

Virus-driven change in energy

What happens beyond the immediate crisis will depend on how governments, business and households react. Alan Pears suggests some possibilities.



- Alan Pears, AM, is one of Australia's best-regarded sustainability experts. He is a senior industry fellow at RMIT University, advises a number of industry and community organisations and works as a consultant. He writes a column in each issue of *Renew* magazine: you can buy an e-book of Alan's columns from 1997 to 2016 at shop.renew.org.au.

As response to Covid-19 becomes the 'new normal', lots of people are predicting what will happen beyond the immediate crisis. The obvious answer is 'it depends'. It depends on how governments, business and households react. The reality is there will be powerful competing forces.

Big industry, led by the resources and fossil fuel industries, will focus on manipulating the federal government. State governments will be focused on 'keeping the lights on' and managing the number of deaths, as the national government will be keen to blame states for any shortcomings in their responses.

But households, small businesses and disruptive businesses will make their own decisions. Many subtle factors will influence them. How will they integrate the experiences of massive bushfires, slow wages growth, Covid-19, their employers' behaviour, their concerns about their kids' futures and coping in the short term as some employers bend over backwards to help their staff while others take the opportunity to exploit them?

The economy will not bounce back to how it was. Some businesses will not recover from the setbacks, while others will capture new opportunities, and some will exploit the situation. Many people's conception of their future will be changed.

I can't predict the future, but here are some possibilities.

Transport may be transformed. Many people and businesses are discovering that they don't need to travel as much as they used to. Virtual work, meetings and socialising can work surprisingly well.

Bike sales have boomed. The emergence of micro-mobility options including e-bikes and e-scooters will mean many households can sell their second car and save a lot of money. Lightweight, foldable personal e-scooters could allow people to better integrate personal and public transport, because they can take them on buses and trams, as well as trains.

Governments may grab this opportunity to restructure taxation of vehicles from excise on petrol and large fixed registration/insurance charges to road use and congestion pricing, to maintain revenue as people shift to electric

vehicles. 'Virtual' travel will also offer opportunities to save time and reduce dependence on owning and using so many cars.

International tourist air travel will be limited to trusted countries, while businesses will use more 'virtual' travel over the internet. Many businesspeople will appreciate less travel, preferring more time with family and friends.

We are conducting an interesting experiment with energy use. Many businesses will be surprised at how big their energy bills are, despite being in shutdown. A lot of energy is wasted by equipment that runs continuously or is inefficient when running at part load. Maybe some businesses will now focus on cutting this waste—or not.

Many households will see the impact of higher occupancy on their bills. This may be surprisingly large or small, depending on many factors. Emerging data analytics services being offered by some energy retailers and service providers could help them to understand what's going on, and potentially do something about it—or not.

Manufacturing will be more focused on adaptable, flexible and smart process equipment. A factory that can switch to producing essential products and equipment and is not dependent on inputs sourced from overseas will remain profitable, maybe even more profitable. Digitalisation and modular and distributed technologies will be winners. Capacity to turn local resources into products, a key feature of circular economies and industrial ecosystems, and to adapt to using different inputs such as recycled materials will provide resilience.

In the electricity and gas industries vicious battles between incumbents and disruptive competitors are likely. Fundamentals may play out. First, improving energy efficiency is cheapest and delivers valuable multiple benefits such as productivity, resilience and quality of life. Second, renewable energy combined with energy storage and smart energy management should swamp coal and fossil gas. Third, existing incumbent energy retailers, network operators and generators may battle among themselves, trying to find viable business models. Energy policy makers, swamped by lobbyists,



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may struggle to respond to the conflicting pressures applied to them.

The energy sector may realise that no one really wants their products: they want services that involve some energy use and will happily adopt alternatives if they work well. The importance of the energy sector is not a fundamental: it is an outcome of past decisions that created a fragile, centralised energy system that seemed like a good idea at the time.

Long-term energy market failure but hope for the future?

The Energy Security Board and Australian Energy Market Operator are beginning to frame the design of our post-2025 electricity market. This supposedly reflects the view that our present market design is no longer fit for purpose. Let's be clear: it was never 'fit for purpose' from the day the Victorian market began in the mid-1990s, followed by the National Electricity Market.

In 1992, the State Electricity Commission of Victoria published scenarios showing how it could achieve a 20% reduction in emissions by 2005, using experience from its Demand Management Action Program and renewables: for example the SECV and Victorian Solar Council had installed our first 'large' grid-connected wind generator at Breamlea, near Geelong, in the mid-1980s. Then the economic fundamentalists and ruthless asset sale experts took over when the Kennett government was elected in late 1992. Energy market design ignored demand-side action. Support for renewable energy was slashed.

The National Grid Management Council, tasked with design of the market, initially framed some reasonable objectives in 1992:

- to encourage the most efficient, economical and environmentally sound development of the electricity industry consistent with key National and State policies and objectives
- to provide a framework for long-term least cost solutions to meet future power supply demands including appropriate use of demand management
- to maintain and develop the technical, economic and environmental performance and/or utilisation of the power system.

But these were modified over time to exclude environment and focus on electricity prices not overall cost. They evolved into 'economic' objectives—actually short-term narrow financial objectives limited to energy supply.

The 2002 Parer Review identified problems with market design that have still not been fixed.

The Australian Energy Market Operator and Energy Security Board are doing some good work reframing future energy market design. But the barriers to fundamental change are challenging and deeply ingrained in energy culture.

Digitalisation lessons from industrial compressed air

I've recently been working on a project exploring alternatives to compressed air systems, often called 'the fourth utility' after electricity, gas and water. Many existing systems are shockingly inefficient, with 80% to 90% losses. They are widely used in industry for activities such as drying, assembly, blow moulding and paint spraying.

But digitalisation is transforming the situation. Smart, connected electric actuators can perform these functions and not only control air pressures and flows much more precisely and faster, but also provide real-time information that can identify inefficiencies, optimise performance and capture valuable business productivity benefits.

These go far beyond cutting energy costs within existing company structures to business transformation. Emerging

alternatives that reduce or avoid the need to use compressed air can deliver up to 80% energy savings but also speed up production, such as filling containers.

The International Energy Agency has published some great work on the role of digitalisation in transforming business energy productivity and quality of life. IEA's 2014 report on the multiple benefits of energy efficiency and a chapter in their latest annual energy efficiency report provide many useful insights.

Locally, the Australian Alliance for Energy Productivity has produced useful reports, to which I have contributed. These include one on transforming manufacturing through digitalisation focusing on energy productivity improvement. For example, it can underpin preventive maintenance by tracking deviations from expected performance, so that loss of production and energy waste from unplanned machinery failures can be avoided, or flag when food temperatures increase if a refrigerator fails.

The many benefits flow not just from on-site digitalisation, but through sharing of information across the whole value chain to capture benefits far beyond saving energy. One project involved placing cloud-connected temperature sensors in food, to provide real-time information as it moved from farm to store. The value of the potential reduction in food waste far outweighs the substantial savings on energy. For example, food left on a loading dock warms up and its shelf life is reduced. Peak cooling demand will be higher and more energy will be used to re-cool that food when it is moved to the cold room. Real-time tracking means workers can be alerted to take action, and training and payment incentives can avoid future problems.

The provision of the right real-time information, to the right person, at the right time, and in the right form, is transforming and disrupting the energy world, the economy and society.



Compressed air systems are used in many applications from rejecting damaged bottles on a production line to positioning systems in car manufacturing. But smarter alternatives based on electric actuators can save huge amounts of energy and have productivity benefits. This blower-powered 'air knife' array is used to dry fruit and vegetables after washing. Such systems are safer and cleaner as the air is both dry and oil-free.

Image: Henan Joyshine Machinery Co.