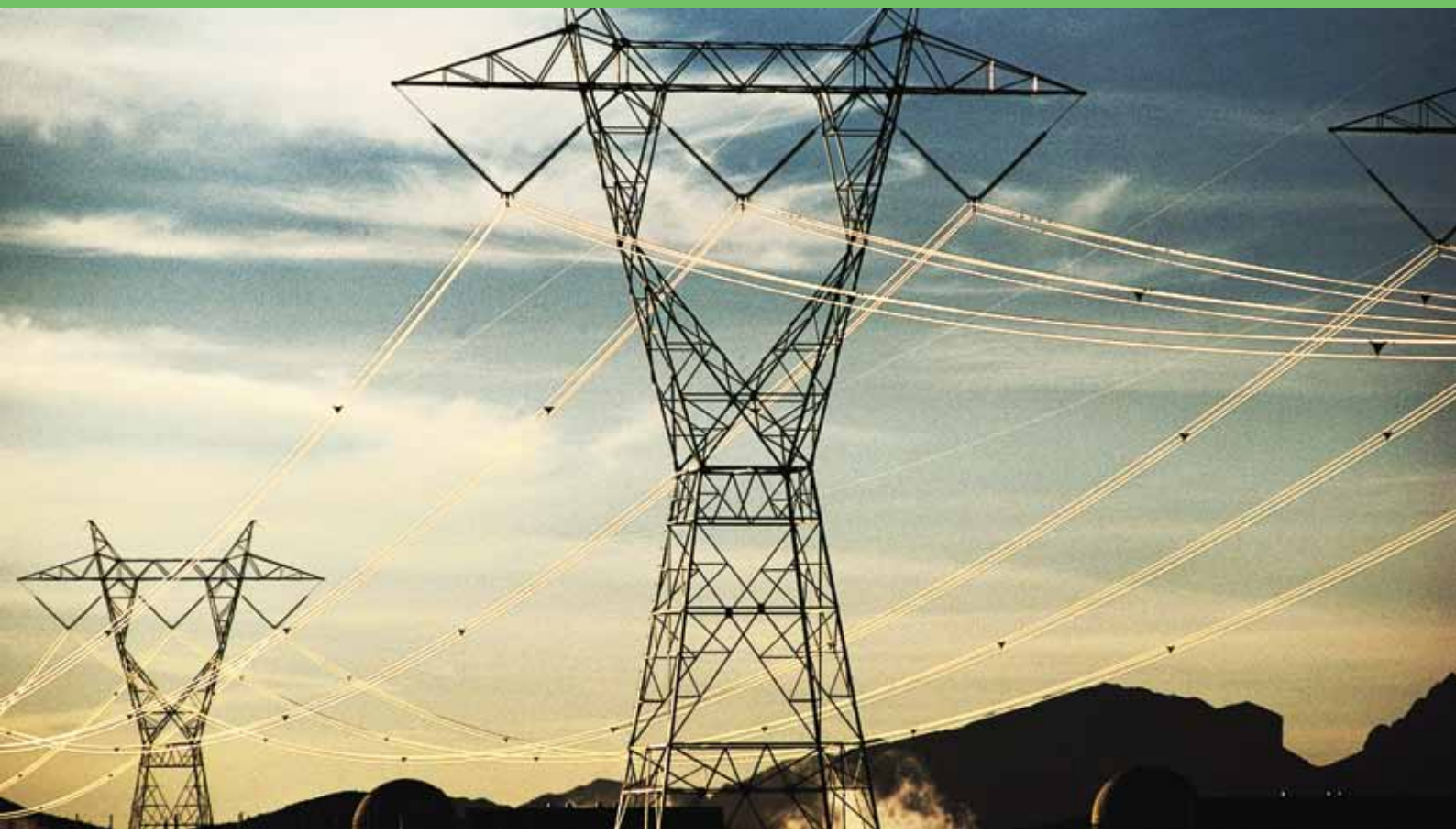
.energy.



Feel the power

Australia's energy landscape was very different 20 years ago, dominated by state-owned monopolies and prices coming off their 1970s peaks. Since then we have witnessed a battle between advocates of economic rationalist policies and of sustainable energy solutions.

Australia initially developed a strong National Greenhouse Response Strategy, building on Bob Hawke's Ecologically Sustainable Development process in 1992 and a raft of state level activity. But the rest of the decade was dominated by the energy market reform agenda.

This century has seen the intermittent rise of renewable energy sources and a slow expansion of corporate energy programs, notably the Energy Efficiency Opportunities scheme federally and strong industry programs in Victoria and NSW.

They are delivering significant volumes of cost-effective energy savings and greenhouse abatement. A new analysis of Victoria's Environment and Resource Efficiency Plans (EREP) shows most of the energy savings pay back inside a year.

Still, stationary energy accounts for 70 per cent of Australian greenhouse emissions. Reform is required. Some are pushing nuclear energy and carbon capture and storage. Others favour energy storage, smart grids, sophisticated demand management and distributed energy production ranging from building integrated solar PV to district level cogeneration.

Energy veteran Alan Pears is sitting on the fence. "The outcome will depend on how quickly advocates can deliver real outcomes that meet society's needs, as well as political decisions. Since the global financial crisis, financial risk has also become a bigger issue: smaller scale, shorter term projects are more likely to be funded." Maybe the time has come to realise that small is beautiful. WME

February 2010 issue

WME

Environment Business Magazine

SPECIAL REPORT

Local Government

Local government are the biggest buyers of environmental products and services, ranging from waste contracts to water management, consulting services to carbon. WME takes an in depth look at Local Government in action and the landscape ahead.

Also in FEBRUARY 2010: **PUMPS, VALVES AND SEALS**

Advertising

To make sure your message reaches your target market, telephone (02) 9817 6400 or email sales@wme.com.au for a Media Kit or more information.

Editorial

With an audited circulati on of 7,488, WME is Australia's leading environment business magazine. Submissions to the editor, Richard Collins on (02) 9817 6400 or by email richard@wme.com.au

The new energy paradigm

Innovation in both demand and supply side solutions may be unprecedented, but will this lead to a paradigm shift in how we think of energy, wonders Alan Pears.

In many ways, our thinking on energy has come almost full circle from where it was 20 years ago. In the late 1980s and early 1990s, we were just beginning to develop solid experience in energy efficiency programs and renewable energy systems. We had also begun to grasp the reality that people and industry do not need energy per se, they need and want services to which energy (along with technology and social drivers) is an input.

The take-over of energy policy by privatisation advocates, econocrats and vested interests through the energy market reform process of the 1990s swamped the emerging sustainable energy paradigm.

Since the turn of the century, three issues have challenged the paradigm: the climate change debate, problems in trying to cope with explosive growth in peak electricity demand, and rapid increases in electricity and oil price.

We are slowly seeing energy efficiency improvement recognised as a core policy issue: in most other countries, it is expected to deliver the bulk of emission abatement throughout the next few decades at low or even negative cost. But it has languished in Australia under a one-sided energy market framework and weak, fragmented policies constrained by 'energy efficiency sceptics' in governments and industry.

Appliance efficiency programs are delivering millions of tonnes of abatement at minus $56/tonne of avoided emissions. Early results from our first serious industry energy efficiency programs – the federal Energy Efficiency Opportunities program, Victoria's EREP and the NSW Energy Savings Plans – have shaken the sceptics and opened the eyes of governments.

Business is *not* optimally efficient in its use of energy! Our best green office buildings now use 70 per cent less energy than average buildings, while 8 and 9-star energy rated houses are being built.

Governments are only now beginning to allocate more resources to energy efficiency, although we still lack the organisational infrastructure to manage the demand side well.

Renewable energy traction

The renewable energy industry has also surprised the sceptics. The supposedly challenging 2010 Mandatory Renewable Energy Target was largely met by 2007. And now the 2020 Renewable Energy Target is finally in place, Renewable Energy Certificate prices have halved as new projects, solar hot water and rooftop solar cells flood the market.

Governments and the energy sector still seem to be struggling to understand how the new energy paradigm works. It captures economies of scale through production volume (like cars), not project size. At the same time, biased energy market rules still block major potential in demand side action and distributed generation.

As paradigms clash, heated debates abound: Alan Pears.

Distributed energy generation, particularly cogeneration, is still struggling to gain traction in Australia, despite offering large potential for cost-effective abatement. Distorted energy market rules and the use of monopoly market power by network operators are major blocks. Governments will eventually have to confront this issue.

> **"Governments and the energy sector still seem to be struggling to understand how the new energy paradigm works"**

The rapid emergence of interest in intelligent energy grids is also challenging traditional thinking. The combination of high efficiency, smart equipment, distributed storage, diversified electricity sources and intelligent management systems redefines many aspects of energy systems.

The 'big energy' paradigm remains alive and well, with large public investment – and some private – flowing into development of the 'silver bullet' solutions for coal and the re-emergence of advocacy for nuclear energy.

As paradigms clash, heated debates abound. On one hand, base load power stations aren't much help on hot summer afternoons when flexible plant is needed. On the other hand, it is often argued that renewables can't supply base load.

Analysis shows that much of our base load demand is artificial, the outcome of decades of discounted off-peak electricity pricing. The phase-out of off-peak electric hot water and reduced energy waste from equipment left on overnight could eventually see much less demand for overnight electricity.

It will be supplemented by a shift towards cogeneration by large industrial sites, developments in energy storage, and smart demand management. Even scenarios involving charging electric vehicles overnight don't create much additional demand for overnight electricity generation.

We are seeing a remarkable rate of innovation in both demand side and supply side energy solutions. The role of social responses is just beginning to be acknowledged as an important complement to technology change. We are yet to see policy focused on managing the total cost of delivered energy services instead of the price per unit of energy.

Our energy future is very uncertain. I'm glad I'm not an investor in large energy facilities or energy networks. The combination of rapid innovation, the global financial crisis and climate change response means we could quite soon see some stranded energy assets.

Alan Pears is Adjunct Professor at RMIT University and runs consultancy Sustainable Solutions.

Energy powers on

Throughout the years, energy reform has sparked some intense speculation, debate and even deregulation. Richard Collins highlights the top 10 peak moments.

1. Aggressive deregulation: Australia's energy landscape 20 years ago was very different, with electricity and gas supply dominated by monopolies, most of them publicly owned. While there was some electricity trade between states through the Snowy scheme (pictured), it was much smaller in scale.

In 1994, following the influential Hilmer Report on competition policy, Victoria set off the deregulation snowball that would change the picture altogether. It aggressively drove its energy market reform process, eventually selling off its electricity industry at unexpectedly high prices.

NSW and then others followed, but Victoria had set much of the agenda and its market structure shaped the national approach. Today, the National Electricity Market connects all the states bar Western Australia and electricity is traded on the spot market as a highly fluid commodity.

2. Emissions targets unleashed: Everyone knows the 1997 Kyoto Protocol set emissions reduction targets for nations, but few remember its forerunner, the Toronto Target. The Hawke Government signed on to it in 1990 and developed a plan to cut CO_2 emissions by 20 per cent relative to 1988 levels by 2005.

Business rebelled and talked of a $200 a tonne carbon tax, which helped kill it off. The arm wrestle over the Carbon Pollution Reduction Scheme has gone to script, with one key difference – it is not going away.

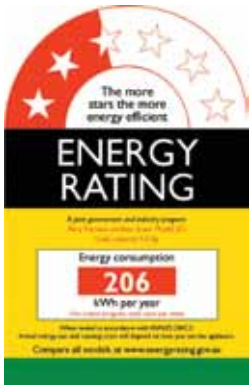
Climate change has entered the public consciousness, the tipping point coming in 2006 through the combination of Al Gore's *Inconvenient Truth* and Sir Nicholas Stern's landmark cost-benefit analysis of addressing climate change. The genie was out of the bottle, and despite the odd dip will not go back in.

3. The carbon cutback: In 1992, the State Electricity Commission of Victoria (SECV) 'got' carbon, the first government body to acknowledge climate change was a problem. It published a paper showing how it could meet the Toronto Target at low cost and ran Australia's most comprehensive demand side efficiency scheme, the $30 million a year Industrial Energy Efficiency Program.

Mark Searle of Key Energy & Resources ran the project and remembers George Bates, chief general manager of the SECV, appearing in a promotional video in front of a huge pile of coal talking about CO_2.

"It was not demand control. They were not interested in reducing maximum demand, they were interested in megawatt hours of electricity saved and tonnes of CO_2 avoided," he said.

It was highly cost-effective in terms of avoided demand and emissions, running for three years until deregulation broke up the SECV.



4. A star is borne: Several states introduced mandatory appliance energy labelling in 1986, a scheme that not long after went national for whitegoods and air conditioners. The Energy Star label is widely recognised and often copied.

In 1995, energy ministers agreed to implement minimum energy performance standards (MEPS) for refrigerators, freezers and electric storage water heaters, to take effect in 1999.

MEPS for motors were first proposed as early as 1994 but it was not until 2001 that regulations came into force. It removed about 20 per cent of models from the market and was updated and expanded in 2006.

5. Making sustainable obtainable: In the late 1990s, some glimmers of light appeared for sustainable energy. The NSW Government established the Sustainable Energy Development Authority (SEDA), initially for a three-year period, to address short-term barriers to sustainable energy in the early years of energy market reform.

Energy industry veteran Alan Pears said SEDA pursued an innovative and aggressive agenda, leaving a legacy of talented young professionals and useful programs such as the Building Greenhouse Rating tool and the identification of 1,845MW of cogeneration potential.

The government also established the Greenhouse Gas Abatement Scheme (GGAS), an early cap-and-trade scheme for CO_2. The Australian Greenhouse Office was formed in 1998 and promptly released a discussion paper on emissions trading.

6. PM rates renewables: Prime Minister John Howard's 'Safeguarding the Future' statement in the lead-up to the 1997 Kyoto Climate Conference laid the groundwork for the introduction of the Mandatory Renewable Energy Target in 2000 and the expanded Renewable Energy Target this year.

"When the [Howard] Government committed to MRET,

setting a 30,000 gigawatt/hour clean energy target, that was the most important thing for renewables," said Ric Brazzale, one-time head of the renewable energy association that became the Clean Energy Council.

"It has driven billion dollars of investment. It was absolutely pivotal."

7. Industry gets efficient: At the turn of the century, the Energy Efficiency Best Practice program challenged the belief that industry was optimally efficient in its use of energy.

These lessons flowed into the structure of the mandatory national Energy Efficiency Opportunities program, which has since July 2006 identified millions of tonnes of very cost-effective abatement through energy efficiency improvement.

More than 220 corporations (incorporating about 1,200 subsidiaries) are now registered for the program.

8. Investors weigh in: Garry Weaven was accused of paying way over the odds for renewable energy company Pacific Hydro in 2005. The boss of superannuation company Industry Funds Management – who parted with $800 million to fend off Spanish giant Acciona – was one of the first Australian businessmen to invest in the promise of carbon.

That same year, it became the first Australian firm to participate in Kyoto-driven carbon trading contracts through its interest in a hydro-electric project in Fiji.

9. Incandescent streak: Environment Minister Malcolm Turnbull – he was the last of the Howard era incumbents – in 2007 took a shot in the dark and set a deadline to ban conventional, incandescent light bulbs. It came in last month.

Turnbull said the measure, actually determined by setting minimum energy standards incandescents have no hope of meeting, would save up to two million tonnes of CO_2 in its first few years.

10. The stockpiling state: Aggressive energy efficiency measures, a demand side response mechanism to reduce peak power spikes, and cogeneration to localise electricity supply could see NSW have an energy surplus by 2020.

It would save $500 million compared to business as usual and 7MT of CO_2 emissions, says a powerful report this year by Chris Dunstan of the UTS Institute for Sustainable Futures. This suite of measures coordinated through a smart energy grid, and combined with utility-scale renewables, holds the seeds of a sustainable energy system. WME

Origin Solutions understands the energy needs of Australian businesses

As one of Australia's top 20 companies listed on the Australian Stock Exchange, Origin is a leading energy company with a proud history dating back more than 150 years. But we're not only an energy retailer we also sell energy-related services. One of our prime objectives is to focus on understanding the energy needs of Australian business and to continually explore new possibilities to best help businesses meet their energy needs, to create greater efficiencies, cost savings and energy solutions that are more environmentally responsible.

We are committed to working with businesses to help make all these goals possible. It is this commitment that delivers a real business advantage, which is why large commercial and industrial organisations, rely on Origin to meet their energy needs and turn possibilities into real advantages for them.

As a founding member of the Business Roundtable on Climate Change, we're leading the climate change debate for businesses. Together with CEOs from BP, IAG, Swiss Re, Visy, Westpac and the ACF, we demonstrated that it is possible for us to reduce our greenhouse gas emissions at an affordable cost while continuing to grow.

As energy management and sustainable challenges become more and more complex we want to work alongside businesses to clarify energy and greenhouse objectives and develop effective, practical implementation programs to help achieve energy management goals.

Origin Solutions is a team dedicated to identifying energy efficiency opportunities for businesses and provide end-to-end energy management and sustainable solutions. Part of the Origin Energy Group and a preferred partner to Australian businesses in end to end energy management and sustainability solutions, we focus on taking care of business energy needs at every stage.

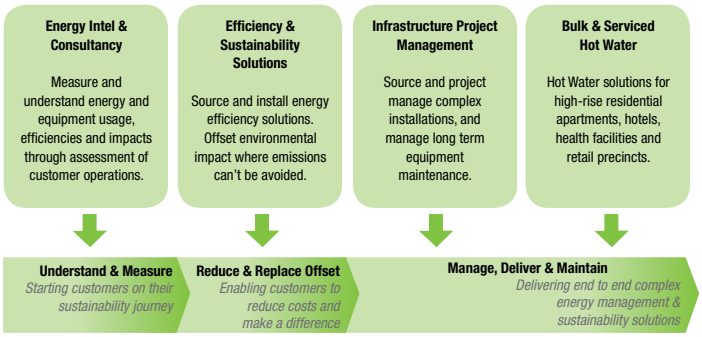
We can provide a tailored energy optimisation solution for business customers taking the complexity out of energy management by leading and facilitating our customers' journey from immediate, simple project implementation through to fully integrated best practice energy management solutions.

We provide:

- End to end energy management solutions
- Guidance on how to bring sustainability strategies to life
- Unique tailored solutions designed and delivered to suit businesses
- Attractive payment options to enable projects to be implemented as soon as possible
- The advantage of a credible fully integrated energy company

We simplify energy management requirements by project managing solutions from beginning to end. From the initial analysis and scoping of requirements, sourcing the best suppliers and delivering the outcome at an affordable price.

Our objective is to help save energy and costs, maximise the performance of plant and machinery, and source the most suitable solutions for specific business needs.



Origin Solutions operates nationally and we serve a wide range of sectors that have a common need for energy management and sustainability solutions.

The Journey

There are many ways we can work with businesses to help improve energy management from every aspect - efficiency, economy and long term sustainability.

The table above summarises the key steps that enable businesses to clearly realise energy management needs in line with business requirements and achieve operational and sustainability outcomes.

Service

Our team can work closely with businesses by identifying and implementing opportunities to save energy.

No matter at what stage businesses are on their sustainability journey, our experts can work with businesses to identify requirements, plan the steps that need to be put in place and actions to be undertaken that will deliver the solutions to match business drivers, resources, budget and timing.

For example, our experts can assess opportunities and will recommend cost effective improvements using a wide range of energy efficiency technologies, including: Compressed air services; Lighting services; Co and Tri Generation; Renewable generation – solar and wind installations and process optimisation.

Solutions that improve operational effectiveness and energy efficiency make good business sense. When you choose Origin, you are choosing more than today's leading energy provider.

Commitment

Origin invests in, explores and develops new lower emission energy sources and is fully committed to

- exploring and developing gas both on-shore and off-shore in Bass Strait,and off-shore New Zealand and Kenya.
- reducing the carbon intensity of our economy.

Snapshot of some of the services on offer from Origin Solutions:

Customer need	Origin Solutions
Energy usage intelligence monitoring.	Carbon footprint assessments, energy audits, NABERS, building ratings, sub-metering/load monitoring.
Increased efficiency and meeting sustainability targets	Lighting and air-conditioning efficiency consultancy, maintenance and equipment provision, fuel conversion, Power Factor Correction, carbon offsets, GreenPower, solar and wind generation.
Infrastructure project management	Design, project management and delivery of complex installations such as Co and Tri generation, demand management solutions, low voltage to high voltage conversions, wind farms and HV transformers.
Bulk and serviced hot water	Hot water solutions for high-rise residential apartments, hotels, nursing homes, cold water metering, pool heating.

In addition to this, Origin

- is a leading producer of gas in eastern Australia and is the largest owner and developer of gas-fired electricity generation in Australia.
- is investing in lower carbon technologies such as efficient gas fired generation and renewable energy.
- is the owner of the Cullerin Range Wind Farm near Gunning in NSW which provides enough renewable electricity to power 15,000 typical homes in NSW.
- is the leading developer of coal seam gas in Australia and holds the largest coal seam gas reserves.
- is playing an active, leadership role in both the Adelaide and Bendigo/Ballarat Solar cities projects.
- is investing in 'hot rock' geothermal technology which harvests heat from over 4 km below the earth's surface to generate cleaner electricity.
- has planted 700 Pongamia trees in and around Spring Gully in QLD. The plants are nurtured by water from the Reverse Osmosis Plant and produce oil that can be converted to biodiesel for cleaner energy production. This is part of trial being run in partnership with the University of QLD.

Job creation and community support

Origin is creating jobs and supporting the communities we operate in by encouraging our next generation to be more energy wise, by helping 500,000 kids and their families learn to save energy and keep safe around gas and electricity.

- Together with Carbon Conscious, Origin will plant more than 6 million trees over the next 3 years.
- Origin has already planted more than 100,000 trees, released 250,000 native fish into the Murray-Darling Basin and is cleaning up half a million square metres of land around the Great Barrier Reef – on behalf of their green energy customers.
- Origin produces purified water from their Reverse Osmosis Plant in Spring Gully, QLD. From this water we supplement the flow of a local creek, helping bird life & water species.
- Origin sponsors the Banksia Foundation's Gold Award which recognises and encourages organisations and individuals who are actively reducing their environmental impact.

Delivering cost effective solutions for businesses

- Consulted and project managed the design, supply and installation of 50+ train station lighting upgrades for Connex Trains, this included energy efficiency and light quality.
- As part of the Central Victorian Solar City project, Origin is managing the design, supply, installation, commissioning and maintenance of 2 x 300kW solar farms in Ballarat and Bendigo.
- A 770kW cogeneration plant was set in place on the roof of the University of NSW Cancer Research Centre. Enclosed in a specially designed rooftop container the 770 kWe natural gas engine plus 400kW heat recovery unit for hot water will provide electricity and hot water to the research facility. 1,400 tonnes of CO_2 will be saved per annum.

Key facts

- an Australian company
- operations in every Australian state.
- grown with Australia for the past 150 years.
- delivering gas, electricity, LPG, solar to customers throughout Australia and the Asia Pacific region.
- Australia's #1 green energy provider.
- a leading provider of grid-connected solar solutions to both residential and commercial customers across Australia.
- assisting businesses with energy efficiency and energy management for years and is constantly building capability.

Origin Solutions takes the complexity out of energy management and serves business customers by improving commercial energy management performance, minimising risks associated with energy price volatility, while reducing environmental impact where possible.

Start making a positive difference to your business and talk to the Origin Solutions today

Contact us now on 13 23 34 or email originsolutions@originenergy.com.au and see the Origin difference

Together we can make a difference.™

2.4MW trigeneration plant - 101 Miller Street, North Sydney.

Solar winds of change

Solar power may have been blown away by wind's success on the renewable energy front, but solar's turn to shine could come again, writes Richard Collins.

The amount of solar energy that hits Australia in one summer day alone is about half the total global annual energy demand. It's little wonder Australia was one of the first to flirt with what solar pioneer David Mills calls the "photon economy".

The forerunner of the Australia New Zealand Solar Energy Society (ANZSES) was formed in 1961 and early innovations from our shores include evacuated tube technology, which underpins China's booming solar collector market.

However, it is almost 20 years ago that the local climate for solar cooled courtesy of the withdrawal of federal government support, sparking an exodus of researchers and a complete departure of manufacturers. Today wind is seen as the big winner from the renewable energy scheme.

So what's to celebrate? A coming of age, according to ANZSES chief John Grimes, who says solar is at a tipping point. On the other side of it is grid parity pricing for solar inside three years and new storage technologies delivering base-load reliability.

"There is a real vibrancy in the industry right now and everybody feels like we are on the cusp of something big. There is an energy around the solar industry that people have not felt for the last couple of years," said Grimes, fresh from the industry's annual conference.

The world's fourth largest supplier, Tokyo Electron/Oerlikon, told Solar 09 that thin film PV will achieve "grid parity pricing" here in about a year, and it wants a slice of that pie.

PV module prices have also tumbled 40 per cent this year and are expected to drop another 20 per cent by year's end, courtesy of the financial crisis to be sure, but Grimes also points to the achievement finally of global critical mass and the rapid rise of Chinese manufacturing.

"The big breakthrough is we have companies claiming they are manufacturing for less than US$1 per watt, which has been the Holy Grail of PV manufacturing. It means by 2013 we are in grid parity pricing territory without a [Renewable Energy Certificate] multiplier or any other form of rebate."

Courtesy: Australian National University

Wizard's 400m² Big Dish at ANU and pressure vessels for ammonia-based storage.

Harvesting sunshine

Two Australian firms stole the show at Solar 09, solar thermal concentrator specialists Ausra and Wizard Power.

"I think solar thermal will ultimately be the cheapest form of solar," said Grimes. "Of all the renewable technologies it also offers the greatest potential from an industrial/commercial perspective because it has the ability to offset peak or base load demand and feed into existing infrastructure."

Mills' company Ausra has been trialling its solar troughs in the Hunter Valley to boost the generation efficiency of the Liddell power station. It has just announced plans for a full commercial scale project, 10 times the size of Liddell, at Kogan Creek Power Station in Queensland.

The Queensland Government has backed the $200 million project, which will help generate more than 23MW of electricity per year, making it the largest use of the technology in the world.

Wizard has built a 400m² big dish concentrator that has only one problem – the energy is too intense and is melting the materials Wizard has tried so far. It's not a major impediment. But that's not all.

"One of Wizard's big innovations is they have perfected the technique for storage of solar energy in ammonia," said Grimes. "They use ammonia, which is widely available for use in agriculture, and introduce a catalyst that splits it into hydrogen and nitrogen, both of which are stable in their respective parts.

"When a catalyst is reintroduced, the two are combined and release almost as much energy as they once held [more than 90 per cent]."

Wizard aims to employ the technology in a stationary power plant, especially as the ammonia can be endlessly reused in a closed loop, but Grimes sees it as a new energy export industry.

"You can have these separate canisters you can ship overseas and move long distances," he said. "The future would mean you would have the ability to ship energy. If we look further into the future, Australia is enormously well placed as a solar collector for the world and instead of sending coal overseas could send these types of energy resources."

He's not alone. CSIRO's renewable energy projects manager Wes Stein says solar power could be exported as Synthetic Natural Gas, tempting traditional farmers to switch to "farming the sun". WME