

The Electric Energy Society of Australia

A word from your President



Unprecedented Electricity Prices Hikes

Recent price increases for electricity have been so large that for many businesses and low income families, electricity has become the new luxury commodity. The flow on effect from new network service charges that took effect from 1 July 2009 have seen many of my large industrial customers experience increases of over 40%. For those industrials who have been forced to renew their long term retail contracts over the past 18 months, some have experienced similar 40% increases in their retail energy costs.

For the mum and dad customers and small businesses, electricity price increases have not been as large, but a 20% increase is not uncommon. Indications are that there are more large price increases in the pipeline. The federal government's Carbon Pollution Reduction Scheme (CPRS) and the need for continuing investments in our aging networks are both going to be key drivers.

The CPRS is already pushing up prices of energy in the wholesale market beyond 1 July 2011 despite the cost pass through provisions in all retail contracts. For this reason alone, electricity consumers can expect some sharp price increases in the medium term future. In NSW we have become accustomed to paying environmental levies for "Renewable Energy Certificates" and the "NSW Greenhouse Gas Abatement Scheme". To add to the customer burden, the NSW government has now introduced a new third environmental levy called the "Energy Saving Scheme". This new impost starts off as a modest charge and grows year by year.

We are well down the track of rapidly increasing electricity prices. Energy is becoming more complex and more expensive. I am convinced that in Australia we are losing our international comparative advantage with electricity. Some will argue that high prices are an essential part of curbing demand and saving greenhouse gas emissions. Industry will need to adapt as well as domestic and small business customers. If energy prices continue to rise as I predict, we are going to need major restructuring towards improved energy efficiency and lower energy intensity businesses. Businesses that are heavy energy users will either adapt, fail or move to other world locations where energy is cheaper. On the people front, it will be low income earners who will suffer the most. Pensioners and fixed income retirees beware – tougher times are ahead.

EESA Electricity NSW Conference 28-30 October 2009

I'm really looking forward to this conference which will be the highlight event of the EESA NSW calendar. The theme of this year's event is "Managing the Winds of Change". With Gold sponsors EnergyAustralia, Integral Energy, Country Energy, TransGrid and Bronze Sponsor ActewAGL this conference is set to be a great success.

Dr Robert Barr
EESA National President

Bulletin 6: December - January 2009:

Please email submissions by 9 December 2009 to the Bulletin Editor,
Patrick McMullan on pmcmullan@energy.com.au

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ENERGY NSW 2009 Conference & Exhibition

EESA NSW State Conference – October 29 - 30 at the Powerhouse Museum.

The EESA NSW annual conference will be held once again at the Powerhouse Museum at Darling Harbour a location which has proved to be very popular and convenient to the CBD. The theme for this year's conference "Managing the Winds of Change" addresses the ongoing evolution in energy networks and the new drivers emerging that will change its nature and operation. All this in an environment of changing regulatory structures, an emphasis on overall sustainability, intelligent grid applications, an uptake in embedded generation, an economic downturn and recovery and an unprecedented public spend by NSW energy utilities to replace aging networks and still cope with ongoing growth in energy demands.

The conference will start with a series of keynote addresses from major energy figures in our industry including George Maltabarow from Energy Australia, Kevin Murray from TransGrid, Rod Howard from Integral Energy, Col Ussher from Country Energy and Matt Zema the CEO of the Australian Energy Market Operator. Dr. Ralph Craven from Ergon Energy and Bob Simpson from Transpower, New Zealand will also present their thoughts on the issues confronting the industry.

Following this there will be parallel sessions dealing with such topics as implementing Embedded Generation into Networks, aspects of Power Quality, introducing Smart Networks and the progress to date, details of current large energy projects in NSW, climatic change and its impact on networks, asset management challenges and solutions, smart energy meters and updates on safety and communications issues in the energy industry.

The conference will end with another plenary session with the new topic of "Recovery from large scale disasters – lessons learnt and future challenges".

Once again the speakers are drawn mainly from the energy industry and the problems and solutions being discussed are real and current.

The conference provides an invaluable opportunity to catch up with energy industry developments from a 'macro and micro' view as well as encouraging many networking opportunities with colleagues from other networks and manufacturers.

Once again we have been very strongly supported by our corporate members with Energy Australia, Integral Energy, Country Energy and TransGrid taking up Gold Sponsorship and ActewAGL Bronze sponsorship. Schneider Electric this year will be our host for the very popular conference dinner.

See you there!



News and issues around the Industry...

EI Informer – October 2009 - Demise Of Container Ships No Accident

Distance to market does matter, especially with higher fuel prices

Perry Sioshansi reports that if you walk into a Wal-Mart super store you are likely to be confronted with 100,000 products, mostly imported from China or other foreign destinations. The miracle of logistics, container ships, plus cheap oil equals cheap mass-produced goods from far away places at your local store. It is called globalization. Increase the price of oil, or add a premium to carbon emissions associated with transport of goods across long distances and the picture changes dramatically.

Depending on the product and the distances involved, as much as 70% of a manufacturing company's carbon footprint may be attributed to transportation, according to Ernst & Young.

Companies that took a global view of both their suppliers and customers are beginning to shift to a regional perspective. For some products, say organic, perishable produce, there is a tendency to go local. Japanese car makers, the masters of just-in-time inventory management, have been building more of their cars in the US closer to their key markets. How long before the Chinese and others follow?

Tiny 'nuclear batteries' unveiled by University of Missouri team

Researchers have demonstrated a penny-sized "nuclear battery" that produces energy from the decay of radioisotopes. Nuclear batteries are an attractive proposition for many applications because the isotopes that power them can provide a useful amount of current for phenomenally long times - up to hundreds of years or more. As radioactive substances decay, they release charged particles that when properly harvested can create an electrical current.

Nuclear batteries have been in use for military and aerospace applications, but are typically far larger. As a result, they have seen use in spacecraft that are fired far off into the cosmos. But for applications here on Earth, their size has limited their use.

The University of Missouri team says that the batteries hold a million times as much charge as standard batteries.

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News and issues around the Industry...

Liquid solution

The Missouri team, led by Jae Wan Kwon, employed a liquid semiconductor to capture and utilise the decay particles. Most nuclear batteries use a solid semiconductor to harvest the particles, but the particles' extremely high energies means that the semiconductors suffer damage over time.

This means that to build a battery that can last as long as the isotope inside, they must be built larger.

The team's solution incorporates a liquid semiconductor, in which the particles can pass without causing damage. They are now working to further miniaturise the batteries. They have developed it in an attempt to scale down power sources for the tiny devices that fall under the category of micro- and nano-electromechanical systems (Mems and Nems).

And although the whole idea hinges on the use of radioactive materials, the devices are safe under normal operating conditions.

"People hear the word 'nuclear' and think of something very dangerous," Dr Jae said.

"However, nuclear power sources have already been safely powering a variety of devices, such as pacemakers, space satellites and underwater systems."

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/8297934.stm>: Published: 2009/10/08

EEI Informer – October 2009 - FutureGen's Future: Cloudy

Alternatives to the ill-fated DOE venture make future of FutureGen doubtful

Perry Sioshansi reports that FutureGen, the US Department of Energy's answer to clean coal, has had an eventful history. With rapidly escalating costs, DEO withdrew its support for the project under the Bush Administration (No future for FutureGen, Mar 08). Incoming President Obama, formerly a Senator from Illinois, was heavily lobbied to revive the project (Obama gives clean coal a second lease on life, Aug 09). But it appears that the resuscitation came too late, leaving the project's fate in limbo.

The resurrected project calls for a 275 MW plant initially designed to capture 60% of the carbon – not 90% as originally proposed – with an estimated cost currently pegged around \$2.4 billion. DEO has earmarked \$1 billion from CCS funding under the American Recovery and Reinvestment Fund of 2009. But the money comes with many strings attached including a requirement that the FutureGen Industrial Alliance expand its membership from the original 11 to 20, each participating company contributing at least \$30 million over the next 4-6 years to the project. Other requirements include a complete funding plan, rapid re-start of design and detailed cost estimates.

In the mean time, American Electric Power (AEP) and Southern Company, two of the biggest supporters of the Alliance and both big coal-burning utilities, have decided to withdraw their support, pursuing their own initiatives that are not mired in bureaucratic red-tape and more likely to succeed. AEP has embarked on its own plan to test CCS at the Mountaineer coal-fired power plant in New Haven, WV while Southern Company is pushing its own idea.

Bluegen Latest Green Option

The Sydney Morning Herald (SMH) reports that alternative energy company Ceramic Fuel Cells (Ceramic) will commence production of its gas powered "Bluegen" home solid oxide fuel cell units for release into the Australian market in early 2010. According to the SMH, the dishwasher sized units convert natural gas to produce up to 17,000kwh of electricity per year, double the requirements of an average home and at a higher efficiency and lower cost than coal-fired power generation. Ceramic Fuel Cells' managing director Brendan Dow reportedly commented that the company hoped its product would be certified as a "safe gas appliance" by February 2010 and would also qualify for the Federal government's Renewable Energy Certificate scheme as an incentive for installation of units.

SMH: Ceramic fires up Bluegen (5 October 2009)

Plans to Create a Smart Grid

Environment Minister Peter Garrett, Communications Minister Stephen Conroy and Energy Minister Martin Ferguson have jointly announced the federal government's \$100 million Smart Grid, Smart City initiative, which aims to create Australia's first commercial-scale smart grid. Smart grid infrastructure "uses sensors, meters, digital devices and analytic tools to automate, monitor and control the two-way flow of energy from power plant to plug". The DEWHA has released a pre-deployment report, Smart Grid, Smart City: A new direction for a new energy era (2009), which "outlines the potential economic and environmental benefits of smart grid technologies, and indicates that the Smart Grid, Smart City demonstration project can deliver the robust data needed to inform broader adoption of smart grid technologies and applications across Australia". The DEWHA also released the Draft Guidelines - National Energy Efficiency Initiative: Smart Grid, Smart City (30 September 2009) for public comment. Final grant guidelines are expected to be available at the end of October 2009.

Comments on the draft guidelines close 12 October 2009 and should be sent to the DEWHA.

Further information from the DEWHA

Joint media release (30 September 2009)

(Source: Environment Minister; Communications Minister; Energy Minister; DEWHA)

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Victorian Chapter News

Russell Place Substation, EESA Site Visit.

Alan Conrau, Mainco Melbourne, 23/9/2009

An unobtrusive grey roller door opens in front of me as I wait eagerly on the footpath of Russell Place in the afternoon sun of a mid winter's day.

Upon being invited inside, the Operator, in his grey dust-coat and white hard-hat, busily scurries around preparing for the arrival of the rest of his guests.

As I look around, I notice a crane above me and a removable concrete floor below. Numerous artifacts of a time gone by stand quietly around the perimeter of the room, reminding me of how things used to be.

The other guests arrive, 22 in total, and we separate into two groups before beginning our descent into Russell Place Substation...

Russell Place Power Station, originally built as a DC generating station in 1882 by the Australian Electric Company, was the first public electricity supply point in the Southern Hemisphere. Russell Place Power Station was originally used to provide power to the new electric lighting of nearby buildings and electric arc street lighting in parts of Bourke and Swanston Streets.

The site in Russell Place has undergone numerous changes throughout the years – the original DC generating equipment was decommissioned and replaced by Rotary Converters in 1929, which were then replaced by Mercury Arc Rectifiers in 1962 after the station was completely rebuilt to its present form in 1950.

The commercial demand for a DC supply became ever smaller, and the Mercury Arc Rectifiers were eventually turned off and taken out of service in 2003.

Today, Russell Place Substation is operated by CitiPower as a 22kV to 6.6kV Substation, and is directly connected to Richmond Terminal Station by 3 dedicated 22kV cables. The Substation supplies 6.6kV to customers in the Melbourne CBD and is reticulated entirely by underground cables.

The bulk of the installation is underground, and consists of a main corridor with adjoining chambers, all separated by thick concrete walls and enormous riveted steel sliding doors.

The Substation contains 3x 10MVA, 22kV to 6.6kV transformers, which are housed in 3 separate chambers. The remaining chambers house iron-clad 6.6kV Reyrolle switchgear (which is arranged into 3 buses), protection and control gear, and two Mercury Arc Rectifiers. The Substation also supplies neighboring buildings with 415V.

Although the Mercury Arc Rectifiers are no longer in service, we were privileged to witness these electrical devices light up with a mesmerizing eerie blue glow. The arcs dance over the surface of a pool of mercury, which vaporizes and condenses on the top of the glass bulb. The anode connections (the radial arms at the bottom of the bulb) are where the multi-phase AC is connected via the unit's Quadruple Zigzag Rectifier Transformer.

An interesting feature of the Rectifier unit that many on the tour may not have noticed are the solid wooden fans, located directly underneath the glass rectifier bulbs. The fan control system is also a reminder of times gone by – The speed of the fan is controlled by an auxiliary winding of the Rectifier Transformer, the voltage of which is proportional to the magnetic fluxes present in the Rectifier Transformer main windings, which means the fan speed is therefore directly proportional to the rectifier's load. Brilliant!

Mercury Arc Rectifier technology is now a cumbersome and outdated method of producing a DC from an AC waveform, but this author truly believes that no other piece of functional industrial electrical equipment will ever be as beautiful and elegant while in operation.



NSW Chapter News - Past Events

Greg Skinner (member) presenting John O'Connor with a cheque at the Science and Engineering Challenge held in Newcastle on the 27th August 2009. EESA sponsors an annual "science communication scholarship" (\$3300 annually) as well as a general donation of \$1500 (ie total of \$4800 per annum, the amount of this cheque)



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NSW Chapter News - Past Events

IEEE Talk at EnergyAustralia on Smart Grid

On the 24th of August 2009 at Energy Australia's CBD Auditorium some 80 + attendees drawn from IEEE, IET and EESA members listened to two presentations on:- The Role of Renewable Energy in mitigating the need for Large Station Power Plants and What is the Smart Grid and What is Needed to Make it a Reality given by Professor Saifur Rahman an IEEE Distinguished Lecturer who was visiting Australia.

A brief introduction on Energy Australia's considerable efforts in this area was initially given by Adrian Clarke from Energy Australia before Professor Rahman spoke.

Professor Saifur Rahman is the director of the Advanced Research Institute at Virginia Tech where he is a Professor of Electrical and Computer engineering. He also directs the Centre for Energy and the Global Environment at the University. He has served as a program director in engineering at the US National Science Foundation between 1996 and 1999. He is the vice president for New Initiatives and Outreach for the IEEE Power & Energy Society and a member of its governing board.

The outline of the talks is summarised below.

The concept of the Smart Grid originated from the desire to make the grid – starting from the power station to the end-use device – smarter, safer and more reliable using advanced sensors, communication technologies and distributed computing. A smart grid will look more like the Internet, where information about the state of the grid can be exchanged quickly over large distances. It will also allow integration of new sustainable energy sources, such as wind, solar, off-shore electricity etc. There are four attributes of the Smart Grid that need to work interactively for this concept to be a reality. These are Technology, Standards, Public Awareness and a Policy of incentives.

At present there are efforts from vendors to develop technologies which will become building blocks of this grid. At the same time standards are being developed which will make technologies from different vendors inter-operable so that many players will be able to participate giving customers a broad choice. All of these will depend on whether the public will find value in participating in this opportunity. This will depend on two things, awareness and incentives, which are interrelated. The public must be made aware of the benefits of participating and at the same time there must be incentives for them. There must be policies and regulations in place that will encourage participation by creating a differential pricing structure for the electricity consumed.

Patrick McMullan, EnergyAustralia

EESA NSW Chapter Seminar: Power Industry Seminar

'Emerging Practices & Requirements'

A hotel roof-top function area in the CBD of Port Macquarie was the fabulous venue for another successful EESA NSW Chapter seminar. The half-day event held on Thursday 27th August was attended by 50 or more local and regionally based delegates keen to learn about 'Emerging Practices and Requirements' in the NSW Electricity Distribution Industry.

Six presentations were given over the afternoon covering a diverse range of interesting and contemporary topics highlighted amongst others by:

- an insight into the requirements of the proposed new High Voltage Live Working National Standard,
- Low Voltage grid interactive inverter design philosophies and technologies under prototype development for grid augmentation applications including power quality conditioning and optimisation,
- the impact of small scale renewable generation on the network,
- a practical application of the new handbook (HB264) developed as a guide covering the management and limiting of harmonic voltages and voltage fluctuations in medium and high voltage networks,
- the emerging use, techniques and application of specialist powerline design software and corresponding photographic montages portraying the visual aesthetics of existing and future infrastructure.

On behalf of the NSW EESA Chapter, many thanks to all those involved, especially Ben Bates, Jennifer Hadfield, Tony Patterson, Ian Askeil, Leith Elder, Ian Thompson, Cory Urquhart, Chris Halliday, Russell Wills, Dennis Stanley, the attending EESA members/committee members, and the Country Energy executive management including Ken Stonestreet and Col Usher for sponsoring this regional event.

If you're not already a member of EESA, consider the benefits of joining, as admission to these types of events is often free to members. Annual membership is a modest charge of A\$77, and 'student' membership is FREE!

Neville Cooper, Country Energy