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# Consumer preferences and electricity pricing reform in Western Australia

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ABSTRACT

Australia's electricity prices are high, driven by rising peak demand that is forcing significant levels of infrastructure investment. Compounding these factors is the lack of transparent price signals for consumers, with uniform pricing structures providing no incentive to change consumption behaviours.

This research surveyed residential electricity consumers in Western Australia about their perceptions of solar, consumption behaviour, and electricity pricing structures.

The results suggest that customers in Western Australia may be willing to change behaviour, reduce electricity usage, and be rewarded for use of renewable technologies, highlighting an opportunity for policies such as retail tariff reform to be further explored.

## 1. Introduction

Rising electricity prices are the bane of many households and businesses. The provision of electricity services has also been a sticking point for many governments around the world, due to the inherent political contention of increasing costs, direct and growing impacts on the environment through greenhouse gas emissions, and the risk of unreliable supply causing the lights to go out. The challenge for policy makers and utilities alike, therefore, is in managing and balancing three equally vital elements: how to provide affordable, reliable, and clean electricity to all customers.

This research paper focuses on pricing (the affordability limb), whilst acknowledging the natural tensions and overlaps in providing efficiently priced electricity without sacrificing safety, reliability and environmental priorities.

In Australia, electricity prices are consistently ranked amongst the highest in the world (Sandiford, 2016), a fact widely recognised by media, reluctantly acknowledged by State and Federal governments, and reinforced to customers at every billing cycle. Exactly what drives these high prices is a complex and contentious issue, with a myriad of subsidies, cross-subsidies, welfare payments and regulatory challenges conflating with a sector facing the disruptive challenges brought about by significant technological innovation.

Governments are also held accountable by electoral cycles, and politicians are reluctant to push for contentious reforms that will inevitably create a spectrum of winners and losers when the status quo is changed.

Australia, and Western Australia in particular (given its isolation and expansive service area), provides a valuable opportunity to test innovations in electricity pricing models. Through an extensive literature review, coupled with a small, targeted survey, this paper explores several design considerations that decision makers and electricity utilities may want to explore with their customers and constituents going forward. It provides a first approach into the electricity policy and high-level consumer considerations for Western Australia and identifies future opportunities of research to be supported with behavioural insights, in an attempt to unpack some of the psychological barriers that have inhibited effective electricity price reform to date.

## 2. Background

### 2.1. The traditional pricing model

Whilst rapidly changing, the electricity system is still largely based on the same centralised supply model as introduced a century ago (Roberts, 2015). This model sees electricity generation predominantly involve the use of large fossil fuel plants reliant on economies of scale: “the larger the plant, the more efficient and cheaper the electricity generation” (e-Lab, 2013). This electricity is then transported, often over large distances, through a network of poles and wires until it reaches its ultimate destination –households and business customers.

Given the significant upfront investment required to construct these large power stations (relative to the low cost of operation), a natural incentive was created for electricity utilities to maximise the production

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and sale of electricity (Caldecott and McDaniels, 2014).

The cost structure for utilities is therefore calculated according to how much electricity each customer uses over a given period, and driven by the long time frames over which investors can achieve a return of and return on their capital employed. Increasing demand, maximising the utilisation of the entire electricity supply chain, and pricing service on the basis of kilowatt-hours delivered, were assumptions in-built to the business cases of utilities and that largely stood the test of time over the last century. The view of ever-rising demand also pervaded into the standard approach to power-system and security planning, network regulation, and energy market dispatch design (Schaltegger et al., 2012; Richter, 2013; Roberts, 2015; Sioshansi, 2014).

Historically, electricity demand was thought to be largely price-inelastic and the main driver of cost was the specific period of 'peak demand', that is, when all customers seek to use electricity at the same time. In Australia, this is commonly an evening peak, when customers start returning home from work or school, whilst large commercial and industrial loads are still operating (Leitch, 2016). To cater for this one or two hour period of peak demand (usually the hottest or coldest day of the year driving cooling or heating loads), utilities have to incur the full cost of the infrastructure required, even though for the remainder of the year this infrastructure remains unutilised.

From a customer perspective, the current 'uniform' pricing structure does poorly reflects the actual cost of service, and gives consumers little incentive to reduce their electricity usage during infrequent peak periods. Instead, uninformed customers continue to drive up the level of peak demand, and as a result, utilities are forced to continue increasing their spend on the infrastructure required to service the growing peaks.

From 1990 to 2012, peak demand across Australia grew on average by 50–100 percent. A large proportion of this growth can be attributed to the increased uptake of air-conditioners by customers, which rose from 30 percent to 70 percent over the same period (ABS, 2011; DEWHA, 2008).

A second order issue is the inequity of charging customers who do not contribute to these peak periods the same amount as those that contribute greatly (e.g., those customers that have multiple air conditioners running on hot days are effectively subsidised by those that rely on ceiling fans). This is just one of many existing (and potential) inequities that are created when pricing structures do not reflect the underlying costs of service provision.

By incentivising a shift in demand into non-peak periods, utilities will be able to limit further infrastructure requirements and therefore remove major cost pressures on electricity retail tariffs.

However, shifting demand and changing customer behaviour is never a straightforward proposition. Whilst 'price' forms an important factor, research conducted by the AEMC (2012) also recognised "convenience, awareness and understanding", to also have the potential to influence and shape customer's behaviours and decision making in regards to when and how they use electricity.

### 2.2. Disruptive pressures

Exacerbating the inefficiencies and inequities of the existing pricing structures in electricity service provision is the disruption occurring in the sector due to a convergence of several factors across technologies, economics, and public policies. In the past decade alone, the energy sector has been navigating rapid technology innovations and the falling cost of distributed generation assets, changes in demand patterns and behaviours, and mixed messages from capricious governmental policies on energy, particularly renewables (Kind, 2013; E-Lab, 2013; Grace, 2014; Bunning, 2011). In combination, these factors are set to fundamentally change the way our electricity systems operate and without being addressed, will continue to put upward pressure on costs and worsen inefficiencies and inequities.

The impact of technological innovation will further increase the challenges for utilities and governments, but in particular, WA's isolated electricity networks are already becoming a demonstration site for policymakers globally due to existing high costs (Parkinson, 2015).

Whilst other markets have also been grappling with the pressures of disruptive innovation (e.g., high solar PV penetration rates in Hawaii, California, and Germany), WA has a unique confluence of economic affluence, market reform, network isolation, high solar radiation and consumer demand that has driven Government impetus to recognise the urgency in addressing the impacts of the outdated systems and related pricing structures (Parkinson, 2015; Bromley, 2015).

### 2.3. The changing business model

Within this landscape of disruptive innovation, electricity utilities will need to make bold decisions to change their business models and introduce new products and services together with innovative pricing plans, and then be the ones to convince customers of their value (Ratinen and Lund, 2014). Utilities moving into this space would also need to either prove their differentiation from existing products and services in the market, or expand the market itself (Richter, 2013).

It will not be a straightforward journey and there is no perfect strategy for its navigation. Developing these new utility business models will require an iterative process, and the utilities cannot formulate and develop their strategies in a vacuum, whether Government-owned or private enterprises (Vanamali, 2015). The transition will also require extensive collaboration and participation across policymakers, regulators, investors, consumers, forward thinking government Ministers, as well as technology innovators and entrepreneurs (Tayal, 2016).

As market dynamics continue to drive these innovations, changing the business models away from a conventional, grid-based system towards a more distributed model forms a leading long-term solution for the majority of electricity businesses. Yet many of these technology innovations present a perceived threat of separating a utility from its customers, who may seek to find these new products and services from new entrants and other providers (PWC, 2016). Utilities undertaking future business planning and strategy development should be proactively looking to incorporate energy efficiency, solar PV, and energy storage systems as growth opportunities rather than as existential threats, and making sure these products and services are priced appropriately will be one of the most critical, but complex challenges (Poudineh and Jamasb, 2014; Klose et al., 2010).

### 2.4. The Western Australian challenge

WA presents a uniquely challenging environment under the traditional approach to electricity service provision. WA has over one million electricity customers who are spread out across millions of kilometers. In contrast, the United Kingdom, which has a similar sized service area, has 73 million customers at a much higher density (McGoldrik, 2016). This creates an immediate cost pressure and a challenge in providing customers with affordable and reliable electricity. Indeed, the government-owned electric utilities rely on millions of dollars of annual subsidies to provide uniform electricity tariffs to residential customers across the state irrespective of location. Unsurprisingly, the actual cost of supplying customers in the remote and rural towns scattered across WA is significantly higher than providing electricity to anyone living in the urban centers such as the capital, Perth, which has established distribution networks, excess capacity, and a reliable distribution network (WA Government, 2014).

Whilst infrastructure upgrades and network expansion have always faced tough regulatory investment tests to justify their requirement, the costs for simply maintaining the existing network, given its expanse, are significant. The additional threats of bushfires, cyclones, and equipment issues also present considerable challenges for the WA Government and local regulators in providing reliable, secure, yet affordable supply of electricity to all consumers.