

A word from your president



South Australia Sets Records with Wind Farms

After recently completing two EESA “windpower seminars” in Sydney and Newcastle, I look with amazement at the aggregate magnitude of the MW capacity of windfarms in South Australia. Half of Australia’s 2000MW of wind capacity is now installed in South Australia and further windfarms are being planned. At our seminar, Graham White and Dr Matthew Bechly (of Garrad Hasson) gave expert descriptions of the state of the art wind power technology. Machines from 1 to 5 MW are now common with 15 MW machines predicted for the future. Windpower has matured to a proven technology. Double wound induction machines with power electronics are now routinely used with other controls to regulate power output, turbine speed and power factor in ways that were not possible a few years ago. However, it is clear that this technology will continue to evolve with ever larger machines, more sophisticated controls and geographic diversity.

George Bergholcs of Electranet in South Australia then gave some insight into the stability and connection issues in connecting 1000 MW of windpower into the South Australian grid where the load can fall as low as 800 MW. The penetration of wind as proportion of the South Australian load is amongst the highest in the world. The introduction of major windfarms has impacts that all transmission entities need to carefully consider and evaluate. These include system stability, new variability in the output of conventional coal and gas power stations, power flows in magnitude and direction that were not considered possible just a few years ago and voltage uplift at many parts of the transmission network. These effects force a rethink of the tapping range requirements of transformers, assessment of voltage sags due to the energisation inrush currents of very large wind farm step up transformers in weak parts of the network.

My conclusions are that:

1. Windfarms that are much smaller than the network capacity at the point of connection can generally be connected without serious impacts on the network or the local conventional power stations.
2. Major windfarm penetration in weak networks is likely to produce network constraints that can significantly reduce the efficiency of conventional coal and gas power plants.
3. Lowering the efficiency of coal and gas plants may significantly negate the “carbon” benefit of installing the windfarms in the first place.

There is need for some serious research and a PhD thesis or two in modelling all of these effects. With the Federal government’s 20% renewable energy targets in place, the “carbon” benefit of new windfarms is going to be subject to diminishing returns with ever increasing per unit \$/MW costs as the best wind sites are used up first. Where the sensible balance resides is difficult to see and will be completely at the whim of government policy.

It is becoming increasingly apparent that to fully embrace large scale wind farms, we will need extra strong transmission networks to cater for the windpower variability. The aggregate wind farm output in SA has been as high as 90% and as low as 1% of nameplate MW ratings. Even the geographic spacing of existing windfarms in SA does not give us the reliable power output diversity that a network operator can rely on. Windpower MW output diversity between the states of SA, Victoria, NSW, Tasmania and Queensland will hopefully be far better. In the case of South Australia, this may mean extending the 500kV transmission system from Victoria to the major windfarms of South Australia. The questions arise as to who should fund such a massive project, the wind farm operators, the South Australian electricity customers, the SA government or the Federal government? How could such a transmission extension get a green light under the existing regulatory investment tests? How should AEMO incorporate these future needs into their long term transmission network plans? These are very difficult questions that will need answers in the not too distant future.

After our windpower seminars in Adelaide, Melbourne, Sydney and Newcastle we are now looking at the feasibility of going to Perth and Brisbane. If you would like a wind power seminar in your area, talk to either myself or your local EESA committee members.

The New Year and EECON National 2011 Conference Hobart & EECON NSW 2011

On behalf of the EESA I hope you had a Merry Christmas and Happy New Year and enjoyed the holiday season with your families and friends and have come back to 2011 with renewed energy and vigour for what will be a further year of ongoing change and excitement in the electricity industry.

This year I’m looking forward to the 87th Annual National Conference of the EESA - EECON National 2011 Hobart 6 - 8 April 2011. Thanks to our sponsors Wilson Transformer and ALSTOM for supporting our first EESA Conference to be held in Tasmania, as well as EECON NSW 2011 Conference & Trade Exhibition, Australian Technology Park 7 - 9 September, Sydney.

Dr Robert Barr
EESA National President



Have you saved the date April 6-8, 2011?

EECON2011 - the 87th EESA National Conference and Exhibition

Wrest Point Conference Centre, Hobart, Tasmania

Registration is now open.

You are invited to Dinner at the Bellerive Oval.

You are invited to Dinner at the Bellerive Oval where you will be able to visit the fabulous Tasmanian Cricket Museum pre-dinner and then have dinner looking out over the most southern test cricket ground in the world. The Tasmanian Cricket Museum offers a special experience for cricket enthusiasts with innovative displays, video and state-of-the-art interactive technology. Tasmania's rich cricket heritage dating back to the very early years of settlement is illustrated through displays and video and the most recent addition to the Museum is the Ricky Ponting Corner.

We have secured 3 keynote speakers for the conference program.

- **Prof Felix Wu**, Professor in Electrical Engineering, The University of Hong Kong.
- **Prof Jovica Milanovic**, The University of Manchester, School of Electrical and Electronic Engineering.
- **Ken Brown**, FIEAust CPEng, Western Power.

The technical program is currently being organised and will be posted on the web site once suitable detail is available.

The Call for Papers has now closed.

Pre-conference seminars are being organised – details on the web. An Overhead Lines Seminar will be held on Tuesday April 5th at Wrest Point. This 1 day seminar will provide an overview of the new standard AS/NZS 7000:2010 – Design of Overhead Lines from a team of subject experts drawn from around Australia involved in the preparation of the new standard. The seminar will focus on the application of this new standard to pole line construction in distribution networks.

And please remember that our theme - **"Future energy ... empowering sustainable solutions"** - is designed to encourage greater participation from young engineers. Are you bringing along a colleague?

All conference details are available at the **Conference web page** and you can download a **Sponsor and Exhibitor Prospectus** from the web pages also.

Further details from Convention Wise
Email: conference@conventionwise.com.au
Phone: +61 (0)3 6234 1424

Thank you to our current sponsors:

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News around the Industry

Safe Work Australia chair invites public comment on Regulations CCH Online

Safe Work Australia chair, Tom Phillips AM, has called on interested parties to provide comment on the Work Health and Safety Regulations (Regulations) when they are released in December 2010 for a period of public consultation.

Mr Phillips confirmed that the Regulations and priority Codes of Practice would be made available for public comment until April 2011. He extolled the value of public comment, stating that "we need your views to ensure the model Work Health and Safety Regulations and priority model Codes of Practice are relevant to all Australian workplaces".

According to Mr Phillips, the OHS harmonisation process "will increase profitability and productivity and most importantly, lead to improved safety for workers and greater certainty for employers". Mr Phillip said that the consultation process would help achieve the best possible approach to health and safety for all Australian workplaces.

History of ECNSW being undertaken

The inside story of the publicly-owned electricity body - the ECNSW is the subject of PhD research by a Newcastle University student, ABC News reported.

Kenneth Thornton, who has recently retired and who worked at the Liddell and Eraring power stations is preparing to write a dissertation on the worker's perspective of the Electricity Commission of NSW and its corporatised successor Pacific Power. "What I am looking for from the people that I'm trying to find are the workers stories and their insight that you do not find in the regular documentation that has been saved," Mr Thornton said. The paper's research focuses on the period 1950-2002.

If you would like to participate, please contact ken at: Kenneth.Thornton@uon.edu.au or phone 0458 662 096

**Bulletin 2, March - April 2011:
Please email submissions by 8th April
to the Bulletin Editor, Patrick McMullan on
pmcmullan@energy.com.au**

International Snippets from around the Industry

IEA releases Smart Grid Technology Roadmap

The International Energy Agency has released the first phase of its IEA Smart Grid Technology Roadmap outlining its key findings, new regional CO2 emission reductions and analysis of smart grid drivers. The smart grid roadmap provides advice on the required actions for stakeholders to support smart grid development and deployment, including advice for electricity generators, system operators, government and regulators, technology and solution providers, consumers and environmental groups. Further publications related to the IEA smart grid roadmap will be forthcoming in coming months.

Success in Europe's regional energy market integration

The European Regulators Group for Electricity and Gas has published its 2010 status review of European Union regional initiatives. The findings show there has been progress across the seven electricity and three gas regions in areas such as the regionally coordinated approach to gas infrastructure needs, improvements in the use of existing gas and electricity interconnections and transparency of information. The status review also provides policy advice on how the regional initiatives can contribute to third package implementation. In it, for example, ERGEG calls on each gas region to pilot test, at regional level, at least one project under discussion in the context of the framework guidelines and potentially binding network codes currently being developed at EU level so as to provide feedback into the policy development. A future consideration of ERGEG's is the strategy for moving from regional markets to a single market.

Global gasification database now available from DOE

The US Department of Energy has released a database that documents the worldwide growth of gasification, the expected technology of choice for future coal-based plants that produce power, fuels and/or chemicals with near-zero emissions. The 2010 Worldwide Gasification Database, a comprehensive collection of gasification plant data, describes the current world gasification industry and identifies near-term planned capacity additions. The database reveals that the worldwide gasification capacity has continued to grow for the past several decades and is now at 70,817 MWth of syngas output at 144 operating plants with a total of 412 gasifiers. Gasification is a technological process that uses heat, pressure and steam to convert any carbon-based raw material into synthesis gas or syngas.

Phasor Measurements Go the Last Mile - Transmission and Distribution magazine Dec 1, 2010 12:00 PM

By Terry Boston, PJM Interconnection, Mike Heyeck, American Electric Power, and Arshad Mansoor, EPRI

Although phasor measurement units (PMUs) were developed years ago, many utilities are adding more of them to the grid today. Yet the meaningful use of this technology has not progressed much beyond the collection of massive amounts of data for display or forensics.

What is preventing this worthy technology from making that last-mile journey from a data-collection device to enabling proactive applications? What can the industry do to realize the full potential of this technology to improve grid reliability and performance?

The Promise

The conventional technology used by grid operators for monitoring the grid is supervisory control and data acquisition (SCADA). These data are then used by the state estimation (SE) application to determine and display the state of the power system. Synchrophasors are precise grid measurements taken by PMUs at high speed, typically 30 times per second, compared to one every 4 seconds using conventional technology. Each measurement is time-stamped according to a common time reference. Time-stamping allows synchrophasors from different utilities to be synchronized and combined, providing a precise and comprehensive view of a regional interconnection. Synchrophasor data enable the determination of grid stress and can be used to trigger corrective actions to maintain reliability.

Some applications use synchrophasor data to create the situational awareness for operators to detect sub-second phenomena across the power system. System stress across a wide area or an instantaneous measure of power system dynamics, such as swings, can be recognized nearly instantaneously using such highly accurate data.

Metaphorically, synchrophasor technology is like an MRI of the power system, as compared to an X-ray image provided by traditional SCADA technology. Because of instantaneous, high-resolution and more-detailed measurements, PMU data are well suited as input to activate local or centralized automated controls. Such use of synchrophasor technology for wide-area monitoring and control will facilitate the evolution of the existing grid into a smarter transmission grid.

Defining, designing and demonstrating a set of applications that use phasor measurements either to create decision support information for operators or to execute closed-loop control, thus replacing many of the existing SCADA-based tools, represents the last mile in the journey to enabling proactive applications.

The Evolving Transmission Grid

With the U.S. Department of Energy's (DOE's) vision for 20% of total electric generation from wind renewable energy by 2030, the nation has started to tap into variable renewable energy resources. The penetration of wind and solar generation is expected to increase over the next few decades. The Midwest and Southwest are seeing unprecedented levels of variable generation being added to the power generation mix. Adding higher levels of variable renewable generation creates system operation challenges.

In addition to introducing more variability and uncertainty, wind and solar photovoltaic generation can have an impact on the dynamic

International Snippets from around the Industry

performance of the power system in response to disturbances. Many wind and solar photovoltaic generators do not have inherent inertial response because of the present controls associated with the power electronic interfaces to the grid. As a result, when these new technologies replace conventional generation, the frequency response and modal behavior of the power system will change. The industry needs to understand and quantify these challenges, and develop solutions to address them to enable effective and reliable integration of renewable resources for the energy future.

The Technology

The DOE is providing grants to install more than 850 PMUs. Per the DOE, these PMUs will cover 100% of the U.S. electric grid and make it possible for grid operators to better monitor grid conditions and prevent minor disturbances in the electrical system from cascading into local or regional power outages or blackouts. This monitoring ability also will help to maintain grid reliability as the grid evolves in ways such as incorporating large blocks of variable renewable energy, like wind and solar power, to take advantage of clean energy resources when they are available and make adjustments when they are not.

As the United States prepares to integrate larger amounts of renewable generation resources, synchrophasor technology can help in multiple ways:

- **Situational awareness:** This is a real-time understanding of the state of the system and how potential actions may affect it. Having complete and up-to-date information is essential for managing complex systems such as the grid. When monitored at critical locations, the information may help detect system stress and foretell an impending system emergency. The operator may reach a high level of awareness much quicker using this information rather than using traditional SCADA data.
- **Dynamic performance:** Synchrophasors can assess how the dynamic performance of the system changes with various levels of renewable generation penetration. Many of the new generation sources are more remote from load centers than conventional generation and will result in the need to move power across longer distances. Synchrophasors will provide the ability to monitor phase-angle differences and potential oscillatory modes that need to be managed to maintain system stability.
- **System model validation:** As wind, solar photovoltaic and other emerging resources become more prevalent across the grid, accurate models will be needed to ensure reliable system planning and operation. Synchrophasors will provide a key data resource for developing and validating system and component models.

Perry Sioshanshi in the latest edition of EEnergy Informer writes

ENEL, which already has one of the most extensive applications of smart meters globally, claims annual savings of €500 million on an initial investment of €2.1 billion, or a payback period of roughly 4 years, according to Jon Stromsather, ENEL's senior smart grid project manager. He says ENEL has experienced annual operational cost savings of €31 per customer, with costs falling from €80 per customer in 2001 when the project started to €49 in 2008. ENEL's average annual supply interruptions are reportedly down from 128 to 50 minutes over the same period, among other reported benefits.

With smart meters in place, utilities are moving towards more ambitious smart grid applications. Enough has already been written about the potential benefits of the smart grid and all the wonderful services, applications and tremendous cost savings that could be had once you have it in place.

Now a few words of caution on the dark side of the smart grid that few wish to talk about, namely under-estimating the challenges, the scale and the difficulties of getting it to work at a level remotely close to what is expected or planned at the outset.

Last fall, the PricewaterhouseCoopers (PwC), the management consultancy, invited some 40 senior executives of major global utility companies, network operators, suppliers and regulators working on smart grid applications to a roundtable to discuss current projects and issues related to roll-out of a number of massive smart grid projects.

PwC published a glossy summary of the deliberations of the executives titled Smart from the start – presumably with the aim of impressing clients about how much it knows about the subject. But reading between the lines, one gets the impression how little is really known about the smart grid concept and how difficult it will be to get it right, or working as planned.

The overwhelming message of the executive roundtable – and everyone we have spoken with – suggests that the typical smart grid project, like any other large and complex undertaking, goes thru several phases, and a key to the overall execution of the project may be managing the initial hype and the expectations as the project goes through various cycles.

The PwC report is written in business-speak – the high flouting style of expensive management consulting firms – making it rather difficult to decipher, but the main lesson is to be aware of the scale and complexity of large smart grid projects that may appear simple on paper.

In short, PwC suggests – that smart grid projects should be approached as if you were sending a man to the moon. If the project turns out to be less complicated, you'll be relieved. If it turns out to be more complicated, you will be relieved of your duties.

Queensland Chapter News

Qld Chapter Activities - Port of Brisbane Site Visit and the EESA North Queensland Conference 2011

Chapter members attended a site visit to the Port of Brisbane on Wednesday 17th November. The Port of Brisbane has achieved 15 years of continuous growth in total trade, with 11.5% average annual container growth over the past 10 years. Every year the Port of Brisbane services more than 2,600 ships and handles more than 30 million tonnes of international cargo, valued at over \$37.5 Billion.

Glenn Rolfe, the Electrical Coordinator at the Port of Brisbane, took the group on a guided tour of the facilities. The Port of Brisbane electrical infrastructure network consists of:

- Sixteen 11kV substations consisting of ABB RGB 12 ring main units and Hawker Siddeley high voltage isolators.
- Panamax cranes operated by an 11kV trailing cable protected by 100amp RCD safety switches.
- Substations consisting of 11kV to 415 volt 1MVA transformers supplying power to what are referred to as "reefers" - Refrigerated Container units either 40 foot or 20 foot in length.
- Port wharves have cathodic protection on individual piles supporting the wharf. This is a system referred to as "impressed current", preventing or diminishing the corrosion of steel piles.

There were a number of subjects of a wider engineering nature that were of particular interest to the group.

The totally automated Panamax Cranes were seen travelling around the wharf areas without drivers. The control systems automatically direct the vehicles and manage manoeuvring at intersections through automated decision criterion. The control system was developed by Melbourne University at the height of the wharf disputes in the late 1990s, with incentives provided by Chris Corrigan.

Glen Rolfe has worked for the Port of Brisbane since 1984 at which time he was employed as a Port Operations Supervisor. He was directly involved with the Electrical development and ongoing maintenance and commissioning of all aspects of port / wharf operations. During the period from 1994 to 2000, he was responsible for the overseeing of all electrical and communications of buildings and installation of six 1000 tonne container cranes, eight wharves and considerable infrastructure development.

The Queensland Chapter Committee has developed a provisional program for the EESA North QLD Conference 2011 to be held in May 2011 in Townsville. The committee is considering a conference venue on Magnetic Island. The conference will focus on smart grid technologies and will include a site visit to the Solar Cities Project on Magnetic Island. A request for paper abstracts will soon be released for the conference.

Farewell to Don Wheeler & Syd Tutton

Farewell to Syd Tutton - ex ESAA and CIGRE

Vale Syd Tutton, National President of the St Vincent de Paul Society in Australia and former manager and company secretary of the Electricity Supply Association of Australia, who died recently in Cabrini Hospital of a recently diagnosed cancer. He was 73.

Syd lived, and died, as a fighter for social justice. This for him, was what it meant to be a man of faith. He was a much loved and charismatic figure in the electricity industry during some of its most turbulent times and spent 51 years in the electricity supply industry, serving as manager and company secretary of the Electricity Supply Association of Australia, secretary of the Australian National Committee of the World Energy Council and member of the Executive Assembly representing Australia. He was later secretary of the Australian Committee of the Conseil International des Grands Reseaux Electriques, CIGRE, the Paris-based organisation for the interchange of technical information on transmission of high voltage electricity, and was appointed a distinguished member in 2000.

Syd was a member of the St Vincent de Paul Society for more than 40 years. He served as the Victorian state president from 2001 to 2006. He then served as national secretary from June 2006 before being elected as national president in March, 2008.

Syd gave himself completely to the cause of people who are pushed to the margins of society, both globally and locally. He continued to call for a revolutionary approach to social justice and social change, unafraid of the criticisms he sometimes incurred for this courageous stand.

His practical achievements as St Vincent de Paul's Victorian state president, national secretary and national president, are too numerous to list but he was uninterested in personal recognition, making light of the papal knighthood he received in 2009, threatening to ask the Vatican for a horse to go with the title!

Farewell to Don Wheeler - ex Southern Tablelands Country Council

"Don Wheeler passed away on 6 September at the age of 79, after a short battle with stomach cancer. Don was born in Lane Cove, educated at North Sydney Boys High, and left Sydney University with degrees in Science and Electrical Engineering.

As a bonded cadet with ECNSW, he moved to Goulburn in 1953, and remained there for the rest of his life. He was Chief Electrical Engineer at Southern Tablelands County Council for 16 years until 1979, President of ESEA in 1975/76, Secretary for ESEA for 8 years from 1982 until 1990, a fellow of the Institution of Engineers, and served on the Board of the local TAFE for 25 years. At his funeral service at the Goulburn Anglican cathedral, special mention was made of his lifetime of integrity and grace, and the very high regard in which he was held by all those who knew him. Don is survived by his wife of 57 years, Helen, three sisters, three children, four grandchildren and two great grand children. He will be missed."





“Social Networking” for Business Professionals

EESA LinkedIn Group commences

EESA is pleased to announce the **EESA LinkedIn group**. This professional networking group has been created to add value to EESA membership for an active online discussion forum.

All members are encouraged to participate and add to the current discussion topics ranging from Renewable Energy, Solar Panel considerations on the Utility Networks, Voltage and System Frequency discussion, HVDC, to Nuclear Energy to achieve the required CO₂ reductions in the required timeframes while renewable solutions can be put in place (including the implementation of electric vehicles).

Members range from uni students, graduates to very experienced technical engineers, and managers.

Some of the benefits include:

1. Access to a wealth of local knowledge to people who like to have a good technical chat!
2. Create sub-groups for popular topics such as climate change.
3. Help grow the discussion, interest and passion for the power industry across all age groups, including eligible students for whom it is free. Our industry is a key to our successful future!

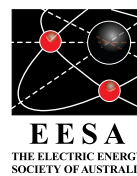
Follow the three easy steps to join:

1. Apply to join as an individual with **LinkedIn** (set the privacy level that you prefer -there are strong anti-spam rules and you need to know someone before you can contact them directly): <http://www.linkedin.com>
2. Join the "EESA (Electric Energy Society of Australia) LinkedIn Group (providing your member number via the message text assists): <http://www.linkedin.com/groups?mostPopular=&gid=3079715>
3. Participate in the Q&A technical discussion - we look forward to you posting a topic!

If you have any questions about this new forum, you can contact via the EESA LinkedIn group or email EESA NSW Chapter member tim.degrauw@alliancepoweranddata.com.au.

New Honorary Fellows

Engineers Australia last month announced the selection of five new Honorary Fellows. They are Dr Jim Gill, David Klingberg, Peter Cockbain, Prof Andrew Downing and Dr John Sligar. An honorary fellow is, in the opinion of the national Council, “a person who has rendered conspicuous service to the profession of engineering or is eminent in engineering or an allied science, or is a distinguished person whom the Council desires to honour”.



EESA NSW Chapter is proud to present EECON NSW 2011 Conference & Trade Exhibition

EECON NSW 2011 is gearing up to be another popular event. We will be returning to the Australian Technology Park for the conference as it proved to be a very attractive location for delegates and exhibitors. With almost 50% of booths sold already, get in quickly to secure your spot!

For more information on the conference or to download the sponsorship and exhibition proposal please go to www.eesa.asn.au or contact The Meetings Manager on 02 9810 7322 or meetings@tmm.com.au

Call for Papers

This conference is one of the only conferences that is exclusively focused on electricity supply, touching mainly on areas of distribution and transmission and associated engineering philosophies.

The areas to be discussed at the conference are outlined below and papers are invited that contribute to our understanding of:

- Victorian bushfire recommendations and the implications for NSW
- Update on renewables for large scale generation
- Cable and overhead lines - ratings, testing and new technology
- HVDC Applications revisited
- Telecommunications and networks - convergence or else?
- Electric vehicles/renewables and networks - synergies or sinks?
- Intelligent substations - progress in Australia
- Power quality and the customer in times of change
- Customer End Use Energy Efficiency and Demand Side management
- Carbon capture and sequestration
- Large ambitious projects
- Regulation in the new energy environment
- Disaster recovery - including NZ and other International case studies

People interested in giving a paper should submit an abstract of up to 150 words to Helen Mackenzie on meetings@tmm.com.au by Friday 25 February. A brief biography of the author/presenter should also be included.