Thought of as revolutionary as information technology at the start of the 1990s, ‘clean-tech’ – short for ‘clean technology’ – is a ‘perfect storm’ of new technologies backed by entrepreneurs, neo-greens, environmental business and technologists. It’s already having a significant impact on Australia.

Back in January, the Asia Pacific Partnership on Clean Development and Climate (AP6) generated more than its fair share of controversy. Amongst the debate, an unfamiliar word drifted into the political lexicon: cleantech.

For some, cleantech seemed like a buzzword concocted by the government and the coal industry to again stifle the renewables industry. But to think that would be to misunderstand a new and important, movement. Internationally, cleantech is a hard to categorise sector, joining entrepreneurs, greens and environmental business with technologists who think new clean technology possesses transformative qualities comparable to those that drove the ‘IT’ revolution.

Somewhat overshadowed by the recent Asian AP6 climate initiative, the first-ever Australian Cleantech forum late last year sought to explain the new movement in some detail. Ecos caught up with the new cleantech pioneers at the event for some insight and working definitions.

For most of this decade, Chairman of the Cleantech Capital Group, Nicholas Parker, and Chrysalix Energy CEO, Dr Wal Van Lierop, have been busy establishing the Cleantech Venture Network in North America. The network coined the term ‘Cleantech’ in 2002 to power shift the ‘array of alternative energy, energy efficiency and other green technologies’ under one mainstream movement.

According to the Cleantech Capital Group, ‘cleantech’ is defined as ‘any knowledge-based product or service that improves operational performance, productivity or efficiency while reducing costs, inputs, energy consumption, waste or pollution.

On the vanguard of cleantech

Prematurely misunderstood in Australia, ‘cleantech’ is a rapidly maturing international paradigm changing the way we see green and clean technologies, investment, business and politics.

Nicholas Montgomery reports on the emergence of a lucrative industry under the new environmental imperatives.
‘Increasingly, clean technologies are developed primarily to meet an economic need; their environmental benefits are a significant but secondary consequence’

‘The cleantech concept is not specific to a particular sector; it encompasses energy generation, energy storage, energy infrastructure, energy efficiency, transportation and logistics, water purification and management, air quality, materials and nanotechnology, manufacturing/industrial, agriculture and nutrition, enabling technologies, materials recovery and recycling, and environmental IT.’

‘On the face of it, environmental technology is spawning a host of new industries, from hybrid electric vehicles to wind power. But cleantech’s advocates see it as the new energy vanguard offering a clear divergence from the sometimes politically correct ‘envirotech’.

‘Clean technology is about becoming the enabling technology of the 21st century industrial society. It’s not classic envirotech – more like biotech or information technology,’ offers Nicholas Parker. Cleantech is lighter, smarter, stronger and cheaper to manufacture, as well as being less carbon-intensive and more energy efficient.

‘For some, renewables do not cut it,’ explains Wal Van Lierop. ‘People, governments and investors are sometimes afraid of renewables – they’re big and something we associate risk with. We (cleantech) use the slogan Preferred Energy.’

Developed to meet an economic, consumer or government demand, cleantech makes no qualms about placing environmental needs second. ‘Increasingly, clean technologies are developed primarily to meet an economic need; their environmental benefits are a significant but secondary consequence,’ says Parker.

‘Traditionally, clean technologies are developed primarily to meet an economic need; their environmental benefits are a significant but secondary consequence,’ says Parker.

The motto is: ‘cleantech that wins will be decided by energy security, energy prices and technology prices.’

And so, remarkably, if cleantech sees massive renewables as hap-hazardous, they will equally criticise current power provision as centralised and expensive, and be made inefficient by carrier systems. As a result, greens may then feel a tad better about cleantech’s refusal to be politically correct or to fall back on ideology.

The Cleantech Network sees Australia adopting this unique position. It’s not a contradiction for Australia to support both solar and ‘clean coal’ technology, Parker says, confidently. He sees Australia’s strength in cleantech in wave and solar options, based on the ‘sun, surf, sand’ trademark known so well to tourists. At the same time, he strongly advises embracing clean coal too.

Parker sees Australia’s research and development cleantech base as ‘world-class.’ The Cleantech Network notes that Australia’s foremost research and development organisation, CSIRO, is now allocating 40 per cent of its budget to Cleantech. Wal Van Lierop also views CSIRO as foremost in promoting Australian cleantech worldwide.

But, while cleantech pioneers are enthusiastic about the organisation’s new cleantech uptake, many in the media and environmental lobbies take the view that cleantech means a backing away from renewables at CSIRO.

The demand for environmental technology is spawning new industries, such as the one for hybrid and electric vehicles. The electric Vectrix motor scooter from the US, soon available from Vectrix Australia, is capable of a top speed of 100kph within 6.8 seconds and gives 5 hours of driving on a 2 hour charge time.
A new philosophy is about placing priorities in ways simply unavailable to most other countries on Earth. ‘We call micro-power, such as solar and residential wind power, the sort of new philosophy and direction CSIRO is taking,’ says Frank van Schagen, CSIRO’s Coal in Sustainable Development (CCSD) Chief Executive.

CSIRO’s Coal in Sustainable Development (CCSD) is also moving more towards clean technologies with integration in mind, it makes for an easy transition of power generation technology. CSIRO’s Coal in Sustainable Development (CCSD) Chief Executive, Frank van Schagen, says solar-thermal clean tech doesn’t only supplement power; it can also draw power from coal stations by converting methane from natural or ‘coalbed gas’ to make ‘synthesis gas.’

Add the solar gas to CSIRO’s hybrid coal gasification, coal sequestration and solar-turbine technologies, and it seems clear that the mix of clean tech under the Energy Transformed Flagship projects appears set to expand. ‘The (clean tech) philosophy is about making what we’ve got clean, and building new energy systems from there,’ explains Wright. ‘We have to be clear on this: all energy systems are extremely important to getting it right and lowering greenhouse gas. This requires an active research, development and demonstration program to reduce the greenhouse intensity of technologies using fossil fuels, while addressing the need to reduce consumption and develop affordable renewable energy technologies.’

Schagen also sums up CSIRO’s cleantech approach when he says: ‘In the polarised public debate, Australia’s energy challenge is often depicted as fossil-versus-renewables. In reality, the answer lies in an intelligent combination of the best technologies. Australia has sunlight, and it has coal and gas – in vast amounts. We can combine them to create ideal energy solutions in ways simply unavailable to most other countries on Earth.’

Indeed, it is about setting priorities in changing markets and environmental conditions. And increasingly it’s about going micro. Micro cleantech, developed with integration in mind, is a crucial element of the cleantech movement says the Clean Tech Network. CSIRO’s 40 per cent cleantech initiative is focusing on an array of small technologies like the ultra hydrogen battery and residential wind power, says Dr Wright.

‘We call micro-power, such as solar and micro turbines, distributed energy systems that will help with peak power and create an intelligent grid. The intelligent grid itself will employ technologies such as computer networks and energy efficient distribution systems that can flood power to pressure points during peak use.’

Some smaller, but nonetheless important, cleantech is emerging from Australia’s other leading research and development organisation, the Centre for Energy and Greenhouse Reduction Technologies (CEGT). Since 2000, the Centre has been moving more towards clean technologies development. CEGT’s Jan Dekker says 60 per cent of their cleantech solutions contain three common elements: they are small, they integrate into existing infrastructure and they are energy efficient.

The hundred or so cleantech products developed and funded by CEGT go from the simple Active Reactor Lighting Controller (the installation has seen CO₂ emission reductions equivalent to taking 10 000 cars off Victoria’s roads), to the complex: brown coal drying and cryogenic gas sweetening technology; cleantech that turns CO₂ into liquid for coal-sequestration. Then there’s the outright radical: the Kinetic Energy Cell that turns vibration into energy.

Queensland’s Sustainable Energy Innovation Fund is another good example of the support behind the switch to a portfolio mix of clean technologies. It has been funding solar thermal research since 2000 alongside efficient solar lights, diesel-ethanol and sugar-mill cleantech, and polymer beams for building.

Other bodies moving to cleantech include Sustainability Victoria, AusIndustry, the CRC for Coal in Sustainable Development, the CRC for Sustainable Resource Processing, Commercial Ready, the Greenhouse Gas Abatement Program, South Australia’s Sustainable Energy Research Advisory Committee and Victoria’s Energy Technology Efficiency Strategy.

With so many like-minded organisations switching, Australia is positioned well in research and development ‘to become the Silicon Valley of cleantech,’ says Australia’s own cleantech expert, Clean Technology Austral-Asia’s Peter Castellas. Castellas, also the Fund Manager of the Sustainable Melbourne Fund, thinks Australia can drive world cleantech with water. ‘Australia boasts a long pedigree in the area of innovation in the water quality and wastewater treatment area. Perhaps the
greatest market for innovation and growth in the cleantech space is water,’ he says.

Clean Technology Austral-Asia points to local company Agralink’s automatic spray irrigation machines and wireless C-probe technology, which measures soil moisture, as cleantech world-beaters. Agralink CEO, Peter Hasko, explains why: ‘Our revolutionary system allows people like primary producers and environmentalists to log onto the Internet and monitor the status of a crop or soil on their property from anywhere in the world’. The system has since been micro-sized into a device that calculates whether household gardens actually need watering.

Australia’s big-name water cleantech also includes advances in desalination, water purifier, water-saving piping and wastewater recycling systems. The diversity is further increased by Melbourne and Sydney Water’s ‘energy from sewage’ cleantech, and the University of Queensland’s Advanced Water Management Centre similarly removes algae and sewage from water for energy use.

Australian cleantech is so significant, in fact, that Zurich-based Sustainable Asset Management has added an Australian water fund to its portfolio for European investors. Driving this boom is speculation that water will be seen as the oil of the 21st century.

Green building and infrastructure is another high noon area according to Castellas, and he’s not wrong. Garry Weaven, Founder and Executive Chair of Industry Fund Services and now CEO of one of Australia’s leading clean energy companies, Pacific Hydro, believes infrastructure provides more than unlimited potential for cleantech application.

But it is the prospect of investment in this new phase technology by big institutional backers such as Weaven, along with the likes of Macquarie’s Clean Technology Fund, Babcock & Brown, and James Fielding’s Cleantech Capital, that could take cleantech onto new territory and into buildings. Australian pension funds are already following the US trend to invest in the technology, stocks and capital. Under California’s Green Wave initiative, pension funds are committing $1.5 billion to investments in ‘cutting edge technologies’.

Company wise, Clean Technology Austral-Asia has identified 70 cleantech businesses in Australia with a total capitalisation of $7.8 billion and they had raised nearly 15 per cent of their value ($1.1 billion) by way of new capital since July 2004. These include Australian Ethanol Limited, Eastern Star Gas, Advanced Nanotechnology, Babcock & Brown Wind Partners, Viridis Clean Energy Group and Geodynamics Limited.

Clean tech can deal with both ‘conservatives’ and ‘progressives’ adds Castellas. Moreover, the healthy competition between state and federal ideas on climate change – the states favour Kyoto, carbon trading, 20 per cent renewable targets and wind, whereas the federal government favours solar, clean coal, and to ‘go it alone’ – is closing around a consensus behind cleantech.

Clearly then, Australian cleantech has some political, economic, development and research weight behind it. But it still lingers outside the public consciousness. Small cleantech is as yet unfashionable or hidden, while larger cases – renewables, for example – are currently prone to bouts of instability. Then there are the negative impressions of cleantech that have already developed to some extent through media association with untested clean coal technologies – something the Australian government has yet to counter.

But the Cleantech Network’s Dr Wal Van Lierop expects a flagship product to soon ‘flex’ cleantech into the mainstream. ‘We need an iconic “iPod” cleantech device that opens understanding to the possibilities and benefits of cleantech,’ rouses Wal Van Lierop.

Australia may already have one such device. CEO of Ceramic Fuel Cells Limited, Brendon Dow, is touting their...
Network predicts China will propel this global cleantech revolution. China is already the sixth largest solar manufacturer in the world. Interestingly, a Chinese–Australian cluster of cleantech knowledge and technology has emerged, driven by China’s ongoing industrial revolution. China to run Suntech Power – now the second largest solar manufacturer in the world.

On the back of Suntech Power, China is making significant progress in clean coal technologies, with a potential for 70 coal-fired stations going up in China, clean coal technologies will play a major role. China is also becoming a major player in carbon capture and storage (CCS) technologies, with a number of pilot projects under way.

China’s cleantech industry is not just a manufacturer. Indeed, the big two of the Pacific Partnership – Japan and China – tend to exist in Western minds as manufacturing hubs. Yet, if the Japanese are anything to go by, we are in for a cleantech shockwave. Hybrid cars are placing it squarely as an early first mover. Developed in Japan, the Toyota Prius broke cleantech wide open last year. The next generation Prius will employ cleantech that needs little or no petrol.

Similarly, Japan’s Micro energy 1MW solar systems are already popular with consumers, and the fact that Sharp has claimed ‘the largest manufacturer of solar technology’ title in Japan holds some product-potential possibilities.

But even with Australasia showing its potential, the US still points the way forward for cleantech. America’s energy giant, GE Energy, is the leading proponent of cleantech with hybrid-electric locomotives, fuel-efficient aircraft motors, membrane water purifiers and pesticide superspreaders. Even cleantech washing machines are among their arsenal.

Other US cleantech includes kites that generate power from high altitude winds, recycled plastic cardboard coatings, green dry cleaning technology, UltraCell micro fuel cells and Recycle Bank – a product that identifies how much a home recycles and then pays the home for the amount recycled.

Of course, cleantech’s advocates do not hold all their faith in consumer products. What they are doing, however, is addressing the possibilities of the coming ‘clean economy’. The mere notion that cleantech could rival the information technology revolution provokes visions of a clean and green planet. Google or Microsoft on your solar-hydrogen-powered PC anyone? While the size of the cleantech picture is still becoming clear, it is already offering government, industry and consumers a unique way to break free of some ideologically thinking and move forward with solutions to the challenges.

‘Don’t underestimate China,’ says Cleantech Capital Group’s Nicholas Parker, referring to the perception that China is just a manufacturer.

More information:
CSIRO Energy Transformed Flagship: www.csiro.au/csiro/channel/ppch1d.html
Cleantech Venture Network: www.cleantech.com
AustralAsian Cleantech Finance and Investment Forum: www.cleantechforum.com