



Back Row, from L to R: Alex Wonhas, Liam Wagner, John Foster, Luke Reedman, Gregor Verbic, Front Row, from L to R: David Hill, Iain MacGill, Tony Vassallo, Joe Dong, Jenny Riesz, Peerapat Vithaya.

## Welcome to Transmission

Welcome to the first edition of Future Grid's newsletter.

Our quarterly newsletter for clients, research partners and others who are interested in the Future Grid Research Cluster.

## Powering Up

"The energy challenge underpins all other major challenges facing this country," stated Dr Tom Hatton, CSIRO Energy Group Executive as he launched the Future Grid Research Cluster at the University of Sydney on 30th May.

The Future Grid Cluster is a 3 year, \$13 million collaboration between the CSIRO and four leading universities, Sydney, NSW, Queensland and Newcastle, to develop Australia's capacity to plan the most efficient, low emission electricity grid for Australia.

Australia's entire electricity network is expected to undergo a major transformation that will affect all aspects of the energy supply chain. Factors such as renewable and distributed generation, demand side technologies, climate change and social/political attitudes will drive changes in

power generation, transmission and end use, which will severely test the current infrastructure. In 2050, CSIRO predicts that our homes and businesses could be powered by more than 20 different energy sources and technologies. The investment in the domestic electricity and gas system required to deliver this transformation may be in excess of \$240 billion by 2030.

Recent work by the CSIRO-led Future Grid Forum has brought together people from across the energy value chain, to envisage potential future scenarios for the electricity network. The Forum's work will inform the Future Grid Cluster's research to develop the required modeling tools. The Cluster's work will provide advanced tools to answer questions such as: What are the energy loads going to be like in 20

years, where do you invest to maximise your return on investment, how do you write policy when you don't know how future platforms will operate?

Whilst parallels can be drawn from previous international studies, there are no direct matches for the Australian situation, therefore the work of the Future Grid Cluster will be groundbreaking.

Dr Alex Wonhas, Director, CSIRO Energy Transformed Flagship, emphasised that getting Australia's energy grid right is the enabler to "making energy in Australia affordable and to reducing emissions". Future Grid will allow technology and energy providers to interact and understand how new technology interfaces with the grid, focusing the right resources on the energy challenge.

### Project Overview

The research will draw together Australia's best energy economists, engineers and policy specialists in four major areas of research:

**Project 1: Power & Energy Systems Modelling & Security** (University of Sydney) Static and dynamic engineering models of the power system that assess the technical feasibility and reliability of possible future energy scenarios.

**Project 2: Grid Planning & Co-Optimisation** (University of Newcastle) Planning of grids with a high-share of renewable generators and co-optimisation of electricity and gas networks where 'networks of networks' interact according to long-term changes in generation, load and market.

**Project 3: Economic & Investment Models for Future Grids** (University of Queensland) Power and gas network

investment models that use multi-objective optimisation techniques to identify least cost, maximum benefit outcomes from a range of future energy system scenarios.

**Project 4: Robust Energy Policy Frameworks** (University of New South Wales) Robust policy analysis and development that will encourage market participants to deliver the desired long-term outcomes.

## Up for the Challenge: UQ

When you google The University of Queensland (UQ) project leader, Professor John Foster, you find an impressive list of global academic honours and industry accolades, too long to recount here. Google lead researcher, Dr Liam Wagner, and you find a list of publications and research that occupy several screens. It's no surprise that UQ Energy Economics researchers were ranked 11th in the world and John personally in the world top 5% by IDEAS\* recently at the University of Connecticut. Yet both men humbly claim that the exciting thing about the Future Grid project is "working with Australia's leading researchers".

### Prof John Foster

John's focus was on complex systems science as applied in economic contexts. In late 2008 the energy sector drew his attention as an area to apply his knowledge. "The energy sector was ideal with the NEM and the grid underlying excellent examples of networked complex systems and renewable energy being a fine example of an innovation diffusion process in action". John established the Energy Economics and Management Group at UQ who are currently working on

### Industry Reference Group

An important and essential aspect of the research is ongoing collaboration with industry stakeholders to ensure the work is relevant and the findings are applicable. An Industry Reference Group has been established to provide guidance on the direction of the research, feedback as the research progresses and to share their insights with the project team. Members of the Group will share their deep specialist knowledge and broad understanding of the electricity (and gas) transmission and distribution sectors, and their ability to think critically and creatively about how these sectors could and should develop in the future.



L to R: Professor John Foster and Doctor Liam Wagner.

several projects relating to renewable energy generation.

John believes the importance of the Future Grid project is its contribution to a fundamental redesign of the energy system, which may negate the need for massive future investment, as power generation becomes increasingly decentralized and power demand peaking diminishes. He also suggests "what happens in storage over the next decade...could take pressures off the existing grid".

The challenge of keeping abreast of international research is something John is particularly aware of in Australia. He recently held the distinguished position of President of the International JA Schumpeter Society, the premier international grouping in the field of the economics of innovation. His strong European research connections were an advantage and have been integral to investigations he has conducted for the Australian government. John's spirit of discovery and passion for a challenge sometimes sees him departing economics for time on the ski slopes, bush walking or exploring exotic foreign destinations.

### Dr Liam Wagner

Liam's experience as a Trader and Quantitative Analyst with a large Australian electricity generation company, equips him with key insights into market structure and behaviour. Coupled with a PhD in maths, Liam specialises in providing key stakeholders and policy makers with the tools that allow them to make informed decisions. His connections within the energy sector

have recently enabled UQ to partner with industry to investigate the volatility of wind generation in the grid and the NEM.

Advising Ministers on current and potential issues confronting the energy industry is a regular past time for Liam, who has been appointed to panels regarding the design and implementation of energy efficiency improvement measures, smart grids, energy security and emissions reduction. The range of issues he advises on include renewable energy, electricity markets, natural gas and the effects of the impending exports of LNG and energy security.

Liam sees the value of the Future Grid project in examining "how the sector can be facilitated towards a low pollution future...how the system can be best prepared for shifts in consumers energy needs...and how large scale transmission expansion and innovation in electricity generation technologies will enable policy makers to best adapt to an uncertain energy future." Liam's awareness of global issues and the effectiveness of policy decision is reflected in his favourite leisure activities of reading history and foreign travel.

\*the largest bibliographic database dedicated to Economics and available freely on the Internet.

Further information on the Future Grid Cluster research, including how to subscribe to Transmission, is available from [futuregrid.org.au](http://futuregrid.org.au) or contact Danielle Turner:   
E [danielle.turner@sydney.edu.au](mailto:danielle.turner@sydney.edu.au)   
T +61 422 973 082