

Problems with the “Reformed” New Zealand Electricity Market

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1. Introduction

Radical reform of the New Zealand electricity system commenced in 1986 and took three decades to complete. The final shape of the restructured sector has now been established for nearly a decade and there is adequate published data to support evaluation of outcomes against the promises of the architects and promoters of reform. Three key areas are considered in this paper: economic efficiency, social equity, and physical reliability of supply.

The reform agenda carried through from 1986 to 2014 was premised on the idea that reliability of physical supply could be maintained to a high standard while introducing “market disciplines” - first to drive economic efficiency gains, and second to ensure that those gains were passed through to consumers (especially low-income domestic consumers). The risk from the outset was that market forces, once unleashed, might yield opportunism, rent-seeking, and monopolistic price gouging, rather than outcomes consistent with textbook perfect competition. The failure by policymakers to anticipate that risk has led in practice to failure of the reform programme in terms of those original goals. Along the way, powerful vested interests have been created which now block the path to fixing the problems that have emerged.

2. Summary of the reforms¹

The pre-reform structure comprised two tiers of publicly-owned monopolies, each with a democratically-enforced mandate to supply electricity as an essential service on a non-profit basis, at prices that recovered all costs on a cash basis. The top tier - bulk wholesale supply - was owned by central government and comprised large-scale central generators integrated with a national transmission grid and a merit-order dispatch system. The lower retail tier was part of local government and comprised local distribution networks integrated with retailing, appliance sales and servicing, and some small-scale local generation.

Designed and run by engineers to high standards of both construction and physical performance, the pre-reform system provided households and industry with the fourth lowest power prices in the OECD², while sustaining a massive programme of infrastructure construction to keep ahead of growing demand. Peak shaving was done by remotely-operated “ripple control” of electric water heaters, and the hydro lakes were managed with a constant eye to preserving stored water against the risk of a dry winter. As an example of a planned publicly-owned system designed for the specific conditions of New Zealand and operated using optimal control principles, the New Zealand electricity system was outstandingly successful.

Why, then, did policymakers in the 1980s and 1990s embark on a radical and disruptive reform programme? The central motivation was ideological - the

familiar neoliberal desire to shrink the public sector and privatise as much of it as possible. Supporting this was the fiscal authorities' perception that investment spending needed to increase while the revenue-generating potential of state-owned enterprise in general was being suppressed by the political goal of keeping prices low.

Always in the background in the 1980s was the strong international tide of economic opinion in favour of electricity sector restructuring, triggered first by the US Carter Administration's quest to remove entry barriers for new providers (the 1978 PURPA legislation) and second by new thinking about markets for power stemming from the work of Schweppe and Joskow. Opening the New Zealand electricity sector to competitive new entry and corporate profit-oriented management seemed in tune with this international current of opinion, and might (local reform proponents hoped) uncover efficiency-enhancing options suppressed or overlooked under the not-for-profit engineer-dominated regime.

The reforms began with two pieces of legislation. First was the strongly deregulatory Commerce Act 1986 which removed not only the previous automatic regulation of monopoly profits but also most barriers to anti-competitive conduct. Second came the State-Owned Enterprises Act 1986 which converted former government departments into commercial corporate entities with profit-maximisation as their goal, and with social equity objectives explicitly removed from their mandate⁴.

Restructuring of electricity began with the state-owned generation-transmission monopoly, which was quickly corporatized in 1987. To prepare it for privatisation it was then split into two separate generation and transmission companies³. In November 1995 the generation company was split up into two state-owned companies, ECNZ and Contact Energy; then in 1999 ECNZ was split into three, while Contact was privatised. Finally, during 2013 and 2014 the Government part-privatised the remaining state-owned generators by selling off 49% of the shares on the open market.

Meantime at retail level, in 1992 the Energy Companies Act forced the former Electricity Supply Authorities (ESAs)(against much local opposition) to corporatize by 1994, and subsequently several of the larger ones were privatised.

Next came the creation in 1996 of a wholesale market which in theory was supposed to enable new retailers to enter and compete to supply final consumers with electricity purchased wholesale from grid-connected generators and delivered to local networks by the transmission grid.

With the ostensible intention of opening up space for retail competition, in 1999 the former ESAs were com-

pelled to divest either their lines networks or their generation and retail activities. All except one (Trustpower) opted to keep their lines networks and to sell off their generation and retail activities. Far from opening the way for retail competition to flourish, the absence of regulatory restraint enabled the large generators to snap up blocks of retail customers, creating vertically-integrated energy companies known as “gentailers” with massive market power.

As of 2020, the industry's post-reform structure is fully bedded in. Generation and retailing are dominated by five large players with a small marginal “fringe” at each level. Transmission and system operation remain in the hands of a state-owned monopoly, Transpower. The natural-monopoly local lines networks are held partly by large corporates (some of them owned by municipal authorities) and partly by smaller companies owned by consumer trusts (an arrangement that reflects local defiance of the dictates of central Government reformers as well as the genuine advantages of local trust control⁵).

3. Efficiency outcomes

The belief of the New Zealand Treasury in 1984 was that untapped potential efficiency gains were waiting to be captured in publicly-owned enterprises and that corporate, profit-driven management was the way to realise those gains. Experience has not borne out either of those hopes. The best evidence on the outcome of reform comes from the productivity statistics prepared as part of the annual national accounts. Those statistical series enable us to track various sectors' labour productivity, capital productivity and total factor productivity, in terms both of output per unit of inputs and of value added per unit.

Over the thirty-three years 1986-2019, the sector “electricity, gas distribution, water and waste services” – a sector which is dominated

by electricity - has exhibited a dramatic decline in its productivity; see Figures 1-4. Figure 1 shows that up to the mid-1980s when reform began, this sector was one of the economy's star performers but that since then it has switched from positive productivity growth to steadily-worsening productivity decline. Multifactor productivity was down by over 30% in 2019 compared with 1986. Over the nineteen years 2000-2019 (shown in Figures 2 and 3) labour productivity fell roughly 40%

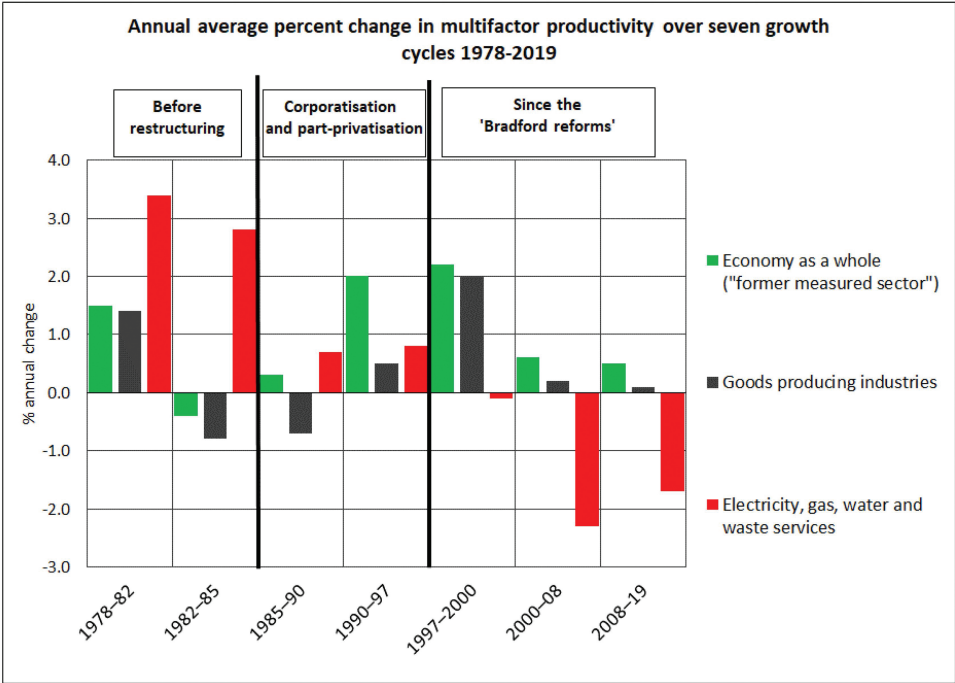


Figure 1
Source: Statistics New Zealand, Productivity Date 1978-2019, downloaded February 2020 from <https://www.stats.govt.nz/assets/Uploads/Productivity-statistics/Productivity-statistics-19782019/Download-data/productivity-statistics-1978-2019-productivity-by-industry.xlsx>

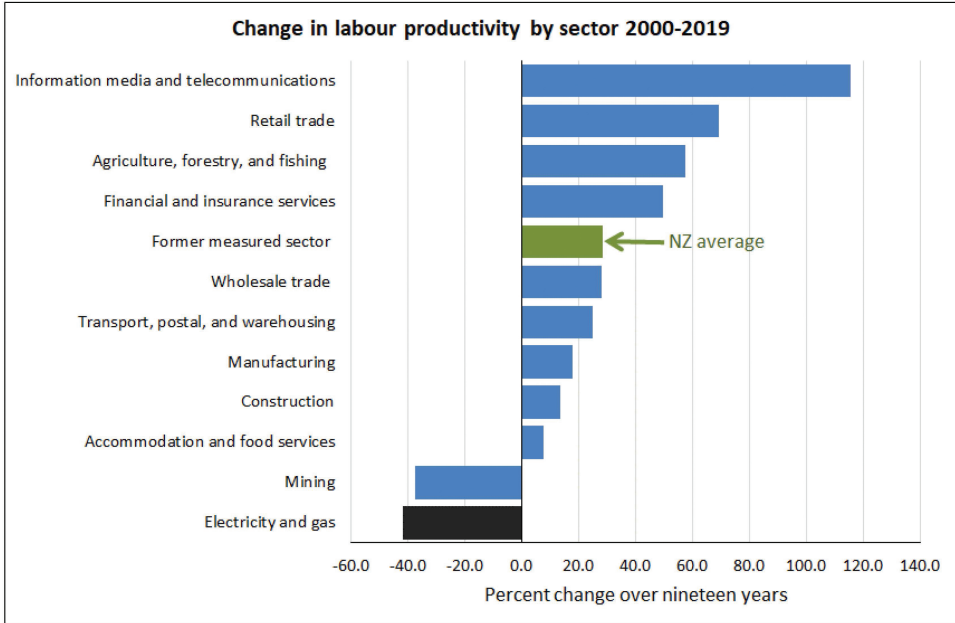


Figure 2
Source: Statistics New Zealand

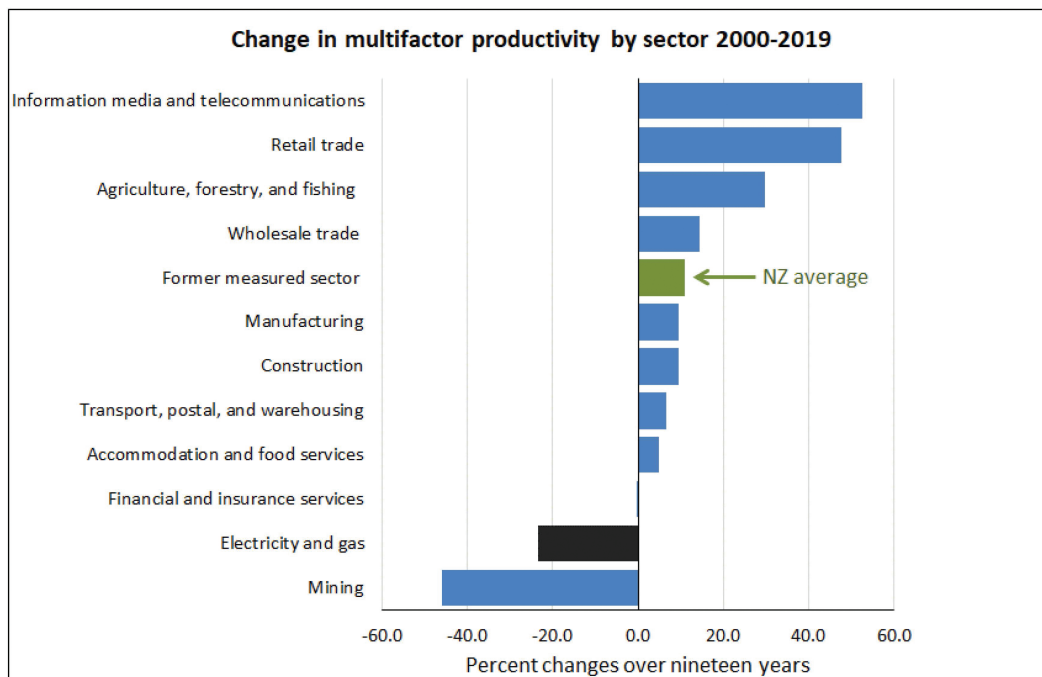


Figure 3
Source: Statistics New Zealand

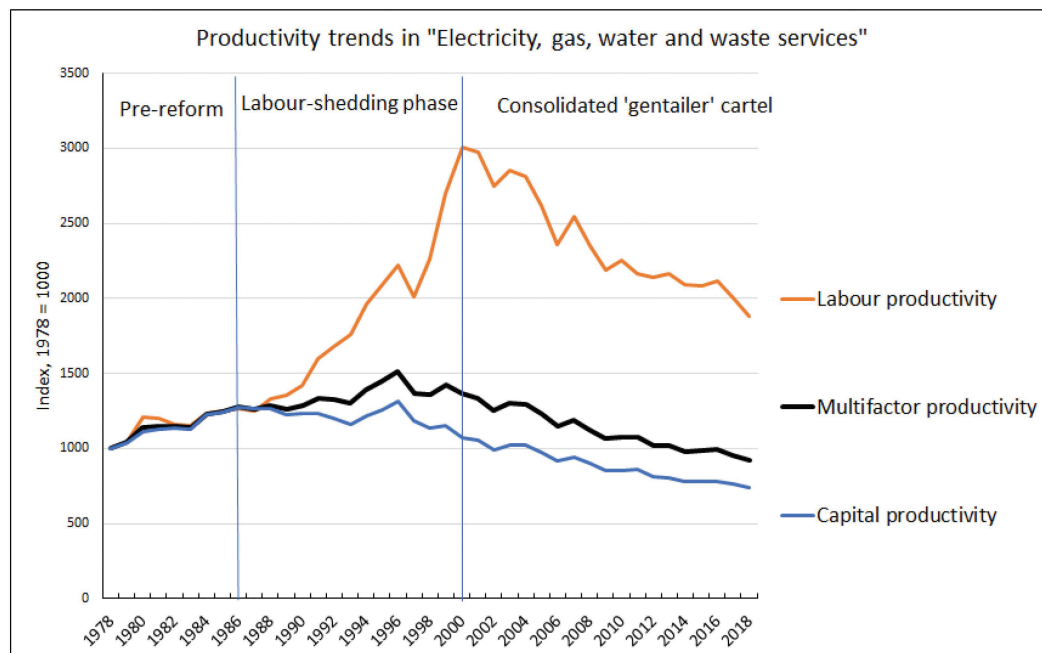


Figure 4
Source: Statistics New Zealand online Infoshare Table PRD014AA as at 21 February 2019, from <http://infoshare.stats.govt.nz/infoshare/>.

while multifactor productivity fell more than 20%, in an economy where other sectors (apart from mining) exhibited rising productivity.

The sole sign of efficiency gains under market-driven corporate management came in the sector's labour productivity surge during the first decade (Figure 4), as ruthless labour-shedding was driven through. In the one-and-a-half decades 1986-2000 the industry's labour force was halved, producing the short-lived "sugar high" in labour productivity seen in Figure 4, before the consolidated post-reform industry began

hiring again, more than doubling its labour inputs 2000-2019. But whereas the early-stage layoffs consisted to a large extent of technically-proficient engineering and maintenance staff, the new hirings since 2000 have been focused on marketing, PR, financial management, executives and legal staff, all on high salaries but many of them performing unproductive roles in terms of what the national accounts measure.

4. Prices and profits: the equity issue

While productivity sagged, the industry's profits rose dramatically over the three decades of reform, on the back of a doubling of the electricity prices charged to household consumers (industry's prices barely changed while prices to commercial users fell).

These price trends, seen in Figure 5, reflect very clearly the degree of countervailing market power exercised by the three groups of consumers in the face of monopolistic conduct by suppliers. Strong countervailing power exercised by industrial and commercial interests has

enabled them to resist price increases in real terms, which has shifted the burden of funding the industry's rising monopoly rents and falling productivity onto dispersed and powerless residential consumers, who have lacked any powerful champion to offset the industry's imposition of Ramsey pricing principles. Central government, which in pre-reform days treated residential electricity supply as an essential service and held prices down, has since 1986 treated the industry as a fiscal cash cow and has welcomed the dividend revenue from

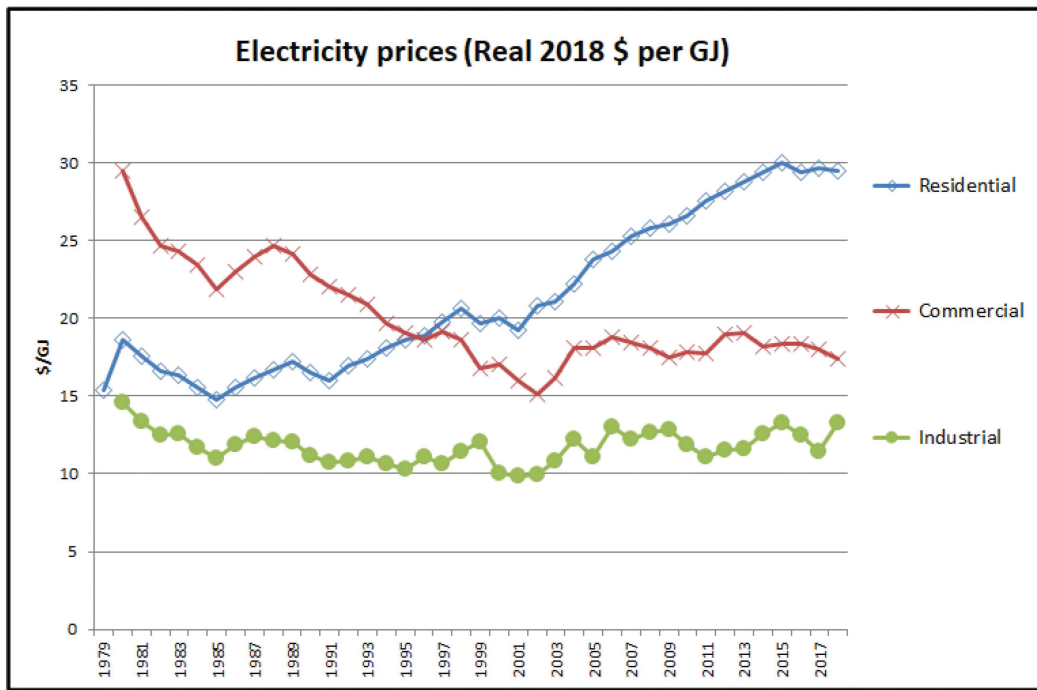


Figure 5

Source: <https://www.mbie.govt.nz/assets/Data-Files/Energy/nz-energy-quarterly-and-energy-in-nz/Prices.xlsx> downloaded November 2019.

its ownership stakes in generation, transmission and retailing (Barry 2018). No regulatory mechanisms exist to control the detailed structure of retail prices. (The Commerce Commission ineffectually regulates the total revenue allowed to lines networks but not its allocation across customer groups. The Electricity Authority exercises no price control functions.)

There was from the outset a regulatory problem associated with placing strategic public assets into the hands of corporate management, often combined with private ownership. Enormous market power is associated with the supply of electricity by a large centralised system in a country as small as New Zealand, with no pricing discipline available from international trade (there is no prospect of interconnection with the nearest country, Australia). The clear risk was that the new managers - oriented to profit and shareholder value - would pursue cost-cutting and price-hiking to inflate margins and raise asset values, rather than passing gains through to consumers. To confront this threat, the original reform architects foreshadowed policy measures (i) to prevent natural-monopoly lines owners from exercising that monopoly power, and (ii) to facilitate open entry and exit in the generation and retail markets.

In the event, no such effective policies were forthcoming. In the case of lines networks, over the decade 1994-2004 the owners were not merely permitted, but actively encouraged, to drive their prices, profits and asset values up to textbook monopoly profit-maximising levels, in the mistaken belief that "market contestability" would then provide some equivalent to competitive disciplines. From 2008 on the companies were then placed under a standard regulatory regime that locked-in the monopoly asset values while guaranteeing a commercial return on those assets and fully

indexing company revenues and profits to inflation. The resulting transfer of wealth from consumers to producers has been of the order of several billion dollars and the regulator (the Commerce Commission) has served as a shield behind which the companies have sustained their profitability. The story of lines regulation has been a classic example of regulatory capture.

For generation and retailing the story was more complex but no less negative in its effects on residential consumers. The two separate activities of producing and

selling energy were considered potentially competitive, and the original premise of reform was that freedom of entry and exit would impose competitive pricing discipline and drive innovation. In practice, any hope of competitive outcomes was foreclosed in 1999 when Government permitted the five large generation companies to buy up the retail customers being forcibly divested by distributors. Once vertically integrated, the resulting cartel of large 'gentailers' successfully erected strong barriers to independent entry and relegated the few surviving independent retailers to perpetual fringe status.

The industry's favoured anticompetitive practice has been the withholding from independent would-be retailers of access to a full range of arms-length competitively-priced hedge contracts that could protect them from being squeezed by wholesale price spikes at time of supply shortage. While the gentailers themselves stand to gain from shortages that raise prices, independent retailers without secure contracted supply are continually at risk of being bankrupted. The most spectacular instance of this exercise of market power to drive out independents was the 2001 bankruptcy of OnEnergy, a large retailer that lacked generation assets of its own and consequently was dependent on wholesale market supply. Despite being owned and backed by a deep-pocketed overseas company (Australia Gas and Light), OnEnergy quickly folded after incurring hundreds of millions of dollars of losses. The experience confirmed that to survive as a large independent retailer in the New Zealand market, it is essential for a company to be internally hedged by owning its own generation. Retailers without such in-house supply can never hope for more than a precarious existence at the outer margins of the market. There has to date

been no effective regulatory response to the problem despite it having been well recognised since the 1990s.

A great deal of regulatory effort has, in contrast, gone into the promotion of retail switching by small customers, and high churn rates (driven by promotional hype as much as by continual customer frustration with rising prices) have been hailed by the Electricity Authority as evidence of retail-level competition. No actual competitive discipline on prices flows from high switching rates, however, because the members of the 'gentailer' cartel have no incentive to expand their retail market shares beyond the limits of their in-house generation. (No gentailer wishes to be placed in the position that On Energy faced in 2001, of being exposed to wholesale price spikes charged by its notional competitors.) Overall retail market shares have consequently been very stable throughout a decade of supposedly fierce competition. However, to satisfy the political need to demonstrate some progress, the industry has shuffled its retail customer bases across regions to produce lower regional Herfindahl-Hirschman indices, which the Electricity Authority proudly parades as evidence of regulatory success.

5. Physical reliability

In the context of the industry's failure to improve efficiency and the massive equity costs of the reforms, the only bright spot is that the lights have stayed on. With occasional hiccups (see below), New Zealand's electricity supply has been maintained at a high standard of reliability, by the dedicated efforts of engineers at all levels.

The hiccups, however, speak volumes about the effects of shifting from an engineer-driven to a profit-driven model. A familiar and predictable pattern of conduct by profit-driven management is to cut back on maintenance spending, and the radical labour-shedding and cost-cutting of the first decade of reform resulted in a legacy of costly failures. The first of these, in 1998, caused a total blackout of the business centre of the biggest city, Auckland, for five weeks in 1998⁶. The second, in 2006, again cut power to Auckland due to failure of a corroded Transpower shackle at a substation⁷.

A catastrophic failure of the inter-island HVDC link loomed as a threat when the link was allowed to be reduced to a single pole between 2008 and 2013⁸ as the single remaining pole began to deteriorate; an additional line was hastily installed, but only after the country had (by good luck) survived several years at less than the recommended (n-1) level of security.

Most recently Aurora Energy, the lines operator serving Dunedin City and the Central Otago region, incurred a \$5 million legal sanction for increasing outages resulting from decades of sweating its assets, and is being allowed by the regulator (the Commerce Commission) to raise its prices to fund a \$400 million upgrade of its systems. (As usual the regulator has required no write-down of the high valuation of the existing deteriorated assets on which customer charges are calculated, so that the full burden of remedying the company's failure falls not on its owners but on its customers⁹.)

Beyond these hiccups lie two much bigger issues for the future. One is the issue of dry years. The other is the role of the electricity industry in decarbonising the New Zealand economy in response to the threat of climate change.

The dry-year issue

New Zealand's electricity system is dominated by hydro generation which accounts for roughly 60% of total supply. Because the dams are on long narrow rivers they have very limited storage capacity, which means that a winter with low rainfall results in shortages. The problem for planners has always been how to protect against these events. In the pre-reform era the solutions were giant construction programmes to increase total capacity ahead of demand growth, combined with rationing arrangements (power cuts) when shortages struck. Reform proponents suggested that the switch to market disciplines would result in some optimal response to the issue. In practice the opposite was the case. A dry-year produces system-wide stresses requiring a coordinated response, while individual generators have no ability nor incentive to solve the problem on their own. Unsurprisingly, industry players opted to free-ride in the knowledge that in a dry year the government would have no alternative but to implement some sort of rationing arrangements, while the shortages would bring high prices (hence profits) for the gentailers.

This classic coordination failure was on show in 1991, the first serious dry year of the reform era. Not only had commercial management allowed lake levels to drop below prudent levels over the previous summer; they responded to the experience of being obliged to operate high-cost fossil-fuelled plant during the shortage period by immediately decommissioning that plant as soon as the crisis had passed, increasing in the process the economy's exposure to future recurrences.

The next dry year was in 2001 and again the industry collected high prices while leaving Government to manage the rationing. Fortunately since then there has been no major episode – but the industry's investment programme has failed to improve the economy's resilience. On the contrary, gentailer-owned windfarm sites for which consents were granted years ago have remained undeveloped (but withheld from independent entry), and the industry (supported by its ostensible regulator the Electricity Authority) has obstructed the entry of distributed generation – particularly rooftop solar – that could provide dry-year insurance but would threaten the gentailers' profits and market share.

The latest development is that given the industry's failure to provide dry-year security of supply, the burden of doing so is to be picked up yet again by taxpayers, through the proposed spending of \$4 billion of a huge pumped-storage scheme at Lake Onslow in Otago.

Climate change

Electrification of the economy will be central to New Zealand's ability to meet ambitious greenhouse-gas emission targets. Again the profit motive has proven

counter-productive in the absence of effective regulatory policy. New Zealand's main policy instrument to place a price on carbon emissions is its Emissions Trading Scheme (ETS) which interacts in a strikingly perverse way with the structure of the wholesale electricity market. The market, by design, sets the spot price at the highest offer price in the generation merit-order stack, which means for most of the time one of the fossil-fuelled generators, whose costs (and hence bids) include the carbon price. Because all generators receive the same price, the effect is that electricity consumers are forced to pay carbon tax on electricity supplied from hydro and wind. But since hydro and wind generators pay no carbon tax on their operations, the resulting revenue flow goes directly to their bottom lines and asset values.

The result is that the ETS which is ostensibly aimed to incentivise a move away from carbon instead creates a perverse incentive both to dampen down substitution in final energy uses away from fossil fuels towards electricity (for example, switching from internal combustion cars to electric vehicles) and for electricity generators to ensure that there is always fossil-fuelled generating plant at the market margin.

6. Conclusion

This quick overview of some of the major features of New Zealand's experience with electricity sector reform has not found much to celebrate. Certainly the promises that were made by policymakers at each stage of the reform process have proved to have been empty ones. Neither efficiency gains nor lower consumer prices have been achieved. Confronting future needs for dry-year security of supply and decarbonisation of the economy will involve difficult policy choices in the face of well-organised and strongly funded rentier vested interests. The strength of the industry's position in opposing effective regulatory change is reinforced by the fact that part-privatisation has created an alignment of interest amongst the big industry corporate players, a substantial cohort of share-owning citizens, and a Treasury that continues to collect large sums

in dividends and taxes from the profits that would be squeezed by regulation.

Footnotes

¹ For detail see Bertram (2006, 2013, 2016) and MBIE 2015.

² International Energy Agency, *IEA Energy Prices and Taxes Statistics*, database accessed through OECD i-Library, 1986 data comparing prices in US dollars at Purchasing-Power-Parity.

³ See Geoff Bertram "Why the Commerce Act 1986 is unfit for purpose" *Policy Quarterly* 16(3): 80-87, August 2020, <https://ojs.victoria.ac.nz/pq/article/view/6562/5726>.

⁴ A 1987 District Court judgment confirmed that the profit goal overrode all others unless Government exercised its power under the Act to direct, and pay for, pursuit of any other goal. That power has never been exercised in relation to electricity supply.

⁵ Kalderimis 2000.

⁶ See https://en.wikipedia.org/wiki/1998_Auckland_power_crisis.

⁷ See https://en.wikipedia.org/wiki/2006_Auckland_Blackout.

⁸ See https://en.wikipedia.org/wiki/HVDC_Inter-Island

⁹ See https://comcom.govt.nz/_data/assets/pdf_file/0017/228023/Draft-decision-Aurora-Energy27s-proposal-to-customise-its-prices-and-quality-standards-12-November-2020.pdf.

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