeared as the mines moved on out of our region and as demand for coal decreased. We sought to grow diamonds from coal by encouraging the move to renewable energy through developing renewable transport technologies on the back of the coal industry supply chain. If transport would move away from internal combustion of liquid imported fuels to electric vehicles, and if those vehicles could be manufactured within Australia eventually using renewable energy sources to recharge their batteries, then we could markedly reduce the economic leakage from importation of all our vehicles and fuels. Our approach was to initiate in 2011 the annual Hunter Valley Electric Vehicle Festival to promote thinking of sustainable transport in fun and innovative ways that would support the development of electric vehicle industries in the region and foster student interest in science, technology, engineering

and mathematics (STEM). Research indicates that 75 per cent of the fastest growing occupations in our global economy, driven by data, digital technologies and disruptive innovation, now require these STEM skills. The EVFestival has thrived since 2011 culminating in the Smart Future Cities 2015 Conference today.

The conference is an initiative of the Tom Farrell Institute for the Environment at the University of Newcastle in partnership with the Regional Clean Energy Program of NSW Office of Environment and Heritage and The City of Newcastle. Our central “kitchen cabinet” of Nigel Stace, Belinda McNab, Gordon Fraser, Desiree Sheehan and Adam Clarke has been a pleasure and inspiration to work with. I gratefully acknowledge the wide range of organisations and individuals who have shared their thoughts and ideas and hard work in bringing together a stellar group of speakers to address the three themes of the conference: future transport in particular the potential of autonomous vehicles to make our cities more liveable; clean energy implementation in all its various guises from finance to innovation to mitigation of global warming; and innovation and emerging technologies in the built environment which and what this means for communities, businesses

and all levels of government. All of the above are necessary components of creating a Smart City.



I invite you to vigorously participate in the conference: to ask questions of every speaker; to grow your network of contacts and future colleagues and collaborators through the generous times we have allowed for the coffee breaks; and to enjoy every aspect of the diverse program on offer.

Professor Tim Roberts, Director

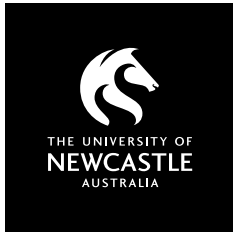
The Tom Farrell Institute for the Environment

**THE TOM FARRELL
INSTITUTE**
FOR THE ENVIRONMENT
FACULTY OF SCIENCE AND INFORMATION TECHNOLOGY
THE UNIVERSITY OF NEWCASTLE



Office of
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& Heritage





**THE TOM FARRELL
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powered by*



The grid electricity used by this year's Smart Future Cities Conference is displaced with GreenPower accredited renewable energy, which has zero net greenhouse gas emissions. By GreenPowering this event, organisers are reducing its impact on the environment and are helping to support Australia's large-scale renewable energy sector at the same time.

For more information visit www.greenpower.gov.au.

Clean Energy and Future Transport Conference 2015

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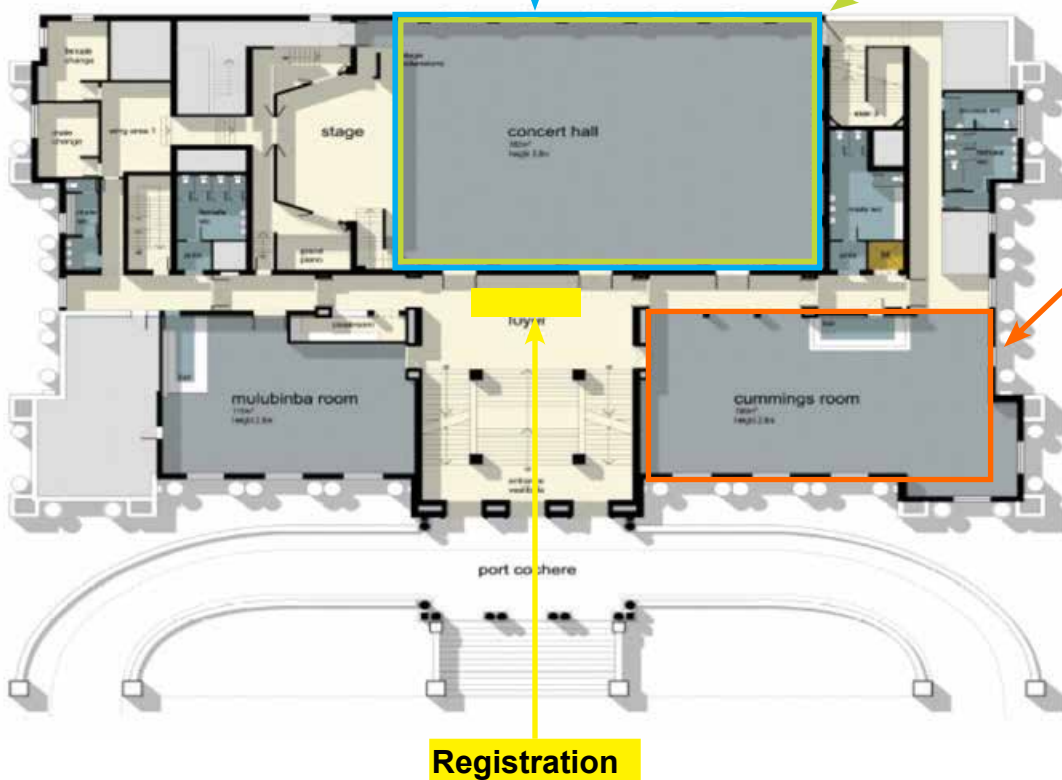
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GROUND FLOOR

Meal Breaks
and Exhibitors



FIRST FLOOR



SECOND FLOOR

8 Conference Program

Day One - 1st October 2015

08.00 – 08.45 CONFERENCE REGISTRATION – NEWCASTLE CITY HALL FOYER

08.45 - 08.50 MC Opening and Welcome

08.50 – 09.05	OPENING REMARKS Concert Hall	
08.50 - 08.55	Welcome Address & Acknowledgement to Country – The Tom Farrell Institute, Director, Prof Tim Roberts (5 mins)	
08.55 - 09.00	Ken Gouldthorp , General Manager, Newcastle City Council (5 mins)	
09.00 - 09.05	Message from Sponsor	
09.05 – 10.15	OPENING PLENARY - SPONSORED BY NSW OFFICE OF ENVIRONMENT AND HERITAGE Concert Hall Keynote Speakers	Page
09.05 - 09.20	Oliver Yates , CEO, Clean Energy Finance Corporation	17
09.20 - 09.35	Mark Diesendorf , Associate Professor and Deputy Director, Institute for Environmental Studies, University of NSW	18
09.35 - 09.50	Dr Gary Ellem , Project Manager, Future Industries, The Tom Farrell Institute for the Environment	19
09.50 - 10.05	Prof Miroslav Svitek , Dean of Faculty of Transportation Sciences, Czech Technical University, and president of ITS Association of the Czech Republic	20
10.05 - 10.15	<i>Question Time</i>	

10.15 – 10.45 NETWORKING AND MORNING TEA - BANQUET ROOM

10.45 – 13.00	Future Transport		Clean Energy		Innovation & Emerging Technologies in the Built Environment	
	Cummings Room – First Floor		Hunter Room – Second Floor		Concert Hall – First Floor	
10.45 – 10.50	Message from Sponsor	Page	Message from Sponsor	Page	Message from Sponsor	Page
10.50 – 11.05	Collaborative Innovation for every Australian	21	ZNET Town Project	27	Adaptive building re-use – 75 York Street Teralba	31
	Allan Ryan, Executive Director, Hargraves Institute		Bruce Thompson, Director, Moreland Energy Foundation Ltd		Peter Jamieson, Director, Umwelt	
11.05 - 11.10	Question Time		Question Time		Question Time	
11.10 - 11.25	Understanding co-creative consumers’ psychological ownership in the sharing economy	22	Solar community energy projects	28	Emerging Technologies delivering efficiency and environmental benefits	32
	Tom Chen, Newcastle Business School		Stuart Blanch, CEO, Hunter Wetlands Alec Roberts, Chair, CleanAs		Kathryn Maxwell, Sustainable Living Coordinator, Lake Macquarie City Council	
11.25 - 11.30	Question Time		Question Time		Question Time	
11.30 - 11.45	Electric vehicle rollout in Denmark and biofuels development in Sweden, Denmark, Austria, Germany and Brazil.	23	Aligning social investment with clean energy infrastructure: The deep place approach	29	Transitioning precincts: how can we better optimise, integrate and communicate?	33
	Andrew Lang		David Adamson, Research Development Manager, Compass Housing Donald Proctor, Group Manager Assets, Compass Housing		Suzanna Remmerswaal, Sustainability Consultant, AECOM	
11.45 - 11.50	Question Time		Question Time		Question Time	

11.50 - 12.00 SHORT BREAK / CHANGE OVER TIME

12.00 - 12.15	Ideas for disruptive innovation David Wilson , Principal Transport Planner, Transport NSW	24	Virtual Net Metering in Australia: An update Introduction and short presentations from each panel member	30	Clinical telehealth – saving precious time Ashley Young , Senior Clinical Business Analyst, Hunter New England Health	34
12.15 - 12.20	<i>Question Time</i>		Jay Rutovitz , Research Principle, Institute for Sustainable Futures, University of Technology Chris Barratt , Commercial Manager, Green Infrastructure, City of Sydney Sandi Middleton , Sustainability Officer, Byron Shire Council		<i>Question Time</i>	
12.20 - 12.35	Will we need so many roads? Graham McCabe , Service Leader, GHD	25			Leakage in schools (LiS) smart metering Stephen Askew , Water Management Engineer, Hunter Water Corporation	35
12.35 - 12.40	<i>Question Time</i>				<i>Question Time</i>	
12.40 - 12.55	Smart accessibility: shaping the Lower Hunter Region for the 21st Century Ian Donovan	26	Facilitate Panel Discussion		Hemp as carbon storage Klara Marosszeky , Managing Director, Australian Hemp Masonry Company	36
12.55 - 13.00	<i>Question Time</i>		<i>Question Time</i>		<i>Question Time</i>	

LUNCH WITH THE EXHIBITORS
Banquet Hall

13.00 - 14.00

Playtime in the Lunch Break - Meet the Technology
Demidov, Accenture
Newcastle Room

14.00 - 15.15	FINANCE PLENARY - SPONSORED BY CLEAN ENERGY FINANCE CORPORATION	Page
14.00 - 14.05	Message from sponsor / MC to open	
14.05 - 14.20	Financing a Smart Future City Meg McDonald Clean Energy Finance Corporation	37
14.20 - 14.35	Department of Industry and Science Mark Davis, Manager Business Engagement, Community Energy Programmes, Department of Industry and Science	38
14.35 - 14.50	OEI Financing a Renewable Energy Future Tim Wong, Senior Project Officer NSW Office of Environment and Heritage	39
14.50 - 15.05	Innovation trends for smart communities Dr Khimji Vaghjiani, Manager Innovation and Collaboration NSW Department of Industry	40
15.05 - 15.15	Question Time	

15.15 - 15.45 NETWORKING AND AFTERNOON TEA - THE BANQUET HALL

15.45 - 17.00	SMART CITY PLENARY - THE CITY OF NEWCASTLE	Page
15.45 - 15.50	Message from Sponsor / MC to open	
15.50 - 16.10	The future of transport Kyle Loades, President National Roads and Motorists Association	41
16.10 - 16.30	Urban Informatics: Towards Collaborative and Participatory Citymaking Professor Marcus Foth, Research Leader Queensland University of Technology	42
16.30 - 16.50	How to make a smart city Bud Kapoor, Sales Manager, Asia Pacific Japan, Smart+Connected Communities CISCO	43
16.50 - 17.00	Questions and close	

17.00 - 17.05 MC CLOSE

17.30 - 20.00	EVENING GALA COCKTAIL EVENT Hunter Room AECOM Interactive Panel Cocktail evening for conference delegates and speakers
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Gala Cocktail Event - Thursday Evening

AECOM is proud to sponsor the Smart Future Cities Conference evening cocktail party. The event will feature a discussion of ideas and examples from smart cities around the world, and give delegates and attendees a chance to network and make new connections.

For more information on AECOM and what we do visit aecom.com

When: Thursday 5.30 - 7.00pm

Where: The Hunter Room, Newcastle City Hall

Cost: Free (limited to 150 people)

AECOM

FREE!

Day Two - 2nd October 2015

08.30 – 08.55 CONFERENCE REGISTRATION – NEWCASTLE CITY HALL FOYER

08.55 – 09.00 MC OPENING / WELCOME TO DAY 2

09.00 – 09.55		OPENING PLENARY - SPONSORED BY BEYOND ZERO EMISSIONS	
		Concert Hall	
		Keynote Speakers	Page
09.00 – 09.15		May Ngui, Director, GHD, Smart Transportation – it's not just about the technologies, it's what you do with them that counts	44
09.15 – 09.30		Jamil Khan, School of Electrical Engineering and Computer Science, The University of Newcastle, Energy efficient ICT infrastructure for future smart city deployments	45
09.30 – 09.45		Stephen Bygrave, CEO, Beyond Zero Emissions, Going beyond zero emissions in energy, transport and buildings	46
09.45 – 09.55		Question Time	

09.55 – 10.25 NETWORKING AND MORNING TEA

10.25 – 12.40		Future Transport Cummings Room – First Floor	Clean Energy Hunter Room – Second Floor	Innovation & Emerging Technologies in the Built Environment Concert Hall – First Floor
10.25 – 10.30		Message from Sponsor / MC to open	Message from Sponsor / MC to open	Message from Sponsor / MC to open
		Page	Page	Page
10.30 – 10.45		Australia why so slow? Electric Vehicle uptake and what you can do about it. Electric Vehicles: the missing piece of the puzzle. Kymberley and Gabriel Noronha Recharging NSW	NICTA and the Australian Renewable Energy Mapping Infrastructure Peter Leihn, Director, NICTA	IoT – the digitisation of video data Peter Quinlan, Technology Consultant
		47	52	58
10.45 – 10.50		Question Time	Question Time	Question Time
10.50 – 11.05		Build it and they will come – the future of electric vehicle charging in Australia Anthony Froelich, ABB Australia Pty Ltd	Let's dig it, using the ground for thermal energy storage: the experience of the Riverina Highlands Building Energy Efficiency Project, Tumut NSW Joanne Spicer, Environmental/GIS Officer, Tumut Shire Council Yale Carden - GeoExchange Australia / International Ground Source Heat Pump Association – Australasia, Managing Director / President	Driving building performance using big data analytics Cara Ryan, Offer Manager, Building Performance Centre, Eco Buildings Division, Schneider Electric
		48	53	59
11.05 – 11.10		Question Time	Question Time	Question Time
11.10 – 11.25		Electric vehicles are becoming a viable alternative to conventional internal combustion engine. Kirk Martel	How much solar are we actually talking about? Oliver Hartley, Managing Director, Epho Pty Ltd	Open data, applications and innovation ecology James Giblin, Founder and Principal Australian Energy Consultants Andrew Mears, Founder SwitchDin Pty Ltd
		49	54	60
11.25 – 11.30		Question Time	Question Time	Question Time

11.30 – 11.40 SHORT BREAK – CHANGE OVER TIME

11.40 – 11.55	Intelligent Transport Systems as Study Programme Miroslav Svitek, Faculty of Transportation Sciences, Czech Technical University in Prague	50	Highlighting solutions to deal with the challenges of a paradigm shift in energy sector Christopher Martell, Principal Engineer, Global Sustainable Energy Solutions Pty Ltd	55	Virtual smart cities with Barrangaroo's Open Building System Integration Jeremy Harkins, Director, Ineni Realtime James Paterson, Operations Manager, Barangaroo, Lendlease	61
11.55 – 12.00	Workshop		Question Time		Question Time	
12.00 – 12.15	How can the Hunter progress 'Innovative Future Vehicle Infrastructure'? Workshop speakers and Panel Discussion	51	Quantum shift in supply chain – how disruptive technologies are reshaping the electricity industry and how will it adapt? Craig Chambers, Market Sector Director, Power Generation, AECOM	56	Award winning innovative University buildings Phillip Pollard, Director, Amenity Urban and Natural Design Environments SGSC findings Hua Fan, PhD Candidate, Faculty of Engineering, University of NSW	62
12.15 – 12.20			Question Time		Question Time	
12.20 – 12.35			Smart future energy systems John Ward, Principal Scientist, Grids & Energy Efficient Systems, CSIRO	57	Performance analysis and energy benefits of a commercial desiccant trigeration system Stuart Hands, CSIRO	63
12.35 – 12.40	Question Time		Question Time		Question Time	

Day Two - 2nd October 2015

LUNCH WITH EXHIBITORS

Banquet Hall
and

Playtime in the Lunch Break - Meet the Technology
Demidov, Accenture - Newcastle Room

12.40 - 13.40

13.40 - 14.45		Future Transport Cummings Room – First Floor		Clean Energy Hunter Room – Second Floor		Innovation & Emerging Technologies in the Built Environment Concert Hall – First Floor	
13.40 - 13.45		Message from Sponsor / MC to open	Page	Message from Sponsor / MC to open	Page	Message from Sponsor / MC to open	Page
13.45 - 14.00		Newcastle Bicycle City Steven Fleming, Director, Cyclespace International Pty Ltd	64	The Direct Action Policy – How can it work for you? Andrew Maddocks, Senior Consultant – Carbon and Energy Management, GHD	67	Smart City Infrastructure David Abrahams, Digital Research, Strategy, Policy and Investment	70
14.00 - 14.05				Question Time		Question Time	
14.05 - 14.20		The opportunities for innovative research within the Cyclesafe Network proposal Ben Ewald, Senior Lecturer, The University of Newcastle	65	Novel Solutions for Findhorn Ecovillage, Scotland and the NSW Narara Ecovillage's advanced carbon neutral smartgrid John Talbott, Consulting Engineer Toby Roxburgh, E2DesignLab	68	Transitioning to a Sustainable City - Urban Development Lessons for Australia David Crofts	71
14.20 - 14.25		Question Time		Question Time		Question Time	
14.25 - 14.40		Solar powered electric bike rental stations in the future city Brian Hill, Quiet Rush	66	Solar Paint: A Hunter based solution to clean energy Matthew Griffith, Priority Research Centre for Organic Electronics, UON Coralie Epstein, PhD Candidate, Centre for Organic Electronics, UON	69	Bandung as New Emerging Smart City Meredian Alam, PhD Candidate Sociology, School of Humanities and Social Sciences, University of Newcastle	72
14.40 - 14.45		Question Time		Question Time		Question Time	

14.45 - 15.15 NETWORKING AND AFTERNOON TEA

15.15 - 16.15	FUTURE PREPARING OUR CITIES PLENARY - SPONSORED BY LAKE MACQUARIE CITY COUNCIL						Page
15.15 - 15.20	MESSAGE FROM SPONSOR / MC TO OPEN						
15.20 - 15.35	Andrew Lang, The potential of energy from municipal waste streams in Australia						73
15.35 - 15.50	Sharon Pope, Manager Integrated Planning, Lake Macquarie City Council, Preparing the City's first digital economy strategy						74
15.50 - 16.05	Don Burke, Cities of the Future - Benefitting from climate change						75
16.05 - 16.20	Gary Ellem, The Tom Farrell Institute - Future Cities						75
16.20 - 16.30	Question Time						
16.30 - 16.40	Announcement of Hackathon Winners						
16.40 - 16.50	Announcement of Student Poster Prize Winners						
16.50 - 17.00	Tim Roberts, Director Tom Farrell Institute, Closing Remarks						

17.30 - 19.30		FREE PUBLIC FORUM Newcastle: Smart City, Our Future				Page
		Newcastle Concert Hall Opening address: Peter Chrystal, Director, Planning & Regulatory, Newcastle City Council				
		Speakers: Ed Blakely, Future Cities Collaboration, United States Studies Centre, University of Sydney				14
		Bud Kapoor, Manager Cisco's Smart+Connected Communities Program for Asia-Pacific				15
		Michael Neilson, Newcastle NOW				16
		Nathaniel Bavinton, Newcastle City Council				16
		Tarik Hammadou, VIMOC Technologies				15
		Proudly supported by: Newcastle City Council and Newcastle NOW				

Playtime in the lunch break

Meet the Technology

The aim of these sessions is to provide delegates with a hands-on experience of the technologies associated with smart cities. The technologies will be on display in the Newcastle Room, which is next to the Banquet Room of the Newcastle City Hall. You will have the opportunity to demonstrate your product and to interact with conference delegates to discuss how the technology works.

Playtime will run concurrently with lunchtime each day. Conference delegates will be encouraged to view the technologies during the lunchbreak on both days. At this stage you would be required to be available during the following times:

Thursday, 1 October

1.00 - 2.00pm

Newcastle City Hall

Newcastle Room, Ground Floor

Friday, 2 October

1.00 - 2.00pm

Newcastle City Hall

Newcastle Room, Ground Floor

Ivan Demidov

Chief Solution Architect, Demidov Innovations

P: +61 2 4023 2902

W: www.demidov.com.au



Two Oculus Rifts (virtual reality headsets)

The Oculus is one of the most advanced virtual reality headsets, coming to the consumer market first quarter of 2016.

The Oculus Tech. demos include but are not limited to:

- walk-through of building and open spaces
- vehicle simulation like parking, flying
- entertainment e.g. roller coaster and horror immersion games

A few minutes is usually sufficient for people to experience and understand what the Oculus is and how it works, at which point people can start to come up with concepts for software. Some ideas so far:

- Training e.g. confined spaces, dangerous environments, empathy training - HR, psychology
- driving / flying simulations
- design virtualisation e.g. a new park or development can be digitised, and participants can walk through it as if it were real
- assisting people with impaired mobility to experience events and locations they otherwise would not be able to get to.

Cisco is bringing **Smart Lighting and Parking, Smart Waste Management, and Safety and Security** technologies to the conference



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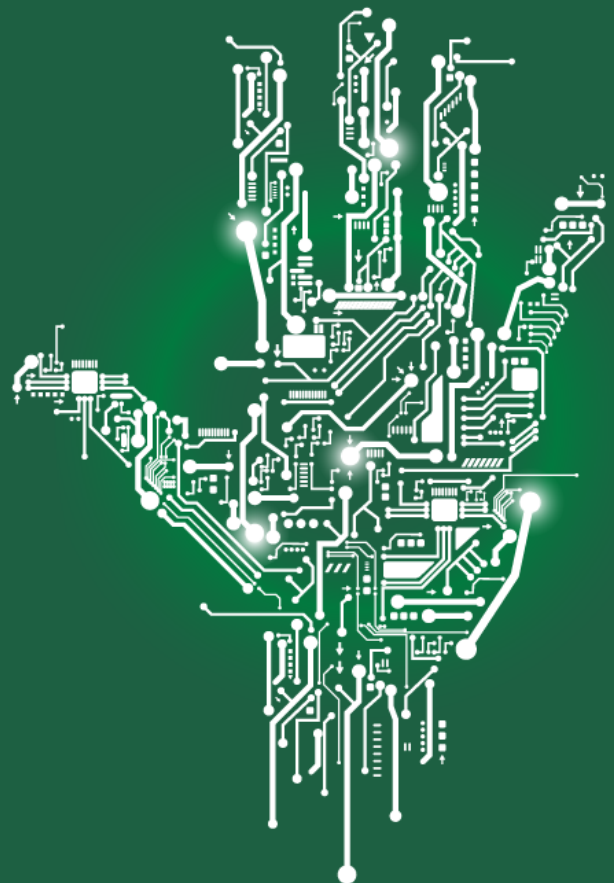
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Demidov Innovations Pty Ltd. is new generation of IT people – not a separate business group or just someone that shows up when there's a problem (though that is still necessary a lot of the time).

We are a consulting, support and training firm that specialises in optimising the benefits of information, communication and technology for small and medium businesses and home owners.

Our goal is to combine our expertise with yours to make your business more efficient by utilising the most appropriate technologies and processes. These include:

- Maintenance and Trouble Shooting
- Office Automation
- Custom Software and App Development
- Training and Documentation
- Security Systems
- Procurement
- Website Design and Development



Visit www.demidov.com.au for more information or call us on 02 4023 2902 to discuss your next project.

Newcastle: Smart City, Our Future

Free Public Forum - Friday 5.30pm - 7.30pm

What is a smart city? Can technology make our city more liveable? How will smart city technology affect our lives on a daily basis? How can we use technology and innovation to harness the potential of our region for economic growth, jobs and a higher quality of life?

In 2015 smart city technologies have hit the mainstream, transforming the role of digital connectivity in our lives and changing how everyday urban living, business, and city planning takes place.

But what does it mean to be a smart city? A smart city is a means, not the end: Newcastle's vision is to be a smart, connected, liveable and sustainable city where technology supports an improved experience of residents and visitors living, working and playing in the city.

At this FREE public forum the idea of a smart city will be de-mystified and explained, and the potential benefits for Newcastle and the Hunter will be explored.

The Newcastle Smart City Initiative has enormous potential for our city and region. It aims to bring people together behind a unified vision and collaborative strategy, make better use of technology and creative opportunities, and to build the foundations of a city and region that are continually seeking new ways to do things, to make better use of what we have, and to enable economic initiative to flourish.

Come along and hear what is already in place, and what is just around the corner as Newcastle begins to transition to a smart city. Hear from the experts who are leading Newcastle's smart city journey:

- Mr Michael Nielson, CEO of Newcastle NOW
- Mr Bud Kapoor, Manager of Cisco's Smart+Connected Communities Australia New Zealand
- Dr Tarik Hammadou, Tech Entrepreneur and CEO of Vimoc Technologies
- Dr Nathaniel Bavinton, Smart City Coordinator for the City of Newcastle.

Informative and intriguing discussion will be facilitated by special guest, Professor Ed Blakely, Director of the Future Cities Collaborative at University of Sydney.

www.smartfuturecities.com.au

Edward J Blakely

Chair, Future Cities Collaborative
Honorary Professor in Urban Policy, United States Studies Centre at the University of Sydney

One of the world's leading scholars and practitioners of urban policy, Professor Edward Blakely has been Dean of the School of Urban Planning and Development at the University of Southern California and Dean of the Robert J. Milano Graduate School of Management and Urban Policy, New School University in New York City. He currently serves as an Honorary Professor in Urban Policy at the United States Studies Centre at The University of Sydney. He is also the **Founder and Chair of the United States Studies Centre urban policy initiative, the Future Cities Collaborative**. In addition to Professor Blakely's background in academia, the Professor has an extensive record of public service that includes advising the Organization for Economic Cooperation and Development, the city of New Orleans after Hurricane Katrina, state and federal governments in Australia and the United States, as well as governments in Korea, Japan, Sweden, Indonesia, New Zealand and Vietnam. The United States Studies Centre and the Future Cities Collaborative allows Professor Blakely to combine his passion for sustainable urban design with his expertise in teaching and fostering capacity building in all levels of government.



Budrish (Bud) Kapoor

Sales Manager, Asia Pacific Japan
Cisco Smart+Connected Communities

As the APJ Sales Manager for Smart+Connected Communities, Bud is responsible for enabling Cities and Councils to transform themselves through smart cities services and new ways to engage citizens.

Bud has been with Cisco for 10 years and brings over 32 years of senior management experience across the US & Asia-Pacific region in building and leading multi-disciplined teams to meet and exceed company and customer objectives through all stages of product development, manufacturing, sales, implementation, and product support. He has demonstrated leadership and success in managing strategic, financial, operational and technical aspects of both complex projects and solution sales.

Previously with the Cisco Partner Organization in ANZ where he was an Partner Account Manager focusing on large outsourcers and consulting-led partners like EDS, CSC, Fujitsu, HP, Wipro, IBM, and Accenture.

Prior to Cisco, Bud was with Lucent Technologies as the General Manager for New Zealand, Member of Technical Staff at AT&T Bell Laboratories, Program Manager for Harris Corporation and a Captain in the United States Air Force.

Bud holds a Master degree in Business Administration - Financial Management and a Bachelor of Science in Electrical Engineering. Bud was born in India, grew up in the US.

Bud Kapoor will share the Cisco Smart+Connected Communities experience gained in working with cities for the past five years. This experience and intellectual property gained has been through collaborating with cities across the globe in helping them progress and achieve their Smart Cities objectives. Cisco's Platform approach to the solution harnesses ongoing innovation of sensor and applications/ analytics from an extensive ecosystem. However, it is not just about the technology, it is about leveraging information from a variety of sources to deliver new and relevant citizen services. It has been our experience that cities that have been successful have had a clear vision, leadership to bring together all elements of a city, and a commitment to move forward. At the most basic level - Cisco has been helping customers, globally and locally, in defining and refining their vision, developing the appropriate blueprint – architectures and roadmaps, and of course implementing the Cities Digital Platform to gather and make sense of the data from sensors.



Tarik Hammadou

VIMOC Technologies

Tarik Hammadou is a global visionary entrepreneur with over 15 years of industry experience spanning R&D, product development, business development, sales, industry evangelism, and general management.

Tarik's passion, leadership style brings together ideas from diverse cultures and groups. Through passion, discipline and dedication he established to harness technical, business and entrepreneurial IQ to nurture breakthrough innovation.

He built over the year significant relationships with key leaders in high technology companies, universities, and in governments and their national labs around the world. His contribution to innovation in law enforcement and public safety has been discussed several times at the NSW Australian parliament.

He is the author/co-author of over 20 journal and conference papers, and holds several patents in the area of image processing and sensors. For his excellence and outstanding contribution to innovation, he is the recipient of the Australian "Pearcey Special Recognition Award" in 2009.

From 2000 to 2003 he was with Motorola labs working on advanced CMOS image sensors. In 2004 he founded Digi-sensory technologies where he was involved in the development of a new generation of visual intelligent processors for 8 years.

As of October 2012 he is with VIMOC Technologies developing a new generation of cognitive computing machines for IoT and smart city applications.



Michael Nielson

CEO Newcastle NOW

Michael was appointed to the role of CEO for Newcastle NOW in 2012. Newcastle NOW is an association representing the interests of city centre businesses. Michael holds a Bachelor of Business degree from University of Newcastle and has over 15 years' experience in both operational and strategic roles. With a strong industrial relations and human resources background, Michael has held a number of positions within local government including his most recent role of Service Review Manager where he was responsible for the internal review of more than 150 services within a large Council. Coupled with his corporate skills and knowledge, Michael is also entrepreneurial owning a number of successful businesses on the East Coast of Australia. Under his leadership, the dynamic Newcastle NOW team has consolidated its role in the revitalisation of the Newcastle City Centre.



Nathaniel Bavinton

Smart City Initiative, City of Newcastle

Dr Nathaniel Bavinton is an urban sociologist, social researcher and strategic planner. He has spent over a decade conducting research and planning focused on interconnections between urban governance, design, community, consumption and culture. His doctoral research focused on the night-time economy and was awarded Thesis of the Year in 2011 by the Australian New Zealand Association of Leisure Studies for its contribution to understanding the dynamics of cities at night. Nathaniel moved from academia into local government to put ideas into practice. He has since added experience in social and cultural planning, project management, community engagement, placemaking and events to a research background encompassing sociology, architecture, political economy, cultural research, and innovation studies.



In 2014 Nathaniel was appointed to the role of Community Safety Facilitator at the City of Newcastle where he manages strategy for the night-time economy, public domain safety and crime prevention planning, among other things. In 2015 he has taken leadership of the Newcastle Smart City Initiative, which is developing vision and collaborative strategies to identify and take advantage of opportunities related to digital economy, connectivity and integrated analytics in the built environment. The Newcastle Smart City Initiative is helping to develop Newcastle as a smart, liveable and sustainable city. Nathaniel is really interested in how the city can be a more creative, safe, connected, and socially diverse place.

What is a smart city?

Can technology make our city more liveable?

How will smart city technology affect our lives on a daily basis?

How can we use technology and innovation to harness the potential of our region for economic growth, jobs and a higher quality of life?

Smart Future Cities 2015 presents:
Newcastle Smart City Initiative

Come along and hear the answers to these questions.

Discover what is already in place, and what is just around the corner as Newcastle begins the transition to a smart city.

FREE Public Forum

Where: Newcastle City Hall, Newcastle

When: 2 October 2015

Time: 5.30pm - 7.30pm

Register: www.eventbrite.com/d/local/newcastle-smart-city-initiative

This is a FREE public event, but places are limited. Register now to avoid disappointment.

Oliver Yates

Chief Executive Officer, Clean Energy Finance Corporation

Suite 1702 1 Bligh Street

Sydney

NSW 2000

T: 1300 00 2332

E: o.yates@cleanenergyfinancecorp.com.au

W: www.cleanenergyfinancecorp.com.au



Mr Yates has over 20 years of global experience in corporate advisory, financial structuring, project finance, debt structuring, equity raising and listings, with extensive experience in clean energy. At Macquarie Bank he was involved in establishing new businesses and growing operations internationally, and leading the Bank's initiatives in wind, solar, biofuels, carbon credits and other renewable businesses.

Mr Yates has played key roles in clean energy, terrestrial and bio-sequestration and other solutions to the climate change challenge over many years. He established BioCarbon, a leading international project developer which invests forestry, land-use and sustainable energy service projects, as a joint venture between Global Forest Partners LP, the International Finance Corporation (IFC) and Macquarie Group.

He is an investor in and has held board positions on a number of innovative energy ventures. He participated in the South Australian Government's Green Grid study to look at unlocking renewable resources on the Eyre Peninsula and the Victorian Government study into carbon capture and storage (CCS) for the Latrobe Valley.

Mr Yates holds a Bachelor of Commerce from the University of Melbourne, and is a Graduate Member of the Australian Institute of Company Directors (GAICD) with an Advanced Diploma in Mastering the Boardroom.

Smart Future Cities Conference

The Newcastle Smart City Initiative is part of the Smart Future Cities 2015 conference which is being held at Newcastle City Hall from 1-3 October.

To find out more about the Smart Future Cities conference visit: www.smartfuturecities.com.au

The **Newcastle Smart City Initiative** aims to bring people together to make better use of technology and creative opportunities, and to build the foundations of a city and region that are continually seeking new ways to enable our communities to grow and flourish.

Hear from the experts who are leading Newcastle's smart city journey:

- **Mr Michael Nielson**
CEO of Newcastle NOW
- **Mr Bud Kapoor**
Manager of Cisco's Smart+Connected Communities Australia New Zealand
- **Dr Tarik Hammadou**
Tech Entrepreneur and CEO of Vimoc Technologies
- **Dr Nathaniel Bavinton**
Smart City Coordinator for the City of Newcastle

Facilitator and special guest: **Professor Ed Blakely**, Director, Future Cities Collaborative at University of Sydney.



Book now:
www.eventbrite.com/d/local/newcastle-smart-city-initiative

Mark Diesendorf

Associate Professor Interdisciplinary Environmental Studies

UNSW Australia

Sydney NSW 2052

Australia

E: m.diesendorf@unsw.edu.au

W: <http://www.ies.unsw.edu.au/our-people/associate-professor-mark-diesendorf>



Dr Mark Diesendorf is Associate Professor and Deputy Director of the Institute of Environmental Studies at the UNSW Australia. Previously, at various times, he was a Principal Research Scientist in CSIRO, Professor of Environmental Science and Founding Director of the Institute for Sustainable Futures at University of Technology Sydney, and Director of Sustainability Centre Pty Ltd. Currently his principal research is on rapid mitigation of global climate change and, in particular, integrating renewable energy on a large scale into electricity supply-demand systems. His most recent book is Sustainable Energy Solutions for Climate Change (UNSW Press and Routledge-Earthscan, 2014).

Abstract

Could Australia's energy system be transformed entirely to renewable energy?

Author: Dr Mark Diesendorf

Energy from fossil fuels is responsible for most of Australia's greenhouse gas emissions and is also a major cause of air pollution and associated respiratory diseases, water wastage, water pollution and land degradation. To develop a solution to these environmental and health threats, we consider energy use in each of its three forms: electricity, non-electrical heat and transport. Computer simulations of electricity supply-demand systems from many regions of the world, including Australia, show that 80-100% renewable electricity is technically feasible, reliable and affordable. In Australia 100% renewable electricity could be based on scaled-up commercially available technologies: wind, solar PV (both rooftop and solar farms), concentrated solar thermal with thermal storage, biofuelled gas turbines and hydro-electricity. Practical experience from northern Germany, Denmark and South Australia supports the validity of the electricity simulations. However, transforming heat and motor vehicle transportation to renewable energy is more challenging. The easiest pathway is to supply heat by renewable electricity, supplemented by direct solar heating, and most transport by electric vehicles (both public and private) and active transport. Only air transport and long-distance rural road transport cannot be electrified. For these modes a possible future pathway is to use renewable electricity to produce hydrogen fuel by splitting water.

Gary Ellem

Conjoint Academic & Program manager – Future Industries, Tom Farrell Institute for the Environment, University of Newcastle

E: Gary.ellem@newcastle.edu.au | M: 0423 163714

Dr Gary Ellem is a sustainability futurist working mainly in the areas of transport, energy and regional innovation. He identifies system scale opportunities which combine technology, business, regulatory and social innovation.

Dr Ellem received his PhD in Biophysics from the University of Newcastle (Australia) and followed on to lecture in Biology, Ecology and Sustainability Strategy. He has worked in industry as a Senior Scientist, Analyst and Strategist in the cleantech and digital innovation space, helping companies to identify technology and business pathways to new cleantech products and services.

Gary's is a national thought leader in sustainability and was recently invited to write for The Conversation where you can see his contributions including 'Peak fossil fuels won't stop climate change – but it could help' and 'Four ways to boost the Australian economy that could help the climate'.



Abstract

Getting smart about the smart transport revolution

If we are smart, Australia can use the emerging smart transport revolution to mitigate our exposure to almost \$1 trillion in imports of cars and oil over the next 10 years. If we are smarter we may even develop some high-tech industries for the future.

So how would we do it?

The smart transport revolution comprises an entire ecosystem of developments from embedded sensors, communication networks and the internet of things to driverless transport, personalised transport apps and big data transport analytics. To be operationalised these need to be implemented within a legal and policy framework and adopted by people as their preferred transport means.

What Australia needs is a test bed for smart transport systems where not only the new technologies, but their integration, legal and operation frameworks can be tested at appropriate scales. This presentation outlines some of the key physical, social and economic infrastructure that needs to go into a test bed and compares it with the capabilities of the Newcastle Smart City Initiative.

This talk is intended to focus and encourage an ongoing discussion as to how to match smart technology with smart strategic positioning to accelerate uptake and promote industries of the future.

Miroslav Svítek

Faculty of Transportation Sciences, Czech Technical University in Prague

Konviktská 20, 110 00 Prague 1, Czech Republic

E: svitek@fd.cvut.cz

Miroslav Svítek was born in Rakovník, Czech Republic, in 1969. He graduated in radioelectronics from Czech Technical University in Prague, in 1992. In 1996, he received the Ph.D. degree in radioelectronics at Faculty of Electrical Engineering, Czech Technical University in Prague. Since 2002, he has been associated professor in engineering informatics at Faculty of Transportation Sciences, Czech Technical University in Prague. Since 2005, he has been nominated as the extraordinary professor in applied informatics at Faculty of Natural Sciences, University of Matej Bel in Banská Bystrica, Slovak Republic. Since 2008, he has been full professor in engineering informatics at Faculty of Transportation Sciences, Czech Technical University in Prague. He is currently teaching courses and doing research in theoretical telematics, intelligent transport systems, smart cities, quantum system theory and quantum informatics. Miroslav Svítek is president of Association of transport telematics of the Czech and Slovak Republic (it covers more than 80 public and private organization), member of Engineering academy of the Czech Republic and Dean of Faculty of Transportation Sciences, Czech Technical University in Prague. He is author or co-author of more than 250 scientific papers and 10 monographs.



Abstract

Smart city - a big challenge

Professor Svítek examines the rationale of being part of a Smart City project. What are plausible outcomes and what are some of the ways to navigate towards these goals. For example the interaction between 'sharing models', such as for cars and bicycles, and the city's infrastructure, existing and future. Professor Svítek also discusses some challenges in planning based on often incomplete models, especially in the face of nonlinear and time dependent demand for services from a city's occupants, and he will also explore alliance formation. Professor Svítek calls for a multi-disciplinary approach in developing Smart Cities, beyond the dry technical level, to include the areas of economics, law, sociology, psychology and other humanistic disciplines.

Allan Ryan

Executive Director, Hargraves Institute

Mobile: 0418614243 | W: hargraves.com.au

Allan Ryan provides innovation advice, tools and training to organisations. He is a business founder that empowers people and teams to achieve more than they could by themselves. Currently Adjunct Professor at UTS Business School and Executive Director of Hargraves Institute, Allan works closely with Australia's leading innovative organisations as a coach, mentor, teacher and consultant. Recent clients include Veolia, CSIRO, Hong Kong Jockey Club, Horticulture Innovation Ltd, Coca-Cola Amatil, New Zealand Fruit Industry, Baxter Healthcare and Macquarie Graduate School of Management. In addition, as a Director of Arthritis NSW, Allan's objective is to grow awareness and support of bone related conditions affecting over 25% of all Australians.



Abstract

Collaborative innovation for every Australian

In one of his last presentations as Apple's CEO, Steve Jobs said his company lived at the intersection of 'technology' and 'liberal arts'. The future success of cities is the intersection of technology and people, productivity and empathy, coding skills and social interactions.

Recently Hugh Bradley, Chief Scientist at Telstra said 'The key to achieving Utopia will be making technology accessible and ensuring no-one gets left behind.' Social innovation, collaboration and shared value are the new tenants of successful cities.

This presentation will outline the strategies, principles and tools of innovation that are the building blocks for everyone to build a Utopia. Using case studies from successful innovative organisations, Allan Ryan, founder of Hargraves Institute, will outline how leaders and teams have implemented the building blocks for entrepreneurship and intrapreneurship. Hargraves Institute has been researching innovation and collaboration in Australia for nearly 10 years. Members and clients include many of Australia's most successful and innovative organisations, e.g. Cochlear, ResMed, Suncorp, Brookfield, AMP and The Dulux Group.

Participants will share in practical insights and actionable tools that will inspire change and action.

22 *Presenter Profiles*

Future Transport Strand

Tom Chen

Newcastle Business School, Australia

E: Tom.Chen@newcastle.edu.au

Dr Tom Chen is a lecturer in marketing at the Newcastle Business School at the University of Newcastle, Australia. He holds a PhD from Queensland University of Technology. His recent work investigates how and why consumers voluntarily engage in a value co-creation process. His recent publication in the Journal of Marketing Management proposes Experience Sharing as a value creation effort for the direct benefit of others. His current research interests include customer co-creation and engagement in sharing economy, social entrepreneurship and social innovation, transformative service and consumer research, social media and digital marketing.



Abstract

Understanding Co-creative Consumers' Psychological Ownership in the Sharing Economy

Widely applied in an organisational context, the psychological ownership concept broadly includes the facets of: (1) possession, (2) intimate interaction, and (3) have a place. Psychological ownership is defined as "a psychologically experienced phenomenon in which an employee develops possessive feelings for the target (Van Dyne & Pierce, 2004, p. 439)". Ownership of Value Initiation (OVI) is grounded on psychological ownership. OVI is defined as, "a psychological state of mind of entitlement, engagement, and empowerment emerging from a co-creation relationship, system, or environment". OVI supports the key concept of "service for service" within service-dominant logic (S-D logic) (Vargo & Lusch, 2004) and reflects the psychological state of competent and willing individuals who actively co-create value. OVI is important to service providers in three areas of the sharing economy. Firstly, OVI reflects the likelihood of an individual contributing to open innovation (e.g., crowdsourcing). (2) OVI helps to explain why actors engage or disengage in a service ecosystem (e.g., Apple and Android). Thirdly, in a collective consumption context (e.g., bike sharing), OVI shows one's willingness to share one's resources reciprocally or non-reciprocally. In summary, OVI can help service providers to understand co-creative consumers' psychological ownership of their contributions in service co-creation and the factors that aid in sustaining their contributory behaviours.

Andrew Lang

E: andrewlang001@bigpond.com

Andrew Lang trained as an agricultural scientist and is a farmer and farm forester near Ballarat in Victoria. He is a Churchill and Gottstein Fellow and is a vice president of the World Bioenergy Association and the board member representing Australasia-Oceania.

During the eight years involvement with the World Bioenergy association he has gained a good understanding about issues and technologies related to energy from wet and dry municipal wastes, agricultural residues and forestry residues. He is presently working on reports on biofuels and biogas.

Abstract

Electric vehicle rollout in Denmark and biofuels development in Sweden, Denmark, Austria, Germany and Brazil.

While many countries are seeing the direction of low emission transport to 2050 as being most rationally managed by development of one or more biofuel options, Denmark is one country that is investing heavily on rolling out an electric vehicle charging network, and on stimulating the public to move toward this option.

This is influenced by their present development of electricity from wind, and investment in smartgrid technology. While Denmark has the ready access to almost instant balancing supply of hydropower from Norway and Sweden via heavy AC and DC connectors, being able to access the storage capacity of batteries of millions of vehicles is clearly also a way to balance the fluctuating electricity production from wind.

Sweden is an example of the alternative development program and this country is aiming to cease import of all fossil fuels by 2030, including for fueling light and heavy vehicles. Already the Swedish rail system is almost entirely electrified, and the majority of new vehicles sold are designed to use one or other of the 'safe' fuels. City buses in most larger and many smaller cities run on biomethane, ethanol or biodiesel. The heavy truck manufacturers Volvo and Scania have completed trials to assess practicality of these fuels and other alternatives including methanol, dimethyl ether and liquified biomethane.

Production of biofuels is not new in Europe, with biodiesel being made in Austria since the early 1990s and cellulosic ethanol in Norway since at least the 1960s. Sweden continued to do development work on charcoal gasifiers into the 2000s, and also in the 2000s several Nordic companies are engaged in commercial production of 'drop in' or renewable diesel fuel from the fatty acids produced as a by-product of making pulp from conifers. Germany has maintained a technical leadership in the Fischer Tropsch process which allows almost any biomass to be the feedstock for making biofuels that are chemically identical to the petroleum derived fuels.

Work by Inbicon in Denmark prior to COP 15 in Copenhagen in 2009 produced industrial volumes of cellulosic ethanol from straw, and this technology or variations of it is now producing ethanol at commercial scale from various forms of agricultural ligno-cellulosic material in Brazil, Italy, USA, and Denmark, with strong interest from other countries that can economically bring together major amounts of this feedstock. Brazil is already notable for its production of cane ethanol, and that almost all of its spark ignition vehicles are able to be fueled by 100% ethanol (including a significant fraction of its agricultural spray planes)

So, provided there are no global catastrophes in the meantime, it seems likely that the scene with both light and heavy vehicles in 2050, including in Australia, will contain both electric vehicles, biofuelled vehicles, and a number of hybrid options, including vehicles powered by hydrogen or biomethane fuel cells.



David Wilson

Principal Transport Planner

Major Project Transport Planning

Planning and Programs

Transport for NSW

Email: David.Wilson4@transport.nsw.gov.au

Office: 02 8265 7231



David has extensive experience leading teams at senior levels of government in Australia, UK, USA, Africa, the Middle East and Europe including over ten years working in Australia for Transport for NSW and as an advisor to the NSW State Planning and Environment Department in Sydney, as well as Transport for London and English Partnerships in addition to significant transport and land use planning consulting experience in the private sector.

David is based in Sydney and has dual qualifications in urban planning and practical experience in integrated transport planning, strategic planning, and multi criteria assessments of projects. David is a leading strategic thinker interested in the planning implications of road vehicle automation technologies and their potential impact on the future design of cities. He will illustrate his research into Smart cities and Smart teams in Beijing, Singapore, Nevada, Eindhoven and Newcastle.

Abstract**Ideas for disruptive innovation**

What sets smart cities apart? They have adopted new ideas and changed priorities to reduce traffic congestion, pollution and energy use. This may sound easy but it is not. Reshaping transport networks and fossil fuel vehicles is being vigorously opposed by vehicle owners and entrenched vested interests. This paper examines the birth pangs of disruptive innovation that are forcing change on transport networks and the design of our cities.

The ideas I intend to explore include:

- Changing the DNA of global vehicle designs
- Interactive linkages between vehicles, transport networks and the internet
- Recharging vehicles through renewable energy
- Adapting vehicles to respond to future city design
- Behavioural change by car drivers from using carbon fuels to smart energy

Four solutions will be assessed to transform cities and vehicle use by designing:

- Seamless cities – free of barriers
- Reconfigured cities – through redefining the urban shape of cities
- Networked cities – through transformational change in personal mobility
- Social cities – with a density of uses and interactions

Cities are dependent on flows of energy, goods and people. Their success is dependent on legibility and self-governance. Sprawl is unsustainable. Smart cities are the cure.

Graham McCabe

Service Leader – Transport Optimisation and Planning, GHD

T: +61 2 9239 7625

E: graham.mccabe@ghd.com

Graham McCabe is Service Leader, Transport Optimisation and Planning with GHD. He leads a team of multi-disciplinary professionals who are developing new and optimised transport systems for clients including the Australian and NSW Governments. During his career he has created advances in transport by introducing separated two-way bicycle paths into the Sydney CBD and inner Sydney, doubling the use of cycling in the area. He has also used large data sets such as those from traffic modelling and bus tracking to develop methods for monitoring congestion using limited sources. Graham has previously worked for Transport for NSW, Roads and Maritime Services and the Council of the City of Sydney.



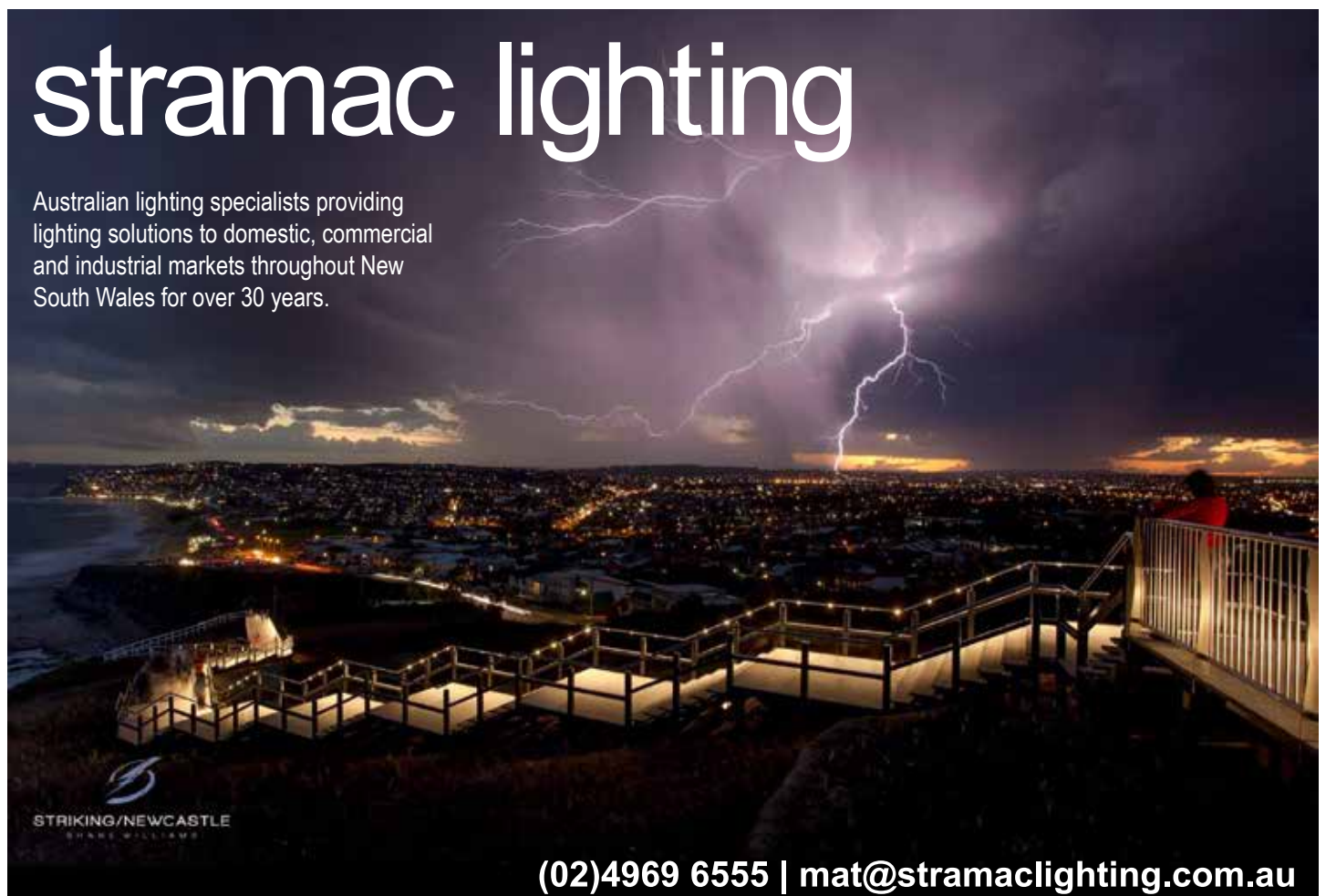
Abstract

Will we need so many roads?

Currently road networks are designed and constructed based on vehicle fleet projections. The development of smart, connected vehicles and automated vehicles will have a significant impact on the width of roads, the amount of parking required and how we travel around. This presentation considers the impact of increased automation on the way we plan and design road networks and alternate uses of existing traffic lanes and parking to create a more sustainable transport system.

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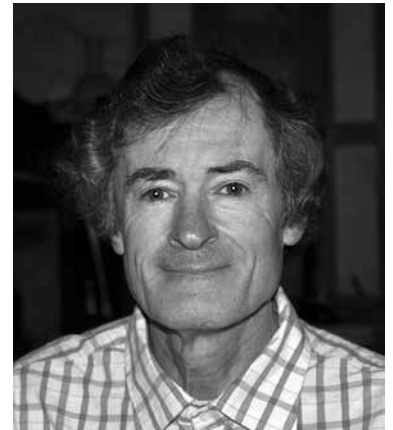
Ian Donovan

17 Bennett Street

Hamilton NSW 2303

E: planplus@idl.net.au

Ian is a town planner with extensive experience in local government, the NSW Environment Protection Authority, and as a planning consultant. He currently lectures in planning at the Faculty of Engineering and Built Environment, University of Newcastle. A particular interest is achieving better integration of accessibility, natural resource management and biodiversity conservation goals through regional and local planning. He is the recipient of several planning awards. Ian is also president of the Hunter Branch of the National Parks Association of NSW, and edits its newsletter *Nature News Hunter Region*.

**Abstract****Smart accessibility: shaping the Lower Hunter Region for the 21st century**

Despite being Australia's sixth largest urban region (population 2014: 562,500, similar to Canberra, Hobart and Darwin combined, and expected to reach 760,000 by 2030), planning and provision for public transport in the Lower Hunter arguably receives little more priority than in a large country town. Long-term under-investment in public transport and poor integration with urban planning have contributed to very low patronage levels. However, growing population and congestion, transition from a consumption economy, the 'peak car' phenomenon, decarbonisation of urban transport and others factors all point to the need for significant rebalancing between public, private and active transport modes, with an emphasis on 'accessibility' rather than 'mobility'. The issue has been heightened by the contentious removal of a key segment of the regional rail network. In contrast, comparable medium-sized cities overseas have been extending their rail networks. The presentation will examine six key actions for reshaping inter- and intra-regional accessibility to meet the needs of the 21st Century:

1. Planning for high speed rail
2. Bringing intercity rail up to scratch
3. Re-routing the East Coast rail freight corridor
4. Shifting to a 'network effect' public transport system
5. Locating travel-generating activities according to accessibility
6. Reforming regional public transport governance.

Bruce Thompson

Director, Major Projects
Moreland Energy Foundation Limited
Suite 6, Level 1, 200 Sydney Road,
Brunswick, Victoria 3056

P: +61 3 9385 8511

M: +61 (0) 400 628 600

E: bruce@mefl.com.au

Bruce has a technical background in energy management and extensive experience in community partnership development, working for many years in advocacy roles for a national environment NGO and supporting regional and indigenous communities understand and respond to uranium mining issues. He holds a Masters degree in Engineering (Renewable Energy) and Graduate Certificate in Project Management.



Abstract

ZNET Town Project

MEFL and its delivery partners were employed by NSW Office of Environment and Heritage to develop a strategy for Uralla to be Australia's first 100% renewable community and establish a blueprint for others to follow. Z-NET is initially a target for stationary energy and excludes transport fuels such as petrol and diesel. Uralla's current stationary energy needs comprise electricity (49%) and firewood (45%) with a modest use of LPG gas (6%). Uralla currently spends approximately \$12M per year to meet these needs.

The project considered a range of possible options to use less energy, understand what can be generated locally or nearby and compared this to what could be imported from other regions. Each option was evaluated on its technical feasibility, financial viability and social desirability. This was tested with the community through a strong local community engagement process for its suitability and probable uptake levels catering for the peculiarities of the region.

The Z-NET Blueprint delivers immediate, measurable benefits to the local community. It provides the foundations to adopt large-scale generation or import renewable energy in the most competitive way. It also provides a blueprint for strategy development for other towns and regions in rural Australia.

Stuart Blanch

CEO, Hunter Wetlands Centre Australia

T: +61 2 4951 6466 | M: +61 (0)403 209 805

W: www.wetlands.org.au | E: ceo@wetlands.org.au | F: <https://www.facebook.com/wetlands>

Dr Stuart Blanch is passionate about renewable energy and helping the community and small business go solar. He has worked in the community environment sector, NSW Government and in ecological research for 22 years. He commenced in the role of CEO of Hunter Wetlands Centre Australia in October 2014, where he is leading development of new strategic initiatives. He hosted the Northern Territory's first Solar Summit in 2013, was a Member of the NT Green Energy Taskforce, and co-hosted a workshop to scope construction of a High Voltage Direct Current DC cable from Darwin to Indonesia to create a Australia-Asia Interconnector to enable regional generation and transmission of renewable energy. He spent a decade as a river researcher, environmental campaigner and policy analyst on river management and environmental flows in the Murray Darling Basin. For the past decade he lived and worked in Darwin where he was a leading voice on conserving and sustainably developing Northern Australia.



Abstract

Hunter Wetlands Solar: Harnessing community power for renewable energy

Hunter Wetlands Centre Australia (HWCA) is installing 12 kW of solar panels to generate up to 20% of its average daily power use. HWCA is a community-owned, not-for-profit charity that has restored & protected 43 hectares of wetlands on the edge of Hexham Swamp. HWCA celebrates its 30th anniversary in 2015, including by going solar and becoming carbon neutral for its stationary energy.

The \$20K solar investment is being funded through sponsorships from community members and The City of Newcastle, in a new partnership the Clean Energy Association of Newcastle and Surrounds (CLEANaS), which is supported by a grant from the Regional Clean Energy Program of NSW Office of Environment and Heritage.

The solar array involves 48 Tier 1 SunTech panels installed by ACS Solar, coupled with new generation M215 microinverters by Enphase. Energy generation data will be viewable on a real time display in the HWCA Visitors Centre to raise awareness about renewable energy, climate change and wetlands.

The presentation will detail technical, power generation, savings on power bills, fundraising and partnership aspects of the Hunter Wetlands Solar initiative, as well as future stages, eg, installing battery storage and more panels, purchasing electric vehicles, and installing energy efficient fittings/appliances.

Alec Roberts

Chair CLEANaS

M: 0434 189 454 | W: <http://cleanas.org.au/> | E: alec@cleanas.org.au

F: <https://www.facebook.com/cleanas.org.au>

Alec Roberts is a project manager, community renewable energy advocate and the current chair of CLEANaS (Clean Energy Association of Newcastle and Surrounds). CLEANaS is a not-for-profit association that aims to drive the uptake of renewable energy generation technologies in Newcastle and surrounds with the goal of 100% renewable energy for Newcastle. CLEANaS members aim to do this through developing projects to provide opportunities for community funded renewable energy installations and by running events and initiatives to educate members and the public about the opportunities that exist in participating in clean energy. The key reason for their success to date is the highly motivated and well organised active membership.



Abstract

Lighthouse Community Energy Project

CLEANaS first project delivered the Lighthouse Toolkit, a model to make it easier for community groups to own and profit from solar installations which generate clean energy for direct use by local businesses and organisations. The Lighthouse Community Energy Project will refine this model to develop an effective community energy financing mechanism, engage the community about the benefits of community owned clean energy, gauge the level of interest, and establish a critical mass of project sites ready for implementation. The current business model used for community investment in individual solar installations restricts the number of investors to 20 "sophisticated, experienced or professional investors". For installations such as at community facilities, there is little opportunity for the general community to invest. By lowering the investment threshold and removing the limitation on the number of investors, the new model will remove the restrictions on everyday members of the community, and will enable the community at large to invest in projects that they are passionate about for as little as say, one hundred dollars. Those on lower incomes will have the opportunity to benefit financially by investing in solar panels on their local community centre.

David Adamson

Research Development Manager, Compass Housing Services

T: +61 428 469 890

E: DavidA@compasshousing.org

Donald Proctor

Group Manager Assets, Compass Housing Services
President Australasian Housing Institute
Research Development Manager

T: +61 2 49202600

E: DonaldP@compasshousing.org



David Adamson

Dave Adamson is Research and Development Manager at Compass Housing Services, Newcastle, NSW. He recently arrived in Australia and retains the title of Emeritus Professor at the University of South Wales, UK, where he worked for 30 years and held the Chair of Community and Social Policy. He has extensive experience of research, evaluation and policy development in regeneration and anti-poverty related areas and has worked with a wide range of partners including the Welsh Government, third sector organisations, housing providers and local authorities. He has published widely in the field of area-based regeneration in Welsh and UK policy. His current interests include regeneration policy, measuring impact, environmental resilience, low carbon transition planning and housing-led regeneration.

Donald Proctor

Donald Proctor has an honours degree in architecture and a masters degree in urban & regional planning from the University of Sydney.

He worked with Housing NSW as an architect, strategic planner and asset manager for over 20 years. Until 2013 he was Director of Asset Programs for the NSW public housing asset portfolio.

In 2013 Donald held the post of Practitioner in Residence with the Henry Halloran Trust at University of Sydney, where he researched "Workplace Communities of Practice".

Donald currently holds the position of Group Manager Assets, Compass Housing Services, one of the largest Community Housing Providers in Australia. He is also the current President of the Australasian Housing Institute, the professional body for social housing professionals in Australia and New Zealand.

Abstract

Aligning social investment with clean energy infrastructure: The Deep Place Approach

Contributors: Professor Dave Adamson: Research and Development Manager Compass Housing Services, Emeritus Professor University of South Wales UK. Donald Proctor: Group Manager, Assets, Compass Housing Services.

Climate change particularly impacts disadvantaged communities (Benzie et al, 2011) and discussions of climate social justice have highlighted the ways that people experiencing poverty are at risk both from climate change itself and mitigation policies such as carbon pricing and water supply pricing (Preston et al, 2014). Ensuring protection of the most vulnerable is of major significance to housing organisations who manage the social context of their tenants as well as their physical environment. Where alignment between these two domains of responsibility can be achieved, successful outcomes for the tenant, the housing organisation and the achievement of low carbon objectives can be successfully delivered.

The paper will outline the Deep Place (<http://bit.ly/1m6GqcQ>) approach developed in the UK and at an early stage of application by Compass Housing in Australia. The Deep Place approach combines the alleviation of poverty with the achievement of environmental sustainability. By installing energy conservation and generating capacity at household level, personal energy security, reduced costs and carbon reduction can be achieved. Implementation at scale provides employment opportunities and contributes towards poverty alleviation. We will illustrate the paper with a case study of a photo-voltaic retro-fit program initiated by Compass Housing, which is one of the largest Community Housing Providers in Australia, based in Newcastle.

References - Magnus Benzie, Alex, Harvey, Kate Burningham, Nikki Hodgson and Ayesha Siddiqi (2011, Vulnerability to heatwaves and drought: adaptation to climate change. Joseph Rowntree Foundation: York

Ian Preston, Nick Banks, Katy Hargreaves, Aleksandra Kazmierczak, Karen Lucas, Ruth Mayne, Clare Downing and Roger Street (2014), Climate change and social justice: an evidence review. Joseph Rowntree Foundation: York

Panel Session - Virtual Net Metering and local network charges in Australia: an update

The rapid penetration of small-scale distributed electricity generators in distribution networks has been driven by a number of factors, including community interest in low-carbon and renewable energy and the decreasing cost of alternative generation technologies, especially solar PV. Under the prevailing electricity market structure these projects are generally only cost effective if most of the output is consumed on-site. If it was possible to transport excess energy to other sites in the vicinity then it could improve project performance, and would certainly allow project proponents to consider larger systems. However, distribution businesses do not currently offer tariffs to reflect partial use of the electricity network, and retailers do not offer a standard netting off service where energy is shared between multiple sites (referred to as “virtual net metering”). Local councils in Australia have emerged as key proponents of network tariff reform and virtual net metering due to their interest in reducing their greenhouse footprint and encouraging the growth of distributed generation reducing energy costs across their facilities.

This will be a 60-minute panel session with presentations followed by a structured discussion and Q&A session. The session will include an introduction of a research initiative by the Institute of Sustainable Futures with representation from two local councils - Byron Shire, and the City of Sydney.

Speaker bios

Jay Rutovitz

Research Principle, Institute for Sustainable Futures, University of Technology Sydney
E: Jay.Rutovitz@uts.edu.au

is an environmental scientist and energy specialist who has worked in renewable energy and energy efficiency since 1994, after 15 years in the electrical contracting business. She has worked on precinct scale options for designing energy smart solutions, was the lead author for the NSW Bioenergy Handbook, and worked on the early development of Network Opportunity Mapping. She has a particular interest in the integration of renewable energy and demand side options into the energy system.



Chris Barrett

Commercial Manager, Green Infrastructure, City of Sydney
E: cbarrett@cityofsydney.nsw.gov.au

is a member of the Green Infrastructure Team at the City of Sydney. The team delivers on energy, water and waste elements of the City's 2030 Sustainable City Vision. A key component is the decentralised energy master plan which involves changes to the national electricity regulatory framework. Chris's background includes electricity distribution, strategic planning and economic development in NSW, Qld and Victoria.



Sandi Middleton

Sustainability Officer, Byron Shire Council E: Sandi.Middleton@byron.nsw.gov.au

is the Sustainability Officer for Byron Shire Council, responsible for the implementation of the Low Carbon Strategy. Sandi has over 11 years' experience in leadership roles in both the private and public sectors, and is a professional sustainability leader, program manager, community capacity builder and sustainability coach. Sandi was previously the Queensland regional leader for the National Energy Efficiency Network, creating communities of practice around energy efficiency in the not for profit sector. Sandi specialises in creating sustainable change in our communities for the better.



Moderator bio

Andrew Mears

CEO, SwitchDin Pty Ltd E: andrew.mears@switchdin.com

is an electrical engineer, policy specialist, and entrepreneur with more than 20 years of experience in the areas of renewable energy, climate change and resource efficiency covering Asia & Pacific, Africa and Australia. He has worked as an academic, consultant, and in senior lead roles including with the United Nations and the World Bank. Dr Mears is a recipient of the 2011 Newcastle University Alumni award for International Leadership and is co-founder of the Newcastle-based clean tech and smart city co-working space Eighteen04. Recently he founded SwitchDin, to develop a virtual power management platform for renewable energy and battery storage.



Peter Jamieson

Director, Umwelt (Australia) Pty Limited
75 York Street
Teralba, NSW 2284

P: +61 2 4950 5322 | M: +61 (0)417 675 377

E: pjamieson@umwelt.com.au | W: www.umwelt.com.au

Peter is a Director of Umwelt (Australia) Pty Limited and has 25 years experience in environmental assessment, environmental engineering, catchment management, coastline management, design of surface and groundwater management systems including flood and groundwater modelling and environmental research projects. Peter has prepared and presented in excess of 30 expert reports in relation to soil and water management, flooding, management of urban and industrial stormwater and groundwater the Land and Environment Court and to Commissions of Enquiry.



Abstract

Adaptive building re-use – 75 York Street Teralba

The proposed presentation would be on Umwelt's head office at 75 York Street Teralba. The sustainability design attributes of the building include:

- Adaptive reuse of the 1925 former Teralba Co-Operative store heritage building.
- High thermal mass combined with 3800 m of hydronic piping embedded in thick concrete slabs and 100 metres of chilled beams. Building temperature is controlled by heating and cooling the water in the pipes and chilled beams using a reverse cycle system.
- An additional 1200 metres of condenser piping is located 3 metres below the car park to assist in heating and cooling water from the reverse cycle systems. Solar hot water is also used in heating the building.
- Doubly insulation roof, extensive solar panels, wide eaves, louvers and landscaping to reduce building heat load.
- Passive ventilation via doors, windows, stairs and buildings 'chimney' effect.
- Low E Comfort Glass to reduce heat load in summer and heat loss in winter
- LED lights throughout the building.
- 28,000 litres of rainwater gravity fed to toilets and landscaping.
- 35 kW of solar panels producing approximately 135,000 kWh/year of electricity using thin film solar panels which perform better in low light and require 30% of energy to manufacture compared to monocrystalline panels
- 100 kWh of battery capacity powering server and communications for up to 20 hours during blackouts.
- Extensive landscaping including a roof top garden that links to the conference area and extensive under covered deck to enable greater use of the outdoors as part of everyday office life.

Our building won the heritage category of the Lower Hunter Urban Design Awards in 2013, is nominated in the LHUDA 2015 40th anniversary "Enduring Urban Design" awards and won the 2013 Lake Macquarie Business Excellence Award for Sustainable Business Practices.

Kathryn Maxwell

Sustainability Living Coordinator, Lake Macquarie City Council

Kathryn Maxwell has been working in the field of sustainability for many years and has recently joined Lake Macquarie City Council as Coordinator of the Sustainable Living Team. This team has responsibility for projects which achieve reductions in greenhouse gas emissions, water savings, green buildings and reducing waste to landfill. Previously, Kathryn has worked for the New Zealand Government implementing their sustainability program including developing minimum standards for government buildings, vehicles, consumables including office paper and sustainability reporting. Kathryn also worked as Sustainability Manager for the New Zealand Department of Conservation from 2008-2011. The work undertaken during this time received the 2010 Energy Efficiency and Conservation Agency award for public sector. Key projects included installing renewable systems and energy efficiency measures on a number of remote islands and developing and implementing a workplace travel plan in large offices. Kathryn worked for the Australian Federal Government in 2011, implementing the Energy Efficiency Information Grants program. Kathryn also has experience implementing a number of energy efficiency measures on community buildings for Devonport City Council and Alpine Shire.



Abstract

Emerging Technologies Delivering Efficiency and Environmental Benefits

City planners are increasingly under pressure to keep up with emerging technologies that will help deliver services more efficiently and cost effectively. Similarly, local governments are increasingly playing their grass roots role in the worldwide movement towards social and environmental sustainability. Councils, however, are challenged with balancing the drive for continual improvement and guiding their cities into the future, with minimising the risks of implementing new technologies. Driven by environmental targets, Lake Macquarie City Council has implemented a variety of innovative projects to improve its facilities including: solar car park lighting; LED office lighting; smart water metering; centralised irrigation control systems; procurement of the first NSW LED flood lighting for a sports field; and turning its Administration Building into a 178kW solar power station. Council is proposing to present these case studies, outlining the cost savings to the community and the environmental benefits that smart technologies employed by Councils can deliver. Lake Macquarie City Council will share the successes and challenges inherent in bringing these projects to fruition.

Suzanna Remmerswaal

Sustainability Consultant, AECOM

P: +61 2 8934 0683 | E: Suzanna.Remmerswaal@aecom.com

Suzanna combines her experience in sustainable building engineering with her knowledge of urban planning to provide a valuable nexus across urban systems. Her experience in leading multidisciplinary teams to sustainability certification under a range of frameworks provides depth and support to the advisory team in IS accreditation and GS accreditation.

Suzanna is currently working on road and rail infrastructure projects, two Green Star Communities projects, and a low carbon precinct optimisation project for Broadway.

Suzanna is the chair of the Local Government Working Group for the Infrastructure Sustainability Council of Australia, Chair of Consult Australia FutureNet Sydney, and a member of the Green Building Council of Australia - Design and As Built Technical Advisory Group. She holds a Bachelor of Engineering with Honours (Natural Resources), and is completing a Masters of Planning in 2015.



Abstract

Transitioning precincts: How can we better optimise, integrate and communicate?

Transitioning precincts: How can we better optimise design solutions, integrate new development into existing community structure, governance, and finance models and communicate with key stakeholders? Projects such as transitioning the Broadway precinct in Sydney, NSW to a low carbon and low energy precinct offer opportunities to establish processes for implementation across Australia. Tools such as the Sustainable Systems Integration Model (SSIM), Precinct Information Modelling (PIM), and Green Star Communities can be used to ensure that precinct design responds to the key issues facing precincts and communities. Successful precinct transition also requires understanding of communities key concerns and clear communication of how future development addresses these concerns. Visualisation and modelling results linked to tools like SSIM can provide quantitative information whilst also providing a platform for further community engagement. Finally, the successful transition of precincts require integration of development into existing governance and finance models, as well as community and social structure and policy of future communities. The success of car sharing schemes and others show the importance of mechanisms with support collaborative consumption and how they will shape our future communities.

Conclusions:

Successfully transitioning precincts to low carbon and low energy precincts requires optimised design solutions which clearly address community concerns and are able to integrate with existing governance and community structures.

Ashley Young

Senior Clinical Business Analyst, Clinical Telehealth, Information Technology & Telecommunications

Lookout Rd, New Lambton Heights NSW 2305

T: +61 2 4921 3050 | M: +61 0414 899 078

V/C Alias: 64141 | Scopia: [665673](https://scopia.com.au/665673)

E: ashley.young@hnehealth.nsw.gov.au

W: <http://www.hnehealth.nsw.gov.au/telehealth>

Mr Ashley Young is a Senior Clinical Business Analyst with Hunter New England Health in NSW, leading the implementation and mainstreaming of telehealth as a standard mode of service delivery across all specialities and disciplines in the district.

A pathology scientist by background, Ashley moved into redesign project management roles in 2005, and into IT system design and implementation in 2010. Hunter New England Health is successfully delivering clinical telehealth services to patients in their homes, at their GP practices, Aboriginal Medical Services and Aged Care Facilities, and lobbying hard to mainstream the service delivery for the benefit of all patients when clinically appropriate.



Abstract

Hunter New England Health Clinical Telehealth – Saving Precious Time

Hunter New England Health (HNE Health) provides public health services to the Hunter, New England and Lower Mid North Coast regions. We service the health needs of 850,000 people, employing 15,500 staff with an annual expenditure budget of \$1.8billion and spanning 25 local government areas.

Every year, our patients are travelling over 20million kilometres to attend outpatient appointments at our tertiary referral hospitals in Newcastle, which is at great expense and inconvenience to them.

To address this, HNE Health is utilising smart technology through telehealth to transform the delivery and practice of clinical healthcare through a secure, virtual and mobile health environment. The provision of healthcare through this innovation is developing new models of care that are benefiting regional and rural patients, Aboriginal people, elderly, disabled and palliative patients. It is also continuing the delivery of world class care, while saving significant travel and personal costs and time for our patients.

Telehealth in HNE represents a shift in focus away from historical care models. Now patients can receive personalised care at home or much closer to home. Our focus is on embedding telehealth into all aspects of care delivery, and making it available and accepted across all disciplines and specialties.

Stephen Askew

Water Management Engineer, Hunter Water Corporation

36 Honeysuckle Drive
Newcastle NSW 2300
PO BOX 5171 HRMC NSW 2310

T: +61 2 4979 9776 | M: +61 (0)459 095 487 | F: +61 2 4979 9711

Twitter: [@hunterwater](https://twitter.com/hunterwater)

E: stephen.askew@hunterwater.com.au | W: hunterwater.com.au

Stephen Askew, an Environmental Engineer, has over 13 years' experience and began his career with the NSW Public Works, Government Architects Office as a Water Engineer. Stephen then undertook a role as a consultant engineer for VOS Group Pty Ltd, working on projects around the world. Stephen's current role is Water Management Engineer with Hunter Water Corporation.



Abstract

Leakage in Schools (LiS) Program

As part of its commitment to water efficiency Hunter Water undertook a trial of smart metering across ten schools in 2009. The smart meters identified leakage in these schools reducing water consumption by up to 31% with one school saving over \$20,000 in the 12 month trial. The trial identified actions with the potential to save schools between \$5,000 and \$9,000 a year off their water bills.

Due to the success of the trial, the Leakage in Schools (LiS) program was launched opening up involvement to schools with high water consumption from 2010 to as recently as June 2015. Currently there are 58 schools within Hunter Water's area of operations involved in the program.

The objectives of the program were:

- Encouraging schools to become water smart;
- Installing smart meters;
- Eliminating leakage;
- Empowering students to be water efficient;
- Build partnerships with NSW Department of Education and Communities (DEC) and Catholic Schools Office (CSO); and
- Assessing whether the water meter is appropriately sized.

Hunter Water is committed to water security through water efficiency, recycling and increasing water storages. Smart metering has the potential to play a significant role in empowering customers to become more water efficient and reduce unnecessary water loss.

Klara Marosszeky

Managing Director

Australian Hemp Masonry Company

M: +61 0422750612

E: klara@hempmasonry.com.au | W: www.hempmasonry.com.au

Klara Marosszeky has been involved in the Australian Hemp industry for 16 years in both the farming and construction sectors. Commencing with a 2ha agricultural trial in Wollombi in the Hunter Valley in 1999, she has grown on dryland as well as irrigated farms in NSW and has worked with farmers and processors throughout NSW since 2006. Through research at the Australian Centre for Construction Innovation at UNSW, she developed a Hemp Lime building material and construction process and provides training to architects, building designers, builders and owner builders. Klara is a qualified sustainability educator in the VET sector and home sustainability assessor, who until recently was employed as Project Manager Ecological Sustainability Initiatives for the North Coast Institute of TAFE. She is the Founding Chair of the newly formed Australian Industrial Hemp Alliance, Secretary of Northern Rivers Hemp Inc and Managing Director of Australian Hemp Masonry Pty Ltd.



Abstract

Hemp as carbon storage

Hemp lime or hemp masonry construction materials are increasingly attracting attention globally because hemp construction transforms infrastructure into carbon storage. It offers a solution to demands for zero-carbon construction, produces healthier homes and workplaces and has major potential in both mainstream and social housing and in commercial construction. Our research at UNSW from 2000-2006 resulted in the development of a range of Australian hemp lime building materials that to date have been used in 18 Australian homes and in the construction of the zero energy Green Gallery and Heritage Museum in the Singapore Botanic Gardens.

Hemp is a rapidly growing renewable biomass. Few durable building materials are made from renewable resources, let alone from a resource with such clear potential to create further green industry. With a new Hemp Mill in Dungog, this growing industry can make a significant contribution to creating a smart future for the Hunter region.

Hemp buildings have excellent thermal performance. The slow phase change material creates walls that are highly insulative, mitigate humidity and radically reduce operational energy costs. The materials are non-combustible, recyclable, light and easy to work with and breathable walls create healthy indoor air quality by enabling adequate air exchange.

AUSTRALIAN INSTITUTE OF ENERGY

Newcastle Branch

The Australian Institute of Energy is a not-for-profit professional association of people and corporations with a keen interest in the energy sector. The Institute was founded in 1978 and has eight regional branches around Australia.

Members have an interest in the production and use of energy and the social and environmental impact of such use.

The institute has no political or other formal affiliations.

Our mission is to promote a better understanding and awareness of energy issues as a contribution to the improved use of energy technology and the development of responsible energy policies.

More information can be found at www.aie.org.au



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AND USE OF ENERGY
AND IN RESPONSIBLE
ENERGY POLICIES.

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BRANCH

Jim Kelty (Honorary
Secretary)

0428 529 503

Jim.kelty@emsenergysavings.com.au

Meg McDonald

Chief Operating Officer, Clean Energy Finance Corporation

Suite 1702 1 Bligh Street
Sydney NSW 2000

T: 1300 00 2332

E: info@cleanenergyfinancecorp.com.au

W: www.cleanenergyfinancecorp.com.au

Ms McDonald was CEO of Low Carbon Australia prior to its merger with the CEFC. She has significant career experience in business and carbon policy. Ms McDonald had roles with Alcoa as President of Alcoa Foundation and Director, Global Issues, Alcoa Inc. in New York and General Manager, Corporate Affairs for Alcoa in Australia. Before joining Alcoa, she was a senior Australian diplomat, holding roles including Australia's Deputy Ambassador to the United States, where she played a central role in the establishment of the Australia-US Free Trade Agreement. As Australia's Ambassador for the Environment in 1997-98, Ms McDonald was Australia's lead negotiator for the Kyoto Protocol and played a key role in shaping those negotiations and other environment treaties.

As CEO of Low Carbon Australia, Ms McDonald led the development of innovative financial solutions to Australian business, government and the wider community to encourage action on energy efficiency, cost-effective carbon reductions, and accreditation for carbon neutral products and organisations. Low Carbon Australia financed a range of individual energy efficiency projects, and significant investment partnerships in excess of \$80 million, generating a flow of new financing of more than \$270 million for energy efficiency and low emissions technologies in the marketplace.

Ms McDonald holds an Honours Degree in Applied Science from the University of NSW.



Abstract

What role does the CEFC play to help catalyse the investment required to finance Smart Future Cities?

Building Smart Future Cities will require significant investment in transport, clean energy and more efficient infrastructure and buildings. The Clean Energy Finance Corporation (CEFC) was established to help facilitate flows of finance into the clean energy sector and invests in renewable energy, energy efficiency and low emissions technologies that benefit businesses, local councils and households across Australia.

The CEFC, through its investment of over \$1 billion in renewable energy and energy efficiency across Australia, has identified extensive economic, social and environmental benefits for cities to become smarter, cleaner and more productive with their use of energy.

In the presentation, Meg will provide case studies and lessons from projects the CEFC has funded that will provide insights into some of the challenges and opportunities in building Smart Future Cities. The presentation will address the financing challenges these projects faced and how the CEFC has worked with businesses, councils and co-financiers to help overcome these challenges.

Plenary Session Presenter Profiles

Mark Davis

Manager, Business Engagement, Community Energy Programs, Department of Industry and Science

E: Mark.Davis@industry.gov.au

P: +61 2 6213 6000

Mark Davis is Manager of the Business Engagement Team within the Department of Industry and Science. In this role, Mark is responsible for the Emissions Reduction Fund and Clean Technology Program. Prior to this, Mark managed the Energy Efficiency Information Grants and Low Income Energy Efficiency programs, which were established to help businesses, community groups and low-income households use energy smarter.

Mark has worked in all three tiers of government on a range of built environment policies and programs. This includes stints on the NSW South Coast and Snowy Mountains, Sydney and Canberra.

Mark has formal qualifications in construction and management. This includes a Master's degree from the University of Newcastle.



Abstract

In 2011 the Australian Government initiated a suite of energy efficiency programs to complement its efforts to reduce greenhouse gas emissions. The programs targeted local government and community organisations, small and medium-sized businesses and low-income households. In addition to environmental benefits, the programs were designed to provide substantial economic and social benefits to participants.

Over 440 projects worth a total of \$350 million have funded the installation of a range of technologies in council and community-use facilities; the delivery of practical energy efficiency advice to diverse business sectors; and a number of different approaches to reduce the burden of energy costs on the budgets of low-income households.

A significant by-product of the programs has been the large amount of data collected and the plethora of energy efficiency material developed. Analysis of the data and lessons learnt, including the many real-life experiences from participating businesses and households, provides a fascinating tapestry of lessons about energy efficiency. Certain technologies have proven to be much more viable than others when retrofitted into existing facilities; unexpected energy-saving opportunities have been uncovered in some unlikely business sectors, and there have been some extraordinary results from the work carried out with low-income households.

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Tim Wong

Senior Project Officer - Markets and Finance

Office of Environment & Heritage, NSW Department of Planning and Environment

PO Box A290 Sydney South NSW 1232

T: +61 2 8837 6027

E: tim.wong@environment.nsw.gov.au

W: www.environment.nsw.gov.au



Tim Wong is a Senior Project Officer with the Office of Environment and Heritage (OEH), responsible for the Markets and Finance (Business) unit which manages the Environmental Upgrade Agreement program as well as supporting businesses sector with understanding financing for clean energy.

Before joining OEH, Tim worked for a number of accredited certificate providers under the NSW Energy Savings Scheme. He has also supported businesses operating under the Victorian Energy Efficiency Target Scheme.

Prior to this Tim worked for Thomson Reuters as a commercial manager where he developed some of the first Australian information services reporting on climate change and the implications for the commercial sector.

Abstract

How is OEH assisting businesses to utilise finance as means of implementing clean energy solutions into their operations?

As a major user of energy the business sector will play a major role in Building Smart Future Cities and this will be underpinned by access to suitably structured finance. The Office of Environment and Heritage (OEH) is assisting businesses understand the evolving market for clean energy finance through the provision of independent information that reviews the commercial rationale for these activities and the various options that are currently available.

OEH is also supporting NSW businesses through Environmental Upgrade Agreements (EUA) which can be used to fund a wide range of upgrades including clean energy solutions.

In the presentation, Tim will give an overview of OEH's recently issued finance guides covering both energy efficiency and renewables and recent EUA developments including market development initiatives targeting key sectors such as commercial size solar.

Plenary Session Presenter Profiles

Khimji Vaghjiani

Manager Innovation & Collaboration

NSW Department of Industry

Level 48| MLC Centre | 19 Martin Place | Sydney NSW 2000 | GPO Box 5477 | Sydney NSW 2001

E: khimji.vaghjiani@business.nsw.gov.au

W: www.business.nsw.gov.au



Khimji has recently been working across transport & logistics / E-Health/E-Learning / web semantics, data analytics big-data, manufacturing and renewable energies as part of the Innovate NSW grant funding program for the NSW Govt.. Developing, assisting and mentoring entrepreneurial businesses form collaborative open innovation networks, managing various stakeholders from government, industry and academia. Assisting companies with MVP, minimum viable product development and lean cans across a range of industry disciplines. Managing technology transfer projects and IP development.

Previously, Khimji designed, developed and has exported the solar off-grid product to 18 countries around the world and has 25 years' experience combining Solar, R&D, technology management/venture & commercialisation within banking, telecommunications, manufacturing and R&D, combined with 5 years as Director of a \$100m CRC for Smart Technology. Khimji ran the Corporate Venture capital unit with Westpac wherein he would conduct technology due diligence, and full compatibility of SME within Westpac. Named Australian Innovator of the year 2010 for the innovative solar off-grid product, also awarded the Australian International Design Award 2010 for internationalising the solar product. Won the TECH23, for the most innovative company (Global Sustainability) in Australia in 2010.

Abstract

Innovation Trends for Smart Communities

Innovative solutions emerging from the NSW entrepreneurial community is a useful lead indicator of the use of enabling technologies as well as the development of smart solutions.

Innovate NSW, a state funding program facilitates the development of smart technologies with funding to scalable and global business ideas. The Program has been running for 2 years with over 1000 applications and over 200 projects being funded across a range of industry verticals and technological solutions and grant sizes.

The presentation will provide a glimpse of these emerging trends and showcase a number of successful case studies.

Kyle Loades

President, National Roads and Motorists Association

P: +61 2 92767211 (Office of the President)

E: Kyle.loades@mynrma.com.au

Kyle was appointed President of the National Roads & Motorists Association in July 2014 to oversee the continued growth of one of Australia's most iconic brands. He was first elected as a Director representing members of the Hunter and Central Coast region in 2006 and during this time he has been pivotal in the development of an integrated transport plan to assist with planning of services for the expected increase in population in both regions.

Kyle is also the current Chairman of Hunter Medical Research Institute Foundation, a TAFE NSW Ambassador and he was the President of the Hunter Business Chamber from 2004-2006. He served as a Director of the Westpac Rescue Helicopter Service for 16 years.

He is the founder of Auto Advantage, an independent motor vehicle advisory and buying service that he established in 2001, which provides services Australia-wide from offices on the Central Coast, Newcastle, Sydney, Melbourne, Brisbane and Perth.



Abstract

The future of transport

The National Roads and Motorists Association (NRMA) has played a key role in advocating for the motorists of NSW for 95 years. With a trusted brand, financial strength and strong community links the NRMA is leading conversations across government, industry and business groups regarding the rapidly changing landscape of motoring and communities. We have undertaken extensive research in a number of emerging areas to develop policies that advocate for the best interests of our Members.

The NRMA is focused on a number of areas, particularly the infrastructure that underpins all modes of transport not only cars. We know that 50 per cent of our Members regularly use public transport and 1 in 10 Members cycle at least once a week. The NRMA is also investigating the potential of future cities, autonomous cars, biofuels and Australia's fuel security and peer-to-peer apps. NRMA President, Kyle Loades will highlight some of these issues and discuss how one of Australia's most trusted brands is a key voice in these ongoing debates.

Plenary Session Presenter Profiles

Marcus Foth

Research Leader, School of Design
Director, Urban Informatics Research Lab
Queensland University of Technology, Brisbane, Australia

E: m.foth@qut.edu.au

@UrbanInf | W: www.urbaninformatics.net

Professor Marcus Foth is founder and director of the Urban Informatics Research Lab, Research Leader of the School of Design, and Professor in Interactive & Visual Design, Creative Industries Faculty at Queensland University of Technology.

Marcus' research focuses on the relationships between people, place and technology. He leads a cross-disciplinary team that develops practical approaches to complex urban problems. He adopts human-computer interaction and design methodologies to build engagement around emerging issues facing our cities. Marcus' recent work has examined:

- Urban planning – new approaches to community participation and engagement
- Environmental sustainability – new strategies for energy monitoring in domestic settings
- Food futures – new ideas to re-think eating, cooking and growing food in the city
- Collaboration and co-working spaces – new aspirations for libraries in the 21st century



Abstract

Urban Informatics: Towards Collaborative and Participatory Citymaking

Large, global corporations in the technology sector have started to package and sell the 'Smart City' vision as a centralised service delivery platform – primarily based on five technology trends: broadband connectivity; smart, personal devices; big data; urban screens, sensors, interfaces, and; cloud computing. However, an increasing number of scholars and commentators warn of another 'IT bubble' emerging. They argue that the top-down deployment of these large and proprietary technology platforms will fail without a thorough understanding of the socio-cultural nuances of how people work, live, play across different urban environments, and how they employ social media and mobile devices to interact and engage.

The same technology innovations giving rise to the corporate top-down approach have also enabled people to take action bottom-up. Drawing on examples from around the world, three key characteristics of these 'Smart Citizen' initiatives will be explored: participation, appropriation, and fabrication. The presentation will raise questions about the role that civic hackers and open innovation will play in the quest to create and maintain not only secure and resilient, but productive, sustainable, and liveable future environments. The impact of these trends on collaborative and participatory citymaking will be open for discussion.

Budrish (Bud) Kapoor

Sales Manager, Asia Pacific Japan
Cisco Smart+Connected Communities

As the APJ Sales Manager for Smart+Connected Communities, Bud is responsible for enabling Cities and Councils to transform themselves through smart cities services and new ways to engage citizens.

Bud has been with Cisco for 10 years and brings over 32 years of senior management experience across the US & Asia-Pacific region in building and leading multi-disciplined teams to meet and exceed company and customer objectives through all stages of product development, manufacturing, sales, implementation, and product support. He has demonstrated leadership and success in managing strategic, financial, operational and technical aspects of both complex projects and solution sales.

Previously with the Cisco Partner Organization in ANZ where he was an Partner Account Manager focusing on large outsourcers and consulting-led partners like EDS, CSC, Fujitsu, HP, Wipro, IBM, and Accenture.

Prior to Cisco, Bud was with Lucent Technologies as the General Manager for New Zealand, Member of Technical Staff at AT&T Bell Laboratories, Program Manager for Harris Corporation and a Captain in the United States Air Force.

Bud holds a Master degree in Business Administration - Financial Management and a Bachelor of Science in Electrical Engineering. Bud was born in India, grew up in the US.



Abstract

How to make a smart city

Bud Kapoor will share the Cisco Smart+Connected Communities experience gained in working with cities for the past five years. This experience and intellectual property gained has been through collaborating with cities across the globe in helping them progress and achieve their Smart Cities objectives. Cisco's Platform approach to the solution harnesses ongoing innovation of sensor and applications/ analytics from an extensive ecosystem. However, it is not just about the technology, it is about leveraging information from a variety of sources to deliver new and relevant citizen services. It has been our experience that cities that have been successful have had a clear vision, leadership to bring together all elements of a city, and a commitment to move forward. At the most basic level - Cisco has been helping customers, globally and locally, in defining and refining their vision, developing the appropriate blueprint – architectures and roadmaps, and of course implementing the Cities Digital Platform to gather and make sense of the data from sensors.

May Ngui

Director and Manager, Western Sydney (Parramatta), GHD

T: +61 2 9239 7350

E: Yih-May.Ngui@ghd.com | W: www.ghd.com

May is a GHD director and manages the company's Western Sydney operations based in Parramatta. She is active in technical delivery and client-facing roles. A chartered professional electrical engineer, Fellow of Engineers Australia and Graduate Member of the Australian Institute of Company Directors, May has 28 years' experience in the design and commissioning of electrical and computer-based control systems for industrial plants and infrastructure both in Australia and overseas. May is passionate about technical leadership and development of female leaders in the industry and is a mentor to a number of young engineers both within and outside GHD.



Abstract

Smart Transportation - it's not just about the technologies, it's what you do with them that counts

When we talk about smart transportation, we tend to focus on the 'bells and whistles' of the flashing lights, control centres, and mobile apps. Invariably, transportation projects which have a smart technology component become the domain of technology vendors and engineers. The overall vision and operational philosophy is overshadowed by the zeal to implement "smart" solutions. This is especially important given the fact that the benefits of ITS cut across multiple government objectives – including safety, journey management, environment, freight and public transport. The presentation will focus on the critical aspects of smart transportation projects and the need to recognise such projects for what they are - a business transformation and change process which is using technology as the change agent. Therefore organisational changes and mindsets need to be considered hand in hand with the technology implementation.

Jamil Y. Khan

School of Electrical Engineering & Computer Science

The University of Newcastle

Callaghan, NSW, 2308

E: jamil.khan@newcastle.edu.au

Jamil Y. Khan received his Ph.D in Electronic and Electrical Engineering from Strathclyde University, Glasgow, Scotland in 1991. Since receiving his PhD he has worked as an academic in the UK, NZ and Australia. In 1999 he joined the University of Newcastle, and is currently an associate professor in the School of Electrical Engineering & Computer Science. He is the research leader of Telecommunications networks within the school. He is a senior member of the IEEE (Institute of Electrical and Electronic Engineers) and a member of ACM (Association of Computer Machinery). Currently he has more than 150 referred international publications in forms of a research book, book chapters, journal and conference papers.



Abstract

Energy Efficient ICT Infrastructure for Future Smart City Deployments

Future smart cities will evolve around the advanced ICT (Information & Communication Technology) infrastructure and solutions. Information gathering and decision processes in a smart city domain will determine the level and quality of services available to its inhabitants. Wireless sensor networks (WSN) will be one of the key elements for the future ICT infrastructure that will enable city sensor and actuator networks. It is essential for a smart city that all sensors distributed over the city areas are read in time and appropriate actions are taken based on the data intelligence. The temporal relationship between data gathering and subsequent actions is a very critical issue which demands an efficient ICT infrastructure. In city areas not only gathered data from sensors is important, but subsequent actions taken by different actuators, devices and applications are also very significant. Such processes require an efficient machine to machine (M2M) communications environment which introduces a very high degree of autonomy. M2M communications and wireless sensor networks are the key enabler of the Internet of Things (IoT) which will help to develop the key ICT infrastructure for smart cities.

Future smart cities need to be energy efficient. Massive deployment of ICT infrastructure could significantly increase the energy consumption and defeat the main purpose of a smart city. In order to counter this problem it is necessary to develop energy efficient ICT hardware and software. This presentation will introduce the ICT infrastructure requirements for smart cities to support its main functionalities such as information collection & decision processes, traffic management, utility management and cost reduction, secure living and working environments, and energy efficiency. The presentation will address the development of sustainable ICT infrastructure based on energy scavenging techniques leading to development of more eco-friendly electronics and computing systems.

The presentation will introduce future guidelines for developing sustainable ICT systems; without such a solution, cities could become less environmentally friendly. Finally the presentation will introduce an energy efficient ICT blueprint for future cities.

Stephen Bygrave

CEO, Beyond Zero Emissions

M: +61 (0)408907 686

E: stephen.bygrave@bze.org.au | W: www.bze.org.au



Qualifications:

- Bachelor of Science (First Class Honours), Bachelor of Economics, Australian National University
- PhD, Resource and Environmental Management, Australian National University

Stephen is the CEO of climate change think tank Beyond Zero Emissions. He has worked on renewable energy, energy efficiency, sustainable transport, emissions trading and climate change for over 20 years. His experience covers village scale renewable energy projects in Fiji, Solomon Islands and Kiribati, domestic climate policy as a senior executive in the Australian government, and international climate policy with the OECD in Paris, France. Stephen worked on the design of Australia's mandatory renewable energy target in the late 1990s, and the design of Australia's carbon pricing mechanism between 2007 and 2012. Stephen is Adjunct Professor at the Institute of Environmental Studies at University of New South Wales, Visiting Fellow at the Fenner School of Environment and Society at the Australian National University, Associate at Melbourne Sustainable Society Institute and Co-Founder of the Energy Freedom Alliance.

Beyond Zero Emissions has published research on an Australia powered by 100 per cent renewable energy, zero emissions buildings, high speed rail, zero emissions agriculture and Australia as a fossil economy. Work currently underway includes reports on electric vehicles and industrial processes, as well as a book on energy freedom. Beyond Zero Emissions is partnering with Byron Bay Shire Council in the transition to Australia's first zero emissions community over a ten year period.

Abstract

Going Beyond Zero Emissions in Energy, Transport and Buildings

The world's leaders have accepted that the transition to zero emissions is inevitable if we are to limit warming to 2 degrees by the end of the century, and then to move beyond zero emissions after that. Zero emissions electricity, buildings and transport systems are all possible, and indeed are already being developed in many parts of the globe. Communities are also making the transition to zero emissions using technology that is available today.

This paper will cover these developments, as well as discuss the Zero Emissions Byron initiative that commenced this year. The presentation will also provide the Newcastle launch of a new book by Beyond Zero Emissions titled "The Energy-Freedom home - How to cut your energy and gas bills in nine steps".

Kymberly & Gabriel Noronha

Recharging NSW

P: +61 2 40211551

W: www.RechargingNSW.com.au

Gabriel Noronha

Gabriel is the Director of Recharging NSW, a company formed to meet the gap in electric vehicle infrastructure in Australia. Gabriel graduated from the University of Newcastle, with a B. Engineering (Computer) / B. Mathematics. When not working on increasing the electric vehicle uptake in Australia he works as an Automation and Control Systems Engineer.



Kymberly Noronha

Kymberly is also a graduate of the University of Newcastle, with a B. Engineering (Computer). When not acting as a community partnerships and sales manager, she works as a Software Engineer. Kymberly and Gabriel share the driving of the family's Electric Vehicle, a 2012 Mitsubishi I-MiEV.

Abstract

Australia why so slow? Electric Vehicle uptake and what you can do about it.

How you can help electric vehicles take off in Australia. Specifically:

- Why electric vehicles are important
- What electric vehicles are available
- Barriers to electric vehicle uptake
- The effect on the grid and power requirements they have
- What is being done to encourage electric vehicle ownership and
- What you can do to help.

Anthony Froelich

ABB Australia Pty Limited, DM Power Conversion
601 Blackburn Rd, Notting Hill,
Melbourne VIC 3168, AUSTRALIA

P: +61 3 8577 7132

M: +61 417 525 070

E: anthony.froelich@au.abb.com | W: www.abbaustralia.com.au

Anthony Froelich is the Sales Manager for Electric Vehicle charging infrastructure at ABB Australia. He has been with ABB for over 11 years, working across technical, project management and sales roles, within ABB's Drives & Controls and Power Conversion business units.



Abstract

Build it and they will come – the future of Electric Vehicle charging in Australia

Electric Vehicle (EV) growth in Europe, USA and Asia is booming. One of the key drivers of this growth, is the progressive and forward-thinking approach employed by many local councils and governments across the world, where they have proactively invested in EV fast-charging infrastructure. This has enabled consumers to buy an EV, with the confidence that they can go about their daily business, and re-charge their vehicle at their own convenience.

The ABB Group has a wealth of experience establishing country-wide fast-charging networks with municipal, governmental and commercial partners in countries, including Estonia, Denmark and the Netherlands. Estonia was one of the first countries to roll out a large-scale EV charging network. Project 'Elmo' delivered over 160 ABB fast-chargers for Estonia in 2013. 'Fastned' was the Netherlands foray into EV charging, with over 200 ABB fast-chargers installed. Danish operator 'Clever,' has also installed over 100 ABB EV fast-charging units across its network.

Anthony Froelich from ABB will provide an overview of the EV standards that are in use around the world. He will also provide some insights as to where the technology is heading with the various vehicle manufacturers in the coming years.



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@EngAustralia

Kirk Martel

P: +61 7 4755 2496

M: (preferred): 0408 158 941

E: kirk.martel@my.jcu.edu.au

I was born in the town of Emerald, Central Queensland, and raised on a cattle station until I was 10 years old. I then moved to Townsville where I completed the last of my primary school and also graduated high school. By this time I had discovered my passion for mathematics and science, and so I applied for a Bachelor of Engineering at James Cook University, in the hope of seeing my passion exercised. After my first year of study, I chose Electrical and Electronic Engineering as my discipline, and I am now in the fourth (last) year of my degree. Over the course of my degree, I gained invaluable work experiences at Ergon Energy. It was from these experiences that I decided I wanted to work in and contribute to the energy industry, and my first contribution to this industry has been my Thesis project – designing a communication board to inform electric vehicle owners of how they can optimally manage their vehicle.



Abstract

Electric vehicles are becoming a viable alternative to conventional internal combustion engine

Electric vehicles (EVs) are becoming a viable alternative to the conventional internal combustion engine (ICE) vehicle, and as a result there is a rising penetration level of EVs on a global scale. Without applying any control over the charging behaviour of EV owners, peak demand (where the electricity demand from the grid is at a peak) could be significantly increased beyond the delivery capacity of electricity networks. Technologies of the smart grid include bi-directional communication between electricity suppliers and consumers in near real-time. This utilizes an advanced electricity meter called a smart meter, which can provide the consumer with information about electricity prices and consumption. The capabilities of a smart meter can be harnessed to provide EV owners with essential information concerning how to optimally manage their vehicle – where the optimal scenario includes charging the vehicle when the electricity price is low and discharging the vehicle (selling electricity back to the network) when the electricity price is high. A display board to be integrated within the EV is proposed, which has communication capabilities to receive information about the electricity network, including prices and demand, as well as information about the vehicle and its battery. The fundamental purpose of this display board is to inform EV owners of what charging behaviours they can adopt to minimize stress on the network and how they can benefit from adopting this strategy.

Miroslav Svítek

Faculty of Transportation Sciences, Czech Technical University in Prague

Konviktská 20, 110 00 Prague 1

Czech Republic

E: svitek@fd.cvut.cz

Miroslav Svítek was born in Rakovník, Czech Republic, in 1969. He graduated in radioelectronic from Czech Technical University in Prague, in 1992. In 1996, he received the Ph.D. degree in radioelectronic at Faculty of Electrical Engineering, Czech Technical University in Prague. Since 2002, he has been associated professor in engineering informatics at Faculty of Transportation Sciences, Czech Technical University in Prague. Since 2005, he has been nominated as the extraordinary professor in applied informatics at Faculty of Natural Sciences, University of Matej Bel in Banská Bystrica, Slovak Republic. Since 2008, he has been full professor in engineering informatics at Faculty of Transportation Sciences, Czech Technical University in Prague. He is currently teaching courses and doing research in theoretical telematics, intelligent transport systems, smart cities, quantum system theory and quantum informatics. Miroslav Svítek is president of Association of transport telematics of the Czech and Slovak Republic (it covers more than 80 public and private organization), member of Engineering academy of the Czech Republic and Dean of Faculty of Transportation Sciences, Czech Technical University in Prague. He is author or co-author of more than 250 scientific papers and 10 monographs.



Abstract

Intelligent Transport Systems as Study Program

Transport Telematics/ Intelligent Transport Systems (ITS) connects information and tele-communication technologies with transport engineering to achieve better management of transport, travel and forwarding processes by using the existing transport infrastructure.

Intelligent Transport Systems are concerned with the use of new information, sensor and communication technologies to support transport services and applications across all modes. The development of ITS, in accordance with ERTICO and the European Commission, provides an opportunity to apply advanced technology to systems and methods of transport for efficient, comfortable and safer highways, railways, inland waterways, airports, ports and linkages between these different types of transport.

Development of new advanced transport systems, integration of systems into large complexes and development of these systems in general causes increasing demand for ITS professionals able to design, create, control and assess these systems. To match this tendency Czech Technical University in Prague, Faculty of Transportation Sciences (CTU – FTS) adds to its current offer of study programs the study branch specialized directly at Intelligent Transport Systems.

The ITS specialists need both transport and technical knowledge and ITS study programs should reflect these requirements. Creation of specialized ITS study programs is a way how to help this area to evolve quickly and ease everybody's life.

During their studies of the ITS study program students further focus on their preferred ITS area and choose their specialization either in Traffic Control, Vehicle Technology or ITS Project Management, to ensure high quality of education the study program introduces also the possibility of "block-scheme" education to enable easy lecturing of foreign guesting specialists.

Kathryn Maxwell

Sustainability Living Coordinator, Lake Macquarie City Council

Kathryn Maxwell has been working in the field of sustainability for many years and has recently joined Lake Macquarie City Council as Coordinator of the Sustainable Living Team. This team has responsibility for projects which achieve reductions in greenhouse gas emissions, water savings, green buildings and reducing waste to landfill. Previously, Kathryn has worked for the New Zealand Government implementing their sustainability program including developing minimum standards for government buildings, vehicles, consumables including office paper and sustainability reporting. Kathryn also worked as Sustainability Manager for the New Zealand Department of Conservation from 2008-2011. The work undertaken during this time received the 2010 Energy Efficiency and Conservation Agency award for public sector. Key projects included installing renewable systems and energy efficiency measures on a number of remote islands and developing and implementing a workplace travel plan in large offices. Kathryn worked for the Australian Federal Government in 2011, implementing the Energy Efficiency Information Grants program. Kathryn also has experience implementing a number of energy efficiency measures on community buildings for Devonport City Council and Alpine Shire.



Lake Macquarie City Council - Workshop Proposal

Lake Mac Smart City: How Can the Hunter Progress 'Innovative Future Vehicle Infrastructure'?

Society is on the cusp of a new transport revolution. Major advances in computing power and battery storage together with the threat of climate change are pushing transport innovations into mainstream territory—electric vehicles and bicycles will play an increasingly important role in the years to come.

Delegates are invited to participate in a facilitated and collaborative workshop to brainstorm the following questions:

- How can the Hunter Region embrace infrastructure that supports innovations in transport including electric vehicles and bicycles
- What are the opportunities for public transit, walking and cycling; and how we design our streets and cities to ensure healthy living?
- Who are the key stakeholders needed to make this happen?
- What are the key barriers
- What are the greatest opportunities

Help us map out an action plan for our region!

Peter Leihn

Director, NICTA Victoria, Director, Environment Business

NICTA | 115 Batman Street | West Melbourne | Victoria 3003, Australia

W: nicta.com.au

Research Excellence in ICT : Wealth Creation for Australia



Peter has worked across Australia and Asia with global ICT companies Hewlett-Packard and Autodesk developing markets for new technologies. Prior to joining NICTA Peter held several senior leadership positions in the NSW Government including heading the Office of the Director-General for Water and Energy, Director of the Office of the Chief Scientist and Engineer and Director of the Office for Science and Research where he drove policy development and program delivery in environmental management, renewable energy and research commercialisation.

Peter holds a Bachelor of Applied Science in Environmental Resource Management (Coastal) and a Masters of Environmental Science and Law. His interest is the deployment of leading edge technologies to achieve improved social, economic and environmental management outcomes.

Projects:- [Solar Generation Forecasting](#), [Geothermal Data Fusion](#), [Groundwater Monitoring Optimisation](#), [Air Quality Prediction](#), [Groundwater Modelling](#)

Abstract

NICTA and the Australian Renewable Energy Mapping Infrastructure

Peter Leihn, Michelle Nic Raghnaill, Mats Henrikson

NICTA has been funded by the Australian Renewable Energy Agency to create a national renewable energy knowledge sharing platform, the Australian Renewable Energy Mapping Infrastructure (AREMI) platform. AREMI is developing and hosting a new mapping capability for Australia that will provide long term access and interoperability for currently disparate data mapping products from Federal and State Government agencies, academia and industry. The platform builds upon National Map, <http://nationalmap.gov.au>, a previously developed NICTA capability.

The AREMI platform consolidates location-enabled energy sector related data to publish, link and visualise renewable energy knowledge for Australian industry, governments, academia and the wider community. AREMI aims to integrate the full spectrum of renewable technology geo-spatial datasets including: wind; solar photovoltaic (PV); solar thermal; geothermal; tidal; wave; biofuels; agricultural waste; landfill gas; and other renewable sources. Complementary studies will also be included such as detailed network constraint modelling (e.g. DANCE by the Institute for Sustainable Futures) and analytics features (e.g. Australian Wave Energy Atlas, AWAVEA).

Built using Open Source technologies developed in-house at NICTA and by third parties, the AREMI platform, available at <http://nationalmap.gov.au/renewables/>, allows the Australian energy industry to fast-track planning for new projects, investment, and policies by providing a renewable energy focussed one-stop-shop for spatial data. With multiple relevant datasets in one location, the energy industry can gather data more efficiently during the initial stages of planning for new developments. This data is available to the public in an online, freely available mapping portal accessible through any modern web browser without the need for third party plugins or other software. Geoscience Australia host the AREMI platform.

The AREMI platform supports:

concurrent visualisation of a wide variety of energy resource and infrastructure datasets to benefit the energy industry, with the renewable energy sector being a particular focus

- improved energy sector investment decisions, maximising economic yield and efficacy
- enhanced energy sector pre-competitive analysis
- efficient governance of energy related infrastructure
- heightened opportunity for value-added energy services and,
- a single location for ARENA funded projects with geospatial outputs

The development team utilise a very flexible approach with regards to development, using an agile software development methodology. Building new features essentially as prototypes, then engaging with users to perform focused user experience evaluations to gauge their efficacy, followed by iteration based on user feedback. This enables customisation of features to ensure a useful platform is provided to the industry.

NICTA has also partnered with the Clean Energy Council and Geoscience Australia in order to develop this project and to engage with their broad network of renewable energy partners, with all funding provided by the Australian Renewable Energy Agency (ARENA).

Joanne Spicer

Environmental/GIS Officer - **Tumut Shire Council**
76 Capper Street, Tumut NSW 2720

E: jspicer@tumut.nsw.gov.au

W: www.tumut.nsw.gov.au

Yale Carden

GeoExchange Australia Pty Ltd
PO Box 1142, Level 8, 100 Walker Street, North
Sydney NSW 2060

W: www.geoexchange.com.au



Joanne Spicer

Tumut Shire Council, Environmental / GIS Officer

Joanne (Jo) Spicer has worked in Local Government at Tumut Shire Council for five years as their Environmental/GIS Officer. Jo is an Environmental Scientist with a Certificate IV in Carbon Management and is an Associate CPESC (Certified Professional in Erosion and Sediment Control). She is a passionate advocate for sustainability, environmental management and resource management. Jo is the Communication Officer for the RHBEEP (Riverina Highlands Building Energy Efficiency Project). She (with Yale Carden, Managing Director GeoExchange Australia Pty Ltd) has co-authored a Federal (AIRAH) award application and made successful applications for four finalist awards – one Federal (Banksia Award) and three NSW State awards and one overall winner in LG NSW Climate Change Action Award for the RHBEEP.

Yale Carden

GeoExchange Australia / International Ground Source Heat Pump Association – Australasia, Managing Director / President

Yale Carden is the Managing Director of GeoExchange Australia and the President of the Australasian Chapter of the International Ground Source Heat Pump Association (IGSHPA – Australasia). Yale has been working in the sustainability sector for almost twenty years and has spent the past ten years working with Geoexchange systems. He is a member and certified installer with the International Ground Source Heat Pump Association (IGSHPA), a member of AIRAH and has advised on Geoexchange systems across the Asia Pacific.

Abstract

Let's dig it, using the Ground for Thermal Energy Storage: The experience of the Riverina Highlands Building Energy Efficiency Project, Tumut NSW

All buildings interact with the ground for its ability to support their foundations. However, very few buildings interact with the ground for its ability to provide heating, cooling and thermal energy storage. We have all experienced the moderate temperatures within a cave at depths of just a few metres. These temperatures are a function of average annual air temperature and are the result of the ground absorbing and storing solar energy. The use of this indirect and renewable solar energy can provide significant energy savings for heating and cooling systems.

This presentation will provide an overview of how the ground is being utilised for its thermal energy storage capabilities, with focus on a local installation at the Tumut Council owned Riverina Highlands Building, located in Tumut NSW. The installation has provided Council with energy savings on heating and cooling of 80 %, reduced peak energy loads by 40%, reduced maintenance cost and with a return on investment of 11%.

This has also increased the capacity and effectiveness of the concurrently installed solar PV array with a combined peak reduction of 75 % and will ensure that future solar energy storage will have greater impact. Most importantly, RHBEEP has provided significantly higher levels of occupant comfort and is a tangible example of energy efficiency to the community.

Oliver Hartley

Managing Director, Epho Pty Ltd

M: +61 405 927 057

E: o.hartley@epho.com.au | W: www.epho.com.au

Oliver has almost 20 years of experience in solar energy. He is the Managing Director of Epho Pty Ltd, a company specialised in the development of turn-key solar solutions for businesses across Australia. Oliver has had a wide range of managerial roles across the industry from research, manufacturing, project management to sales and marketing. He has a PhD, which he carried out at the UNSW Photovoltaic Special Research Centre, Sydney. Oliver has over 40 scientific and industry journal publications and conference presentations, in recent years with a strong focus on improving quality within the Australian solar industry.

**Abstract****How much solar are we actually talking about?**

Many government organisations and councils have great intentions to promote renewable energy and in particular solar power in their areas. In most situations this requires convincing internal stakeholder to rally behind the cause. Unfortunately, this is often challenging, when it is unclear how big the potential actually is, the size of the opportunity, and whether it is worth spending time on it. Once there is clarity about the amount of solar power that could be installed in a particular area or within a group of buildings as well as the generated benefits, it becomes much easier to achieve the buy-in from various stakeholders.

Epho Pty Ltd, a company specialised in commercial solar power, has carried out two detailed studies to address this challenge. The first study evaluated the potential of solar power on specific buildings, which form part of the Better Building Partnership managed by the City of Sydney. The second study reviewed the overall potential of solar power in the industrial zones of the Council of Parramatta and was conducted on behalf of the NSW Office of Environment and Heritage.

This presentation will discuss the methodology and results of these two studies. It will also review possible funding models available to reach the solar potential identified and discuss their pros and cons.

Christopher Martell

Principal Engineer

Global Sustainable Energy Solutions Pty Ltd

P: 1300 265 525 | F +61 2 9024 5316 | M +61 416 166 270

E: chris.martell@gses.com.au | W: www.gses.com.au



Chris Martell is the Principal Engineer at GSES Australia. Originally from Boston, USA, Chris came to Australia in 2009 to participate in the burgeoning photovoltaic industry that was evolving in Australia. Six years on and un-phased by the solar rollercoaster, Chris is very optimistic for the future of the renewable energy industry both in Australia and globally. Prior to his employment at GSES, Chris obtained his Masters of Science in Photovoltaic Engineering from UNSW. Since then, Chris has worked as the lead engineer at a residential PV installation company based in Alexandria, NSW and a commercial PV EPC company based in St. Leonards, NSW. Chris has experience in both grid connected and standalone PV systems and has completed a range of design projects including a 170kW car park roof mounted PV system that was the recipient of the 2013 Clean Energy Council award for best system design over 100kW. With GSES, Chris has completed design, consulting and training projects throughout Australia as well as in South East Asia and the Pacific Islands.

Abstract**Highlighting solutions to deal with the challenges of a paradigm shift in energy sector**

There is currently a paradigm shift occurring in the electrical industry and the energy sector at large. The traditional model using centralised power generation and uni-directional energy flows is quickly changing. The introduction of distributed intermittent generators throughout the grid infrastructure presents many benefits and challenges which are forcing the traditional grid model to change rapidly. This presentation will address the following elements in order to highlight solutions which are being used to deal with these challenges.

- Micro Grids vs Mini Grids
- Types of Micro and Mini Grids
- New National Electricity Market (NEM) Demand Response Mechanism (DRM) and the unbundling of ancillary services from the purchase of energy (submitted 25 March 2015)
- Embedded Networks
- Virtual Metering Arrangements
- Topological Power Plants
- Dynamic Grid Supporting Transformers (Siemens FIT former REG and others)

Craig Chambers

Market Sector Director – Power Generation, AECOM

M: +61 0419 992 380

E: Craig.chambers@aecom.com

Craig has responsibility for AECOM's Power Generation and Renewable business across Australia. He has over 18 years experience in the electricity and gas industry in Australia, Asia and the USA. Craig has in-depth knowledge of financing, designing, managing and commercially evaluating energy projects from concept to operation. He has provided companies advice on strategy, policy, regulatory compliance, due diligence, project development, technical design and construction delivery.

Recently, Craig has completed thought leading reports for Infrastructure Australia, Australian Government Departments and Industry clients contemplating the impacts of disruptive distributed energy resources, (such as energy storage, renewables, electric vehicle etc.) on future electricity market paradigms. He has particular insight into the technical, regulatory and commercial impacts of these technologies.

Craig also holds a Bachelor of Commerce, a Diploma in Sustainable Development and has also completed a Masters of Engineering.



Abstract

Quantum Shift in Supply Chain - How disruptive technologies are reshaping the electricity industry and how will it adapt?

Many electricity systems around the world are experiencing unprecedented transformations due to technology, policy and economic factors and these changes all have considerable implications on future investment (and retirement), prices, and regulatory reform. Technologies such as EV, Batteries, Energy Efficiency and PV (Decentralised Energy Resource or DER) will all play a major role in shaping the future electricity system. For the 'industry', its ability to adapt to this change will define it.

In light of a value transfer occurring, propelled by significant behind the meter investment in DER, it is essential for industry to better understand consumer uptake drivers which will vary according to demographics, incentive programs and the proportion of electricity charges of their overall costs. Utilities must reposition their service offering to ensure they send the right price signals to consumers and shape demand behaviour through appropriate incentives which enable them to maintain the reliability and quality of supply, whilst also recovering their sunk investments. The uptake of new technologies by consumers, if unplanned, has the risk of exacerbating network issues, however when targeted, DER can provide significant shared benefits to both the consumer and electricity industry.

The paper will explore the risks associated with the future uptake of 'disruptive technologies' and highlight the strategies that should be deployed by utilities and regulators to capitalise on the evolution. Using Australia as a case study, the focus will be on up to, and behind the meter, approaches, alternative business models, the regulatory landscape and how smarter use of new technologies can sustain efficient investment in, and use of, the electricity infrastructure.

The paper will also provide a summary of a number of studies AECOM has conducted over the last 12 months for both network asset owners, ARENA, governments and financiers and will provide the audience with some insightful findings on how to navigate to a future grid.

John K Ward

Principal Scientist | Grids & Energy Efficient Systems,
Energy Flagship
CSIRO Energy Centre, PO Box 330, Newcastle, NSW 2300

T +61 2 4960 6072 | M: +61 0400 061 138

E John.K.Ward@csiro.au

www.csiro.au | www.csiro.au/energy

Dr John K Ward is the Principal Scientist for the Grids and Energy Efficiency Systems Research Program at the CSIRO. His research is focused on adding intelligence to the interaction of energy systems within the electricity distribution network. Dr Ward is the architect of the Australian demand response standards for distributed generation (AS/NZ4755 and AS/NZ4777). He carried out the core load and renewable generation modeling for the recent Future Grid Forum, including testing of several demand response scenarios. His research on optimised building control systems has been commercialised by BuildingIQ.



Abstract

Smart Future Energy Systems

This is a time of major change within the energy sector. The decreasing prices of PV coupled with environmental concerns and increasing prices of 'grid' energy has led to the widespread uptake of solar PV rooftop systems, which are now at risk of exceeding the hosting capacity of many Australian electricity distribution networks. This has directly resulted in unacceptably high and fluctuating voltages, PV systems being unable to export to grid at times, and restrictions being placed on PV installations.

Within this context, CSIRO is exploring transition pathways for our energy sector that facilitate increased community awareness and engagement in the efficient operation of the electricity system. This includes the integration of demand management technologies, energy storage and electric vehicles – all of which can help shape our energy use to make best use of existing infrastructure while facilitating additional renewable generation.

This presentation will particularly focus on new equipment standards and CSIRO led trials that are providing community demonstrations of these future systems - showing how smart energy management can provide a low cost pathway to integrated future energy systems.

Peter Quinlan

M: +61 416 238 800

T: +61 2 9091 0400

E: Peter@questsecuritysolutions.com.au

Peter began his career in the electronic security industry in 1987, and has experienced the transformation of video from analogue to IP and more recently to the digitalisation of video and the development of applying video analytics to video. His acquired knowledge is based on local and global exposure to leading industry experts and live use cases. As one of Australia's leading consultants in assisting organisations apply analytics to video to achieve business outcomes, Peter's experience spreads across a wide range of industries including retail, education, councils, mining and manufacturing. Peter is currently one of the technology experts commissioned with designing and implementing a Smart City Video Solution for Newcastle.

**Abstract****IoT - The digitalisation of video data**

The use of video in cities has historically been used as a medium to combat crime and increase safety. The digitalisation of video has enabled the technology to transform from being dependent on human interaction to apply logics in order to deduce outcomes, to become intelligent to the point where video analytic software is able to apply the logic to deliver rich data instantly. This data is made available instantly to the user, enabling them to make decisions based on current information while it is at its most useful. In this world of rapidly expanding data creation through the likes of social media and the web, creating more data is not the objective. Creating data that can be turned into information that is relevant to the here and now is where the future of said video becomes relevant to our everyday lives. This transforms the video data from just being used for security and safety, to providing the residents of and visitors to the city with information that will enrich their experience, such as knowing where a car space is available or a seat in their favourite restaurant. We are already seeing how video is playing a major role in the information creation in order for vehicles to provide instant information to operators, such as lane departure and pedestrian warning. Autonomous vehicles have taken this video data to the next level, enabling them to be free of any human intervention in order to perform their functions.



Eighteen04 is an inspirational co-working space for clean tech and smart city based startups in the Hunter Region. Located in Newcastle, we provide a physical and cultural space to foster collaboration and networking for tech entrepreneurs.

www.eighteen04.com.au



Cara Ryan

Schneider Electric

E: Cara.ryan@schneider-electric.com

<https://au.linkedin.com/in/cararyan1>

Cara Ryan is Offer Manager – Building Performance Centre, for the EcoBuildings Division of Schneider Electric. With 15 years experience in the Building Efficiency industry Cara has led the development of service delivery utilising digital and analytics technology to help customers visualise, analyse and optimise their building performance.

Prior to her work with Schneider Electric, Cara has worked in facilities management and project management; in retail, healthcare, commercial buildings and public infrastructure. This experience has led to a perspective on both the challenges faced by building owners and operators, and how emerging technology can be used to address specific facility requirements. Cara holds an Honours degree in Engineering from Monash University and was a finalist for the Women in Industry Excellence in Engineering Award in 2015.

**Abstract****Driving Building Performance Using Big Data Analytics**

Cost effective cloud based storage and processing power provide increasing opportunities for facility managers to leverage the big data generated by today's Building Management Systems. Big data analytics utilising automated Fault Detection and Diagnostic (aFDD) software offers a genuine opportunity to change the way building information is managed and decisions are made.

Undiagnosed problems such as unnecessary equipment operation, suboptimal strategies, faulty equipment or poorly tuned loops result in energy wastage and comfort issues. Using aFDD software to collect and analyse large volumes of building data, facility managers are presented with prioritised, actionable information to target underlying problems, and opportunities for savings. This emerging technology allows facility managers to proactively identify operational problems such as equipment that needs to be repaired or replaced before critical failure.

Data analytics help to understand not only how a building is operating and where there may be inefficiencies, but why. Through proactively identifying operational problems that would not otherwise be detected, data analytics helps building managers gain a deeper understanding of the "why," which in turn leads to more permanent and effective solutions.

Ultimately, analytics allow building owners and operators to reach and maintain a higher level of building intelligence and performance by providing a baseline, and prioritised actions to improve performance.

James W. Giblin

M: 0415 291 130

E: james@australianenergyconsultants.com.auW: australianenergyconsultants.com.au**Andrew Mears**

CEO

SwitchDin Pty Ltd

M: +61 (0) 421131550

E: andrew.mears@switchdin.comW: <http://www.switchdin.com/>L: au.linkedin.com/in/andrewmears

James W Giblin is the founder and principle of Australian Energy Consultants. He has experience in the retail energy, renewable energy, and energy efficiency in both private and Government sectors. James is an active member of the energy industry and has serviced as a Director on the National Board of the Australian Institute of Energy. He is currently on the Steering Committee for the NSW Government's Energy Innovation Knowledge Hub, as well as the Newcastle Branch of Australian Institute of Energy, which he Chaired in 2013-14. In 2010 he was the Chair of the Lake Macquarie Green Energy Taskforce as well as the Chair of the Lake Macquarie Sustainable Living Advisory Committee and is co-founder of the Newcastle-based clean tech and smart city co-working space Eighteen04 Inc. James loves innovation, crafted beer, and kiteboarding.

Dr Andrew Mears is an engineer, policy specialist, and entrepreneur with more than 20 years of experience in the areas of energy, climate change and resource efficiency covering Asia & Pacific, Africa and Australia. In 1990 he became the youngest executive appointment of TUNRA (University of Newcastle) as manager of the Industrial Electronics division. From 1996 to 2004 he joined the Faculty of Engineering at the University of Technology Sydney and held the role of faculty Director of Studies. In 2003, Andrew founded Majority World Technology Pty Ltd, to promote equitable low carbon climate resilient development advisory services throughout the developed and developing world and subsequently delivered more than 40 assignments in 18 countries with various agencies involving more than US\$200million in program funds. From 2006, Andrew joined the United Nations first as their Chief Technical Advisor on renewable energy in Botswana and SADC region and then for Climate Change in Cambodia. Andrew formulated and mobilised USD\$9 million for the UNDP's first ever national-level climate fund. He returned to Australia in 2011 and has continued to provide independent strategic and technical services to UN and World Bank including preparation of low emission development strategies and programs for Uzbekistan, Sierra Leone, Maldives, Macedonia; and renewable energy and rural electrification plans for Philippines; and electricity market studies for NSW government. He led the development of the \$180 million low carbon cities program for Malaysia in 2014. In 2013 he founded SwitchDin to develop a virtual power management platform for renewable energy and battery storage. Dr Mears is a recipient of the 2011 Newcastle University Alumni award for International Leadership and is co-founder of the Newcastle-based clean tech and smart city co-working space Eighteen04.

Abstract**Open data, applications and innovation ecology**

In the hyper connected world the speed and scale of business is increasing. Web and mobile technologies, the open source movement, and new lean approaches to product development mean entrepreneurs can reach a global market in a short time at a fraction of the development costs previously required. The emerging role of Tech Start-ups is therefore being recognised as an effective platform for economic development whereby data enabled business can solve significant problems for modern society. This new economy involves smart business developing smart technologies to leverage the issues of our time and environmental and urban issues will be at the core of these opportunities. This approach needs to be dynamic and deployable and cities such as Newcastle are transforming from a "dig and ship" to a "create and scale" economy as they realise these benefits. The emerging #newstartups community is growing into a vibrant and exciting ecosystem.

Eighteen04 Inc is a co-working space for CleanTech and Smart Cities start-ups and was co-founded by Dr Andrew Mears and James Giblin. This initiative builds on lessons from cities around the world and seeks to promote the local startup economy as a demand-driven source of innovation. The talk will cover trends in the tech startup ecosystems around the world and how #newstartups ecosystem is placed.

Clean Energy and Future Transport Conference 2015

Jeremy Harkins

Director, Ineco

M: +61 0403 185 970

ineni.co



Jeremy Harkins

Jeremy Harkins is the Director and co-founder of ineni Realtime, an innovative technology company focused on the development of the Realtime Visualisation Industry.

Jeremy is at the leading edge of real-time virtual technologies and has spoken internationally about 3D immersive environments, VR (Virtual Reality) and AR (Augmented Reality) for architecture, mining and smart cities.

Working with Architects, Engineers and Developers, Jeremy is aimed at commercialising and integrating new technologies into the Architecture, Planning, infrastructure and Construction industries.

His company has partnered with world leaders in building automation, integrated systems and business process management and is providing cutting edge solutions for some of the largest and most complex developments in the world.

With over a decade of experience in Architectural Technologies including professional work, consultancy and Full-Time Academia, Jeremy has been Lecturing and Teaching in the field for 12 years, and being an Adjunct Lecturer at the Faculty of the Built Environment, UNSW is now helping to educate industry in what our future Smart Cities can be.

James Paterson

James joined Lend Lease in January 2012 as Operations Manager for Barangaroo. His key role is to support the Development, Investment, Design and Construction teams for Barangaroo to ensure the future operational requirements for the precinct as a whole are incorporated in a way that delivers best practice and operating cost and management efficiencies.

James began his career with the Sydney 2000 Olympic Games as Venue Operations Manager. He then joined Jones Lang LaSalle's Sydney office. In 2007, James joined LaSalle Investment Management in the USA before moving to Hong Kong as Head of Asset Management for Greater China.

James holds a Masters of Commerce (Finance) from the University of Sydney and a Bachelor of Arts (Sports Management & Media) from the University of Canberra.

Abstract

Virtual Barangaroo and the OBSI (Open Building Systems Integration)

Co-Presenters: - Jeremy Harkins – ineni Realtime

James Peterson – Lend Lease

This presentation will be a case study of Virtual Barangaroo and the OBSI Platform (Open Building Systems Integration), one of the innovative solutions being implemented by Lend Lease at the Barangaroo South Development in Sydney.

The OBSI will incorporate commercial, residential, retail and hotel facilities across the entire Precinct under a common 3D Virtual platform, providing a central point of truth and operations for all related systems.

The system will use the data collected from many of the precinct's Building Management Systems (BMS) to provide information to a range of users and applications through a common set of interfaces available on computers and mobile devices across the site. The integrated data gathered from available systems and sensors will be used for many purposes including displaying related services, monitoring building performance, aiding in maintenance tasks and assisting operations managers in many of their daily activities.

Additional functionality will include analysis of historic data in comparison to operational realtime systems, allowing previously unrealised efficiencies to be created across the precinct into the future.

To display the enormous amounts of data collected in an intuitive way, an interactive 3D front-end for the system is being developed to contextual information in a virtual live data linked virtual representation of Barangaroo.

Philip Pollard

Director, AMENITY Urban & Natural Environments Pty Ltd

P: +61 418 681265 | E: AMENITY@gmail.com

Philip Pollard has been a part-time lecturer in the UoN Master of Property since 2004, most recently coordinating the Sustainable Development strand. He is a director of AMENITY Urban and Natural Environments, and practices in architecture, urban design and planning. He is also an associate of the Green Asia Group. His background in education and experience as an elected Councillor in the Byron Shire early in his career, led to an ongoing active interest and involvement in the social and cultural aspects of landuse planning and development, and the impact of development upon the broader environment.



Abstract

Award-winning innovative University buildings

The University of Newcastle won international recognition for a series of innovative and ground breaking buildings, and an associated low-cost and low-impact approach to landscape and catchment management during the period 1993 to 2005. These projects received in excess of fifty awards and recognitions, including the inaugural National Banksia Foundation award for sustainable buildings, two AIA Sir John Sulman Awards, and the AIA Sir Zelman Cowan National Award for public buildings, which is widely considered the most significant architecture award in the nation.

While the projects also largely received very positive feedback from the students and staff who use them, some of the policies arising from the energy conservation program, such as some limitation on the installation comfort of air conditioning, were controversial at the time. Similarly, the extensive use of indigenous plants as understory to the existing spotted gum forest, proved challenging to some whose landscape aesthetic favoured mown lawns rather than 'untidy' native grasses.

This presentation will present a brief overview of the buildings and 'Landsoft' landscape and catchment management approach, and some lessons learned in respect to introducing change and challenging concepts in an organizational culture.

Hua Fan

PhD Candidate, Faculty of Engineering
University of New South Wales, Sydney NSW 2052, Australia

M: +61 425 488 181 | E: hua.fan@unsw.edu.au

Hua has 4 years of research experience in the field of Engineering and specifically in the area of smart grid smart city, and is partway through his Ph.D. Prior to this, Hua had founded 2 start-ups in the field of ICT and received an Innovate NSW grant from the Department of Trade & Investment. Hua's research focuses on the residential electricity area and heavily involves big data analysis.

Recently, Hua have funded a company, and contributing his expertise in the area of IoT (Internet of Things) to bring surveillance, data driven analysis one step further as a part of the BASIX project funded by CRC and City of Sydney.



Abstract

SGSC findings

The residential sector represents about 30% of global electricity consumption. Growth in electricity demand poses great challenges for utilities, economies, and also obstructing sustainability. Understanding options for residential electricity demand reduction is critical to identify potential opportunities for energy efficiency, renewable energy and other mean of reduction strategies. This is necessary to guide policy making and can enable significantly impact on national greenhouse gas emissions. The current study utilise data generated from Australia's first large- scale smart grid project – the Smart Grid Smart City (SGSC). The interviewed household characteristics and matched half-hourly electricity readings collectively exceed 0.9 billion data points. The present paper draws upon such valuable database and simulates reduction strategies using empirical electricity readings sampled from SGSC project. The analysis of this study has revealed important evidence that, pool pump ownerships and ducted air-conditioning ownerships is a major driver of residential electricity demand. Through carefully compared simulations, cost effective electricity reduction strategy could be achieved.

Stuart Hands

P: +61 2 4960 6283

E: stuart.hands@csiro.au

Stuart Hands joined the Solar Cooling Team at CSIRO's Energy Centre in 2012. He has a science degree from the University of Newcastle majoring in Photonics. He has been involved in numerous research projects including the study of the thermal performance of Australian housing, concentrated solar testing and solar cooling, undertaking experimental design, construction, testing and analysis.



Abstract

Performance Analysis and Energy Benefits of a Commercial Scale Two-Rotor Solar Desiccant Trigeneration System in a Building

Stuart Hands¹, Daniel Rowe¹, Subbu Sethuvenkatraman¹, Mark Peristy¹, Mark Goldsworthy, Stephen White¹

¹ CSIRO Energy Flagship, Newcastle, NSW, Australia

A two-rotor Solar Desiccant Evaporative Cooling system (SDEC) has been operating at TAFE NSW Hunter Institute in Hamilton since mid-2012. This system was integrated into the existing plant to provide a net reduction in energy consumption over the pre-existing HVAC system. The installation consists of two SDEC units, designed to supply a combined 12 000m³/hr of fresh air for space cooling, heating and domestic hot water to commercial teaching kitchens, administration areas and a campus function room. While there have been a number of solar airconditioning installations around the world, there is still a need to share design learnings, outcomes and performance numbers.

This paper focuses on the system design and performance analysis of the space cooling, heating and solar based hot water system. During operation of the SDEC units, a marked net reduction in energy has been observed. Solar heat reduced gas usage for domestic hot water and on an annual basis showed a contribution of 24% of the total energy. The solar energy contribution for space heating contributed more than 60% of the total energy requirements. Under suitable ambient conditions, approximately 35% of total building cooling load was met by the solar driven desiccant cooling system.

Steven Fleming

Director: Cycle-Space International Pty. Ltd. ACN 603 608 886

Adjunct Associate Professor, The University of Canberra

M: +61 422486271 | E: steven@cycle-space.com



Abstract

Newcastle Bicycle City

This presentation begins by questioning an assumption infused throughout the call for papers to the Smart Future Cities conference, that Novocastrians can look forward to autonomous vehicles improving their urban landscape. Seeing London and Paris restricting car access, and cities like Helsinki moving ahead with plans to go completely car free, the automotive industry has been investing in AV and battery technology to overcome the congestion and pollution caused by their products. But surely AV—if it increases capacity—has the potential of increasing demand, to saturation! Picture unbroken platoons with the economic and political power to further impede free forms of mobility like walking and cycling. And surely solar power, if seen in the light of Jevons's paradox of resource efficiency, could create perverse outcomes as well.

By comparing the geography, politics, scale, morphology and street grid of Newcastle to those of Dutch and Danish cities where most trips are by bike, this paper will present a more prosperous and sustainable vision for Newcastle than the one implied in the call for papers, with its poster displaying a sports car. Where the AV vision is obesogenic, inequitable and clouded by a Romantic tendency that Leo Marx called the Industrial Sublime, the bike-centric vision would tackle chronic disease, be virtually free to individuals and governments, and take Occam's Razor to the question of the smart city.

The bike city vision begins with a disc line picking exercise to mathematically predict average trip times within a 7.5km bikeable radius of Broadmeadow train station: 24minutes at 15kph. Hypothetically, the area could house 5,000,000 people, if planning restrictions looked more those of the 19th century. However, in light of Nimbyism and the political will of a car-loving electorate, it would be more practical to begin with a bicycle oriented development plan for Newcastle's brownfields that happen to be connected by non-vehicular easements following drainage routes and former rail corridors. The presentation concludes by outlining a plan known to community groups who worked with the author in 2011 on the development of the Newcastle Waterway Discovery Loop. It is a plan to unlock brownfields and greyfields for car-free affordable housing development along a new 8km green loop tying loose ends in the city's cycleway network, while opening motorists' eyes to a new urban model. His work on the Newcastle Waterway Discovery Loop led to the author publishing the first ever book on bicycle urbanism in conjunction with the Netherlands Architectural Institute and a speaking and consulting career working with peak bodies and government agencies in New York, Boston, Vancouver, Singapore and the Netherlands.

For further information and images related to the Newcastle Waterway Discovery Loop please visit:

<http://cycle-space.com/newcastle-waterway-discovery-loop/>

Ben Ewald

Senior Lecturer in Epidemiology and General Practitioner
Centre for Clinical Epidemiology and Biostatistics University of Newcastle
4th floor west HMRI Building Uni of Newcastle
Callaghan NSW 2308

P: +61 2 4042 0544

Dr Ben Ewald B.Med PhD, is an epidemiologist and medical practitioner, with research interests in physical activity and health. Years of advising his patients to get more exercise has led him to believe that making active transport easy and safe will do more than anything else to curb the rise in sitting related illnesses.



Abstract

The opportunities for innovative research within the CycleSafe Network proposal.

Authors and contacts: Megan Sharkey¹ and Dr. Benjamin Ewald^{2}*

1 Environmental Officer, Infrastructure and Facilities Services, University of Newcastle. Email: Megan.Sharkey@newcastle.edu.au.

2 Senior Lecturer, Centre for Clinical Epidemiology & Biostatistics, School of Medicine and Public Health, Faculty of Health and Medicine, University of Newcastle; and General Practitioner. Email: Benjamin.Ewald@newcastle.edu.au.

** Corresponding Author*

The CycleSafe Network (CSN) proposes to build 150km of cycleways to link greater Newcastle with a network of uniform safety that is direct and legible. While cycling offers transportation benefits, the big payoff is in the health gains from increased physical activity, and the intangible social benefits from delight we can take in an attractive and equitable transport environment. By embedding a research agenda during planning and construction of the CSN, a multidisciplinary health and quality of life research program can be achieved whilst simultaneously evaluating the design principles of the CSN. For example GIS citizen reporting of the large number of unreported bike crashes can evaluate cycleway design standards. We will also measure before and after health status of linked communities, and transport behaviour at participating schools. The interrelationship between health, transport, the economy, and urban design offers further research opportunities that can reveal lessons for other Australian cities.

Brian Hill

Quiet Rush

E: brian.hill@laughingmind.com

With a family history across the Hunter that goes back to 1826, Brian is a born and bred Novocastrian, with nearly 50 years of experiencing the Hunter and region and its transformation over that time. Despite career jaunts to work outside the Hunter, learning how to deliver large scale technology solutions for healthcare, service delivery and asset management, Brian has always called it home. Raised in a Civil Engineering family, Brian has an ongoing and active interest in how built environments create viable, vibrant communities with effective urban Placemaking.

Brian joins the Smart Future Cities conference as an informed and experienced technologist, with a bias towards activities that work as lifestyle medicine, getting and keeping people moving, active, creative and engaged. When not doing project work, Brian is running Digital Maker Meetups and exploring Internet Of Things (IoT) Security risks and challenges as a systems auditor. Brian likes to innovate and create ways to build inspiring, creative, entrepreneurial and connected futures. He is currently creating a series of evening space-activation events that celebrate light, water + human motion at www.lumenmotion.com When not in front of a keyboard or his 3 kids, he likes to ride. Anything.



Abstract

Solar powered electric bike rental stations in the Future City

Demonstrating how similar sized European cities are tackling urban transport with self-contained, solar powered electric bike rental stations. Electric Bike sales in the Netherlands and Europe are streaking ahead as populations come to grips with the impact that powered riding at human scale can make on urban transport and population health. We propose a continuum of solar powered bike infrastructure pilots, ranging from mild to wild, in the following formats:

1. Solar charged eBike rental stations at key points of interest for port visitors;
2. Solar powered cargo cycles able to be used as mobile retail, mobile charging stations and portable film festival projection platforms;
3. Silent, solar powered urban action sports: The recent Supermoto spectacular shows there is potential to run a similar action sports format as a new, clean-tech enhanced, urban action sport, using options like our Australian designed Stealth Electric off-road bikes.

Andrew Maddocks

Senior Consultant – Carbon and Energy Management , GHD

T: +61 2 4979 9999

E: andrew.maddocks@ghd.com

Dr Andrew Maddocks is a senior consultant and project manager in GHD's multidisciplinary Sustainability and Climate Change group and has more than 10 years' experience across a number of engineering and environmental fields. Andrew specialises in compiling greenhouse gas inventories, life cycle assessments, resource efficiency and carbon management strategies. He has participated in numerous audits and verifications, and provided strategic advice on sustainability issues related to major infrastructure. In the past four years, Andrew has managed or participated in more than one hundred greenhouse gas related projects.



Abstract

The Direct Action Policy – How can it work for you?

The Federal Government's Direct Action Policy is up and running.

Its centrepiece, the Emissions Reduction Fund, is a \$2.55 billion dollar fund set up to "support Australian businesses and households to take practical, direct action to reduce emissions and improve the environment."

The objective of the fund is to help achieve Australia's 2020 emissions reduction target of 5% below 2000 levels by 2020, by supporting business to become more productive and more energy efficient.

But just how does it work, how can businesses benefit from this fund and what have been the outcomes since the first round of funding commenced in April?

Dr Andrew Maddocks is a Senior Consultant in Carbon and Energy Management. He is part of GHD's Infrastructure Advisory service group, which has to date assisted the Federal Government to develop methodologies for measuring and calculating emissions abatement, has provided advice on the policy framework, and is now helping businesses participate in the scheme.

Andrew will discuss the workings of the fund, the outcomes of the first round of 'reverse auctions' for carbon permits, and what to consider when developing projects for carbon credits.

John Talbott

E: john@nararaecovillage.com

Toby Roxburgh

Principal Energy Engineer, E2Designlab

E: toby@e2designlab.com.au

W: www.e2designlab.com.au

John Talbott is a Consulting Engineer and for over 20 years was the project director of one of the world's first ecovillages, Findhorn Ecovillage in Scotland. Findhorn has received Best Practice designation from the United Nations Centre for Human Settlements (Habitat).



He specialises in green building, renewable energy and infrastructure associated with sustainable communities, and is the author of Simply Build Green, a technical guide to ecological building.

Since moving to Australia in 2003 he:

- undertook corporate cultural transformation programs, including as a facilitator of the ANZ Breakout program, while consulting on a variety of sustainable projects;
- was Technical Director for gDiapers, the world's first biodegradable and flushable baby diaper with Cradle to Cradle Certification;
- was featured in the 'Forward Thinkers' campaign sponsored by the AVIVA Insurance Group;
- worked with ecovillage development and community-scale renewable energy systems;
- co-founded Fairway to Heaven, a week long golf workshop based in Scotland focusing on the "spiritual dimension" of golf and life

John is currently the Project Director of the Narara Ecovillage Co-operative, a 120 home ecovillage development on 62Ha near Gosford, NSW.

Toby Roxburgh

Toby Roxburgh has over 12 years experience in sustainable energy and microgrid projects, through district energy, power stations, urban planning and building services.

He is currently assisting Narara Ecovillage achieve their dream of the smartest net carbon neutral community grid in Australia. He has previously helped the City of Sydney, ACT government and Brisbane City Council with their district energy visions as well as designing solar PV systems, commissioning 20MW geothermal power stations, hospital central plant systems and mini hydro. He has worked across the energy delivery spectrum: from education and energy policy through to cost benefit analysis, feasibility, design, construction, commissioning and operation.

Abstract**Novel Solutions for Findhorn Ecovillage, Scotland and the NSW Narara Ecovillage's advanced carbon neutral smartgrid**

This presentation will consider novel solutions developed at Findhorn Ecovillage in Scotland, such as Wind turbines and PV systems, ecologically-designed buildings, and a car-sharing club of zero-emissions electric vehicles.

It will also cover the status of the Narara Ecovillage Co-operative (NEV) near Gosford, NSW, a 120 home ecovillage development on 62Ha. It is developing holistically sustainable designs for off-grid water and energy, with food-growing capacity.

NEV has a very advanced, net carbon neutral smart electricity grid design that was funded by a grant from the NSW Office of Environment and Heritage, and its electric vehicles are already being charged by its community-funded 30kW PV system. There will also be a connection to the NBN allowing smart applications and members to work more from home.

Matthew Griffith

Priority Research Centre for Organic Electronics
NIER Building, Level 2, Room A490
School of Mathematical and Physical Sciences
The University of Newcastle
Callaghan, NSW, Australia, 2308

E: matthew.griffith@newcastle.edu.au

Coralie Epstein

E: c3110470@uon.edu.au

Dr Matthew Griffith received a Bachelor of Nanotechnology with 1st class Honours from the University of Wollongong, in 2007, and a PhD in Physical Chemistry, from the University of Wollongong in 2012.

He has worked as a Postdoctoral Associate with the Co-Operative Research Centre for Polymers in 2012 and a NEDO Postdoctoral Fellow at Shinshu University, Japan in 2013, where his research focused on understanding the operation of novel solar cell devices. At present, he is a Postdoctoral Researcher in the Centre for Organic Electronics (COE) at the University of Newcastle, where his research examines the fundamental physical chemistry and applications of organic solar cells, with a focus on how to produce these devices on a large-scale using progressive fabrication techniques.

Coralie Epstein received a Bachelor of Science with 1st Class Honours in Physics from the University of Newcastle in 2013. She is currently a PhD candidate with the Centre for Organic Electronics at the University of Newcastle, where her work focuses on the stability and lifetime of organic photovoltaics. She was awarded a University Medal in 2013, which is allocated annually to undergraduate students who have shown exceptional academic merit.

Abstract

Lighting Up the Future: the Production and Characterization of Printed Flexible Solar Cells

Matthew J. Griffith and Coralie Epstein, Priority Research Centre for Organic Electronics, University of Newcastle, Callaghan, NSW, 2308

The aim of this work is to address the major emerging issue of global access to cheap and sustainable sources of energy. Towards this purpose we report our efforts to produce flexible lightweight coatings that function as solar cells; devices which generate electricity directly from sunlight. We focus on organic photovoltaic cells (OPVs), an exciting branch of solar technology that employs conducting plastic materials as the active components to harvest sunlight. The key advantage of OPVs is that the polymer blend materials can be formed into solutions that can be printed at high speeds across large areas using industrial scale roll-to-roll (R2R) processing techniques (Figure 1).

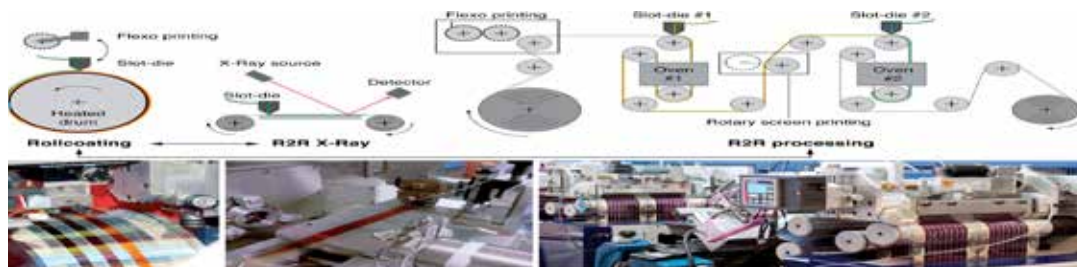


Figure 1: Images of the large scale fabrication of organic photovoltaic cells using roll-to-roll coating technology.

We have established a suite of facilities at the Centre for Organic Electronics that allow for the production of raw polymer materials and the printing and characterisation of OPV devices from these materials. In this talk we will provide an overview of our efforts, beginning with a discussion of our endeavours to produce functioning OPV modules by tailoring the fine structure and morphology of the polymer materials across large areas to avoid unfavourable material reactions. We will then discuss some of the applications of these solar cells and the ongoing efforts required to take the technology into the energy generation market. In particular, we will present a case study that highlights the need to prevent degradation of the fragile polymer materials, and the need to build automated testing equipment and understand the processes that lead to shortened device lifetimes, thereby circumventing the largest remaining barrier to the widespread adoption of these printable solar cells.

Built Environment Strand

David Abrahams

Digital Research, Strategy, Policy and Investment

M: +61 (0)450630181

E: digitdave@gmail.com

T: [@digitdave](https://twitter.com/digitdave)

I: au.linkedin.com/in/digitdave



David Abrahams has a Cand.Mag degree from the National University of Science and Technology NTNU in Norway. He runs a digital innovations company in Gosford and provides investment advice to large infrastructure funds. David has held a raft of senior positions in Industry and in Government advisory roles include as director of the NSW Telecommunications Authority, Member of the Australian Information Industry Association's Industry Development committee, Chair of Regional Development Australia Central Coast, member Federal Broadband Champions and Advocates Committee and Chair and co-founder of YouthConnections.com.au.

David has been guest lecturer at UoN in IT Major Industry Projects as well as conducting research into pollution data sets. He's the voice behind 'Digital Dave' on ABC local radio around the country and is an often sought after industry commentator. Connect via his twitter handle @digitdave.

Abstract

Smart City Infrastructure

What infrastructure is required to build a smarter city? We will quickly examine the technologies, investments, ownership structures and partners required to maximise the rollout of smart city initiatives. What examples can we see from around the world and how could they work in the Australian context? We will use two perspectives to bring Smart City Infrastructure discussions into sharper focus;

The first perspective will look at how promoting open platforms encourages a constant evolution in innovative solutions to Smart City issues as they develop.

The second perspective looks at how good ownership, leadership and investment models can facilitate service improvements and why 'infrastructure' should be the tactical focus.

We will look at inspirational examples from Scandinavia and the Baltic to illustrate those two perspectives, particularly Norway and Estonia.

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HOLISTIC
Security Pty Ltd

Newcastle owned and operated.

E: ben@holisticsecurity.com.au
W: www.holisticsecurity.com.au

David Crofts

M: +61 (0) 413052137

E: solutions@strategyhunter.com.au

W: www.strategyhunter.com.au

David Crofts has over 30 years experience in working at the local, state and national level, specialising in public sector management and policy, urban and regional planning, local service delivery strategy, and economic development.

David has extensive experience at senior management levels of the Australian Public Service and within Local Government. He is qualified company director, holding a Company Directors Diploma from AICD. He has been a company director for over a decade, including an active role on the Board governance and finance subcommittees.

At the national level David led a reform program for local government development approval systems, as well as several ground breaking studies into local government housing, urban infrastructure and the relationship between housing, jobs and services.

He has received an Australian Public Service Departmental Australian Day Medallion for his work on Local Government and Housing.

At the local level David was responsible for city strategy of the City of Newcastle, as Group Manager City Strategy. A member of Council's executive team, his responsibilities included asset management, urban planning, economic development and social planning, amongst other areas.



Abstract

Transitioning to a Sustainable City - Urban Development Lessons for Australia

Cities around the world are adopting more sustainable urban development as a way for increasing economic performance, building community coherence and reducing their environmental footprint.

This presentation will provide a practical exploration of initiatives underway in Europe and the United States. It will focus on inner city development, and some redevelopment areas near the urban fringe. Many of the cities are similar to Newcastle in so far as they have undergone a transition from an industrial based to a service based economy.

Internationally, there is a shift from car dependence and towards providing the community with improved access to alternatives such as walking, cycling and public transport. The experience from these initiatives in retrofitting cities for alternative modes of transport is that it improves their vitality, stimulates business performance, and nurtures an environment conducive to the growth of the "new economy" based on creative entrepreneurial enterprises.

The presentation will be based on study tours undertaken in northern Europe in 2015, and the United States in 2014 and 2005.

The Hunter Environmental Institute

HEI provides a forum for the interaction of people working in environmentally oriented fields in the Hunter Region.

HEI is a non-profit organisation, managed by a volunteer committee and operating under a formal Constitution.

Our bi-monthly afternoon meetings feature presentations by guest speakers (or panels) on a specific issue within the broad range of environmental topics, followed by discussion and networking.

www.hei.org.au

 **HUNTER ENVIRONMENTAL INSTITUTE**

Meredian Alam

PhD Candidate Sociology, School of Humanities and Social Sciences, University of Newcastle

E: c3197024@uon.edu.au | mere.alam@gmail.com

Meredian Alam is a PhD Candidate in Sociology at School of Humanities and Social Sciences, University of Newcastle, Callaghan. He holds M.Phil in Environment, Culture, and Sustainability from University of Oslo Norway, M.A in Biogas Technology. In February 2012 he received a research fellowship at Nordic Institute of Asian Studies, University of Copenhagen Denmark, conducting a study into social domestication for appropriate technology application in developing countries. Prior to his arrival in Australia, he had two-year experience in Indonesia as field coordinator for a post-doctoral research scheme, which investigated the rise of environmental non-government organization in Indonesia commissioned by Norwegian Embassy in partnership with University of Agder, Norway. Currently he is writing his thesis on the young people involvement in high-risk environmental activism in Indonesia supervised by Professor Pam Nilan and Dr. Terrence Leahy.



Abstract

Bandung as New Emerging Smart City

Since the beginning of 2014 Bandung, Indonesia, has been named as Indonesia's first Smart City. The aims of developing Bandung Smart City is to enable the urban residents to connect each other through the cutting-edge technology and to advance the city government's primary roles in controlling and governing the vibrant and harmonious life of the residents. To reinforce the government's power in supervising the city, a sophisticated monitoring infrastructure, namely Bandung Command Center (BCC) is currently built and automatically linked to Global Positioning System (GPS) installed on 4,000 points and Closed Circuit Television put 50 points such as in the ambulance, school buses, city shuttle buses, and garbage trucks operating in across Bandung. In enhancing the digital connectivity in the city, the government also partnered PT Telkom as Indonesia's largest telecom industry to have installed more than 100 free Wi-Fi hotspots at city shopping centre, urban parks, and other public amenities, and established Bandung Digital Valley as a techno-hub that caters for young people with business incubators. Furthermore, this year Bandung is voted as the champion for Asian-African Smart City Alliance, which the city Mayor Ridwan Kamil is appointed as the leader. In light of the development of Bandung Smart City, this presentation will highlight what socio-political capitals are that government is using to enable the smart city, and what future challenges that Bandung city will overcome.

Andrew Lang

E: andrewlang001@bigpond.com

Andrew Lang trained as an agricultural scientist and is a farmer and farm forester near Ballarat in Victoria. He is a Churchill and Gottstein Fellow and is a vice president of the World Bioenergy Association and the board member representing Australasia-Oceania.

During the eight years involvement with the World Bioenergy association he has gained a good understanding about issues and technologies related to energy from wet and dry municipal wastes, agricultural residues and forestry residues. He is presently working on reports on biofuels and biogas.

Abstract

The potential of energy from municipal waste streams in Australia

One way that an increasing number of cities are reducing their greenhouse gas emissions and increasing their energy self-sufficiency is by a near-complete utilisation of the waste streams generated by households, commerce and industry, and from demolition and construction. While the main energy products produced from non-recyclable wastes are electricity and heat, the third fraction of city energy use – transport fuels – is also being met in some cities by production of biomethane from putrescible wastes.

Australia does not yet have any large-scale conversion of municipal waste to energy. Yet in many larger European cities all organic or combustible non-recyclable waste is used to produce energy using one or more of a number of technologies. Driving this has firstly been the rapid increase in waste volumes per person beginning in the early 1950s compounded by the lack of suitable sites for landfills, and secondly, the development of the integrated systems for separation and recycling, and energy production. A third driver that has made development of WTE processes necessary has been legislation, with EU legislation being developed on the basis of what was put in place in Germany, Sweden and Denmark from the early 2000s.

Singapore, Canada, Japan, the USA and Taiwan have all developed a greater use of waste to energy (WTE) technologies. China has now joined this list with major investment in modern plant at many cities. Now policy and planning for production of energy from waste is happening in Indonesia and some other developing countries.

This presentation will go into detail on how leading countries and cities produce energy (heat, electricity and transport fuels) from their waste streams, and the costs, the thresholds of economies of scale, and technicalities involved in doing it in Australia.



Plenary Session Presenter Profiles

Sharon Pope

Manager Integrated Planning, Lake Macquarie City Council

E: : slpope@lakemac.nsw.gov.au

Lake Macquarie City Council is one of the biggest and more diverse council areas in NSW. In the past 30 years the Council area has changed from a low density settlement, with a series of villages around the Lake, to an area with significant employment and retail opportunities, a gradual increase in housing density near town centres, and ongoing greenfield urban expansion.

Sharon has been the Manager for Integrated Planning for seven years, and at Lake Macquarie City Council for nine. Before becoming the Manager, she had 22 years' experience working as a Development Assessment Planner, Strategic Land Use Planner, or Place Manager for a number of Councils in the Hunter and on the Mid North Coast of NSW.

Sharon's team of staff consider and plan the way the various towns and suburbs in the Council area will grow, where jobs will be provided, and identify where new infrastructure will be required.

Sharon is a member of the Planning Institute of Australia and a Certified Practicing Planner.



Abstract

Preparing the City's first Digital Economy Strategy

The arrival of the National Broadband Network (NBN) in Lake Macquarie provides the City with further opportunities to harness digital technology. To navigate its way through a future of high-speed broadband enabled technologies and practices Council is preparing a Digital Economy Strategy. Informing this strategy is Council's city-wide collaboration with the community, known as the 'Lake Mac Smart City' campaign. Council defines a 'smart city' as one that improves the economic, social and environmental performance of both Council operations and life in the City by ensuring: (i) Lake Macquarie communities, government and businesses become 'switched-on' — engaged and empowered to develop innovative responses to digital opportunities; (ii) the City becomes further sustainable, efficient and connected, informed by adaptive and networked infrastructure; and (iii) local leadership and open governance facilitate engagement in the digital economy. Ultimately, the Digital Economy Strategy will provide the vision and outcomes necessary to ensure Lake Macquarie grows as a 'Smart City, Smart Council'. Council will share how it has canvassed ideas from the community through its Lake Mac Smart City campaign and what the community thinks we can achieve with technology to make the City even better.

Don Burke

Australia Day Ambassador since 1990
Past board member Landcare Australia
Board member Sustainable Development Australia
Past President Australian Environment Foundation 2005-2008
Member of founding groups: Greening Australia, Year of the Tree, Decade of the Tree
Recipient 2010 Order of Australia for services to environment, horticulture & the media
Current member of University of NSW Science Advisory Committee

Abstract

Cities of the Future - Benefitting from climate change

Climate change will do much harm to environments and civilisation. But it is worth remembering that it is climate CHANGE not climate DISASTER. That is, some areas of our earth will be devastated, some may be affected only mildly AND SOME WILL ACTUALLY BENEFIT from Climate Change.

The general thrust of this presentation is that while science and people work towards stopping or reversing Climate Change, smart groups will plan to turn the (hopefully) temporary Climate Change into advantages for new cities and industries.

IF WE DON'T DO THIS, ECONOMIES MAY COLLAPSE AND CITIES MAY DISINTEGRATE.

Using climate change computer modelling for the future as a starting point, the idea here is to assemble a multidisciplinary TASK FORCE to plan cities and industries of the immediate future.

By looking at patterns of reduced or increased rainfall, industries can be relocated which means that populations (and hence cities and towns) will also move locations. Many other climate change issues may also yield ever more opportunities apart from rainfall.

The task force will be charged with the task of planning new cities and towns and also creating inducements for people to move. Obviously building infrastructure in advance is essential. Schools, shops, theatres, roads, restaurants, sporting facilities, etc all would need to be developed.

TOO EXPENSIVE?

Constructing roads alone in (currently) rural or useless areas would cost a tiny fraction of the expensive road tunnels that Sydney's urban congestion dictates. Opening up new land and housing developments would make housing affordable for younger people.

The truth is that cities like Sydney and Melbourne are already far too big and congested. They keep adding ever more rings on the outside of the onion. Both have long since run out of adequate water and the environmental cost of more dams is unacceptable.

The task force would include:

Town planners, sociologists, demographers, climate scientists, entrepreneurs, property developers, agriculturists, farmers, environmentalists, road builders, computer modelling experts and many other people with relevant expertise.

Gary Ellem

Conjoint Academic & Program manager – Future Industries, Tom Farrell Institute for the Environment, University of Newcastle

E: Gary.ellem@newcastle.edu.au | M: 0423 163714

Dr Gary Ellem is a sustainability futurist working mainly in the areas of transport, energy and regional innovation. He identifies system scale opportunities which combine technology, business, regulatory and social innovation.

Dr Ellem received his PhD in Biophysics from the University of Newcastle (Australia) and followed on to lecture in Biology, Ecology and Sustainability Strategy. He has worked in industry as a Senior Scientist, Analyst and Strategist in the cleantech and digital innovation space, helping companies to identify technology and business pathways to new cleantech products and services.

Gary's is a national thought leader in sustainability and was recently invited to write for The Conversation where you can see his contributions including 'Peak fossil fuels won't stop climate change – but it could help' and 'Four ways to boost the Australian economy that could help the climate'.

Abstract

Future Cities

This presentation will present a personal view of the highlights of our two-day march towards Future Transport; Clean Energy; and Innovation and Emerging Technologies in the Built Environment, taken against the backdrop of collaborative planning – where all the industries, communities, governments and researchers work together to achieve the best outcomes.





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Rupert Doney

PhD Candidate, Repairing, Retrofitting and Regenerating the City, Discipline of Geography & Environmental Studies, School of Environmental & Life Sciences, Faculty of Science & Information Technology
The University of Newcastle
University Dr, Callaghan NSW 2308

T: 0450398661

E: Rupert.Doney@uon.edu.au



Rupert is a PhD candidate at the University of Newcastle with a research focus on the adaptation and governance of the built environment. His thesis, entitled *Repairing, Retrofitting and Regenerating the City*, is concerned with the delivery, management and practices of housing renovation and domestic retrofit in creating more climate-responsive urban environments. He has previous research and publication experience in the field of social housing policy and development and holds a broader interest in the fields of urban sustainability, politics and policy.

Abstract

Retrofitting and urban energy flows: practitioner and householder perspectives on domestic retrofit and urban energy systems

The built environment is critical to any exploration of urban energy flows and their entanglement in processes of energy provision and consumption. In cities across the world, the promotion of retrofit of the built environment is emerging as key to reconfiguring systems of energy provision and use. Residential housing represents a key juncture between wider systems of energy provision and a key site of energy consumption—the domestic domain (Bulkeley, Luque-Ayala, & Silver, 2014). My concern in this paper is to explore the interplay between the provision and lived experiences of residential retrofit. Bringing together perspectives from assemblage theory and social practice theory, the paper emphasises the socio-technical, material and practice-based nature of residential retrofitting and its associated energy flows. Through interviews with practitioners involved in the provision of heating and cooling retrofits and householders who have retrofitted changes to their home in Newcastle, Australia, I explore how systems and policies have defined practitioners and their roles in certain ways, and the ways in which the experience of retrofitting practices have shaped customs and expectations in the everyday lives of householders that, in turn, iteratively configure pathways of retrofit provision and use. The paper suggest that residential retrofit provides some insights into the contestations, struggles and tensions involved with small-scale attempts to alter urban energy flows via changes to the domestic built environment.

AFM Kamal Chowdhury

School of Engineering, the University of Newcastle, Callaghan, NSW-2308

E: afm.chowdhury@uon.edu.au



I have been working as a PhD student in the Eastern Seaboard Climate Change Initiative project at the University of Newcastle, Australia since March 2013. Before starting this, I completed BSc in Civil and Environmental Engineering from Shahjalal University of Science and Technology, Bangladesh in 2010 followed by a graduate certificate course on Engineering Geology from University of Twente, Netherlands in 2012. I also worked as a lecturer of Civil Engineering in World University of Bangladesh from January to July 2011 and as a lecturer of Disaster Management in Patuakhali Science and Technology University, Bangladesh from July 2011 to February 2013.

In my PhD, I am studying the water security implications of east coast lows in the coastal New South Wales. I have developed a Compound Distribution Markov Chain (CDMC) daily rainfall model which will be used to evaluate the influence of east coast lows on the urban water security of reservoirs. The key contribution of the CDMC model is its ability to preserve the observed rainfall variability in multi-year timescale. Preserving multi-year variability is always challenging for a daily rainfall model, but these statistics are the most important for water security analysis in any part of the world, because reservoir water levels usually response to the multi-year variability. In general, my research interest includes rainfall-runoff modelling, urban water security, climate change, climate variability, extreme weather events, and urban heat island.

Abstract

Stochastic Simulation of Daily Rainfall in Lower Hunter Considering Urban Water Security of Reservoirs

AFM Kamal Chowdhury¹, Natalie Lockart¹, Garry Willgoose¹, George Kuczera¹, Anthony Kiem²

¹School of Engineering, the University of Newcastle, Australia

²School of Environmental and Life Sciences, the University of Newcastle, Australia

Urban water security is a concern for Lower Hunter region with high inter-annual rainfall variability. The urban water planning usually uses stochastic daily rainfall model to generate streamflow for reservoir water simulation. However, the daily rainfall models often underestimate the long term variability of observed rainfall, which can lead to an overestimation of reservoir reliability in urban water planning. We have developed a Compound Distribution Markov Chain (CDMC) model for stochastic simulation of daily rainfall. The CDMC model uses deterministic parameters of the two-state Markov Chain process for rainfall occurrence simulation. The rainfall depth on the wet days is modelled using a gamma distribution where the gamma parameters are sampled from a bivariate normal distribution of log normally distributed mean and standard deviation of wet day rainfall over the sampling period. We have calibrated the CDMC model to the Lower Hunter region using high resolution gridded data produced by NSW/ACT Regional Climate Modelling project. Our results show that the CDMC model satisfactorily preserves the mean and standard deviation of observed rainfall in daily to monthly and multi-year timescales. Preserving multi-year rainfall variability is the significant contribution of CDMC model because the reservoir water levels usually response to the multi-year variability.

Hasintha Wijesekara

PhD Scholar in Environmental Remediation and Public Health,
Centre for Environmental Risk Assessment and Remediation,
University of South Australia, Mawson Lakes Campus, Adelaide SA 5095

M: +61 426 169 192

P: +61 883 023 228

F: +61 883 023 057

E: wijesekara84@gmail.com, hasintha.wijesekara@mymail.unisa.edu.au

W: <http://www.unisa.edu.au/CERAR/>



I obtained B.Sc (Special) degree in Environmental Science and Natural Resources Management from the University of Sabaragamuwa, Sri Lanka in 2010. I then completed M.Phil degree in Environmental Science from the University of Peradeniya, Sri Lanka in 2013. I was a Research Assistant to the Chemical and Environmental Systems Modelling Laboratory, Institute of Fundamental Studies, Kandy. In 2014, I was fortunate to receive the prestigious International Presidential Scholarship (IPS) to conduct my Ph.D studies at the Centre for Environmental Risk Assessment and Remediation, University of South Australia, Adelaide. My Ph.D thesis title is “*Biogeochemical mechanisms of biosolids application on carbon sequestration in soils*”. I use biosolids (which is human waste) to limit climate change. My hobby is disseminating science to Sri Lankan students in my native language.

Abstract

Sequestration of carbon in sandy soils - a ‘direct action’ tool in mitigating climate change

Hasintha Wijesekara¹, Nanthi S. Bolan^{2,3}, Naser Khan¹, Aravind Surapaneni⁴, Christopher Saint⁵

¹Centre for Environmental Risk Assessment and Remediation (CERAR), University of South Australia, Mawson Lakes, 5095, Australia

²Global Institute for Environmental Research (GIER), ATC Building, Faculty of Science and Information Technology, The University of Newcastle

³Cooperative Research Centre for Contamination Assessment and Remediation of the Environment, Adelaide, 5095, Australia

⁴South East Water, 20 Corporate Drive, Heatherton, Victoria, 3202, Australia

⁵Centre for Water Management and Reuse (CWMR), University of South Australia, Mawson Lakes, 5095, Australia

As part of the strategies to reduce greenhouse gas emissions from mega cities, soil carbon sequestration is a proven ‘direct action’ tool in mitigating climate change. Australian soils are generally low in organic matter (OM) content and sandy soils are dominant in most occasions indicating their potential as a sink for long-time storage of carbon. Australia generates a third of a million tonnes of carbon-rich biosolids a year, providing a potential source of carbon from human waste. Therefore, the aim of this study is to understand the carbon storage from the application of biosolids in sandy soils. A series of laboratory incubation studies were performed by adding different alkaline amendments; garden lime (GL), fly ash (FA), and red mud (RM) to biosolids in acidic sandy soils. Soils were mixed with biosolids at a rate of 50g C kg⁻¹ soil, and approximately 10 % alkaline amendments were added. Microbial activity, changes in carbon fractions such as microbial biomass carbon (MBC), recalcitrant carbon fractions such as humic substances were analysed. Cumulative CO₂ emission and MBC data indicate that the performance of alkaline amendments in stabilizing carbon in biosolids followed: FA > GL > RM. This study suggests that alkaline waste amendments can be used to enhance carbon stabilization in biosolids and thereby facilitate the mitigation of climate change.

Rafiu Salami

PhD Candidate,
School of Architecture and Built Environment,
Faculty of Engineering and Built Environment,
University of Newcastle, Australia.

E: RafiuOlugbenga.Salami@uon.edu.au



Mr. Rafiu Salami is a Post Graduate Research Student and casual academic at School of Architecture and Built Environment, University of Newcastle Australia. Rafiu earned a Master of Technology degree in Architecture from the Federal University of Technology, Akure, Nigeria in 2011 and he is a registered member of Architectural Educators in Nigeria. He has over ten years teaching experience in Architecture and Construction Management courses. These include Architectural design, Building Construction Technology and Construction Ecology. He is a member of the disaster and development research group at the University of Newcastle, Australia.

Abstract

Towards developing a viable strategic framework to combat inadequate housing: A case of Ibadan metropolis, Nigeria.

Salami R. School of Architecture and Built Environment, University of Newcastle Australia

rafiuolugbenga.salami@uon.edu.au

Von Meding, J. School of Architecture and Built Environment, University of Newcastle Australia

Jason.vonmeding@newcastle.edu.au

Gigings H. School of Architecture and Built Environment, University of Newcastle Australia helen.gigings@newcastle.edu.au

Inadequate housing has a significant impact on the livelihoods of poor people. It affects their economic, political, and social development, as well as providing poor resistance to natural disasters. More interventions are needed to tackle the devastating impact of climate change on the urban poor and their unplanned environmental conditions. This research aims to develop a viable strategic framework that can significantly improve the living conditions of inhabitants of poor housing. This will provide a deep understanding of dynamics and relationship between inadequate housing and urban poverty through a descriptive survey research design. This study adopts a mixed methods approach, involving multiple case studies in three communities in Ibadan metropolis, Nigeria. A quantitative data in a form of a well-structured questionnaire survey of demographics, socioeconomic, housing physical conditions and infrastructural facilities of a pre-determined sample of 300 households will be exhausted. Also, the follow-on exploratory interview, field observations and focus groups discussion with stakeholders such as urban planning practitioners, local government authorities and NGOs will be explored to collect relevant data. It is expected that the findings of this study will provide valuable theoretical and empirical contributions to knowledge and serve as a guide for combating housing inadequacy and thereby improving the livelihoods of the urban poor.

Alaa Al-Ahmad

Centre for Organic Electronics, School of Mathematical & Physical Sciences, Faculty of Science & Information Technology
The University of Newcastle / AU
University Drive
Callaghan NSW 2308, Australia

E: alaa.al-ahmad@uon.edu.au

P: +61426092810



Alaa Al-Ahmad is a PhD student from Iraq. He received a B.S. degree in physics and the M.Sc. degree in Laser physics from the University of Basrah, Basrah, Iraq, in 2000 and 2007, respectively. He was a Lecturer at the University of Basrah, College Education for Pure Science 2013, and a Research Assistant at the Group of Nonlinear Optics and Light-Matter Interaction, the University of Basrah, Basrah, from 2007 to 2013. He is currently working towards a PhD degree in Organic Electronics at the Priority Research Centre for Organic Electronics, The University of Newcastle, Newcastle, Australia. Alaa will finish his Confirmation-Year-Candidate in July 2015. His research interests include light material interaction, optical characterisation, light design, control, optimization, and reliability modelling in solar photovoltaic applications, as well as renewable-energy and optimization of energy systems in general.

Abstract

Indoor Plant Lighting System Based on Light-Emitting Diode (LED) Technology

Alaa Y. Al-Ahmad, Xiaojing Zhou, Warwick J. Belcher, John Holdsworth and Paul C. Dastoor

Priority Research Centre for Organic Electronics, University of Newcastle, University Drive, Callaghan, NSW, 2308, Australia.

Plant growth depends on the availability of light. Lighting systems play a decisive role in plant studies. Recent advancements of light-emitting diode (LED) technologies have allowed for the use of LEDs in solar simulators (artificial sun) with excellent characteristics that provide opportunities to study various plant light responses. We have developed a solar simulator light source that can be used as a plant lighting system. It irradiates a 127 square centimetre area with a highly uniform distribution of light flux density. The irradiance of the simulator can be controlled using a computer and drive circuitry. This simulator uses a novel configuration of LED clusters, with each cluster consisting of six types of LEDs (cool white, warm white, blue, far red, and two type of IR) positioned in a hexagonal geometry. This cluster arrangement is a unique design that can be repeated in X and Y directions with minimal edge effects, which allows for very large areas to be illuminated uniformly. This simulator is able to achieve 100 mW/cm² irradiance level in the wavelength range of 400-1100 nm. This exciting development will allow for new plant light response studies on a large scale.

Poster Presenter Profiles

Andre Cook

E: andre.cook@uon.edu.au

Andre completed a BSc in Chemistry and Physics in 2014 at Newcastle University with undergraduate research into the effects of potential on the interfacial structure of Ethanalammonium nitrate and the effects of temperature on the resistance of conductive polymers. He is now undertaking an honours course in Chemistry with the Newcastle Australia Ionic Liquids Research group being supervised by Rob Atkin and Hua Li. The honours research seeks to discover and explain the behaviour of Solvate Ionic Liquids at the solid-liquid interface.



Abstract

Nanostructure of Lithium-Glyme Solvate Ionic Liquids at Charged Electrode Interfaces

The solid-liquid interfacial nanostructure of Lithium-Glyme based Solvate Ionic Liquids (SILs) has been studied using Atomic Force Microscopy (AFM). SILs are salts comprised of a bulky anion and a ligand bound metal cation that are liquid at less than 100°C. Their high ionic conductivity and non-flammability make them excellent candidates for safer and more efficient Lithium-ion batteries. In this study the behaviour of various SILs was investigated at the charged interface of graphite and gold electrodes using AFM force curves to study individual molecular layers. It was found on graphite that increasing the positive potential of the surface increased the rigidity of the interfacial structure whereas application of a negative potential caused a structural shift resulting in weakened structure. The effect of changing the anion and the glyme length were also investigated. Anions with a higher bonding affinity for the metal cation than the glymes displace the glyme in the complex, resulting in lower interfacial structure strength for the SILs studied. Little difference was seen between the G3 and the G4 glymes in terms of structure. The shorter G1 glyme, which has a lower affinity for the Lithium than the longer glymes showed weaker interfacial structure due to the presence of un-coordinated glyme.

Shinya Higuchi

Centre for Organic Electronics (COE) | University of Newcastle

P: +61 (0)432 366307

E: hiyama_9555@yahoo.co.jp

Mr. Higuchi was born in Tokushima prefecture in Japan in 1993. He graduated Wakimachi High School in 2011. And He entered to Shimane University, Interdisciplinary Faculty of Science and Engineering Department of Physics in Japan. In 2015, he completed his undergraduate degree there. His thesis title was "The research of inner electric field of hetero-junction solar cells with GZO as cathode." And then he got a scholarship of TOBITATE! Young Ambassador Program. From April 2015, he started to research in Centre for Organic Electronics (COE) in University of Newcastle in Australia. He researches about organic solar cells with Nano particles technology.



Abstract

Plastic Solar Cells You Can Print At Home

Climate change is a global problem that has the potential to have significant local effect. In Australia there is increasing consensus that climate change is exacerbating problems such as drought and crop failures. The solution to climate change is to drastically reduce carbon dioxide (CO₂) emissions, however this will require us to reduce our reliance on fossil fuels, which in Australia accounts for over 80% of our electricity generation. Clearly there is a strong argument for a transition towards cleaner energy sources, including solar and wind. The Centre for Organic Electronics at the University of Newcastle is leading the development of printed solar cells, which are able to be produced using industry standard printing and coating techniques. This simple production method leads to decreased cost, enabling this technology to potentially compete with fossil-fuels. Interestingly this technology could one day be produced in your home on a standard office printer using specialist inks. This poster will cover how a plastic solar cell works and how it could potentially be made in your home on demand.

Yilu Xu

E: yilu.xu@mymail.unisa.edu.au

Yilu XU. Ph. D candidature of Environmental Science (started in February 2014, University of South Australia). I obtained M.S (Master of Science) degree in 2013, East China Normal University (ECNU), China. I obtained B.S (Bachelor of Science) degree in 2010, Hangzhou Normal University, China. During that period, I received China National Scholarship for excellent student and working in Agriculture Department as a laboratory assistance. Presently, my work area includes soil carbon sequestration and microorganisms. By measuring microbial carbon use efficiency (CUE) to evaluating the role microorganisms play regarding soil organic carbon dynamics.



Abstract

Microbial Carbon Use Efficiency in Different Land Use Systems and the Implication on Global Sequestration

Yilu Xu^{1, 2*}, Nanthi Bolan³, Mark Farrell⁴

¹CRC for Contamination Assessment and Remediation in the Environment, University of South Australia, Mawson Lakes, SA 5095, Australia

²Centre for Environmental Risk Assessment and Remediation, University of South Australia, Mawson Lakes, SA 5095, Australia

³Global Institution for Environmental Technology, Science and Information Technology, University of Newcastle, Callahan, NSW 2308, Australia

⁴CSIRO Land and Water/Sustainable Agriculture Flagship, PMB 2, Glen Osmond, SA 5054, Australia

Soil is the third largest Carbon (C) pool, containing 1550 Pg organic C to 1-m depth and 2376 to 2450 Pg to 2-m depth (Lal 2004). Soil C storage contributes to the mitigation of global greenhouse gas (GHG) emission and improved soil fertility. Compared to rural area, urban demands energy, producing GHG with less soil to 'capture' C. Microbial C use efficiency (CUE), measured as the ratio of detrital soil organic C (SOC) to microbial biomass carbon (MBC), is an indicator for soil C sequestration potential and soil quality.

In this study, three C sources were applied into soil samples, which were collected from three different land use systems including peri-urban vegetable cultivation. Soils were incubated in a 30 days period to understand the role of microbes in the decomposition of these carbon sources and the microbial carbon use efficiency. The changes in microbial activity, MBC, soil total organic C (TOC), dissolved organic C (DOC) were measured during the incubation. Other parameters, such as soil pH, CEC, microbial community composition were also determined both at the beginning and at the end of the trial. Microbial respiration was monitored by detecting headspace CO₂ concentration with Servomex 1450 infrared gas analyzer (Servomex, UK). The fumigation-extraction method was used to detect MBC. Microbial CUE was calculated using Eq. 1.

$$CUE_{mic} = \Delta MBC / (\Delta MBC + \Sigma CO_2-C) \quad (Eq. 1)$$

where, CUE_{mic} is CUE measured by microbial accumulation; ΣCO_2-C is the CO₂ cumulative microbial respiration; ΔMBC is the change in microbial biomass carbon during the incubation period.

This study revealed considerable CUE variations among soils from different land use systems with labile/recalcitrant C source, which will provide fundamental instruction in terms of global environment development. Energy crisis associated with urban expanding are the impetus for us to look at the source beneath us-soil and soil microorganisms.

Alaa Yousif Ali

E: C3180873@newcastle.edu.au

Alaa Yousif Ali completed his undergraduate degree in Physics at the University of Tikrit, Iraq in 2009. He completed his masters in solid state physics also at the University of Tikrit, Iraq in 2012. Alaa started a PhD in physics at the Centre for Organic Electronics at the University of Newcastle in 2014. The primary focus of his research is low temperature growth of graphene to use as a transparent electrode in organic solar cells.

Abstract

Synthesis of Graphene Thin Films at the Low Temperature as an Alternative Transparent Electrode for Organic Photovoltaics.

Graphene films show great potential as transparent electrodes for organic electronics were it is lined up to replace the scarce and expensive indium tin oxide. Graphene films can be grown by a promising low temperature chemical vapour deposition (CVD) technique. Graphene films are catalytically grown on copper foil substrates, which, prior to growth, have been cleaned by heating the copper foil to 950°C. Varying the length, between 10 and 60 minutes, of heat treatment greatly influences the quality of the grown graphene film which was investigated by the Raman spectra. The film quality increase for treated foil for up to 30 minutes after which further treatment only display minor influence. The graphene quality can also be improved by controlling the flowrate of Hydrogen pumped into the CVD tube during graphene formation. The optimal synthetic parameters was found to be 30 minutes at 950°C and with a hydrogen flowrate of 50 sccm



Rajasekar Karunanithi

Centre for Environmental Risk Assessment & Remediation [CERAR]
Building X (Environmental Sciences Building), University Boulevard
University of South Australia
Mawson Lakes SA 5095 Australia

P: +61 8 8302 3502

F: +61 8 8302 3057

M: +61414395829

W: <http://www.unisa.edu.au/CERAR/>

Global institute for environmental research (GIER), Faculty of Science and information technology, University of Newcastle.



Rajasekar Karunanithi is a graduate student at Global Institute of Environmental Research, University of Newcastle and his research topic is Phosphorus recovery and reuse from waste streams.

Abstract

Waste management in the future cities: Nutrients recovery from waste for Sustainability

Rajasekar Karunanithi, Nanthi Bolan and Ravi Naidu

The per capita consumption of domestic and industrial water is increasing with the rise of population and it is an important issue to be taken into consideration in order to move on from conventional cities to smart cities. The present waste water treatment plants located in the cities collect and process the sewage water and the treated water is recycled back for other uses. Eventually, valuable nutrients such as Phosphorus and Nitrogen get stock piled with sewage solids. The alternate way is to recover these nutrients and reuse it for sustainable future. Our research is about using various synthesised nanomaterial to recover nutrients from waste water without any external input in a quicker, cost effective and in an environmentally friendly way. The reason for the efficient removal of nutrient by the nanomaterial may be attributed to the large surface area owing to the smaller size. The recovered nutrients may partially substitute the shortage of chemical fertilizer and resulting carbon foot print.

Benjamin Heslop

M: +61 (0)402898539 | P: +61 2 40420345

E: benjamin.heslop@uon.edu.au

Mr Benjamin Heslop is a PhD student within the School of Medicine and Public Health at the University of Newcastle due to complete in 2017. Using his background in engineering, Ben is applying systems modelling techniques to human collaboration. He has developed a model of collaboration with five components and twenty interactions¹. He hopes that teaching the model to students using online self-paced learning will improve their prospects in the workforce. Ben is also interested in applying complex systems analysis to public policy, which has led to Travelling Public². He is seeking people who might wish to join the project and develop its potential.

Ben's employment experience includes defence (Navy and Army), retail, taxi driving, auto-mechanical repairs and website development. He lives with his partner and two cats in an apartment overlooking the CBD. He enjoys cycling to work on his electric bicycle, and watching and reading science fiction or history (which perhaps surprisingly, can be remarkably similar!).



Abstract

Travelling Public

A few years ago while travelling in Moldova – part of the old Soviet Union - I noticed how cheap yet effective their public transport system was. For a small fee you could travel on a minibus anywhere in the city. As they didn't own cars, most people relied on it. I wondered if this system could be improved with use of technology, and so alleviate parking and traffic congestion? In the system I've designed customers use their smartphone to send a trip request to a computer that then creates on-the-fly routes for a minibus fleet. Since the fleet adapts to provide the most efficient transport routes possible, a small fleet of minibuses can make a difference to traffic and parking. It will be cheaper than catching a taxi and less time consuming than catching a bus. The ideal consumer will be those without easy access to buses or trains, or who can't afford to own a reliable car. Newcastle University students and staff are an ideal first adopter market. There is already poor parking and a new campus in the city will worsen the situation. Since most students live in a 5km radius of the main campus, a small fleet could improve conditions markedly.

Davina Hartmann

Visiting Intern, Tom Farrell Institute for the Environment

University of Newcastle

davina.hartmann@web.de

Davina Hartmann is a German undergraduate student who has just finished her third year of Industrial Engineering with sub specialty power engineering (B. Sc.) at the Universität Duisburg-Essen. Her ten weeks lasting internship is supported by the German Academic Exchange Service (DAAD). In this time, she concentrated on smart meters and electricity tariffs as well as technically-orientated activities in some of the University's laboratories (e.g. Newcastle Robotics Laboratory). After returning to Germany, she will write her Bachelor thesis and continue studying afterwards.



Abstract

Smart Meter in Germany and Australia

This poster gives an overview of the actual smart meter situation in Germany and draws comparisons to the Australian one. In Germany, many problems concerning smart meters had to be solved before the retailers and network operators could start the rollout of smart meters. Now, most difficulties are resolved in a government plan that will lead to a law by the end of 2015 or resolved by technical development. Furthermore the data communication of smart meters is displayed as well as their contribution to a smart grid.

Clean Energy Finance Corporation

About the Clean Energy Finance Corporation

The Clean Energy Finance Corporation (CEFC) mobilises capital investment in renewable energy, low-emission technology and energy efficiency in Australia. The CEFC invests using a commercial approach to overcome market barriers and mobilise investment in renewable energy, energy efficiency and low emissions technologies.

Since its inception, the CEFC has committed over \$1.4 billion in finance to investments in clean energy projects valued at over \$3.5 billion.

The CEFC invests for a positive financial return, with more than 55 direct investments and 34 projects co-financed under aggregation programs. These projects help to improve energy productivity for businesses across Australia, develop local industries and generate new employment opportunities.

These CEFC investments are expected to achieve abatement of 4.2 million tonnes of CO₂e per annum with a positive net benefit to the taxpayer.

The CEFC operates under the Clean Energy Finance Corporation Act 2012.

Visit cleanenergyfinancecorp.com.au.

CEFC

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Office of Environment and Heritage

Working with the community, the Office of Environment and Heritage cares for and protects NSW's environment and heritage, which includes the natural environment, Aboriginal country, culture and heritage, and built heritage. OEH supports the community, business and government in protecting, strengthening and making the most of a healthy environment and economy in NSW.

The Office of Environment and Heritage (OEH) consists of eight functional areas: Policy, National Parks and Wildlife Service, Customer Experience, Regional Operations, Heritage Strategy, Performance and Services, Science and Legal. OEH also provides services and other support to: the Royal Botanic Gardens and Domain Trust; NSW Environmental Trust; Western Sydney Parkland Trust; Parramatta Park Trust; Centennial Park and Moore Park Trust; Historic Houses Trust; Taronga Conservation Society Australia; Jenolan Caves Reserve Trust; and the Environment Protection Authority.

Energy efficiency

More productive use of energy is a key goal in the State Government's NSW 2021 – a 10 year plan with targets for the economy, services, infrastructure, governance, communities and the environment. Among the environmental targets is for households and business to realise annual energy savings of 16,000GWh by 2020, through the NSW Energy Efficiency Action Plan (EEAP). One of the key strategies under EEAP is to assist householders in reducing their energy bills by helping them to understand how and where savings can be made in their homes, through initiatives such as:

- The Home Power Saving Program helped more than 220,000 lower-income households collectively save 120,000 MWh (megawatt-hours) of electricity and over \$36 million on their power bills each year. The program, which completed in April 2014, provided householders with an assessment of their energy consumption, a personalised action plan and advice on installing energy-efficient products.
- The Smarter Choice retail program is designed to make it easier for consumers to make informed purchasing decisions when choosing and comparing energy efficient household appliances.
- The Energy Savings Scheme assists households and businesses in purchasing energy-efficient equipment, such as lighting and white goods, at reduced cost. The scheme is part of the Government's plan for achieving a 60 per cent reduction in greenhouse gas emissions by 2050.
- The success of the energy efficiency services industry is important to New South Wales. To extend the sector's ability to market and invest in innovative new products the office of environment and heritage has launched a series of initiatives Become an Accredited Certificate Provider- By applying for ACP-status, your organisation can earn financial benefits for its energy-saving projects Business Data Downloads – Out datasets on participation in energy efficiency programs will help you plan your marketing strategy
- Energy efficiency policy – Measures by the NSW Government focused on improving the use of power in homes, businesses and government agencies throughout the State <http://www.environment.nsw.gov.au/energyefficiencyindustry/>

Community Energy

Through the Regional Clean Energy Program (RCEP), the NSW Government is helping communities to produce their own electricity locally, using renewable energy resources. The RCEP is a key component of the NSW Renewable Energy Action Plan (REAP) to increase generation in the State, and work closely with communities and industry to bring new jobs, investment and technological advances to local economies. Growing Community Energy (GCE), is a grant program to build the community energy sector in NSW.

<http://www.environment.nsw.gov.au/index.htm>



Office of
Environment
& Heritage

Newcastle City Council

Newcastle's vision for 2030 is to be a smart, liveable and sustainable city, which means we will be a leader in smart innovations with a healthy, diverse and resilient economy. We are Australia's seventh largest city and over the past decade the population of the Newcastle local government area has surged with significant growth in its western corridor.



Newcastle City Council has embarked on numerous projects for the future growth and economic stability of our city and the Hunter Region, including the Newcastle Smart City Initiative, which aims to bring people together to make better use of technology and creative opportunities, and to build the foundations of a city and region that are continually seeking new ways to enable our communities to grow and flourish.

Innovation has the potential to create competitive advantage for the city with the development of new technologies and services.

Council is responsible for providing a wide range of community services and assets. We work with local communities and business owners to improve the places we love, work and play, by supporting our business improvement associations, place making initiatives, murals in public places and other beautification projects.

Council's current four priority projects are revitalising our iconic coastline, renewing Hunter Street and the CBD, maintaining and improving Blackbutt Reserve, and improving cycleways across the city and suburbs. We currently manage a diverse asset portfolio of hundreds of assets valued in excess of \$1.6 billion, including Newcastle and Merewether Ocean Baths, Newcastle City Hall, Civic Theatre, Newcastle Art Gallery, Newcastle Museum and Fort Scratchley.

Newcastle is blessed with scenic beauty, natural resources, an ideally situated river and port, and an active, involved community. We will continue to build upon these strengths as we develop new ones, improving the quality of life for our community.



GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, architecture, environmental and construction services to private and public sector clients.

Established in 1928 and privately owned by our people, GHD operates across five continents – Asia, Australia, Europe, North and South America – and the Pacific region. We employ more than 8500 people in 200+ offices to deliver projects with high standards of safety, quality and ethics across the entire asset value chain. Driven by a client-service led culture, we connect the knowledge, skill and experience of our people with innovative practices, technical capabilities and robust systems to create lasting community benefits.

Committed to sustainable development, GHD improves the physical, natural and social environments of the many communities in which we operate. We are guided by our workplace health, safety, quality and environmental management systems, which are certified by Lloyds Register Quality Assurance to the relevant international standards (ISO and OHSAS).

In alignment with the global demands of water, energy and urbanisation, our aim is to exceed the expectations of our clients and contribute to their success.

For more information, visit www.ghd.com



Eighteen04

Eighteen04 is an inspirational co-working space for clean tech and smart city based startups in the Hunter Region. Located in Newcastle, we provide a physical and cultural space to foster collaboration and networking for tech entrepreneurs.

The aim of **Eighteen04** is to support early stage startups seeking to transform our energy economy, environment and build smart and sustainable cities. Our emphasis is on scalable product-based enterprises targeting global markets. Software and hardware startups are welcome and our dedicated team and resident cohort will facilitate access to networks and create a focal point for local action.

www.eighteen04.com.au



Lake Mac Smart City

Lake Macquarie City Council is exploring ways to become a Smart City. That is, a city that uses new technologies to become more connected, prosperous and resilient.

Council has consulted with the community about how technology can be used to make Lake Macquarie an even better place. Ideas and suggestions received are informing the preparation of the City's first Digital Economy Strategy, laying the foundation for becoming a Smart City.

With a clear strategy to guide the City, new technology used by Council and the community could generate further innovations and allow for built-in solutions, such as sensors that monitor real-time use of parking spaces, roads, footpaths and cycleways. This will allow Council, residents and businesses to make more informed decisions, creating a more efficient and sustainable City.

Lake Macquarie City's Digital Economy Strategy also looks at ways to foster local innovators and businesses so that they too can take advantage of emerging opportunities including new ways to engage customers and the utilisation of open data.

Council has a role in paving the way for digital technologies to boost the local economy, improve the performance of City operations and ultimately enhance the lifestyle of residents.

Council has worked hard in recent years to ready the City for the future and embrace this opportunity to become a progressive and thriving regional centre.

Council is committed to utilising new smart technologies and applications to boost its strategic objectives and expand its ability to engage with the community.

Learn more about Lake Mac Smart City by visiting:

<http://haveyoursaylakemac.com.au/smart-city>



Engineers Australia

Engineers Australia is the national forum for the advancement of engineering and the professional development of our members. With more than 100,000 members embracing all disciplines of the engineering team, Engineers Australia is the largest and most diverse professional body for engineers in Australia. Our chartered engineers are regarded as trusted professionals not only in Australia, but worldwide.

Engineers Australia is the trusted voice of the profession. We are the global home for engineering professionals renowned as leaders in shaping a sustainable world.



**ENGINEERS
AUSTRALIA**

Holistic Security

Holistic Security is a Newcastle owned and operated Security Company that has been servicing the Hunter Region for approximately 8 years. We provide security guards for Crowd Control, Property Protection, Cash or Goods in Transit and Retail Security. Currently the company comprises of 3 full-time staff and approximately 70 casual employees.

www.holisticsecurity.com.au



Hunter Environmental Institute

The Hunter Environmental Institute (HEI) was established in 1988 to provide a forum for the interaction of people working in environmentally oriented fields in the Hunter Region. HEI is a non-profit organisation, managed by a committee and operating under a formal Constitution.

Our major events are our bi-monthly afternoon meetings featuring presentations by guest-speakers (or panels) on a specific issue within the broad range of environmental topics. The meetings are held in a semi-formal setting, providing an opportunity for a presentation on a specialist topic with time for questions. This is followed by discussion and networking with others interested in environmental issues in the Hunter Region.

Please browse www.HEI.org.au for more information.



HUNTER ENVIRONMENTAL INSTITUTE

NSW Department of Industry

The NSW Department of Industry, Skills and Regional Development (known as the NSW Department of Industry) leads the state government's contribution to making NSW a fertile place to invest and to produce goods and services. It thereby creates jobs and opportunities.

The department supports all areas of economic activity where NSW has competitive strengths. It also has responsibilities for:

- skill formation and development to match industry demand;
- partnering with stakeholders in stewardship and sustainable use of the state's natural resources; and
- supporting economic growth in the regions.

The department's strategies are built on close relationships to understand industry's needs. It delivers a wide range of training and specialist advisory services; and helps to secure efficient and dependable government decision-making that contributes to business confidence.



**NSW
GOVERNMENT**

**Department
of Industry**

Australian Institute of Energy

The Australian Institute of Energy is a not-for-profit professional association of people and corporations with a keen interest in the energy sector. The Institute was founded in 1978 and has eight regional branches around Australia.

Members have an interest in the production and use of energy and the social and environmental impact of such use.

The institute has no political or other formal affiliations.

Our mission is to promote a better understanding and awareness of energy issues as a contribution to the improved use of energy technology and the development of responsible energy policies.

More information can be found at www.aie.org.au



Stramac Lighting

Stramac Lighting are Australian lighting specialists providing lighting solutions to domestic, commercial and industrial markets throughout New South Wales.

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- Footpath;
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- Landscape;
- Street and area lighting.

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AECOM provides a blend of global reach, local knowledge, innovation and technical excellence in delivering customised and creative solutions that meet the needs of clients' projects. A Fortune 500 firm, AECOM companies, including URS Corporation and Hunt Construction Group, have annual revenue of approximately \$19 billion.

In the Hunter AECOM has over 100 staff dedicated to clients across a range of sectors including transportation, mining and industry, environmental, energy, oil and gas, water, urban development and government.

More information on AECOM and its services can be found at www.aecom.com.

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92 *Waste to Energy Workshop*

Held on Wednesday 30th September - prior to the conference

The Waste to Energy Workshop is being held at Newcastle City Hall on Wednesday 30 September 2015. The workshop will commence at 12.30pm, with registrations from 12 noon.

Commissioned by the Office of Environment and Heritage, CRC Care and the Tom Farrell Institute for the Environment, the program is aimed at:

- Raising awareness about the Waste to Energy Technologies
- Getting attendees to understand that there is an economic return on investment for industry sectors
- Explain how energy savings can be achieved – different strategies apply for different industries, different sized enterprises
- Providing a roadmap in regard to how to have an individual business enterprise appraised

- Appreciating the benefits: economic development, employment generation, strategic positioning of the region on Bioenergy map

The topics covered during this workshop will be-

- The potential of energy from municipal waste streams
- Landfill as a bio-refinery
- Biomass Energy systems
- Waste Heat Recovery system
- Energy from Waste (EfW)
- Harvesting clean energy from Organic waste

Program

12.00-12.30 **Registration**

12.30-12.50 **Jayant Keskar**

Acknowledgement of country

Opening remarks, introduction

12.50-1.10 **Andrew Lang - World Bioenergy Association**

1.10-1.20 Q&A

1.20-1.40 **Nanthi Bolan - Professor of Environmental Chemistry, University of Newcastle**

1.40-1.50 Q&A

1.50-2.10 **Sohum Gandhi – General Manager, Energence**

2.10-2.20 Q&A

2.20-2.40 **Afternoon Tea**

2.40-3.00 **Prof Behdad Moghtaderi - Head; Chemical Engineering Director; Centre for Frontier Energy Technologies and Utilisation. The University of Newcastle**

3.00-3.10 Q&A

3.10-3.30 **Shannon Sullivan – Director and Business Development Manager – Omega Energy**

3.30-3.40 Q&A

3.40-4.00 **Representative from NSW Environment Protection Authority**

4.00-4.10 Q&A

4.10-4.45 **Brainstorm**

4.45-4.50 **Concluding Remarks – Presentation Outcomes**

4.50-5.00 **Prof Tim Roberts: brief for Smart Future Cities conference**

Nanthi Bolan

Professor of Environmental Chemistry, Global Centre for Environmental Research,
Faculty of Science and Information Technology, The University of Newcastle

T: +61 2 49138750

M: +61 (0)438 619 605

E: Nanthi.Bolan@newcastle.edu.au

W: www.newcastle.edu.au/profile/Nanthi-Bolan



Dr Nanthi Bolan is a Professor of Environmental Chemistry at the University of Newcastle. He has served as the Dean of Graduate Studies of the University of South Australia and also as the leader of CRC CARE Program on Prevention Technologies. His teaching and research interests include agronomic value of manures, fertilisers and soil amendments, soil acidification, nutrient cycling, pesticide and metal pollutants interactions in soils, soil remediation and waste and waste water management.

Nanthi is a Fellow of American Soil Science Society and New Zealand Soil Science Society and was awarded the Communicator of the Year award by the New Zealand Institute of Agricultural Sciences. He has supervised more than 40 postgraduate students, and was awarded the Massey University Research Medal for excellence in supervision. He has published more than 200 papers and was awarded the M.L. Leamy Award in recognition of the most meritorious contribution to soil science. Nanthi is currently serving as the Associate Editor of Critical Reviews in Environmental Science and Technology.

Abstract

Landfills as a green technology biorefinery resource to produce biomass and capture biogas

In many countries, domestic and industrial wastes are managed mainly using landfills. For example, in Australia, the majority of municipalities have been managing landfill sites for waste disposal, with an excess of 2000 landfill sites expected nationwide. Although there has been a significant increase in the reduction, reuse and recycling of solid waste, disposal to landfill will inevitably remain the most widely used waste management method. While landfilling provides an economic means of waste disposal, if not managed properly, it can lead to environmental degradation by releasing various contaminants. The major environmental challenges associated with the sustainable management of landfills are the surface and ground water contamination, and greenhouse gas (GHG) and odor emissions.

In recent times many local governments have been introducing engineered landfills with gas recovery systems, thereby landfills potentially providing a major source of CH₄ as a fuel source. Increasingly revegetation (i.e. phytocap) is practiced in traditionally managed landfills sites to mitigate the environmental impacts resulting from leachate generation and GHG emission. Revegetation also provides a major source of biomass for energy production. This paper provides a comprehensive overview on the role of landfills as a potential biorefinery site by focusing on the potential volumes of CH₄ and biomass produced from landfills, the various methods of biomass energy conversion, and the opportunities and limitations of energy capture from landfills.

Andrew Lang

E: andrewlang001@bigpond.com

Andrew Lang trained as an agricultural scientist and is a farmer and farm forester near Ballarat in Victoria. He is a Churchill and Gottstein Fellow and is a vice president of the World Bioenergy Association and the board member representing Australasia-Oceania.

During the eight years involvement with the World Bioenergy association he has gained a good understanding about issues and technologies related to energy from wet and dry municipal wastes, agricultural residues and forestry residues. He is presently working on reports on biofuels and biogas.

**Abstract****The potential of energy from municipal waste streams in Australia**

One way that an increasing number of cities are reducing their greenhouse gas emissions and increasing their energy self-sufficiency is by a near-complete utilisation of the waste streams generated by households, commerce and industry, and from demolition and construction. While the main energy products produced from non-recyclable wastes are electricity and heat, the third fraction of city energy use – transport fuels – is also being met in some cities by production of biomethane from putrescible wastes.

Australia does not yet have any large-scale conversion of municipal waste to energy. Yet in many larger European cities all organic or combustible non-recyclable waste is used to produce energy using one or more of a number of technologies. Driving this has firstly been the rapid increase in waste volumes per person beginning in the early 1950s compounded by the lack of suitable sites for landfills, and secondly, the development of the integrated systems for separation and recycling, and energy production. A third driver that has made development of WTE processes necessary has been legislation, with EU legislation being developed on the basis of what was put in place in Germany, Sweden and Denmark from the early 2000s.

Singapore, Canada, Japan, the USA and Taiwan have all developed a greater use of waste to energy (WTE) technologies. China has now joined this list with major investment in modern plant at many cities. Now policy and planning for production of energy from waste is happening in Indonesia and some other developing countries.

This presentation will go into detail on how leading countries and cities produce energy (heat, electricity and transport fuels) from their waste streams, and the costs, the thresholds of economies of scale, and technicalities involved in doing it in Australia.

Sohum Gandhi

General Manager, Energence

24/10 Gladstone Road
Castle Hill NSW 2154

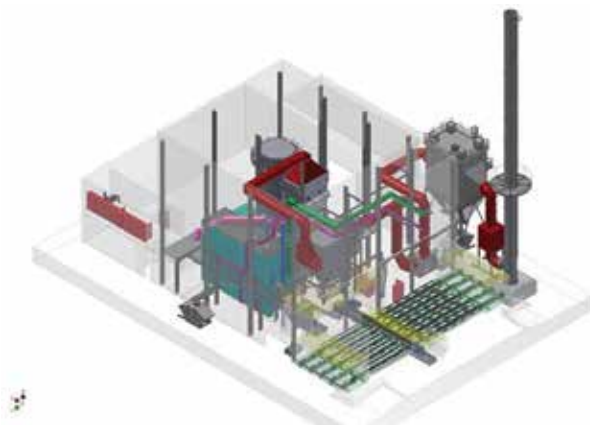
P: +61 (0)2 7903 7175 | F: +61 (0)2 9680 4488 | M: +61 (0)400 661 543
E: sohum@energence.com.au | W: www.energence.com.au



Sohum Gandhi has a Bachelor's of Engineering degree from the University of Victoria, Canada. Since 2004, he has been working within the Australian energy industry. His proactive approach has helped various clients around the country evolve in their designs and energy systems. Over the past years Sohum has been increasingly involved with biomass fuels in an attempt to provide clients with renewable and low cost energy alternatives. His installed projects to date offset many thousands of tonnes of CO2 emission annually, and save clients millions of dollars in fossil fuel costs. Sohum is the general manager of Energence, a leading Australian company providing energy systems for industry. You can contact Sohum Gandhi – email: sohum@energence.com.au or website: www.energence.com.au

Abstract

Biomass Energy systems around the world are responsible for saving millions of tonnes of carbon dioxide emissions when supplied with sustainably sourced biomass. Unlike fossil fuels, biomass absorbs CO2 from the environment when it is grown, then releases it during the energy production process. This is a cycle, and biomass waste and renewable streams lead to reduction and even elimination of increases in global CO2 levels. So how can biomass energy solutions be relevant in residential, commercial and industrial settings in Australia? This presentation will answer those questions while touching on the technology and real world installation examples both in Australia and abroad. From plants that heat only a home, to plants that power a business to plants that heat an entire town... It has been done before, it has been done recently and it will be done again soon with new and inventive technology that increases efficiency and safety all while ensuring clean air emissions to the surrounding environment.



Behdad Moghtaderi

Head; Chemical Engineering

Director; Centre for Frontier Energy Technologies and Utilisation

The University of Newcastle

T: +61 (0) 2 40339062

E: Behdad.Moghtaderi@newcastle.edu.au



Behdad Moghtaderi is a Professor of Chemical Engineering, Head of Chemical Engineering and Director of the Priority Research Centre for Frontier Energy Technologies & Utilisation at the University of Newcastle (Australia). He received his PhD and MES degrees from the University of Sydney in 1997 and 1994, respectively and his bachelor degree from Shiraz University in 1989. The underlying theme of Behdad's research is "Thermo-Fluid Engineering" encompassing applications in the general field of energy and the environment. The focus of his research is development of technologies suitable for direct/indirect minimisation of greenhouse emissions, particularly in application areas, such as: Ventilation Air Methane (VAM), renewable energy systems (geothermal power, solar thermal, biomass utilisation), advanced low emission coal technologies (e.g. oxy-fuel, chemical looping combustion, chemical looping air separation), hydrogen powered micro-energy systems, and energy efficiency. Behdad has published in excess of 250 scholarly articles in international journals, and conferences, authored two books and holds six patents. Behdad is a co-inventor of the GRANEX™ heat engine which is being marketed internationally by Granite Power Pty Ltd. Since joining the University of Newcastle in 1999 Behdad has attracted in excess of \$48M research funding predominately from the Australian Research Council (ARC) and Industry. Behdad is a fellow of the Institution of Engineers Australia (IEAust) and the Australian Institute of Energy (FAIE), and the former Honorary Secretary of the Combustion Institute (Australia and New Zealand Section). He also serves on the editorial boards of several scholarly journals in the field of energy. Twenty three PhD students have completed their studies under Behdad's supervision and 12 other postgraduate students and 7 postdoctoral fellows are currently pursuing their studies under his guidance. Behdad has been the recipient of numerous awards for his research / inventions including: the NSW Science & Engineering Award (2014) and the Newcastle Engineering Excellence Award (2015; Engineers Australia).

Abstract**Waste Heat Recovery using the Hunter-Based Invention GRANEX**

In this presentation, the inventor of the GRANEX heat engine (Prof Behdad Moghtaderi) provides a brief overview of the technology and its development / commercialisation. A particular attention is given to the "Wallsend Public Pool" project where a GRANEX heat engine is being adapted to use solar energy for heating the pool and powering the site. The system also incorporates a thermal storage unit to continue operation after the sunset.

GRANEX heat engine which has been created in partnership with Granite Power Pty Ltd (GPL) and the Newcastle Innovation is an innovative development of the conventional Organic Rankine Cycle (ORC) technology. The technology is transformational for low-medium heat resource opportunities such as recovered waste heat (RWH), geothermal and solar thermal sector. By incorporating the concept of a Regenerative Supercritical Rankine cycle, GRANEX™ significantly improves the efficiency of ORC and as a result reduces the cost of power and produces no CO₂ emissions.

Shannon Sullivan

Director and Business Development Manager - Omega Energy

P: +61 2 4936 2438

M: 0412 816 066

E: shannon@omegaenergy.com.au

W: www.omegaenergy.com.au



Shannon is the Business Development Manager at Omega Energy. The key elements of the role are identifying opportunities to develop waste to energy facilities across Australia and securing waste contracts for Omega facilities.

Shannon is a Town Planner with over 15 years experience in both the public and private sectors throughout the Hunter Region. Shannon has extensive experience in statutory planning and the process of guiding development through the approval process. Shannon has worked on a number of major projects in the Hunter, has developed a broad network of architects and environmental consultants, and has contacts within the Lower Hunter Councils and the Department of Planning, and other approval agencies. He brings strong experience, communication and planning skills to the development of energy from waste projects. He has bachelor qualifications in both environmental science and town planning.

Abstract

The Energy from Waste (EfW) sector is increasingly becoming one of the most dynamic sectors in the renewable energy arena. Australia sends 24.9 million tonnes of waste per year to landfill. Even with high recycling and recovery targets, the growing population will ensure at least 50 million tonnes of waste will still need to be disposed of in 2040. Currently, government policy and public opinion are creating intense pressure for this waste to be diverted from landfill into more sustainable and environmentally friendly treatment alternatives. The Omega Hunter Facility will combine a Material Recovery Facility (MRF) with the EfW operations. The Hunter Facility will use complex technology and design elements that have not previously been combined in Australia, however the process itself is simple in concept. The technologies to recycle waste and to produce power from residual waste that ordinarily ends up in landfill are ready today and have a proven track record internationally for processing waste and delivering reliable energy and other by-products to industry, communities and households. The first movers in the EfW sector will have a significant competitive advantage as Australia, and New South Wales in particular, realise the significant opportunity available to meet two of their greatest environmental challenges, waste and energy.

Jayant Keskar

CRC Care

E: Jayant.Keskar@crccare.com

Jayant brings to the CRC Care extensive professional experience spanning more than 22 years in wastewater and solid waste treatment with an emphasis on biogas generation and converting waste to energy. His experience encompasses business development, process design, feasibility studies, R&D, project management, and training in wastewater and solid waste management for biogas generation. Jayant has implemented a range of advanced technologies within environmental engineering and industrial biotechnology.

**Abstract****Harvesting Clean Energy from Organic Waste- An overview***Jayant Keskar, Ravi Naidu CRC CARE Pty Ltd*

Various types of organic wastes are generated not only from household but also from industrial and agricultural activities. According to ABS data, organic waste was the second largest type of waste generated in 2010-2011, at 13.7 million tonne (out of 53 million tonne waste) in Australia. If not treated suitably, these wastes pose considerable environmental consequences including greenhouse gas emissions.

Clean energy in the form of biogas can be harvested from such organic waste by utilising various established technologies. Example of such technologies include anaerobic lagoon, Continuous Stirred Tank Reactor (CSTR), Plug flow reactors, Up-flow Anaerobic Sludge Blanket (UASB) and dry digestion. The biogas generated from organic waste streams can be utilised for direct combustion, electricity generation or as a vehicular fuel. In addition to the biogas, the digestate which is generated after treatment of waste can be utilised as a source of organic fertiliser.

Proper planning and management of biogas facilities is very important in order to make it profitable. Various case studies both local and international will be discussed with emphasis on capital cost and overall pay back.



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With Special Thanks to our Sub-Committee Members

Future Transport

Colin Coates

David Cornforth

Gary Ellem

Jamil Khan

Latha Lewis

Marc Adam

Mario Minichiello

Mark Balnaves

Mark Roxburgh

Nigel Stace

Tim Roberts

Tom Chen

Clean Energy

Gordon Fraser

Andrew Mears

Benjamin Vaughan

James Giblin

Jayant Keskar

John Shiel

Stephen Bygrave

Tim de Grauw

Alec Roberts

Built Environment

Adam Clarke

Brian Hill

Daniel Livingston

Nathaniel Bavinton

Steele Adams

Thomas Boyle

Desiree Sheehan

James Giblin

John Shiel

With Special Thanks to our Scientific Committee Members

Tim Roberts

Nigel Stace

Belinda McNab

Gordon Fraser

Desiree Sheehan

Adam Clarke

With Special Thanks to our Planning Committee Members

Tim Roberts

Nigel Stace

Belinda McNab

Naomi Keenan

Amber Colhoun

Latha Lewis

Karolina Wrobel

Sandra Porter

Michael Ulph

Tim de Grauw

Desiree Sheehan

Adam Clarke

Gordon Fraser

