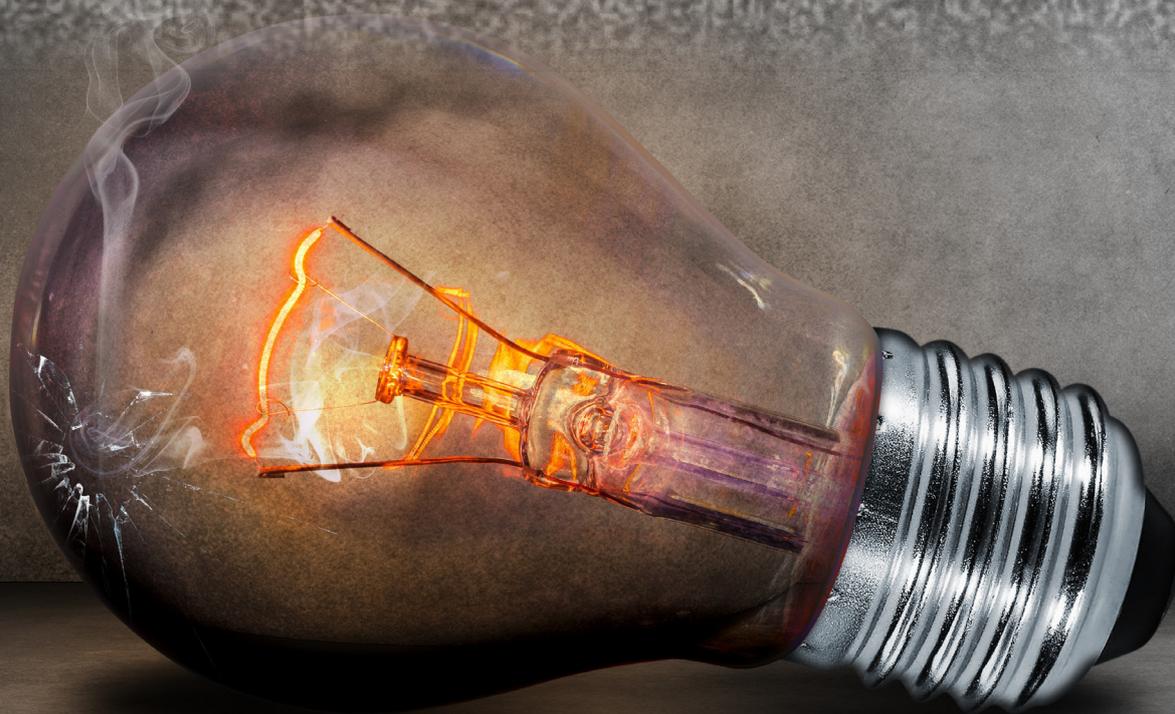


# MIXED SIGNALS

## The Role of Prices in Western Australia's Electricity Sector

Discussion paper • July 2019



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**MANNKAL**  
ECONOMIC EDUCATION  
FOUNDATION

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# *The Role of Prices in Western Australia's Electricity Sector*

## Executive Summary

*Western Australians have long experienced extensive government intervention in their energy sector, primarily through the state's ownership of utilities and setting of prices. This has resulted in cross subsidies and economic inefficiencies, which have been transmitted through power bills and taxes. Current electricity pricing fails to convey sufficiently accurate information to users and producers, thus incentivising inefficient investment and putting additional upward pressure on prices. By applying the insights of Friedrich A. Hayek, we posit that new household-level products and technologies can be optimised by devolving decision making through shifting to market-driven electricity prices. This will empower customers and accelerate the uptake of new products and services that will improve the lives of Western Australians. Importantly, these energy services and products can be offered and deployed without direct or indirect subsidies from taxpayers or other electricity users, reducing upward pressures on prices.*

## Price Theory

Price theory is an arcane subject generally limited to economists and policy specialists. Despite its complicated language, it is a simple concept. Prices reflect the interaction between supply and demand in a market, and thereby convey information about the marginal value of demand to suppliers and the marginal cost of meeting demand to customers. In most situations, markets have proved to be a more efficient allocative mechanism than the alternatives that have been tried. As a simple example, Australian households understand this when the price of bananas rise sharply after a cyclone due to a shock causing a rapid decrease in supply.<sup>1</sup> Depending on their individual preferences, consumers can either choose to pay a premium on the available supply of bananas, purchase other varieties of fruit or not consume.

In *The Use of Knowledge in Society*, the Austrian economist Friedrich A. Hayek described the role of prices as a mechanism to convey information, such as the scarcity of a good or its relative value compared to alternatives.<sup>2</sup> We draw on these insights to illustrate how Western Australian energy policy could be improved. In particular, we consider what more accurate prices would enable and how they would help Western Australia better achieve its energy policy objectives. More detailed quantitative analysis will undoubtedly be required in order to determine the extent of pricing reform, and whether purely real-time pricing is the most appropriate price mechanism for the Western Australian market. Thus, the intent of this paper is to emphasise the theoretical case for accurate price signals.

Hayek outlined these ideas in his seminal text *The Road to Serfdom*. In generalising about the economy he explains:

There would be no difficulty about efficient control or planning were conditions so simple that a single person or board could effectively survey all the relevant facts. It is only as the factors which have to be taken into account become so numerous that it is impossible to gain a synoptic view of them, that decentralisation becomes imperative. But once decentralisation is necessary, the problem of co-ordination arises, a co-ordination which leaves the separate agencies free to adjust their activities to the facts which only they can know, and yet brings about a mutual

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<sup>1</sup> J. Haynes, 'Cyclone Debbie: What will happen to grocery prices?', *ABC News*, 29 March 2017, <https://www.abc.net.au/news/2017-03-29/what-will-happen-to-grocery-prices/8396246>

<sup>2</sup> F. A. Hayek, 'The Use of Knowledge in Society', *The American Economic Review*, vol. 35, no. 4, 1946, pp. 519-530.

adjustment of their respective plans.....This is precisely what the price system does under competition, and which no other system even promises to accomplish.....It is no exaggeration to say that if we had had to rely on conscious central planning for the growth of our industrial system, it would never have reached the degree of differentiation, complexity, and flexibility it has obtained. Compared with this method (price system under competition)....the more obvious method of central direction is incredibly clumsy, primitive and limited in scope.

When prices are distorted or cannot effectively respond to changing conditions, the information mechanism which Hayek described is muted, and the pricing system can lead to more expensive longer-term results due to sub-optimal consumption, production and investment decisions. Such pricing distortions may require further interventions such as cross or direct subsidies that potentially exacerbate problems. At their worst, these forces can cause catastrophic outcomes, as experienced in Venezuela during 2019, but there are many similar disasters throughout recent history.<sup>3</sup> In the case of eastern Australia's electricity supply, the term "death spiral" entered the lexicon to describe the impact of this type of feedback loop.<sup>4</sup>

### Historical Context

During the post-World War II era most electricity systems across the world were dominated by large, centralised power plants. Bulky, consistent demand loads were the norm, and a command and control approach, despite producing various unintended consequences, was possible.<sup>5</sup> This is not the case today. In the 2010s, the accessibility of generation technologies and consumer products increased, and public expectations changed. At the same time, continued government and excessive regulatory interference in the market often has significant cost-increasing consequences.

One obvious example of such consequences is the explicit, and perhaps more significant implicit, subsidisation of roof-top solar panels. These have eroded the profitability of Western Australia's state-owned retailer Synergy. Because of the design of Western Australia's energy sector, and the government mandated sale of electricity below the cost of production to households and smaller firms, losses end up on Synergy's balance sheet. These losses are a liability for the state, ultimately borne by the taxpayer.

The large number of solar panels installed has also adversely affected other generators and increased network costs as adjustments are made to accommodate the impact on daily load profiles. This impact, which has become known as the 'duck-curve',<sup>6</sup> creates more severe 'ramping', or changes in net demand for electricity on the rest of the system. As a result, there is a heavier reliance on the dispatch of more expensive, fast-responding generation to ensure supply meets demand. In addition, generation from solar does not alter the peaks in net demand, which occur in the early evening when solar output is zero. Overall demand for conventional generating capacity therefore remains high even though much of that capacity then remains under-utilised when the sun is shining and the wind is blowing. Expensive changes in network technologies are also required to accommodate increased generation in the low

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<sup>3</sup> Imposing price controls distorts market clearing price mechanisms and results in scarcity. Price controls in Venezuela, originally introduced in the early 2000s, have brought about extensive shortages of essential items, resulting in widespread malnutrition, violence and the creation of black markets. J. Nino, 'Price Controls Are Disastrous for Venezuela, and Everywhere Else', *Mises Wire*, [web blog], 16 August 2016, <https://mises.org/wire/price-controls-are-disastrous-venezuela-and-everywhere-else>

<sup>4</sup> P. Simshauser and T. Nelson, 'The Energy Market Death Spiral – Rethinking Customer Hardships', *AGL Energy Limited*, 2012, [https://www.researchgate.net/publication/266889920\\_The\\_Energy\\_Market\\_Death\\_Spiral\\_-\\_Rethinking\\_Customer\\_Hardship](https://www.researchgate.net/publication/266889920_The_Energy_Market_Death_Spiral_-_Rethinking_Customer_Hardship)

<sup>5</sup> Tariffs charged by state-owned firms are usually not closely related to calculated marginal costs of supply. Instead, publicly owned firms will choose to supply the output which is most suited to further the redistributive aims of politicians and the rent-seeking ability of its employees. P. Hartley, and C. Trengove, 'Who Benefits from Public Utilities?', *Economic Record*, June 1986, pp. 163-179, <https://doi.org/10.1111/j.1475-4932.1986.tb00892.x>

<sup>6</sup> The duck curve was first identified in California in 2013, and describes the difference between electricity demand and the amount of available solar energy throughout the day. When the sun is shining, solar enters the market and then drops off as electricity demand peaks in the evening. B. Jones-Albertus, 'Confronting the Duck Curve: How to Address Over-Generation of Solar Energy', *US Office of Energy Efficiency & Renewable Energy*, [website], 12 October 2017, <https://www.energy.gov/eere/articles/confronting-duck-curve-how-address-over-generation-solar-energy>

voltage part of the network. The current system has been engineered to flow power from the higher voltage to lower voltage parts of the network, not in the opposite direction.

The current imbalance between the ratio of fixed to variable supply costs and fixed to variable electricity charges means that those who cannot afford or otherwise benefit from solar panels effectively subsidise those who can.<sup>7</sup> Prices in a competitive market provide stabilising feedback to consumers and producers, with high prices encouraging more supply and discouraging demand. Administered prices for electricity that do not reflect the true nature of costs produce an unstable feedback loop. As consumers of electricity choose to self-generate using roof-top solar panels, the unchanged fixed costs of supply in the traditional system are left to be paid by a smaller group of remaining customers. As their prices rise in consequence, more of them are incentivised to self-generate and take less power from the grid.<sup>8</sup>

The larger users, who otherwise would otherwise contribute more to covering fixed costs by buying more electricity at higher prices relative to marginal cost, gain the most from self-generating. They therefore disproportionately cut purchases from the traditional system. Yet these are also typically the better-off consumers. The ones left behind bearing most of the fixed costs for running the system tend to be financially poorer. As a result, not only can the system become inefficient and unstable, it can also become inequitable.

Reflecting on these issues in the context of the Texas electricity system, a BP Energy Company executive notes:

Hayek's 'Knowledge Problem' and its optimal solution – decentralized commercial markets – provide the best lens for regulators to see the fundamental issue in electricity market design in response to rapid technological change and increasingly diverse groups of willingly innovative buyers and sellers. As the procurement and use of electricity cross a complexity threshold, as a few customer classes are transformed into a multitude of individual market participants, electricity market design needs to move away from centralized planning to a decentralized procurement of resources, to be both sustainable and efficient in meeting the resource adequacy objectives for the bulk power system and society at large.<sup>9</sup>

The WA government's newly announced *Energy Transformation Taskforce* in early 2019 usefully aims to create a new state-wide approach to respond to the changing dynamics of the electricity sector.<sup>10</sup> The associated focus on whole-of-system planning is understandable given the complexity of electricity market dynamics, but will hopefully not lead to an endpoint of attempting to direct those dynamics centrally. Hayek would surely argue that re-centralising overall industry decision-making amidst such

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<sup>7</sup> The installation of solar PV rooftop panels reduces the amount of energy a customer uses each day, thus reducing the variable component of their electricity bill, whilst fixed costs remain constant. High fixed costs of electricity supply are not recuperated by Synergy as solar PV uptake continues to increase and variable revenue is reduced. This lost revenue must then be recovered by higher variable prices (of which non-solar customers bear the brunt), or by quasi-subsidies paid by all taxpayers through either government transfer payments to Synergy or borrowing by Synergy. D. Mercer, 'Nahan in big backflip over electricity grid imbalance', *The West Australian*, 24 June, 2017, <https://www.pressreader.com/australia/the-west-australian/20170624/282080571840432>

<sup>8</sup> In a competitive market a business can manage the risk that a customer seeking to buy a capital good on credit over an extended period of time will not complete their payments by choosing not to make the sale to the customer or to require different terms. Such options are generally not available under traditional network regulatory cost recovery arrangements, the vast bulk of which are incurred with the expectation that they are required and have been approved and will be recovered from customer charges over time. The cross-subsidy and cost-shifting problem arises when the base over which these costs are to be recovered *materially* shift because some customers are able to "escape" their previously determined or allocated "share". Mathematically, the customers most likely to seek such escape are those who have been allocated costs that exceed those actually incurred to serve them, thus shifting cost recovery to other customers. Whereas some of these costs perhaps should have been allocated to other customers in the first instance, the response behaviours shift additional costs that likely would not have been shifted, or shifted so soon.

<sup>9</sup> M. Giberson, 'Hayek's knowledge problem as an issue in electric power market design', *Knowledge Problem*, [web blog], 12 July, 2012, <https://knowledgeproblem.com/2012/07/12/hayeks-knowledge-problem-as-an-issue-in-electric-power-market-design/>.

<sup>10</sup> Government of Western Australia, *McGowan Government launches Energy Transformation Strategy*, Perth, Western Australia, March 2019, <https://www.mediastatements.wa.gov.au/Pages/McGowan/2019/03/McGowan-Government-launches-Energy-Transformation-Strategy.aspx>

complex and dynamic forces will ultimately fail to deliver efficient outcomes for consumers without eventually turning to the question of what sort of pricing signals customers are actually responding to.

Cost-reflective pricing is without doubt one of the more contentious sector reform elements, but the problems that build up over time from distorted pricing are no less material or costly to WA for being difficult to solve. It would be ironic and unfortunate if one of the key underlying causes of WA's rising costs over time cannot even be usefully discussed except at grave political risk.

Cost-reflective pricing — not just in terms of levels but more particularly in terms of the ratio of fixed to variable components — would bring tariffs more in-line with the actual costs of supplying the electricity households consume at the times they consume it. It would also set the foundation for the remainder of the reform process.

A full transition might take a number of years. Clear guidance as to the future direction of change would communicate risks to those making decisions today, thus achieving positive changes even ahead of the complete transition. Any transition would likely need to be coupled with more focussed support to those least able to afford the new pricing implications. However, as pricing would support more efficient use of the system and more efficient transformation over time, total costs to WA should reduce over time as well. Opportunities to further evolve towards more accurate forms of time-of-use pricing would complement these changes, as could industry restructuring or privatisation initiatives.<sup>11</sup>

The ultimate problem is that amidst inexorably rising costs, persistent efforts to constrain prices rarely end well. Attempts to constrain or cap prices can have disastrous results, an illustrative example of this being rent controls in New York.<sup>12</sup> In contrast, government failure, as described by Public Choice Theory, helps explain why the price mechanism may be muted or even over-ridden by redistributive policies.<sup>13</sup> That solutions to these problems are difficult to implement does not make them any less important as solutions. The alternative of ignoring pricing-related problems is viable only for so long, and the extent of the eventual crisis to be resolved only grows. Even small, directionally right, steps have merit, particularly if complemented by clear information about the need to avoid bigger and more costly problems in the future.

Before proposing changes to how electricity is priced, it is important to examine the underlying cost components. Fixed and variable costs are well-known components, but there are other factors that influence the final cost of delivered electricity, particularly in the case of long-life infrastructure, and services that are delivered over a large geographical region.

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<sup>11</sup> Time-of-use pricing can mean many things. In one form it means prices varying by pre-set amounts at particular times currently corresponding to peak periods. In another form the prices changes are dynamic and linked directly to market conditions (in "real time"). The more accurate and dynamic the pricing, the closer to "market" the pricing signals become.

<sup>12</sup> Rent controls were introduced in New York City in 1943 to regulate increases in rent prices. Economists unanimously agree that price controls on rentals are a blunt policy instrument for achieving their stated goals, but which have grossly distorted efficient market outcomes, and reduced the supply and especially quality of rental housing. L. Sturtevant, 'The Impacts of Rent Control: A Research Review and Synthesis', NMHC Foundation, May 2018, <https://www.nmhc.org/globalassets/knowledge-library/rent-control-literature-review-final2.pdf>.

<sup>13</sup> Efficient price systems coordinate economic activity by acting as an information carrier. Government interventions which attempt to address a market failure through a redistributive mechanism distort these price signals and restrict market processes. As a result, it is impossible for government mandated price constraints to ever efficiently address the original market failure, because policymakers restrict the ability of the market to convey accurate information. This outcome, whereby the government fails to resolve a market failure, is known as government failure. Instead, an appropriate redistributive policy response is to provide independent lump-sum transfers which do not constrain price signals. W. Keech, and M. Munger, 'The anatomy of government failure', *Public Choice*, vol. 164, no. 1-2, July 2015, pp. 1-42, <https://doi.org/10.1007/s11127-015-0262-y>

## Commonalities with Freight Economics

While having multiple components to a price might appear unfamiliar to many, freight rates are a well-known type of non-linear pricing that incorporates several factors. The variable, or marginal, component depends on fuel use, which is based on the distance a good must be transported. However, the marginal price also differs according to factors other than distance including weight, volume, fragility or temperature sensitivity of the item being transported, speed of delivery required and total volume of freight being transported between the two locations.

The total cost of freight also includes a fixed component that is independent of distance. This component covers the cost of establishing and maintaining a fleet, including capital investment, non-transport handling, accounting and administration expenses. To send an appropriate signal to consumers about the cost of serving their needs, freight prices need to reflect at least some<sup>14</sup> of the cost complexity, including at a minimum the proportion of fixed and variable costs of supply.

In addition, many of these factors also make a difference to the value the consumer gets from the service — and in ways that are known only by the consumer. This can include the intrinsic value of the good; how much they value speed of delivery; and the trade-off to the consumer of weight, volume and other characteristics of the item being shipped. The value of these service attributes for consumers need to be transmitted to firms so they know what services to supply in terms of transport modes, vehicles, routes, and so on. A simple, single price based on something like distance transported does not convey to either party to the trade all the required information to achieve the best outcome for both.

Traditionally, we did not have the technology — especially computing and communications bandwidth — to run a real-time electricity market where prices could be used to balance supply and demand. All the relevant inputs to the coordination of electricity network systems had to be centrally determined and managed. Assumed but usually unstated or implied consumer preferences were incorporated into the internal decision making of large, vertically integrated, regulated electricity utilities.

As a consequence, after it became possible to influence and coordinate electricity demand and supply by prices or pricing structures, it took decades before its efficacy was fully understood and appreciated. It was similarly slow to be recognised that centrally determined plans might be limited by the protocols of the well-intentioned planners and thus necessarily less open to innovation. More recently, it can be said that, even under the market-based system that is in place, rigidities in tariff structures have left the system exposed to previously unimaginable levels of behind-the-meter adoption of technologies designed to avoid tariff charges, while unsuspecting other stakeholders (customers and taxpayers) foot a significant part of the shifted costs.

In the name of going greener, while continuing to regulate end-user tariffs, an unfortunate and politically awkward battleground has opened up in Western Australia and many other developed economies pitting well-to-do adopters of green energy technologies against those exposed to shifted costs.

In the contemporary era, with an evolving energy mix and new household-level technologies, consumers have much greater latitude to choose when and how to consume power. To make the most efficient decisions under these conditions, more informative prices reflecting the true cost of supply of electricity at different times and for different volumes are needed. The time of day that electricity is

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<sup>14</sup> There is a trade-off between making prices more complex, and thus harder to comprehend and administer, and making them more informative about underlying cost conditions. However, the electricity tariffs in current widespread use provide too little relevant cost information to consumers.

delivered, the reliability with which it is delivered, and the location on the network where it is delivered can make a tremendous difference to its cost and its value. The ability to respond in real time to short-term changes in demand or supply from other generators also impacts costs and value.

Generation and consumption behaviours that stabilise the network are more valuable than those that destabilise it.<sup>15</sup> These characteristics should be reflected in the prices received by generators and paid by consumers, and similarly in the prices paid by the market to ‘household producers’ who choose to generate electricity themselves with solar panels and export it to the grid. More subtly, the value avoided by consumers choosing to consume their own generation output ought also to reflect the cost impact to the system created by their self-generation.

Like price signals for freight, pricing efficiency for electricity generally requires at least two, three, or even more components related to accurately signalling fixed and variable costs.<sup>16</sup> The resulting structures need not be complex to improve upon existing pricing arrangements. A monthly fixed charge combined with a form of real-time or dynamic energy pricing is one simple structure, but many are in place around the world. A clear stress point arises once peak system demand shifts to the non-solar hours, in which case changes in pricing levels and structures become even more clearly important to promote efficient behaviours behind the meter.

Across the world, utilities are now generally disaggregated into transmission, distribution, and competing generating and retailing firms. New consumer technologies and increasing volumes of non-dispatchable (wind and run-of-river hydro, in addition to solar) electricity generation also have been added to the system. In consequence, the need to maintain continual system balance in this decentralised environment has made the knowledge problem even more complex.

The introduction of real-time fixed and marginal electricity prices that are reflective of the costs of supply need not be feared or viewed as a regression.<sup>17</sup> They are an innovation that can increase consumer wellbeing. Consider, for example, the marriage of technology, freight services and consumer goods on various online retail platforms. The different options for delivery, including speed and priority, help the consumer select the most valuable form of consumption and allow the retailer to invest in its network and optimise logistics to provide the services most demanded at the lowest possible cost. Competitive market mechanisms stimulate investment by rival platform companies like Amazon, Walmart and Target, as well as branded retailers, each pursuing their own combination of strategies.

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<sup>15</sup> Stable frequency is one measure of the instantaneous balance of power supply and demand. To avoid damage to, or failure of, the power system, the frequency can only deviate within a narrow range. If frequency moves outside the permitted range, additional generation may trip the system, further exacerbating the demand and supply mismatch. This can ultimately lead to a complete frequency collapse and a widespread blackout episode. Other important qualitative features of power supply that need to be maintained at all times are the voltage levels and the amount of “reactive power”, or difference in phase between voltage and current levels on the network. The average consumer is unaware of the engineering complexity needed to maintain network functioning and thus is ill-equipped to vote on the desirability of different technologies that can be used to supply power to the system. In a price system, the amount consumers are willing to pay for the product supplied will depend on its quality as well as its quantity and prices will reflect costs and benefits of quality changes without either demanders or suppliers needing to know anything about the underlying decisions being made by their counterparties. Australian Energy Market Operator, *Power System Frequency Risk Review Report – For the National Electricity Market*, June 2018, [https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning\\_and\\_Forecasting/PSFRR/2018\\_Power\\_System\\_Frequency\\_Risk\\_Review-Final\\_Report.pdf](https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/PSFRR/2018_Power_System_Frequency_Risk_Review-Final_Report.pdf).

<sup>16</sup> Some competitive retail prices in some markets are structured simply, but these generally exist in the context of choice by a customer and targeting and risk taking by a retailer. One expects a competitive retail electricity market to exhibit multiple types of price structures and offerings, and these are always changing and often have eligibility conditions or are available only for limited periods of time. And in any event, a key issue concerns the recovery of network related costs which are largely invariant to customer energy consumption in any short-to-medium term, if not for much longer than that (or may even be *increased* if investment is required to cater for uncontrolled increases in electricity injection at weaker points on the grid).

<sup>17</sup> Changes to price structures may not flow through to (small-use) electricity users directly. Instead, retailers may take on the price risk and offer a range of packages to consumers that best meet their needs. For example, this could result in large, aggregated groups of consumers making efficiency decisions based on the packages offered by retailers. Only large customers may choose to refuse a customised ‘package’ of electricity and buy directly from the wholesale market at half hourly prices. In a genuine market context, these kinds of trade-offs would reflect the costs of different arrangements and how much consumers value them.

In this situation, costs decrease, choice expands, innovation accelerates, and consumer needs are more accurately satisfied. The same can occur in Western Australia's electricity system if more accurate prices are enabled to become central to decision making.

In the instance of long-term supply arrangements, risk, volatility and sensitivity to shocks can be addressed by the services of intermediaries. Customers can choose to remove price volatility over a period of time by paying a premium, depending on their sensitivity to risk, much the same as purchasing insurance in any other market. The price mechanism still conveys all the necessary information for efficient decision making, but consumer preferences determine the nature and form of consumption, and where risks are allocated by market participants they are managed accordingly. This can be compared with Amazon's Prime service in North America, where consumers can choose to pay a set fee per month to ensure all deliveries occur within two days and are free of further charges. Similar 'insurance' offerings would be available from risk management intermediaries in a fully-competitive electricity market.

### **SECWA Legacy**

As in many other localities in western nations, Western Australia entered the 1980s with a single, integrated, government-owned energy monopoly. This was the State Energy Commission of Western Australia (SECWA). It supplied both electricity and gas for the entire state.

During the 1980s and early 1990s, as the bi-partisan economic reform agenda was gathering speed, then-Premier Dr Carmen Lawrence (Australian Labor Party) established the Energy Board of Review to examine and report on the Western Australian energy sector. Chaired by Sir Roderick Carnegie, this report was finalised in 1993.<sup>18</sup>

The Carnegie Report, as it became known, recognised the importance of competition and made a series of recommendations to increase it. It outlined a reform pathway that separated the electricity and gas functions of SECWA. It also recommended the separation of the generation, transmission and distribution (including retail) functions of both gas and electricity. This is what regulatory economists refer to as horizontal and vertical separation, respectively. Privatisation was also envisaged after these reforms were completed and bedded down.<sup>19</sup> Despite the overall consensus on the need for change, the Carnegie recommendations, and subsequent roadmap for reform as outlined in the McCarrey report,<sup>20</sup> were only partially implemented.<sup>21</sup>

On January 1, 1995, SECWA was dissolved and Western Power Corporation (electricity), Alinta Gas (gas) and the Office of Energy (policy and regulatory functions) were created. Western Power's functions were 'ring fenced' and an open access transmission and distribution network was designed. Alinta was similarly ring fenced between Alinta Gas (retail) and the Dampier to Bunbury Natural Gas Pipeline (transmission), which in 2000 were both sold as separate entities to the private sector. In 2006, Western Power was further disaggregated into separate generation, transmission and distribution, and retail businesses, and the successor entities remain in public ownership. As a result, the gas and electricity

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<sup>18</sup> Energy Board of Review, *The Energy Challenges for the 21st Century*, Perth, Western Australia, Energy Board of Review, 1993.

<sup>19</sup> In Chapter 17 of the Carnegie Report one recommendation flagged eventual privatisation: 'Industry restructuring would produce benefits; ownership changes can follow later. Privatization of the four businesses in the electricity and gas industries in Western Australia should not be pursued before the benefits of competition have been captured by energy consumers.' *Ibid*.

<sup>20</sup> Independent Commission to Review Public Sector Finances & Leslie E. McCarrey, *Agenda for reform: report of the Independent Commission to Review Public Sector Finances. Volume 2*, Perth, Western Australia, The Commission, 1993.

<sup>21</sup> S. Barton and P. van Onselen, 'Comparing Court and Kennett Leadership Styles: Energy Sector Reform in Western Australia and Victoria', *Policy and Society*, vol. 22, no. 2, 2003. Available from Taylor & Francis Online. [https://www.tandfonline.com/doi/abs/10.1016/S1449-4035\(03\)70022-8](https://www.tandfonline.com/doi/abs/10.1016/S1449-4035(03)70022-8).

sectors went on different paths, with different levels of competition within and between the energy services.

Ultimately, however, the reforms were slowed, stopped, or redirected, with the result that electricity prices ceased to communicate underlying economic realities. Price caps, shifting policies and a focus on industry structure reforms (such as the reaggregation of state-owned Verve and Synergy) rather than economic pricing resulted in a less price-centric sector.<sup>22</sup>

The resulting distorted price signals are illustrated in *Figure 1* and *Figure 2*. During the 2000s, electricity prices fell in real terms following a price freeze on residential tariffs between 1997/98 and 2008/09. Average fixed and variable tariffs, measured in 2016 prices, each dropped approximately 20 percent to 31.4 cents per day and 16.4 cents per kilowatt hour respectively. This was a key driver in the expanding gap between electricity prices and the costs of production, and the move severely limited the ability of customers to make efficient consumption and expenditure decisions. The Economic Regulation Authority, in their 2010 review of the Western Australian electricity sector, noted widespread discontent with the policy among the vast majority of industry bodies and experts.<sup>23</sup>

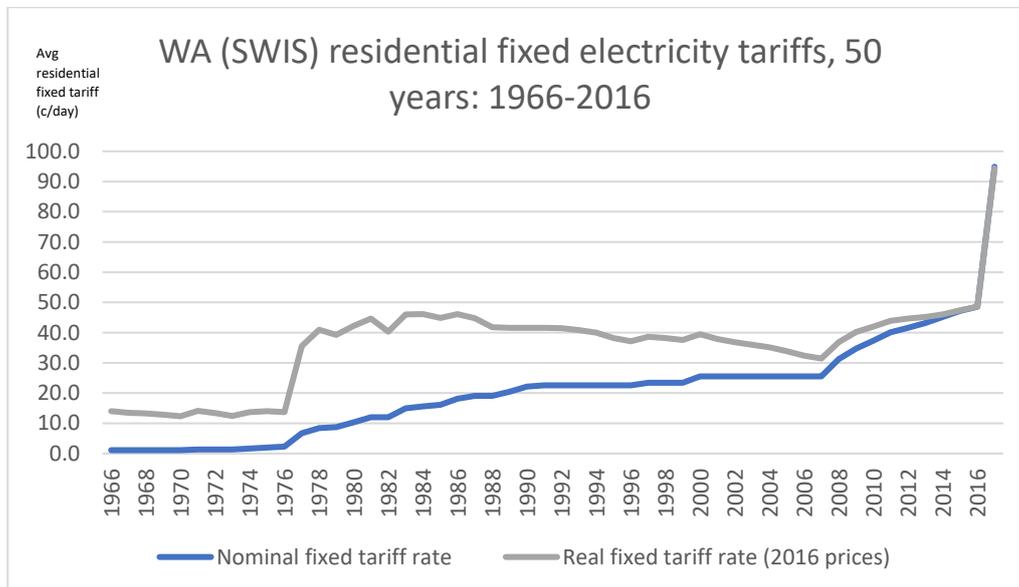


Figure 1 - WA (SWIS) fixed residential electricity tariffs

<sup>22</sup> A dominant influence on the energy reform agenda from 1993 until 2017 was Colin Barnett. As Energy Minister in the Court Government (1993-2001), Opposition Leader with some breaks (2001-2008) and Premier (2008-2017), he never embraced large scale reform programs, including deregulation and privatisation. Influenced by earlier leaders, notably Sir Charles Court (Premier 1974-1982) and Bruce Kirkwood (SECWA Commissioner), Barnett envisaged a central role for the state in energy policy and through various government interventions slowed and even reversed the Carnegie reform agenda. In 2005, as a backbencher, Barnett endorsed the proposal by then Liberal Shadow Energy Minister Dan Sullivan for a price cap to be placed on electricity retail prices as part of the parliamentary negotiations before the 2006 disaggregation of Western Power. As Premier, in 2014, Barnett re-merged Verve (generator) and Synergy (retailer).

<sup>23</sup> Economic Regulation Authority, *2010 Annual Wholesale Electricity Market Report for the Minister for Energy*, Perth, Western Australia, 14 June, 2011, [http://www.parliament.wa.gov.au/publications/tabledpapers.nsf/displaypaper/3813538c9abce82dc1939ded482578e90011a5e4/\\$file/3538.pdf](http://www.parliament.wa.gov.au/publications/tabledpapers.nsf/displaypaper/3813538c9abce82dc1939ded482578e90011a5e4/$file/3538.pdf)

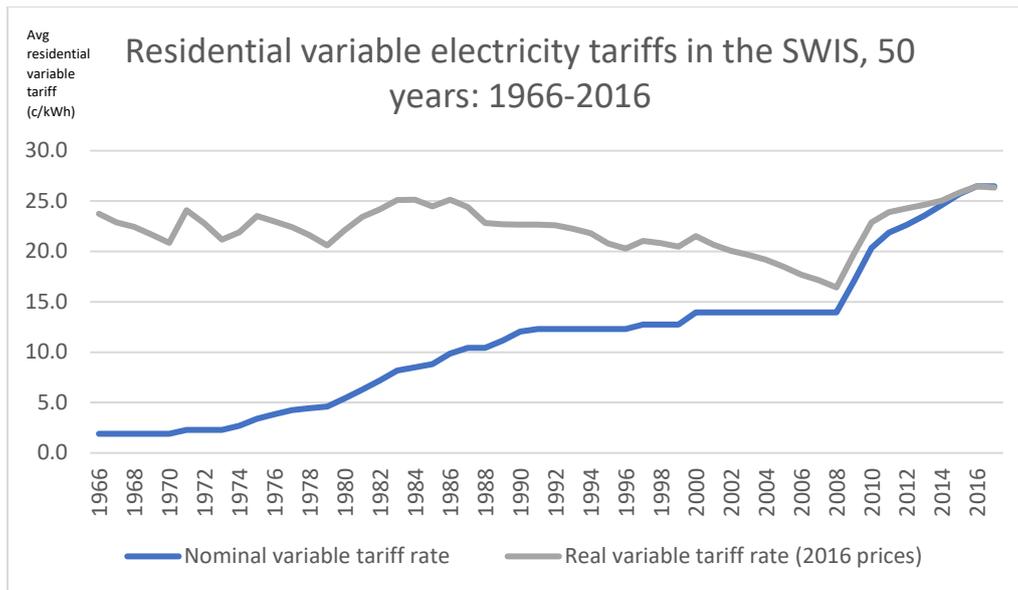


Figure 2 - WA (SWIS) variable residential electricity tariffs

### Partial and Regressive Reform

Partial reform is not unique to Western Australia’s energy sector. The Commonwealth’s Postmaster General’s Department was disaggregated into separate postal and telephony functions in 1975. The telephony department, which ultimately became Telstra, was privatised in several stages. In contrast, the postal service (Australia Post) remains in government hands.

With the growth of postal delivery alternatives such as Fastway, Transdirect, DHL Express, TNT Express, Pack & Send, Couriers Please, Roadrunner Couriers, Mail Boxes and FedEx, it should be clear that the postal business could be run as a competitive industry as it used to be before the United Kingdom set it up as a government-owned monopoly more than 350 years ago. As technology has evolved, especially the widespread use of email and other internet-enabled technologies, keeping Australia Post on the public balance sheet is increasingly anachronistic and a waste of scarce public funds. If it had been sold at the same time as Telstra, there may have been better consumer outcomes, more choice and less of a dilemma for the federal government, which now holds an asset of declining value due to the growth of competitors in the profitable parts of the business and the shift to digital communication.

Reform can also regress, as evidenced by the intervention of the Australian federal government in telecommunications with the creation of the government-owned National Broadband Network (NBN). Adopted as a major federal government policy during the post-Global Financial Crisis Keynesian stimulus effort, the NBN contrasted with a private sector led ‘four digital doors’ form of competition that was advocated by the chief economist of the Committee for Economic Development of Australia, Michael Porter.<sup>24</sup> Had the government allowed the market to deliver data services, on what was then identified as four competing platforms, it is likely the service would have been faster, cheaper and more flexible, with a greater deployment of 5G services, and without the liability of government owning an asset in a highly competitive sector ill-suited to centralised decision making. This lesson is relevant for the currently fast-changing electricity sector, which is undergoing a digital revolution of its own.

<sup>24</sup> M. Porter, *Submission to Independent Cost-Benefit Analysis of Broadband and Review of Regulation Report*, 2014, [https://www.communications.gov.au/sites/g/files/net301/f/submissions/Michael\\_Porter\\_submission.pdf](https://www.communications.gov.au/sites/g/files/net301/f/submissions/Michael_Porter_submission.pdf).

## International and East Coast Experiences

Each jurisdiction has its own development history and reform context. Some have deregulated, privatised and produced largely market-based electricity markets. Others remain dominated by government ownership. Most sit somewhere in between, with a mix of public and private participants and some level of government oversight and intervention.

The United States provides a useful comparison as another industrialised western nation that contains a diverse number of different sub-jurisdictions. While there is debate between economists over the performance of deregulated markets, a recent analysis found that in US states that were deregulated “retail rates tended to converge toward wholesale rates, indicating that competition was providing benefits by stimulating efficiency gains”.<sup>25</sup>

Another larger US study found that:

consumers are considerably better off with competition than monopoly regulation: electricity prices in states with competitive retail markets have trended downward while prices have risen in states with monopoly regulation.<sup>26</sup>

Critics supporting alternative views have often been shown to have cherry-picked data points and outlier examples that skew results.<sup>27</sup> However, the overwhelming preponderance of research has shown that competition provides benefits to consumers in the form of lower prices and improved choice.

Within Australia, reforms undertaken by the incumbent Victorian state government starting in 1992 prior to joining the National Electricity Market (NEM) are viewed globally as a prime example of how to introduce competition into a regulated energy sector. During the 1980s and early 1990s, Victoria was one of the most highly vertically integrated state-owned energy industries in the world. Previous taxpayer-funded malinvestment meant the sector was ridden by poor efficiency along with low and unreliable supply. After 1993, the State Electricity Commission of Victoria was disaggregated into generation, transmission and distribution companies. These companies were then further split and eventually privatised in the mid-to late 1990s.

The success of the Victorian reforms cannot be overstated. Average residential electricity charges fell by 20 percent in real terms between 1989 and 1999 and revenue from the privatisation of energy assets contributed significantly to the reduction of state debt, selling at up to 22 times the value of their earnings before interest and tax.<sup>28</sup>

Many other Australian states commenced electricity utility deregulation and privatisation after the successful Victorian reforms. Prior to the formation of the NEM in 1998, the respective electricity commissions of each member state<sup>29</sup> were vertically separated into generation, transmission and distribution, and retailing bodies. Competition was then introduced through the restructuring of

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<sup>25</sup> P. R. Hartley, K. B. Medlock and O. Jankovska, ‘Electricity Reform and Retail Pricing in Texas’, *James A. Baker III Institute for Public Policy of Rice University*, 2017, <http://www.energychoicematters.com/stories/texas2.pdf>, p.7.

<sup>26</sup> P. R. O’Connor, ‘Restructuring Recharged: The Superior Performance of Competitive Electricity Markets 2008-2016’, *Retail Energy Supply Association*, 2017, [https://www.resausa.org/sites/default/files/RESA\\_Restructuring\\_Recharged\\_White%20Paper\\_0.pdf](https://www.resausa.org/sites/default/files/RESA_Restructuring_Recharged_White%20Paper_0.pdf), p.4.

<sup>27</sup> In 2017, the *Independent Review of the Electricity and Gas Retail Markets in Victoria* was released which called for the effective re-regulation of the electricity market through the introduction Basic Service Offer tariff. The report, which has been endorsed by the Victorian government, relies heavily on flawed analysis of gross electricity retail margins. It uses these overstated figures to justify the position that competition had failed in Victoria. Scrutiny of these figures by industry leaders however, determined that these gross margins were overstated by at least 30 percent, therefore materially over-estimating retailer costs relative to the rest of the consumer’s bills. L. Hoch and R. Harris, ‘Review of the Thwaites report and associated research’, *Oakley Greenwood*, 2017, <https://www.energycouncil.com.au/media/9731/20170919-ogw-review-of-the-thwaites-report.pdf>

<sup>28</sup> A. Stockdale, ‘Privatisation of Victorian Gas and Electricity Industries: Did we Get Where we Thought we Were Going?’, *AMPLA*, 2001, <http://www.austlii.edu.au/au/journals/AUMPLawAYbk/2001/10.pdf>

<sup>29</sup> New South Wales, South Australia, Tasmania, Victoria, and Queensland.

generation and retail arms, and separate transmission and distribution networks under revenue regulation were mandated.

The overhaul of state electricity commissions and the formation of the NEM delivered a range of benefits to consumers and governments. Electricity prices in the NEM fell to the second lowest in the world, investment in the sector surged and the industry was running with renewed efficiency and reliability.<sup>30</sup> By 2014 however, years of consistent national and state energy policy failure had created a number of market distortions and resulted in a major increase in electricity prices and a collapse of the reliability of the network. A major culprit has been state and federal renewable energy targets, and other interventions including restrictions on onshore natural gas production and carbon pricing schemes that have yielded no measurable benefits to date.<sup>31</sup> Another major contributor was the pricing policies, aggravated by feed-in tariffs, which artificially stimulated roof top solar photovoltaic (PV) installations that increased system-wide costs.

The initial success of the NEM following the reform era not only serves as a powerful case for market-driven reform and privatisation; the disastrous outcomes following renewed interventions also serve as a lesson against the destructive effects of government intervention in the market.

### Gas Sector Reform in WA

In Western Australia, the gas sector reform process was largely complete by the early 2000s, with the privatisation of the state-owned gas supplier. Full retail contestability was introduced in 2004, and the state market now has five active gas retailers.<sup>32</sup> The effect of newly introduced retailers within the market has been largely positive. The impact of delivering more competitive gas supply at the margin has become a significant pricing signal for retailers as residential customers increasingly evaluate switching between electricity and gas consumption. Competitive tensions have had a downward impact on prices, with some retailers offering up to 30 percent discounts on the variable component of their existing gas tariffs.<sup>33</sup>

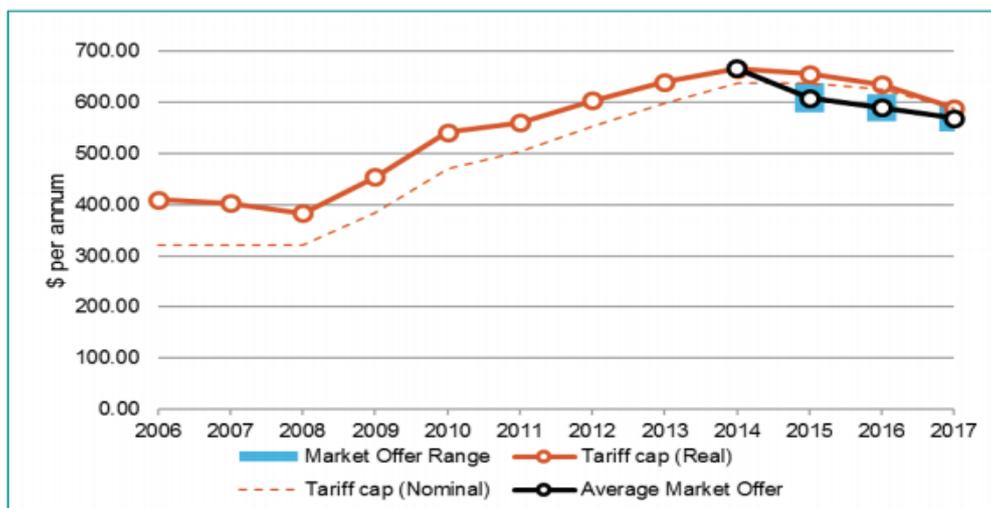


Figure 3: WA Typical Household Gas Bill

<sup>30</sup> P. Simshauser, 'From First Place to Last: The National Electricity Market's Policy-Induced 'Energy Market Death Spiral'', *The Australian Economic Review*, vol. 47, no. 4, 2014, <https://doi.org/10.1111/1467-8462.12091>.

<sup>31</sup> Ibid.

<sup>32</sup> J. Snow, J. Thong, A. Rich and R. Johannessen, 'Gas Price Trends Review 2017', *Gas Major Projects Implementation Team for COAG Energy Council*, 2017, [https://www.energy.gov.au/sites/default/files/gas\\_price\\_trends\\_review\\_2017.pdf](https://www.energy.gov.au/sites/default/files/gas_price_trends_review_2017.pdf), pp 218.

<sup>33</sup> G. Powell, 'Household gas prices fall as new retailer AGL enters WA market', *ABC News*, July 2017, <https://www.abc.net.au/news/2017-07-27/retail-gas-price-war-heats-up-in-wa/8747742>

Figure 3 is taken from a government commissioned report<sup>34</sup> and shows the positive effect of competition on prices within the residential gas sector. Until 2014, the sole provider of residential gas within the Western Australian market operated at the tariff cap price set by the state, which reflected the maximum price a retailer could charge a residential customer. The introduction of new suppliers has driven the average market offer under the tariff cap for the first time, resulting in better outcomes for consumers.

### **Distortions in the WA Electricity Market**

In Western Australia, government entities are involved in all parts of the electricity supply chain. Within the South West Interconnected System (SWIS), Synergy controls a large portion of the electricity generation and retail sector, and Western Power controls all transmission and distribution networks. Outside the SWIS, in regional and rural Western Australia, the electricity supply chain is owned and operated by a fully vertically integrated government entity, Horizon Power. Current residential electricity tariffs, both within and outside the SWIS, do not reflect the true overall level or components of the cost of supplying electricity across the generation, distribution and retail supply chain.

Residential electricity tariffs can be broken down into two types of fixed costs and a variable cost component. The first fixed cost reflects the cost per day of being connected to the network, including costs of accounting, management, network maintenance and other factors independent of the amount of electricity supplied. The second type of fixed cost is the cost of maintaining sufficient generating and transmission capacity to ensure reliable, high quality supply. The variable cost component reflects mainly fuels used to generate electricity and losses on the transmission and distribution network, both of which depend on the amount of electricity supplied. These variable cost components should be reflected in a variable usage charge.

In the Western Australian market, average residential electricity tariffs are below the cost-reflective, efficient market price. However, since fixed costs are largely recovered via a usage charge, the ratio of variable to fixed tariff charges is above the true ratio of variable to fixed costs. As a result, customers who install roof top solar PV save more money than the cost reduction they allow the system as a whole to reap.

Generous feed-in tariff schemes<sup>35</sup> offered by the government in recent years have exacerbated the situation and resulted in an exponential increase in the uptake and installation of solar power by households. That leaves remaining non-solar customers to cover an ever-larger share of fixed costs and cross-subsidise solar households to the tune of hundreds of millions of dollars annually. Even so, government constraints preventing average price increases from matching average cost increases have left many regulated customers paying less than the actual cost of their electricity.

In addition to solar tariffs, there is a range of other cross-subsidies embedded in the system which have created inefficient and inequitable outcomes for consumers.

Considerable growth in the peak daily demand in recent years has been a substantial contributor to rising electricity costs. Since prices are not sensitive to fluctuations in demand, the extremely high cost of fast-start generation capacity needed to cope with fast ramping needs also is not reflected in electricity tariffs. The market therefore fails to provide appropriate price signals to consumers, which otherwise would incentivise more efficient electricity consumption. As a result, consumers who are low

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<sup>34</sup> J. Snow, J. Thong, A. Rich and R. Johannessen, 'Gas Price Trends Review 2017', *Gas Major Projects Implementation Team for COAG Energy Council*, 2017, [https://www.energy.gov.au/sites/default/files/gas\\_price\\_trends\\_review\\_2017.pdf](https://www.energy.gov.au/sites/default/files/gas_price_trends_review_2017.pdf), pp 216.

<sup>35</sup> Solar feed-in tariffs are a rate paid for electricity fed back into the electricity grid from a designated renewable electricity generation source such as a rooftop solar panel system or wind turbine.

users of electricity during peak consumption periods are effectively subsidising the customers who are driving the growth in peak demand.

Regulated prices also create a number of market distortions between urban and rural households because they do not reflect increased transmission and distribution costs. Under the government's uniform tariff policy, electricity tariffs are regulated so that all residential customers across Western Australia pay the same price. Given the sparsely populated rural network, non-urban residents cannot benefit from the economies of scale that urban customers are afforded. To offset the difference in the cost of supplying electricity to urban and non-urban consumers, a subsidy (the tariff equalisation contribution) is collected from urban customers within the SWIS and passed on to remote SWIS and Horizon customers.

The cross-subsidy drives further cost-avoidance investment in behind-the-meter solar rooftop installations in urban areas and even emerging residential battery storage systems. Conversely, it discourages self-generation and storage in remote locations where that might actually be a more efficient option than maintaining a grid that serves few. What might once have seemed a simple 'fairness' issue between those who live throughout the state has evolved into an emerging unfairness and inefficiency issue. In a world of ever-changing choices and consequences, behaviour often responds faster than policies can change. This is exactly where markets work best. Development objectives concerning non-urban regions could be achieved at lower cost and greater clarity if only tackled directly.

In summary, decades of continuous government expansion and interference in the Western Australian electricity sector have resulted in inefficient and inequitable market outcomes by preventing prices from transmitting accurate information about supply costs. This has resulted in sub-optimal consumption, production and investment decisions across the whole Western Australian electricity market.

### **Electricity Sector Reform in WA**

As of 2019, the market still operates in a state of limbo between the limited but controlled efficiency of the former, centrally-planned system in an era of simpler and fewer technologies and choices, and the dynamic efficiency of a true free market helping customers and investors to reconcile a growing number of complex choices. Such a state could easily be worse than either extreme.

As discussed earlier, there are numerous instances where one group of electricity consumers effectively subsidises another group because of regulated prices that do not currently reflect the cost of supply. These cross subsidies would largely disappear if the tariff equalisation contribution was abolished (or achieved in a different way), and pricing was reflective of the true cost of supplying electricity, including at different levels of overall demand on the system.

A further benefit of cost reflective pricing is that it would enable competition to be introduced to all retail customers. Currently, while there is wholesale competition in the electricity market, and competition for retail customers who consume relatively large loads (more than 50 megawatt hours per annum), there is no retail competition for small use customers. They instead face regulated prices that are, on average, below the cost of supply. This means even if legislation was passed to allow new electricity providers to serve smaller customers, none would likely do so as there is no economic incentive to sell electricity below the cost of delivery.<sup>36</sup>

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<sup>36</sup> Large users (below 50 MWH) are still profitable and could be opened to competition, however if this happened under current market structures, the Synergy's state-based 'debt' would worsen, thus forcing the subsidy to Synergy to ultimately grow.

Without pricing reform, Synergy needs a subsidy to cover the cost of supply; whether officially through budgetary measures, or unofficially by Synergy funding activities through debt. Either way, the burden of this subsidy will fall on taxpayers. Aside from being economically inefficient, treating electricity retail prices differently to wholesale electricity and natural gas prices lacks economic rationale.

A shift to real-time and cost-reflective prices may be criticised on social or equity grounds, but the in-kind transfer system Western Australia's market currently operates under is grossly inefficient. It is possible to support true 'hardship' customers through a well-designed welfare system. However this should be allocated from consolidated revenue and delinked to the retailing of electricity (that is, a separate payment), analogous to the low income heating assistance program (LIHEAP) in the US.<sup>37</sup> Cash transfers are far superior in terms of the recipient's utility because they do not constrain behaviour, leaving individuals free to spend as they wish.<sup>38</sup> Furthermore, energy economists Simshauser and Downer<sup>39</sup> believe vulnerable customers are in fact *more* likely than other customers to benefit in dollar terms from cost reflective pricing once demand response is considered, in part due to their ability to choose to consume electricity during off-peak, low cost periods.

## Conclusion

As electricity markets increase in complexity of choices and options, and perhaps especially as those choices involve decisions about generation and storage technologies that could just as easily be located on the grid or behind the meter on customers' premises, pricing structures and tariffs will strongly influence these decisions – independently of the outcome of a whole-of-system planning exercise. Inaccurate prices undermine even the best intentioned of policies.

A shift to a more decentralised form of decision making and trust in competitive markets is required, and will lead to more equitable and efficient outcomes for energy consumers.

In Western Australia, this should take the form of shifting to cost-reflective, real-time electricity prices prior to a full deregulation of price setting. This would allow prices to serve, like Hayek describes, as an information carrier. It would encourage more choice for consumers and speed up the deployment of new products and services. Once prices are allowed to play a central role, comprehensive reform to truly transform the sector becomes both easier and more likely to actually achieve the intended effect.

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<sup>37</sup> The LIHEAP program assists families with energy costs and provides federally funded assistance in managing costs associated with home energy bills, energy crises, and weatherisation and energy-related minor home repairs. Office of Energy Efficiency & Renewable Energy, 'Low Income Housing Energy Assistance Program (LIHEAP)', 2019, <https://www.energy.gov/eere/solarpoweringamerica/low-income-housing-energy-assistance-program-liheap>

<sup>38</sup> C. Buchanan and P. Hartley, 'Equity as a Social Goal', New Zealand Business Roundtable, March 2000, pp. 103-105.

<sup>39</sup> P. Simshauser and D. Downer, 'On the inequity of Flat-rate Electricity tariffs', *Energy Journal*, vol. 37, no. 3, 2016, <https://doi.org/10.5547/01956574.37.3.psim> pp. 199-229.

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