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Finding a way forward: Policy reform of the Australian national electricity market

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ABSTRACT

On balance, it appears reform of the electricity sector has delivered considerable benefits for Australia, and for its individual states and territories. However, these changes have not been without cost, and as is often the case with major long-term reforms, ongoing implementation gives rise to a range of new challenges that need to be addressed, including security of supply and rising prices.

1. Introduction

Concern about the operation of Australia's National Electricity Market (NEM) was heightened after a system event in the state of South Australia in late September 2016. These concerns came at a time when electricity prices in Australia had risen to record levels. In response, the Finkel Review was established, which recommended a range of measures to ensure a secure supply of electricity (Australia, Department of the Environment and Energy 2017). While the bulk of these measures were adopted by the Australian government, the proposal for the introduction of a "Clean Energy Target" was rejected.¹ In its place, the government announced support for a "National Energy Guarantee" (NEG), which nominally focused more heavily on energy security as compared to issues of emission reductions.

Problems in the operation of the NEM have been building up over a number of years. As such, more recent events can best be understood by having regard to the longer-term context in which they have developed. While it is not possible in a paper of this length to describe and analyze the impact all of the changes that have occurred, and are occurring, in the electricity sector, in highlighting the key benefits and costs that have resulted from these changes this paper aims to provide an assessment of the degree to which Australia has gained and lost from the establishment of the NEM. Further, this paper also examines the range of challenges now facing the sector, and considers potential policy pathways to their resolution. The paper is structured as follows. In the next section an account of the industry background and reform process is given. This is followed by sections on the impact of reform and

ongoing and emergent issues. In the final section some conclusions are drawn.

2. Background

In Australia today (2018), there is about 55,000 MW of electricity generation capacity, and despite growth in the use of non-hydro renewable energy sources, the major generation fuel used in Australia is still coal, with natural gas and hydro-electricity also important contributors. From 1970 until the turn of the century, the volume of electricity generated in Australia grew around or above a rate greater than that of real GDP; however since 2000 this growth rate slowed, and since 2008 stagnated (Table 1). At the same time, air conditioning use caused maximum demand to grow faster than overall demand, increasing the risks of physical constraints in a sector in which network infrastructure is required to be built to cater for peak demands.

This changing demand profile has occurred in an electricity sector that has been substantially restructured since the 1980s. Prior to 1990, the Australian electricity supply industry was dominated (in each jurisdiction) by a single, vertically integrated, state or territory government-owned authority. As well as generating and transmitting (and in most cases distributing and retailing) electricity, these bodies were also responsible for the regulation of the industry. Under these arrangements, investment was almost exclusively the responsibility of state and territory governments and their electricity authorities. Electricity prices were set by the governments to cover costs plus any return required. Often politically motivated cross-subsidies were built into price

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¹ The Clean Energy Target was a proposed scheme where companies would have been compelled to provide a set percentage of their power from low-emissions technology, with the increased costs passed on to consumers (Australia, Department of the Environment and Energy, 2017).

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Table 1

Growth and multi-factor productivity growth Australian GDP and electricity industry 1969/70–2015/16.

Source: GDP: Australian Bureau of Statistics, Cat. No. 5206.0. Multifactor productivity growth (MFP): Australian Bureau of Statistics, Cat. Nos. 5234.0, 5260.55.002. In calculating electricity industry productivity measures, the number of people employed was used as the labour input, generation capacity as the capital input, and fuel consumed used as materials Electricity generated was used as the output. The change in productivity was estimated using a DEA Malmquist approach. [Coelli et al. \(2005\)](#).

	Average electricity generation growth % pa	Average GDP growth % pa	MFP change electricity %pa	MFP change GDP % pa
1969/70 to 1973/74	6.8	4.4	3.2	2.2
1974/75 to 1978/79	5.8	2.5	0.9	1.8
1979/80 to 1983/84	4.6	2.4	−0.2	0.7
1984/85 to 1988/89	5.6	4.4	5.4	1.5
1989/90 to 1993/94	3.0	2.2	5.7	0.9
1994/95 to 1998/99	3.5	4.4	4.4	1.9
1999/2000 to 2003/04	1.9	3.4	−0.4	0.8
2004/05 to 2008/09	1.6	2.9	−3.1	−1.0
2009/10 to 2014/16	−0.2	2.1	−0.3	0.4

structures ([Butlin et al., 1982](#)).

By the late 1980s, however, the efficiency of the industry was under serious question ([Australia, Industry Commission, 1991](#)). In particular, monopoly provision and the lack of competitive pressures were argued to be leading to the creation of generation overcapacity, overstaffing, and excessive costs. In July 1991, the Council of Australian Governments (COAG) agreed to reforms that introduced competition into the industry. These involved the introduction of competition into the generation and retail segments, the regulation of open access to the transmission and distribution, and the establishment of a national systems operator and wholesale electricity market. Although a “national approach” was taken to the introduction of competition and the operation of a national market, the question of ownership was left to the individual states and territories to decide, with Victoria and South Australia making an early start on divestment, Queensland and New South Wales doing so much later, and Western Australia and Tasmania maintaining mainly government-owned companies.

Victoria led the way in the reform process, with its distribution/retail assets being divided into five companies with separate franchise areas, and generation being broken up into seven separate companies (these were privatized between 1995 and 1997). South Australia followed with its electricity assets being “privatized” via long-term lease arrangements. In New South Wales (Australia’s largest state) three competing generation, a transmission and six distribution/retail companies (later reduced to two) were created. These initially remained in government ownership, with generation being sold in 2014, transmission in 2015 and distribution becoming partly government-owned and partly privately owned. In Queensland, Tasmania and Western Australia a similar process was subsequently undertaken with the creation of separate entities responsible for generation, transmission, and distribution.

A competitive wholesale market started in Victoria in October 1994, with wholesale electricity traded through a “pool” managed by the Victorian Power Exchange. A similar market began in New South Wales the following year and harmonization of the two markets took place in

May 1997. The NEM began operating in December 1998 and besides Victoria and New South Wales, the states of South Australia, Queensland, and the Australian Capital Territory subsequently joined. The island state of Tasmania joined the NEM on completion of an undersea transmission cable in 2006. The NEM is a wholesale electricity market, combined with a regime of open access for transmission and distribution. Two companies, the National Electricity Code Administrator Limited (NECA, later the Australian Energy Markets Commission, or AEMC) and the National Electricity Market Management Company Limited (NEMMCO, later the Australian Energy Market Operator, or AEMO), were formed to implement it. As well as wholesale competition, retail competition was also progressively introduced in each state in a series of stages, with full retail competition beginning in Victoria and New South Wales in January 2002, followed by other states and territories.

By 2017, in the NEM there were 30 companies registered as principal generators of electricity (an additional nine generate electricity in the separate Western Australian market, and two in the Northern Territory), along with nine transmission companies (additional ones in the Northern Territory and Western Australia), and 14 distribution companies (additional ones in the Northern Territory and Western Australia). In addition there are 36 registered retail companies in the NEM and 12 in Western Australia and three in the Northern Territory ([Australian Energy Council/Energy Networks Australia, 2018](#) 2016–17). These companies supply around 9.7 million residential customers and 1.2 million businesses.

At present, wholesale electricity prices in the NEM are determined every 30 min² and changes generally reflect variations in electricity demand, availability of generation sources, fuel costs, and power plant availability. Prices are usually highest in summer when demand is greatest and more expensive generation sources are added. In recent years wholesale prices have tended to rise. This is for a range of reasons, including lower reserve margins as some older plant has been retired, and rising natural gas prices, which have been impacted by increasing volumes being exported as liquefied natural gas (LNG) ([Figs. 2 and 3](#)).

Higher prices have led to reduction in demand, and together with the impact of renewable energy sources coming on stream, this has contributed to a decline in carbon emissions (from a peak in 2008/09 of 215 million tonnes of CO² to 183 million tonnes in 2015/16 ([Australian Bureau of Statistics, 2017](#), Cat. No. 4655.0). This development of renewables has been encouraged by a range of policies, primarily at the federal level such as the use of renewable energy certificates³ but also as a result of state-based initiatives/targets.

3. Impacts of reform

3.1. Labor and operational efficiency

At the time of reform initiation, a number of benefits were expected. These included higher levels of operational efficiency of plant, more rational investment decisions, and ultimately lower real electricity prices. Additional benefits were expected to be derived from the privatization of state-owned assets. [Tables 1 and 2](#), and [Figs. 1–5](#), provide some details on the way that the industry has changed since the late 1980s. In relation to operational efficiency, improvements have occurred. From [Fig. 1](#) it can be seen that staffing levels fell dramatically through the 1990s, when most reforms were undertaken (although they

² On the Nov. 28, 2017, the Australian Energy Market Commission ruled to move to five-minute price determinations to begin in 2021 ([Australian Energy Market Commission, 2018](#)).

³ Prior to Jan. 1, 2011, Renewable Energy Certificates were used as the primary mechanism in meeting the renewable energy target. After 2011 they were split into small-scale technology certificates and large-scale generation certificates

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