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Back to the future

After 150 issues of *Renew*, what has changed in the world of sustainable technology, and what hasn't?

PAGES 23, 28 & 49

Solar + batteries

Solar system buyers guide; trends in energy storage; and how the new battery installation rules affect you.

WIN

PAGE 95

A Sanden Eco Plus hot water heat pump valued at up to $5000

Australian residents only

ISSUE 150

renew.

Technology for a sustainable future

Happy 150th Renew!

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Technology for a sustainable future

ISSUE 150

Jan - Mar 2020

Robyn Deed
Renew magazine editor

Could an electric tip truck be the tipping point for EVs in Australia? Well, maybe that's a stretch, but the one being used by Yarra City Council in Melbourne is certainly showing up its diesel forebears, with running costs 80% less. And it's made in Australia, by an Australian company to boot. That's just one of the stories of change in this issue, offsetting a little of the despair at political inaction on climate change.

That's the thing about Renew and *Renew* magazine. We operate in a space that has a lot of despair, particularly at our country's inability to get over the 'diabolical politics' of climate change and act decisively. In his book *Superpower* (reviewed this issue), Ross Garnaut sums it up: "... the damage that climate change has wrought so far is of modest dimension compared with what will follow—even if the world takes decisive action immediately. And it is utterly trivial compared with what is to come if we fail to take decisive action."

So are there glimmers of hope? Garnaut's book suggests a way forward that could beat the politics through the improving economics of climate action.

At *Renew*, we see so much hope in the amazing stories of action from our community (see p. 72 for many examples) and beyond. Arguments abound about the point of individual action when the political will hasn't shifted, but we clearly need both. As Doug Rolfe says in his review of 150 issues of *Renew*, there's a virtuous circle of Renew members and others supporting sustainable technologies to the point where they've become mainstream and opened up the many possibilities for the sustainable, renewable economy that Garnaut points to.

Looking back at 150 issues of *Renew*, perhaps the most surprising thing is that the early issues don't have much of a mention of solar PV at all. It wasn't really until issue 100, in 2007, with the support from premium feed-in tariffs and the rise in manufacturing in China, that things started to change. With 2 million Australian rooftops sporting over 8GW of solar panels and changing the grid, renewable energy in Australia really has been led by the community.

Will we get to 20GW by our 200th issue in 2032? Perhaps by then we'll have seen big drops in battery prices, so the cover will have to be an 'always difficult to photograph' battery system. Will Australia be a renewable energy superpower as Ross Garnaut suggests? And where will we be regarding climate change, global warming and survival on this planet? As Doug Rolfe notes, we have all the solutions we need, we just need the political will.

Cover image: Happy 150th issue to us! A big thank you to everyone involved in *Renew*—it wouldn't be possible without the community that makes us. That's summed up in this photo, with people who work on *Renew*, people who've written for *Renew*, a new/old board member (sporting the old red ATA t-shirt), volunteers, readers and even our printer. Our outgoing CEO Donna is on the right—a big and very sad farewell to her. It's been amazing to see the organisation grow through her work, and she's often been a source of ideas for the magazine—she knows a good *Renew* story when she sees one!

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WIN!

A 315L Sanden Eco Plus hot water heat pump valued at up to $5000, fully installed

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BUYERS GUIDE

With six panels being installed each minute (on average), you might think we'd hear Scott Morrison saying, "How good is solar!" Our buyers guide looks at the whys, wheres and hows of getting solar on your roof to join the other 2 million+ solar households in Australia.

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Electric vehicles are now being used for tip trucks, rubbish collection, delivery vans, buses and more. See them in action.

01

Simple, low-cost energy metering

Many households just want a simple, effective energy meter, and the Powerpal is exactly that.

It consists of a small battery-powered Bluetooth transmitter that connects to your existing digital or smart meter using an optical sensor that sits over the meter's flashing LED (the LED flashes a certain number of times per kilowatt-hour).

You pair the Powerpal with your phone or tablet (only iOS or Android, there's no Windows support, sadly) and the Powerpal starts sending data to the app.

The app has four different displays, including a circular graph, linear graph and data table, and shows you how much electricity you have used each day and how much it has cost you. If you have a net-metered solar system (as most now are), the Powerpal only shows the energy used from the grid, not your solar self-consumption.

We tested a Powerpal and found setup very easy. In five minutes it was installed and monitoring. About the only issue we had was occasional Bluetooth disconnections—a problem that proved to be my particular Nokia phone, not the Powerpal!

The Powerpal retails for $129 and is available from Powerpal and Reduction Revolution.

Contact:
Powerpal, ph: 1300 287 909
powerpal.net, reductionrevolution.com.au

02

Compact hybrid inverter

While Huawei is better known for its communications equipment, it is also one of the largest solar inverter manufacturers on the planet.

The Huawei SUN2000L-5KTL is one of the SUN2000L range of inverters and features a maximum AC output of 5 kW and a maximum solar array size of 6.75 kW.

The inverter is a true fanless model, using only natural convection for cooling, eliminating one point of failure—the fan used in many other inverters. It has battery capability using LG Chem RESU 7H/10H batteries, RS485 and wi-fi communications for use with Huawei's online monitoring portal.

The inverter is compatible with the Huawei Smart PV Optimisers (for shaded panels) and Smart PV Safety Box, which supports module-level real-time monitoring and management, and module shutdown capability.

Other features include IP65 rating for outdoor use, a -30 °C to 60 °C operating temperature range (derating above 45 °C at rated output power) and a maximum efficiency of 98.6%. The inverters all measure 375 mm x 375 mm x 161.5 mm and weigh 10.4 kg.

Contact:
Huawei Technologies (Australia)
ph: (02) 9928 3888
au_inverter_support@huawei.com
solar.huawei.com

03

Can't afford a new EV?

While we would all like to replace our dino-burning internal combustion engined vehicles with electric vehicles, the fact is that the current crop of new EVs are out of the reach of many buyers. The alternative is a used EV, but the market is very limited. This is particularly the case in Tasmania, where used EVs are almost impossible to come by.

A new startup, the Good Car Company, is importing used Nissan Leafs and eNV200 vans direct from Japan and bringing them up to Australian requirements (including conversion to English of the display interface and controls), for sale in Tasmania and southern Australia.

Because Japan has strict rules governing the maintenance and lifespan of vehicles (effectively, cars have to be replaced after a few years, regardless of condition) their vehicle stock is in good condition. The Good Car Company ensures that the vehicles they purchase are in excellent condition, with batteries with low levels of degradation.

While only Nissan Leafs and eNV200 vans are currently available, the Good Car Company has plans to expand into other models in the near future.

Prices start at $18,000 and vary depending on vehicle age and battery condition. Each vehicle comes with a charger and has a six-month warranty.

Contact:
The Good Car Company, ph: 0410 111 622
goodcar.co

A greener festival

Music festivals are a growing part of Australian culture, but how do we make sure these parties have a positive impact on the planet? Sophie Weiner looks at how to create a more sustainable festival scene.

Australian music festivals often seem to present a worst-case scenario for sustainability. The massive amount of waste generated by the festival circuit can really put a damper on the party experience for anyone who cares about protecting the environment.

Research released by the advocacy group Green Music Australia earlier this year from a survey of 800 attendees at Falls Festival, Party in the Paddock and Unify Gathering found some sobering figures. One-third of festivalgoers surveyed considered their tents single-use items, while 50% believed that the waste they were generating somehow didn't go to landfill. The disheartening research also found that 55% of attendees didn't believe they were responsible for cleaning up after themselves.

This can seem a bleak landscape for those who care about both live music and sustainability. But the environmental impact of festivals is too important to ignore. The festival industry has experienced unprecedented growth around the world in recent years. A 2018 report from consulting firm PwC found that the global live music industry will be worth $31 billion by 2022. In Australia alone, industry group Live Performance Australia found record-breaking attendances at live music events in 2017, with 23 million attendances at a live music event of some kind and those events generating $1.88 billion in ticket sales. Festivals were among the categories of events that experienced the greatest growth. And an Eventbrite survey found in 2018 that respondents attended two to three festivals a year, with 40% saying they've travelled to another state for a festival, and 16% reporting travelling overseas.

Volunteers plant bamboo at Woodford Folk Festival's yearly planting event on the festival's property in Queensland. The bamboo will later be harvested for festival construction.

Image: Woodford Folk Festival

Transforming festivals from celebrations of excess to sustainability is not an easy feat. It can be hard enough implementing sustainable practices in your own home—encouraging tens of thousands of partiers living together for just a few days to do the right thing can feel impossible. But though the problem can seem overwhelming, there are fans, organisations, promoters and musicians working to implement change at every level and in every area of the festival scene. The culture is changing, albeit unevenly, and there are a variety of innovative projects underway to green the festival scene.

Greening the scene

Several organisations are spearheading a sustainable movement for the festival circuit. Green Music Australia uses music and musicians to push for a greener world, including issues with music festivals, while international organisation A Greener Festival directly targets festivals by using research and advocacy to bring events on board with better sustainable practices.

According to A Greener Festival's Australian representative Amie Green, the growth of the festival industry isn't all bad—it has also led to a greater diversity of available events, including those that explicitly market themselves as sustainable, allowing attendees to vote with their wallets.

"Since there is such a plethora of events to

On the energy storage scene

We talk to installers and Renew's own energy policy team to find out what's happening in the world of energy storage. Where are prices heading, what subsidies are available and are there trends of note?

It can be difficult comparing prices for energy storage systems, given different sizes and the need to take into account usable storage and the lifespan of the battery before it needs to be replaced. But if you just look at the price of some of the common batteries, we're not seeing much change at the moment.

In fact, some prices have even gone up. According to the excellent battery comparison table from Solar Quotes (www.solarquotes.com.au/battery-storage/comparison-table), two years ago, in 2017, the Tesla Powerwall 2, with 13.2 kWh of usable storage, cost $8800, excluding installation. Today, a similar system with 13.5 kWh usable, costs $11,700. However, there was a big drop in price for the Powerwall earlier, when it went from the Powerwall to the Powerwall 2 in 2016: the capacity doubled and the price stayed about the same.

It's a similar story for most of the other leading manufacturers. The Enphase AC system (1.2 kWh usable) has stayed constant since 2017 at $2000 fully installed. The LG Chem Resu 10 (8.8 kWh usable) has gone down slightly to $7655 from $8800. The Sonnen battery has reduced a lot in price, but it's still at the higher end at 13.5 kWh usable for $16,500 today ($30,000 in 2017 for 16 kWh). The cheapest commonly available battery is the BYD B-Box at 13.8 kWh for $9600, down from $8400 (fully installed) for just 3 kWh (the BYD Mini ES) in 2017. For all of these except Enphase and Sonnen, you also need to add the cost of an inverter to that, and in most cases, installation as well, which will add at least $1000 to the price.

Hanwha Q Cells are launching into energy storage with the Q.Home offering, which includes solar panels, battery and inverter in one package. The battery uses Samsung SDI cells and the inverter is from Hanwha Q Cells.

Image: Hanwha Q Cells

New entrants are appearing on the market, including Q.Home which has a system that combines solar and battery to reduce the number of companies you need to deal with (pricing not yet available). The Zenaji Aeon has slipped in on 18 November 2019 with a small battery system using the relatively uncommon lithium titanate technology, which comes with a 20-year replacement warranty, against the more typical five to 10 year warranty. The upfront cost is high ($3000 for 1.93 kWh), but if the warranty holds, it could have advantages for those in for the long haul. We'll report more on where technology is heading in our guide in mid-2020.

Solar Quotes also reports warranted kWh cost, which helps when comparing the price of using a battery compared to getting that same energy from the grid. Warranted kWh uses the length of the warranty provided and assumes either one or two full cycles per day to calculate the cost of using the battery over that warranted life. Most of the batteries mentioned have cost per warranted kWh for one full cycle per day ranging from 22c for the BYD B-Box through to more typical prices around 30c (LG Chem Resu 10 and Tesla Powerwall 2) to 40c (Sonnen), 48c (Enphase AC batteries) and right up to 70c to 90c for some systems. It's clear we have a way to go before battery prices are competitive with using that same energy from the grid, especially as a fair comparison would add at least an extra 10c/kWh to the cost of energy from the battery to allow for efficiency losses and the forgone feed-in tariff.

Why aren't battery prices falling?

There have been lots of projections from industry analysts and technology

The bike doctors

After starting small at a local school, Dr Cranky's is spreading its bike-fixing, community-building initiative around Australia. Peter Foot finds out what's needed to get kids riding.

It's all too easy to fall into despair. Every day, it seems, one of our supposed leaders has said or done something idiotic, or completely at odds with factual evidence, or lacking in a basic sense of empathy. But I found hope recently—and humanity, innovation and just a little magic—in the enterprise of some "quiet Australians", to borrow a phrase I heard somewhere.

"I was helping out at my daughter's school for Ride 2 School day," says Bart Sbeghen. "And I was putting bikes away and realised that a lot of them were unroadworthy. Sometimes the wheel was almost completely off or rubbing against the frame, or the brakes were stuck on."

Bart surmised that some of the kids had actually pushed their bikes to school just to be involved.

"I was fixing bikes as I was parking them, so at least they could ride them home or more easily push them home."

The next year Bart contacted the school—Flemington Primary in Melbourne's inner west—and offered to help repair kids' bikes in the weeks leading up to Ride 2 School day. It was a success and, the following year, another dad at the school, Peter Hormann, suggested they go one step further. He told Bart that there were probably some kids at the school without bikes. As well as doing repairs, why not ask people to donate their unwanted bikes, and then fix them up and see if anyone wanted them? At first Bart was sceptical.

Bikes being fixed at Flemington Primary's Bicycle Hospital.

Everyone's got a bike?

"Everyone's got a bike. That was my belief at the start," says Bart.

But they put the call out anyway.

"We started out under the peppercorn tree at the school with our tools in a shopping trolley," explains Bart. "We started just fixing our own kids' bikes to generate a bit of interest, and then someone donated a bike, and someone else received the bike, and it went from there. Not at any great pace, but it was consistent. We realised that there are kids at schools who don't have bikes, who can't afford them."

Peter and Bart soon began fixing donated bikes year-round and were given use of the bin shed to store tools and bikes. Five years later, over 900 bikes have gone through the 'Bicycle Hospital', as it became known at the school. And not only did Bart discover that the idea worked, but he forged a connection he wasn't expecting.

"There was a whole section of the school community that I had no contact with and didn't know anything about; that was the African community—recent migrants from Somalia and Sudan."

Flemington is an inner-city area with expensive housing and progressive political leanings. But it's also dotted with housing commission flats, many of them occupied by those recent migrants.

"So you have a divergent demographic. You have people with excess and you have people who need bikes. That's part of why it worked."

The program in action

I ride my bike over to Flemington Primary one afternoon to see the Bicycle Hospital in action. When the final bell rings out, kids start pouring out of buildings like ants out of a kicked nest.

Gardening for habitat

Beauty, habitat and always more to learn: there's a lot to be said for bringing a bit of the bush into the suburbs. Bill Aitchison and Sue Guymer describe their Australian native garden in Melbourne's east.

About 30 years ago, we decided to build a house on a block where we could establish a bush garden. We were lucky to find a one-acre block next to the Mullum Mullum Creek in Melbourne's east, about 25 km from the CBD. This was the start of a wonderful journey for us, as we built a garden to encourage habitat and explored the beauty of Australian plants.

Dealing with the weeds (and superphosphate)

The land was part of a subdivision of an old orchard and was bare apart from an abundance of pasture grass weeds. The reserve along the creek to the north of our block was an almost impenetrable thicket of blackberry.

Another problem which we have since discovered is that we struggle to grow some plants. Members of the *Proteaceae* family—particularly banksias and some of the leafier grevilleas—tend to die quickly. This family has specialised proteoid roots (clusters of closely-spaced, short lateral rootlets) which are highly efficient at extracting phosphorus from Australia's often deficient soils. As a result, they are very intolerant of high levels of phosphorus. We assume that superphosphate would have been used on the orchard and is still in the soil.

We have never liked to use poisons, but our weeds were so extensive that it was necessary to poison them; in the case of the blackberry thicket, we then covered the ground in black plastic to smother any seedlings. Since then, we've rarely needed to use weed poisons.

A dusky moorhen nesting on the small lake, just one of the many waterbirds that use this natural feature. The lake is fed from water from the roof, and has not been dry since establishment in 1989.

Giving back to the local environment

We built our house and started to establish the garden in 1988. We were enthusiastic but inexperienced gardeners at that stage and we were both still working full-time, so we needed a landscaper's help. We were very lucky to find Doug Blythe who had a great passion for the indigenous plants of our area. We chose two landscapers from the White Pages, based on ads which seemed to show a genuine interest in Australian plants. It turned out that Doug was a member of our local Australian Plants Society group.

Doug provided the design and he and his workers did the shaping and planting. We left selection of the indigenous plants to Doug, but we chose the other natives. It was a great joy working with him to establish a bush garden. Doug worked in our garden for a number of years before he moved interstate. He has now retired from landscaping.

Our philosophy for the garden was to give back to the local environment, particularly extending the wildlife corridor along the creek. Doug recommended putting a lake in the bottom section of our garden, near the boundary with the creek reserve. This has proved to be a brilliant attraction for water birds as well as a beautiful feature. At the moment, we have a pair of dusky moorhens nesting on the lake.

Bushlike within 10 years

We were very lucky timing-wise. The early 1990s was a period of good rainfall and hence the plants, particularly the trees, established

Solar spring clean

Solar panels are largely a set-and-forget technology, but the occasional bit of maintenance can keep them performing at their peak. Lance Turner looks at what's involved.

It's easy to ignore your solar panels. After all, they sit on the roof and generate electricity without you having to think about them. But like everything that is left outside in the weather, the outdoor environment can affect them, potentially leading to a reduction in performance.

Two primary causes of reduced system output are dirty panels and panel damage. When a panel is damaged, such as by a stone or hail, it usually needs to be replaced for system reliability. Dirty panels, on the other hand, generally just have reduced output which slowly becomes worse over time.

So how often do you need to have your solar panels cleaned, if at all, and what factors determine the period between cleanings?

Dust can build up on solar panels to the point where power output can be noticeably affected. These panels, in a rural area, hadn't been cleaned in almost five years, with energy output down around 6%.

Things that affect cleaning requirements

Solar panels will self-clean to some degree, but this varies depending on a few factors:

- Roof slope—steeper angles produce faster water runoff speeds, providing more effective cleaning just from rain. With shallow angles, water and dust will pool more easily, so the panels get dirtier faster. The Clean Energy Council (CEC) recommends a panel slope of at least 10 degrees to shed water and dirt effectively.
- Location—rural areas tend to be dustier, but any area near a dirt road or construction work can produce a lot of floating dust that can settle on panels. If there is dust being moved around by wind or machine, panels will generally need cleaning more often.
- Wildlife—it's not just dust that blocks sunlight to solar panels; animal poo does too. This includes bird poo (the most common problem) and sometimes possum poo, although the latter tends to wash off in heavy rain if the panels have a reasonable slope.
- Vegetation—if trees drop their leaves on your solar panels, this can greatly reduce energy production. Leaves tend to stick to panels when wet and may not wash off even in heavy rain. If you have trees relatively close to your panels or have noticed a sudden drop-off in output, especially after a storm or high winds, a quick visual inspection will tell you if leaves are the culprit.

Cleaning is not just about generation dropping off. Dust (and possibly other debris) can build up at the bottom of panels, even in areas with heavy rain. This accumulation shades the lower edge of the panels, which causes partial shading of that row of cells. This can cause heating in those cells, increasing the chance of a cell fault. This is a fairly common problem in panels with partial shading and you can see it in discolouration of the affected cells. Dirty panels can lead not just to reduced output, but also reduced panel lifespan.

How often should you clean your panels?

- Urban panels in low-dust areas should be cleaned around every two to five years. However, local conditions can affect this—some panels may stay adequately clean just with cleaning by rain, while others may need cleaning every year if critter poo and leaves pose a regular problem.

How good is solar? A solar system buyers guide

If you haven't yet taken the plunge into solar electricity, now is as good a time as any. Lance Turner explains what to consider when planning your new solar energy system.

The solar industry has become mainstream in the last decade or so and is now a mature industry. Solar technology itself is also mature, with solar panels and system components generally being good quality and capable of excellent energy generation performance as well as producing a good return on investment when designed and sized correctly for a particular home's situation.

In the past, many people were waiting for the next big thing in solar panels, but with current technology costing around $1 per watt of capacity installed, there is little advantage to waiting for technological improvements, as any further gains are likely to be incremental.

Solar systems now tend towards larger sizes, with the average size being around 7 kW and many closer to 10 kW.

Image: SunRun Solar, sunrunsolar.com.au

Why install a solar system at home?

For many people, one of the primary attractions of a solar energy system is its financial benefit. A solar system can greatly reduce your electricity bill, even to the point where you receive bills with little or nothing to pay—or even get into credit if you have a larger system, particularly over summer.

With government-based incentives that reduce the purchase price, a new solar system can pay off financially—where energy cost savings equal upfront system costs—in around five to six years in most cases. Even without incentives, payback can occur in less than 10 years.

The payback period will depend on location (how sunny it is where you live), energy retail tariffs (what you pay for electricity), feed-in tariff rates (what you receive for exported solar electricity), household electricity consumption patterns (how much electricity you use, and when), system costs, which can vary depending on the components and options chosen and the incentives available, and any constraints in the local grid such as export limits or voltage issues.

Solar energy systems are long lasting, with the components generally having long lifespans, so they are usually paid off both financially and emissions-wise before any part of them needs to be replaced. The typical lifespan of solar panels is at least 25 years (most come with a 25-year or more performance warranty), while inverters, which convert the solar electricity into the AC power needed in your home, usually last at least 10 years, as do batteries. Of course, some will last much longer than these figures, while some will die sooner; in many cases, early failure can be attributed to the use of lower quality equipment or installation in an inappropriate location, such as an inverter in full sun running excessively hot.

As well as financial advantages, many people install solar for the environmental aspects. A solar system will reduce your own use of grid energy (still largely fossil-fuelled), while the excess solar energy your system feeds back into the grid displaces grid energy use by your neighbours or other households. Thus a solar system offsets electricity that might otherwise be produced using fossil fuels.

The cumulative output of the rooftop solar

Batman and beyond

From a small solar PV system through to becoming a major solar exporter and embracing energy efficiency, Brian Spies tells the story of his home's sustainability journey and its 'Batman ears'.

Nine years ago, when mandated feed-in tariffs in NSW were a generous 60c/kWh, my wife and I bought our first PV system, a small 1.5kW array. A standard size at the time, the system output was modest, but with an estimated payback period of four to six years, we were quite pleased. Following on from that first step, our house has transformed into a relatively efficient home with new appliances, an 11kW solar PV system, electric garden tools and an electric car. This article describes our journey to energy efficiency and self-sufficiency in our modest double-brick home in Sydney.

The view from the backyard is quite impressive, as the north-east array has filled almost all available roof space.

Our first rooftop solar

Our first solar PV system was purchased in 2010, when Origin Energy advertised a 1.5kW package for $3490 and Energy Australia offered a feed-in tariff of 66c/kWh. With eight Sharp 188W panels mounted on our north-east facing roof, the system achieved a maximum output of 1.2kW or around 6kWh per day during summer.

The inverter was replaced twice under warranty (luckily, the warranty reset with each replacement). We once went for four months without realising the inverter had failed—we only realised when the second quarterly bill arrived and our generation was zero. This experience prompted us to invest in an inexpensive ($112) monitor from Efergy, which enabled us to view the PV output in real-time and better understand the system performance at different times of the year.

Making the most of solar

Being a keen reader of *Renew* and *Sanctuary* magazines and having attended a number of energy expos, I was aware of the rapidly falling cost of solar panels. So, in early 2019, I embarked on the challenge of covering as much of our roof with PV panels as possible.

Even though significant sections of our roof are shaded in the afternoon and in winter, diffuse radiation from the sun could still generate reasonable output. Parts of our roof are also south-facing, but models show that south-facing panels can still produce about 70% of the production of north-facing panels, and 85% of that of east- or west-facing panels.

Solargain designed a system for us to take advantage of the north-east and south-east roof sections, as well as a few strategically placed panels on the north-west and south-west sections to capture sunlight shining between tall trees at different times of the year.

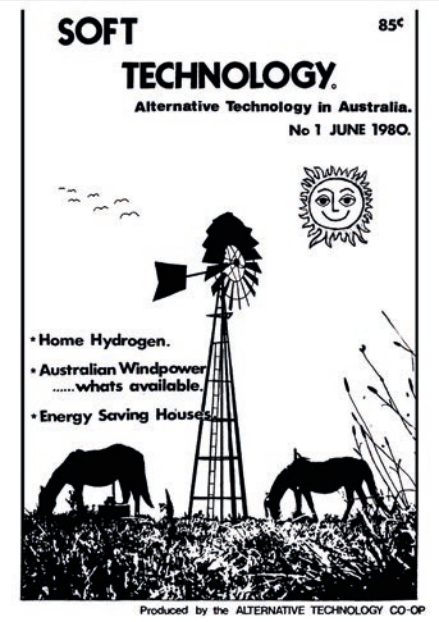
Installed in early March 2019, the 11.3kW system includes 36 Jinko 315W panels with Enphase IQ7 250W microinverters on each. Using microinverters reduced the impact of shading. In practice, the actual output of the system is around 20% less than possible for this orientation, due to the shading from trees to the north and west. For example, Solargain estimated (based on CEC estimates for our area) an average of 20.35kWh/day for June, but we only reached this on sunny days in June, with the actual average around 16kWh/day.

Our measured data is interesting. On a sunny winter day in June, the south-west panels' generation was about 25% of the north-east panels. In November, this increased to about 93%. The inclination of the sun at noon on these dates is 58 degrees and 13 degrees from the vertical, respectively; so in November, the orientation of the roof is less important.

Back to the future

Since *Renew* magazine first came into existence in 1980, the world of renewable energy and sustainable technologies has changed dramatically. Doug Rolfe takes us on a tour via issues 1, 50 and 100.

In looking at the history of *Renew* magazine, it has been interesting (to say the least!) to read through some of the earlier issues including back to the days when it was called *Soft Technology*. It has been pleasing to see how far we've come in what technology is available for sustainable living and sobering to see how far we still have to go.



***Soft Technology 1*, June 1980**
ed: Mick Harris with the help of Tony Stevenson and Jane Herrington

In 1980, the global CO_2 concentration had reached 340 ppm from a 280 ppm pre-industrial baseline. At the time there was very little available in terms of "technology that is ecologically sound and does not conflict with the environment by causing pollution or destruction"—that being the stated focus of the magazine.

At the time, as a Year 9 student, I wasn't yet involved in Renew (then the Alternative Technology Association, or ATA) or reading the magazine, but I was aware of the big changes in technology that were starting to unfold as we began using the first handheld calculators and doing computer programming via paper cards.

Instigated by a small team based in Melbourne, the first issue of *Soft Technology* was 18 pages covering 'alternative technology', typed on an IBM electric typewriter and stapled together by hand. They printed 100 copies and "were delighted when they sold out and had to print another 100."

Membership was $10. For that, you could attend meetings with speakers where the aim was to focus on the use and promotion of alternative technology. Of course, much of this 'alternative' technology is fairly mainstream these days, but we'll get to that later.

In this first magazine in 1980 there was no mention of solar PV systems. Surprised? Although solar PV cells existed for use on satellites, for example, there was no real possibility of home use due to the low efficiency, around 14% at best, and very high cost—around US$25 to $30 per watt compared to around $1 per watt today.

Solar thermal systems for heating domestic hot water were the go, though. The technology was well understood and they were by far the main way of using our plentiful solar resource.

The basics of sustainable design were on display in issue 1 and they haven't changed: suitable house orientation for solar gain, appropriate shading from eaves, insulation and thermal mass matching the climate zone, and planning for rooflines for mounting of solar thermal collectors (the only mention of solar in this issue). This may beg the question as to why so many current homes are still so poorly designed in this respect!

Rather than solar, at the time small wind generators by companies like Dunlite and Soma were one of the best means of generating enough energy to power a home and there were "quite a few wind generators about"—machines in the 0.1 kW to 5 kW range for domestic use, if you had a bit of land.

Interestingly, some of these early machines were so well-built (and maintained) that they are still in operation today, such as the Dunlite at Bindara Station (bindarastation.com), although they are rare.

Today, the cost of small-scale wind turbines has come down in real terms, but they have been totally out-competed by solar PV. A big factor in that is price per watt, but also that wind turbines are not practical in urban areas (see 'Wind power works: Doing small wind right' in *Renew 122*).

Wind's main advantage remains today, though—that is, generating outside the solar daytime peak or during cloudy weather. Their use in the right location can be a boon for rural farms or for the grid as a whole.

When it comes to large-scale wind, in 1980 (and discussed in issue 1), the world's largest wind generator was a 2 MW unit with nine-tonne steel blades and a 43 m high tower, built by GE for the US Department of Energy and NASA. That its power output is in megawatts gives you some idea of how groundbreaking this machine was—a tenfold increase in power output on typical turbines of the era. Modern turbines are still often around this rating (bit.ly/WP-MOD1).

The issue even covers the once-again

EV charging hits the streets

How do you charge your EV if you don't have off-street parking? A 'smart' light pole and a pop-up charging pillar are options being explored for on-street car charging, explains Bryce Gaton.

Given the average Australian daily commute is around 30 km, the charging speeds and times offered by AC charging are now well capable of providing overnight (or even over lunch) recharging well in excess of most average vehicle travel patterns (see Table 1).

As a result, the common finding of studies about how EV owners charge their cars is that 90% or more of charging is done using an AC charger (EVSE) at the home, workplace or destination, be that destination a country B&B or a shopping centre.

EV charging in homes is pretty much sorted (see *Renew 143*) and charging for unit or strata title dwellers has a growing set of available options (see *Renew 145*). You could say that 90% of charging is now able to be dealt with and all that is left is to speed up the rollout of DC charging to facilitate that remaining 10%.

Or maybe not … In Europe, something like 50% of city dwellers do not have off-street parking for their cars, so home charging in a driveway or garage is not an option. In Australia, our urban sprawl means the percentage (and number) of homes without off-street parking is much less, but that doesn't apply in inner-city areas, where off-street parking is not available for the majority of homes. If no solution is offered, it could create a significant barrier to EV adoption in the very built-up areas that are crying out for ways to reduce airborne pollution.

Currently for such homes in Australia, electricity supply laws generally prevent power cables crossing a property boundary, which means a homeowner can't legally install their own EVSE onto the street, or even run an extension lead out to a car.

But options are in development.

Images: Urban Electric Networks Ltd

Urban Electric's pop-up EVSE pillar allows for AC charging on the street, and then can 'disappear' under the surface when not in use.

Options for on-street charging

Overseas, a number of innovative solutions to on-street AC charging are being trialled. One approach is a pop-up EVSE pillar, which disappears under the surface of the street when not in use.

The pop-up EVSE pillars from UK business Urban Electric Networks (pictured below) recently won a UK industry innovation award. They can be activated and controlled by a phone app and currently offer charging at up to 7 kW, which allows for most EVs to be fully charged overnight. Around a dozen of these pop-up EVSEs are currently in trials in Oxford in the UK.

An alternative solution is a light pole mounted EVSE, provided by businesses such as Ubitricity in the UK (and currently being trialled in Leicester) and ENE-HUB here in Australia. According to Ubitricity, their system is about 10% of the cost of installing a stand-alone EVSE and power supply, as they can use existing light pole cabling and infrastructure. Installing them can avoid the cost of digging up the street. Plus, the changeover of street lighting to LEDs that is happening anyway helps: using LEDs frees up a significant proportion of the electricity supply to the pole, so the added draw of an EV on a low power setting is unlikely to require new cabling.

What's happening in Australia?

Here in Australia, as ever, things are moving more slowly, but one trial is just beginning as *Renew* goes to press. In Sydney, ENE-HUB and charging network company ChargeFox have teamed up to trial 7 kW AC charging equipment mounted on ENE-HUB 'smart light poles' (ene-hub.com/smartnode), with the potential for 22 kW in the future. Twenty of these pole systems are now being

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