

## A word from your president



### **AEMO Transmission Planning Statement**

Transmission and distribution network planning is always a challenging job. The goal posts keep being changed by customers, generators, technologies and government policy. A 10, 20 or 30 year plan is never right or wrong - it is simply a concept where planners get a chance to come up with a better plan next year.

I've just looked over the new AEMO "National Transmission Statement for the National Electricity Market" (available at [www.aemo.com.au](http://www.aemo.com.au)). I find the 20 year transmission development timeframe particularly interesting. Having worked more in distribution planning than transmission planning, I struggle to forecast beyond 10 years ahead. I find the 20 year time frame used by AEMO exceptionally bold, but no doubt a necessity in the transmission environment.

All forecasting and network planning needs underlying assumptions and models. The AEMO assumptions are stark and bold. The main drivers are greenhouse gas and renewable energy certificates. The transmission plans appear to be driven by:

1. A big reduction in coal generation, especially brown coal from the Latrobe Valley.
2. A huge expansion of generation from natural gas (a dash to gas) with a decline in production from some existing gas fields.
3. The 20% renewable target triggering a big expansion of wind power.
4. Geothermal generation in 2024.
5. An increase in electricity wholesale prices from ~\$30/MWh in 2009 to ~\$100/MWh over a 15-20 year time frame.

As you can imagine these scenarios represent a revolution of the electricity industry and trigger massive planned additions and augmentations to the national transmission system.

While the plans are no doubt based on the best available information and modelling, they are heavily dependent on government policies that could well change at the next election. What the transmission plan cannot incorporate are the vagaries of government policy, especially the Carbon Pollution Reduction Scheme and the Renewable Energy Targets. Forecasting what is effectively the demise of the brown coal generation in Victoria is a big call that would have a massive impact on the electricity industry.

As a former planner I understand the problems. AEMO need to put a plan forward. I have learnt over many years to be very cautious about making business decisions that are reliant on the maintenance of any government policy. All I can conclude is that AEMO's 20 year plan will most certainly need major revamps over the next 20 years. That is not being critical, that is simply the planning process in action.

Dr Robert Barr  
EESA National President

### **Bulletin 3, May - June 2010:**

Please email submissions by the 18th June to the Bulletin Editor,  
Patrick McMullan on [pmcmullan@energy.com.au](mailto:pmcmullan@energy.com.au)

## Upcoming Events

**86th National Conference  
& Trade Exhibition****Watt's up....  
future-proofing energy networks****1 - 3 September 2010****Keep this date in your diary!!!****Do you have a new product or service you would like to promote to your colleagues in the electric energy industry?**

Sponsorship and exhibition opportunities are now available for the 86th National Conference and Trade Exhibition. This year we have moved the conference to the Australian Technology Park in Eveleigh, Sydney to allow the exhibition to expand. We have also introduced two levels of exhibition space – the larger 3mx3m booth for companies with products to display and a smaller 2m x1m pod which may appeal to serviced based companies and consultants.

Over 50% of the exhibition space has been sold in the first month. If you would like to promote your product or service to senior members of the electric energy industry, don't miss out ... book your booth today!

**For more information on the conference or to download the sponsorship and exhibition proposal please go to [www.eesa.asn.au](http://www.eesa.asn.au) or contact The Meetings Manager on 02 9810 7322 or [meetings@tmm.com.au](mailto:meetings@tmm.com.au)**

**APPEA Conference and Exhibition 2010 - Brisbane 16 - 19 May 2010**

The APPEA Conference is Australia's number one energy conference and regarded as one of the worlds top three 'must attend' gatherings for oil and gas executives, technology experts, government officials and those wishing to do oil and gas business in Australia.

[www.appeaconference.com.au](http://www.appeaconference.com.au)

**News and Issues from around the Industry****Europe to move forward on carbon capture and sequestration with funding from carbon credits**

According to the March edition of EEnergy Informer, the European Commission has agreed to proceed with an ambitious plan to build as many as a dozen coal-fired plants with carbon capture and sequestration (CCS) technology by 2015. The goal is to demonstrate and perfect the technology so that it can be commercially deployed by 2020 - an aggressive schedule. The funding for the scheme is to come from the sale of roughly 300 million EU carbon credits, worth an estimated €3.8 billion.

The future of coal to a large extent will depend on the future of CCS. A vast and potentially lucrative market awaits if the technology can be proven to work on a commercial scale and at affordable cost. The Europeans clearly want to beat the Americans and others who also have plans to commercialize the technology. It is the modern day equivalent of the race to the moon – this time with more down to earth benefits.

**More renewables equals more peaking units**

The same publication also reports that the growing penetration of renewable energy resources - a virtual given - leads to a host of issues including the need for more transmission, integration of intermittent resources, back-up and storage technology and what is the best way to pay for renewable generation.

Depending on their location and prevailing regulations, renewable generators are compensated either on costs – as in the case of feed-in-tariffs popular in Europe – through long-term purchase power contracts with the distribution companies – as in the US – or by bidding their output into wholesale markets at prevailing prices, usually supplanted by subsidies, production tax credits or other financial schemes – as in the US. Mandatory targets such as RPS in the US or the 20% quota for 2020 in EU generate the demand.

But which of these schemes provide the best incentives for investors who are behind renewable energy revolution? That is the topic of an article by Professor James Bushnell, now at the University of Iowa. He says that as the level of penetration of intermittent renewables such as wind increases, the mix of other generation resources shifts towards less baseload and more peaking capacity.

This means that over time, renewable producers earn increasingly more revenue in markets with capacity payments as opposed to those that base compensation primarily on energy as determined by fluctuating prices in wholesale markets. This may sound obvious but has important implications in design of future energy markets – increasingly dependent on renewable generation.

The article may be found at [http://ei.haas.berkeley.edu/pdf/working\\_papers/WP202.pdf](http://ei.haas.berkeley.edu/pdf/working_papers/WP202.pdf)

## News and Issues from around the Industry

**EPRI shows that direct current superconductor cable is feasible for development using today's technology**

PALO ALTO, California 3 March 2010

The Electric Power Research Institute (EPRI) has published a report that describes the design of a superconducting direct current (DC) cable system capable of moving thousands of megawatts of electricity between regions, and which is practical and ready for commercial development, using today's technology.

The EPRI analysis points to significant efficiency gains using superconducting DC transmission lines, with the capability to reduce transmission losses at full load by 50 percent or more compared to alternating current (AC) or high-voltage DC systems. Assuming the trend continues for cost-performance improvements in superconducting wire, such a line could become an option within a decade along with Extra High Voltage (EHV) AC lines that are currently used to move large amounts of power over long distances.

The EPRI report indicates that the builders of superconducting DC transmission lines could rely on commercially available technology and construction methods similar to those used in natural gas pipeline construction. These include factory manufactured, transportable sections of an outer carbon steel pipe containing inner stainless steel piping for the flowing coolant and superconducting cable, and trucking to the site for assembly, welding and burial.

The lighter, thinner, higher-capacity superconducting cable might be fabricated, shipped and installed with methods and equipment now used for conventional underground transmission cable. Production capacity of superconducting wire today is limited but given substantial demand capacity could possibly be expanded sufficiently for longer lines. Refrigeration and vacuum requirements of the line might be met by equipment and methods utilized in the industrial gas industry.

"In the future we may see the development of generation facilities, such as large wind farms or nuclear "farms" capable of producing five to 10 gigawatts (GW), but located far from urban centers of demand. It will then be necessary to move large amounts of power over long distances," said Arshad Mansoor, vice president of Power Delivery and Utilization for EPRI.

As designed, the superconducting cable system outlined in the report would provide 10 GW power capacity with a nominal current and voltage of 100 kiloamps and 100 kilovolts. The report also points to the cable system's potential to enhance the safety, reliability and efficiency of the existing AC power grid.

EPRI also has published two companion superconducting reports. These highlight the practical issues of integrating a long-distance, high-power superconducting DC link into the existing, lower-power AC transmission and distribution systems, and states that the operation and control of this link will be a key to the viability and acceptance of the concept.

The reports can be downloaded from the EPRI website at [www.epri.com](http://www.epri.com).

Main Report 1020458, "A Superconducting DC Cable"

[http://my.epri.com/portal/server.pt?Abstract\\_id=00000000001020458](http://my.epri.com/portal/server.pt?Abstract_id=00000000001020458)

Companion Report 1020330, "Study on the Integration of High Temperature Superconducting DC Cables within the Eastern and Western North American Power Grids"

[http://my.epri.com/portal/server.pt?Abstract\\_id=00000000001020330](http://my.epri.com/portal/server.pt?Abstract_id=00000000001020330)

Companion Report 1020339, "Transient Response of a Superconducting DC Long Length Cable System Using Voltage Source Converters"

[http://my.epri.com/portal/server.pt?Abstract\\_id=00000000001020339](http://my.epri.com/portal/server.pt?Abstract_id=00000000001020339)

**ET energy technology reports on ultracapacitor charged buses in Shanghai**

In Shanghai 17 municipal buses run entirely on ultracapacitor batteries that are charged up during their route at designated bus stops. Without recharging, the buses could only go 3 to 5 miles, but the ultracapacitors allow them to charge rapidly. Even if the batteries are completely empty the bus has to stop only for a couple of minutes.

The test project in Shanghai has proven the concept during the last 3 years. The buses recharge with energy from braking or optionally from solar panels and use 40 percent less electricity compared to other electric trolley buses. Compared to conventional buses with fuel engines over the vehicle's 12-year life, Sinautec estimates its buses have one-tenth the energy cost of a diesel bus which would result in lifetime fuel savings of about \$200,000.

<http://www.etenergytechnology.com/ultracapacitor-buses-run-on-quick-charge-batteries/>

## News and Issues from around the Industry

**Biopower Systems secures access to commercial scale wave energy site in Australia**

NewEnergyWorldNetwork reports that Australian ocean energy company BioPower Systems has secured land access, onshore development rights and project intellectual property for a commercial-scale wave energy site located near the town of Port Fairy, Victoria.

'This stretch of coastline is well known around the world as a premiere location for wave energy development,' the CEO of BioPower Systems, Dr Timothy Finnigan, said. 'The strength and consistency of the swell here is phenomenal.'

BioPower Systems expects to commence works at the site by the end of this year and to initially produce energy using its 250KW ocean wave energy system. A commercial wave farm using an array of larger 1MW units would follow, the company said. Pre-development work at the site was conducted by Diamond Energy, an Australian private company that develops accredited renewable energy projects and also retails clean electricity.

Tony Sennitt, managing director of Diamond Energy, said 'Port Fairy is an ideal location for establishing a wave energy farm'. "Not only does this region have the highest wave energy levels in the State of Victoria, development of the project supports the local community by creating up to 200 new jobs through the development, commercialisation and production stages.'

Last year, BioPower entered into an agreement with the city of San Francisco to investigate the generation of wave energy from the Pacific Ocean.

[http://www.newenergyworldnetwork.com/renewable-energy-news/by\\_technology/biofuel\\_biomass/biopower-systems-launches-san-francisco-wave-energy-project.html](http://www.newenergyworldnetwork.com/renewable-energy-news/by_technology/biofuel_biomass/biopower-systems-launches-san-francisco-wave-energy-project.html)

**Wind power grew by 39% in the USA reports the wind ninja**

The United States is now even closer to the point where 2% of its electricity will come from wind turbines. That may seem like a small number, but considering that growth came during the recession, hopefully it is a sign of better things to come.

The American Wind Energy Association, in its annual report, said the amount of capacity added last year, 9,900 megawatts, was the largest on record, and was 18% above the capacity added in 2008, also a huge growth year.

The A.W.E.A. said the growth of wind power was helped by the federal stimulus package that passed a year ago, which extended a tax credit and provided other investment incentives for the industry.

<http://www.windpowerninja.com/wind-power-government-industry-news/wind-power-grew-by-39-in-2009-80496/>

**Some recent articles from alternative energy news**

<http://www.alternative-energy-news.info/>

**That the future is now with light-powered circuitry**

The brain of any electronic device is the circuitry that operated the machine. Without the circuitry, the device is not even worth the cost of the plastic that it is made of. Any electronics device requires some kind of battery or it is nothing more than a paperweight. Recently, some new technology was created by scientists from the University of Pennsylvania that will no longer require a device to use a battery as the power can come from light-powered circuitry.

<http://www.alternative-energy-news.info/light-powered-circuitry/>

**New battery technology could lead to self-powered devices**

The advancements that are being made in battery technology are pretty mind boggling. We are seeing devices that are drawing power from just about every source that is imaginable, and now there is battery technology from researchers at Imperial College London that may actually have devices that create their own power. From cell phones to cars and everything in between, there may eventually be nothing more needed that to actually use the device.

<http://www.alternative-energy-news.info/new-battery-technology-self-powered-devices/>

**Forget solar power, human power is the future**

That may be a little aggressive, but Princeton University engineers have developed a device that may change the way that we power many of our smaller gadgets and devices. By using our natural body movement, they have created a small chip that will actually capture and harness that natural energy to create enough energy to power up things such as a cell phone, pacemaker and many other small devices that are electronic.

<http://www.alternative-energy-news.info/human-power-is-the-future/>

## News and Issues from around the Industry

**Ceramic Fuel Cells announces second European order for BlueGen**

Ceramic Fuel Cells Limited (AIM/ASX: CFU), a leading developer of high efficiency and low emission electricity generation units for homes and other buildings, has received an order for its BlueGen power and heating unit from Kiwa Gas Technology in The Netherlands for delivery in Q2 2010.

Kiwa Gas Technology will test and operate the BlueGen unit at its facility in Apeldoorn, The Netherlands, on behalf of leading gas utility GasTerra.

GasTerra, also based in The Netherlands, is an international supplier and trader of natural gas and a Fortune 500 company. GasTerra is owned by Shell, ExxonMobil and the Dutch government and has a strong position in the Dutch gas market. In 2009 GasTerra recorded revenues of 25 billion Euros (approx. A\$40 billion).

GasTerra is actively investing in the development of highly efficient gas appliances like small scale power and heating products (mCHP). Jur Kruger, project manager Energy Transition at GasTerra, recently told the parliament of the Dutch province Groningen that GasTerra believes that within the next ten years one million mCHP units could be installed in The Netherlands.

BlueGen is the latest breakthrough in small scale electricity generation. About the size of a dishwasher, each BlueGen unit can produce twice the electricity needed to power an average home, with the surplus electricity sold back to the grid.

BlueGen also produces heat, to make enough hot water for an average home. BlueGen units can generate electricity more efficiently than the current European power grid, significantly reducing a home's carbon emissions and cutting energy bills.

The order from Kiwa Gas Technology is Ceramic Fuel Cells' second order for BlueGen units in Europe, following a recent order from German utility EWE. Ceramic Fuel Cells has also deployed fully integrated mCHP products with leading energy companies and appliance manufacturers in France and the United Kingdom.

[http://www.cfcl.com.au/Assets/Files/20100202\\_CFCL\\_KiwaGastec\\_BlueGen.pdf](http://www.cfcl.com.au/Assets/Files/20100202_CFCL_KiwaGastec_BlueGen.pdf)

**Smart grid command & control: The death of the giant brain in the sky**

Article by Jesse Berst in Smart Grid News 2 March 2010

A new white paper from the Electric Power Research Institute (EPRI) [http://www.smartgridnews.com/artman/uploads/1/EPRI\\_1020432ConceptsAdvancementDER.pdf](http://www.smartgridnews.com/artman/uploads/1/EPRI_1020432ConceptsAdvancementDER.pdf) marks an important milestone in the evolution of the Smart Grid. EPRI describes it as the move from Smart Grid command & control to inform & motivate. I describe it as the move from interactive to transactive.

As devices get more intelligent, the grid can move away from centralized control over each device. We won't need a Giant Brain in the Sky capable of talking to and commanding millions of devices. Instead, we can get by with a central resource controller that keeps those smart devices informed about what is going and gives them incentives for the behavior it wants. Price signals might be one kind of incentive. Seeing that peak pricing was going into effect, a smart appliance might choose to throttle back until prices were lower.

In essence, these devices are performing small transactions. If we take this approach, as EPRI points out, the Smart Grid can move forward much more quickly. For one thing, it lets us innovate and improve without fear of obsolescence. Manufacturers can swap in a newer, better device at any time, as long as it can talk and transact with the system.

The EPRI white paper goes into details about the messaging and other standards needed to allow this kind of system. Many other organizations have been working on this same approach for at least a decade, including Pacific Northwest National Laboratory. But EPRI's paper marks, in my view, the mainstreaming of the concept.

[http://www.smartgridnews.com/artman/publish/Delivery\\_Command\\_Control\\_News/Smart-Grid-Command-Control-The-Death-of-the-Giant-Brain-in-the-Sky-1959.html](http://www.smartgridnews.com/artman/publish/Delivery_Command_Control_News/Smart-Grid-Command-Control-The-Death-of-the-Giant-Brain-in-the-Sky-1959.html)