# The Pears Report
## Risky business?

Transforming our energy system may prove far less risky than propping up traditional over-built electricity supply, suggests Alan Pears.

THIS summer has exposed yet another aspect of the fragility of our traditional electricity grid, with several failures in local distribution networks—the so-called 'poles and wires'. As former ATA staffer Craig Memery has reminded us in a recent article (www.bit.ly/2HSHTao), the vast majority of power failures—97.2% on Craig's figures—happen within local networks, with just 0.24% from insufficient generation.

Once again we face a choice between propping up traditional over-built electricity supply infrastructure or driving transformation. The first involves inefficient capital investment in power lines and equipment capacity used for just a few hours a year; the second involves innovation with confusing options and other risks.

Energy efficiency, demand management, distributed storage, local renewables and new business models all have roles to play (as described in my columns in *ReNew 140* and *141* and my article in *The Conversation* (www.bit.ly/2FfMx40).

The risks seem very different depending on whether you look at the supply or the consumer side of the meter.

The supply side includes generation, wholesale markets, high-voltage long-distance transmission and local networks of poles and wires. The wholesale electricity market is fundamentally about supply and demand. When supply exceeds demand, prices fall and the consumer is king. When supply is tight, suppliers exploit the situation to maximise profit. Policymakers are frantically trying to develop better mechanisms to reward actions that 'keep the lights on', but this is a politically difficult area.

Networks are regulated regional monopolies, but regulation has failed to limit price increases, while network operators have failed to maintain reliable supply in extreme weather.

On the supply side of the meter, the situation is increasingly risky. Building a large power generator, transmission line or energy storage facility takes time and locks up a lot of capital for years: will there be a long-term revenue stream to repay the cost and provide profit? Will consumers continue to tolerate paying for poor decisions?

On the consumer side, if they were available, innovations such as better-insulated fridges that could keep food cold during a 10- or 20-hour power failure and use smart sensors and controls to maximise use of on-site rooftop solar generation—and in the process use $100 less electricity each year—could be attractive. An informed, rational business should be keen to buy behind-the-meter technology such as on-site renewable energy, energy storage and efficient, flexible equipment that could keep production going and income flowing for up to an hour during a power failure—and make money at other times by managing demand.

These products are emerging, allowing more businesses and households to invest 'behind the meter' to take control of reliability and cost, and as a form of insurance.

Local action looks increasingly attractive when you consider the avoided cost of disruption to business, lifestyle or health, combined with increasingly attractive financial returns, lower climate impacts and the opportunity to 'send a message' to the energy industry and governments. A rapidly growing industry is happy to provide the technologies and services, although consumer protection issues need a lot more attention.

### Snowy 2.0: silver bullet or white elephant?

The proposed Snowy 2.0 pumped hydro storage system provides an interesting example of the dilemmas facing energy investors. Pumped hydro uses cheap, excess electricity to pump water uphill, then produces electricity at other times as the water runs back downhill through a generator. The environmental credentials of pumped hydro depend on the source of its electricity input, design and environmental impacts on habitats.

To profit, it will rely on the gap between buying at cheap wholesale electricity prices and selling at high prices, after allowing for its large 'round trip' energy losses of over 30% (www.bit.ly/2HTvUcN), as water flows through a 27 kilometre tunnel between the upper and lower reservoirs.

But the size and frequency of profitable price gaps depend on many factors. If too many energy storage facilities are built before it starts operating or demand response trims peak demand (when prices usually peak), the price gap will close. If improving energy efficiency drives demand down, it undermines the economics of all supply options by shifting the balance between supply and demand (see www.bit.ly/2CPEPYN).

Snowy 2.0 won't be operating until well after the Liddell coal power station closes in 2022, so a lot of new storage and supply capacity and demand-side measures will need to be introduced before then. That will undermine the viability of Snowy 2.0. Given the rapid growth and declining prices of alternatives, Snowy 2.0 may require big subsidies. When price peaks are smaller, all generators operating at the time make less money because the most expensive generator running sets the price for all other generators.

So investors on the supply side of the meter face potentially significant and unpredictable financial risks. Projects that can negotiate long-term contracts and be built quickly have the best prospects. But investing in demand-side modular projects, especially at fringe-of-grid, and packaging high-value services with energy for consumers both look much less risky.

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## Future urban transport

China has over 150 million electric bikes, for good reason. Their experiment with car-based cities showed very quickly that cars simply take up too much space and conflict with more space-efficient solutions in urban areas. Cars injure or kill a lot of people. So Beijing now has many fenced-off road lanes for use by bikes and other low-speed, compact vehicles.

A lot of money is tied up in a car and the depreciation cost is high: in three years, the value of a new car can halve. According to the Australian Bureau of Statistics, an average household spent $195 per week on motor vehicle-related costs in 2015, of which only a quarter was fuel cost. Many spend far more. Annual fuel use contributes over five tonnes of carbon emissions per household.

The cost of new roads in urban areas is astronomical and the impact of disruption during construction and maintenance is high. The 'avoidable cost' of traffic congestion in Australia was estimated at $16.5 billion in 2015, and predicted to increase to around $30 billion by 2030 (see www.bit.ly/2oz3Ovc). Parking space is expensive; it also forces everyone to travel further by taking up land that could be more productively used and limiting access to railway stations, workplaces and services.

There are much cheaper solutions with lower environmental impact.

Many Australian owners of e-bikes have enthusiastically described how their lives have been transformed. E-bikes deal with the hills, headwinds and sweating that discourage bike riding. They can carry substantial loads, including young children. And they can outpace peak hour car traffic.

But the common complaints from both e-bike users and observers are that they don't work well with either pedestrians or cars because they accelerate rapidly and go too fast (see, for example, www.bit.ly/2CPtQ1F). The cheap ones are not very durable and the good ones cost too much. And you can't take them on most public transport, especially at peak times.

So what do we need? We need e-bikes that have sensors and smart speed controls. When they are near pedestrians, they would slow down and avoid them. They would warn riders of nearby cars or other dangers and slow acceleration to match traffic conditions.

Beyond that, we need new kinds of compact low-speed personal electric vehicles that can be carried on public transport. Already many people use electric skateboards. Some use fold-up scooters that could be motorised. My dream is a fold-up e-scooter with an integrated bag so it can become a wheelie bag on public transport.

Governments should be subsidising smart e-bikes and other low-speed personal vehicles, and accelerating roll-out of infrastructure to support them.

## Australia's recycling crisis

China's decision to limit imports of low-quality recyclables has disrupted Australia's pathetically inadequate waste management and recycling system. 'Waste' is a valuable resource, for many reasons including that minimising it will save energy and reduce greenhouse gas emissions. But we have failed to invest in the infrastructure and governance frameworks to capture its potential. Numerous studies over decades have shown us what we need to do and technologies are improving fast; for example, see www.bit.ly/2t4NoQ2.

We need to invest in advanced sorting and reprocessing technologies and 'close the loop' by requiring manufacturers to include recovered materials in their products. And we should become world leaders in mining landfills.

Can our leaders lead us on this at last?

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↑ Overseas you can find all sorts of amazing personal vehicles, many of which would not be legal here. But the revolution is under way. We need to catch up. From left, a low-speed vehicle lane in Beijing, a low-speed 'car' in Beijing, the Ogo Evolution 1 personal mobility vehicle (available here!) and a Metroboard electric skateboard.