Phase out of the Low Fixed Charge regulations

Quantified price effects for the first 3 years

October 2024

SENSE PARTNERS
DATA LOGIC ACTION

Summary of key findings

The government is phasing out the Electricity (Low Fixed Charge Tariff Option for Domestic Consumers) Regulations 2004 (LFC regulations), between 2022 and 2027. The LFC regulations put a cap on daily fixed charges for residential electricity users who are "low users" (as defined in the LFC regulations). This reduces the electricity bills for a subset of low electricity users.

Two-thirds of households qualified as "low users" in 2023, representing 55% of New Zealand's population.

Phase out has resulted in more winners than losers

- Low electricity users' bills have increased by an average of 2% in 2024, due to the phase out of the LFC regulations
    - very low users' (up to 4,000 kWh/year) bills have increased by $125 (+11%) in 2024 (these users make up 35% of low users)
    - moderate low users' (4,000 – 6,000 kWh/year) bills have increased by $54 (+4%) in 2024 (these users make up 36% of low users)
    - a substantial number of low users that use more than 6,000 kWh/year are paying less, on average $37 less (these users make up 20% of low users).
- Standard electricity users' bills have fallen by an average of 2% in 2024, due to the phase out of the LFC regulations
    - the average saving per standard electricity user household is $89
    - for very high electricity users (+16,000 kWh/year), the saving is $156 (-3%).

Very small households face the largest increases in electricity bills

- In 2024, the LFC regulations phase out increased the electricity bill for:
    - a single person household on low income by +0.6% of income
    - a single person over 65 by +0.3% of income.
- In 2024, the LFC regulations phase out saved larger households up to 0.1% of income.

Electricity price increases are mostly due to other drivers

- Price changes due to the phase out are entirely distributional – a rebalancing, not an absolute price increase.
- High wholesale electricity prices have put a squeeze on retailers' margins, as retailers have not passed on all cost increases that they have faced
- Since 2021, household electricity costs have fallen relative to the cost of other goods and services in New Zealand (-7% on average)
- Very low users (4,000 kWh or less) are an exception. They have faced a real increase in the cost of electricity (+3% on average since 2021).

Contents

1. Purpose & scope

This report provides estimates of the effects on residential electricity prices over the period 2021–2024 of the phase out of the Electricity (Low Fixed Charge Tariff Option for Domestic Consumers) Regulations 2004 (LFC regulations).

The Ministry of Business Innovation and Employment (MBIE) has commissioned this report as part of its 'Mid-point Review' of the phase out of the LFC regulations.

1.1. In-scope

Sense Partners have been asked to analyse:

- how prices for residential electricity consumers have changed during the first three years of the phase out of the LFC regulations
- how the phase out of the LFC regulations has influenced changes to residential electricity prices over the period 2021–2024
- variations in electricity consumption across New Zealand households.

1.2. Out-of-scope

This report is only about residential electricity pricing – specifically, changes in the structure of residential electricity prices as a result of the phase out of the LFC regulations, and implications for New Zealand households.

Sense Partners have not undertaken a complete evaluation of the effects of the phase out of the LFC regulations – for example, welfare analysis. Our analysis is mainly descriptive, considering only direct effects of the LFC regulations phase out on residential prices and domestic electricity consumers.

Our analysis also does not include a review of New Zealand's electricity industry. We do not examine, for example:

- regulation, outside of the LFC regulations
- pricing for commercial and industrial electricity consumers
- operation of New Zealand's wholesale electricity market.

1.3. Context: the LFC regulations

The LFC regulations were introduced in 2004

The LFC regulations were introduced on 1 October 2004. Their objective is to:

(a) ensure that electricity retailers offer a low fixed charge tariff option or options for delivered electricity to domestic consumers at their principal place of residence that assists low-use consumers and encourages energy conservation; and

(b) regulate electricity distributors so as to assist electricity retailers to deliver low fixed charge tariff option(s).[1]

From their enactment until 31 March 2022, the LFC regulations required electricity retailers to offer at least one price plan containing no more than one fixed charge (price) of 30 cents per day (excluding GST) for electricity delivered to households with low electricity consumption. Since 31 March 2022, the maximum low fixed charge has increased by 30 cents on 1 April each year, as part of phasing out the LFC regulations over a five-year period. As at 1 October 2024, the low fixed charge permitted by the LFC regulations is 120 cents per day (excluding GST).

Retailers can offer price plans with higher fixed charges, but the low fixed charge option must be cheaper for households using less than 8,000 kWh per year in the North Island and upper South Island or 9,000 kWh per year in the lower South Island.

Electricity distribution companies that provide local lines services to households on a low fixed charge tariff option must not charge that household[2] more than one fixed charge of up to 60 cents per day (excluding GST).[3]

There have been strong supporters and critics

The low fixed charge tariff option has reduced the electricity bills of some households, while increasing the bills of other households – mainly those that consume more than 8,000 kWh per year.

For many years this led to questions about whether the LFC regulations were equitable, given that high-income households with low electricity consumption received lower electricity bills ostensibly at the expense of large low-income households with relatively high electricity consumption.

On the flip side, high fixed charges are considered by some to be inequitable because low users end up paying more on average for the electricity they use. If one views electricity use as the key service being provided, the fact that some people pay more per kWh than others is seen as inequitable.

The LFC regulations have provided a way to limit the bills of superannuitants who traditionally have had comparatively low incomes.

However, a large proportion of the costs of supplying electricity are fixed. For example, most of the cost of building and maintaining an electricity distribution network does not go up or down as people increase or reduce their use of electricity.

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[1] See regulation 3 of the Electricity (Low Fixed Charge Tariff Option for Domestic Consumers) Regulations 2004.
[2] All electricity distributors in New Zealand charge households for local lines services via the electricity retailer.
[3] Until 31 March 2022, this was 30 cents per day (excluding GST). In practice, distributors have applied the maximum low fixed charge permitted (i.e. being 50 percent of the maximum low fixed charge that retailers are permitted to apply).

In that light, high variable electricity charges can be considered inequitable because people pay more towards the cost of distribution networks as their consumption increases even if this does not increase distribution network costs.

From a cost perspective, low fixed charges send a false signal about the cost of electricity supply, increasing the cost of using electricity beyond its actual cost. The advantage of fixed charges is that people are free to heat their homes and water or charge their electric vehicles without attracting an increasing share of costs – beyond the costs they create.

The decision to phase out the LFC regulations by 2027

A 2019 review of electricity prices highlighted some of these issues and recommended phasing out the LFC regulations.[4] In light of this, and after public consultation, the phase out began on 1 April 2022 and is planned to be completed by 1 April 2027.

1.4. Our methods – a summary

The analysis in this report is based on detailed price information provided to MBIE by electricity distributors and retailers. The data comprises annual snapshots of prices by retail pricing plan and distributor pricing category. Graphs and charts included in this report are derived from the pricing data MBIE collected.

We have used this data to analyse the effects of the phase out of the LFC regulations. Our areas of focus have included:

- the extent to which low fixed electricity charges have increased since 1 April 2022,
- whether these charges have increased by the maximum amount permitted under the regulatory rules for the phase out of the LFC regulations, and
- whether any increases in low fixed electricity charges have been accompanied by reductions in variable electricity charges.

We have also investigated the effects of price changes on different types of households. We have done this using observations of household electricity expenditure and consumption (in kWh) from New Zealand household expenditure surveys and data on the statistical distributions of residential electricity consumption both nationally and by electricity distribution network areas. Further details of our methods are presented in the appendix to this report.

[4] Electricity Price Review Hikohiko Te Uira, May 2019, Final Report.

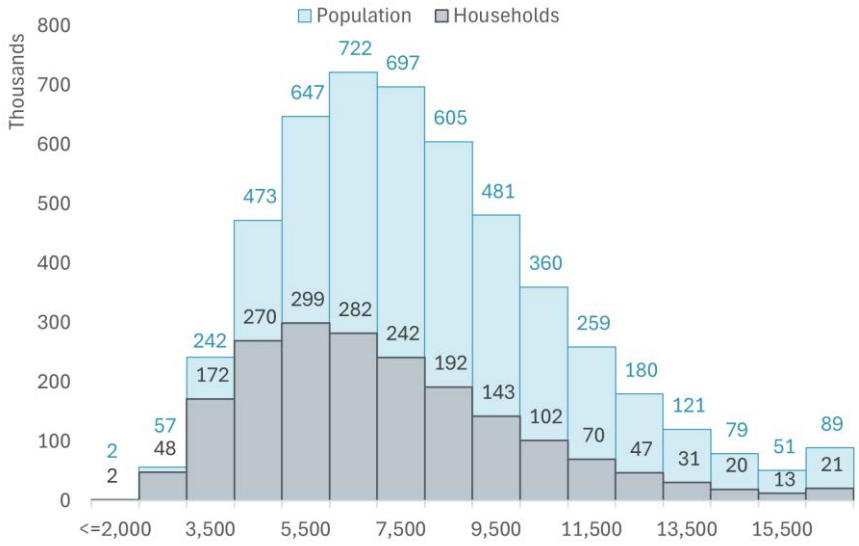
2. Socioeconomic context

2.1. The low user population

Based on the regulatory definition, we estimate that low electricity users made up two-thirds of New Zealand households in 2023.

The share of New Zealand's population that lives in low electricity user households is somewhat smaller – around 55% of the population. This is because low electricity user households are generally smaller (see Figure 1).

FIGURE 1: DISTRIBUTION OF RESIDENTIAL ELECTRICITY USE
Estimated counts of households and population by annual electricity use in 1,000 kWh bands in 2023. Right-most category is greater than 16,000 kWh per year.



Low fixed charges have advantaged some households and disadvantaged others. As the LFC regulations are phased out, these impacts are being reversed.

In general, smaller households have benefitted the most and so they are the ones losing the most financially from the phase out.

2.2. Electricity use by income and household size

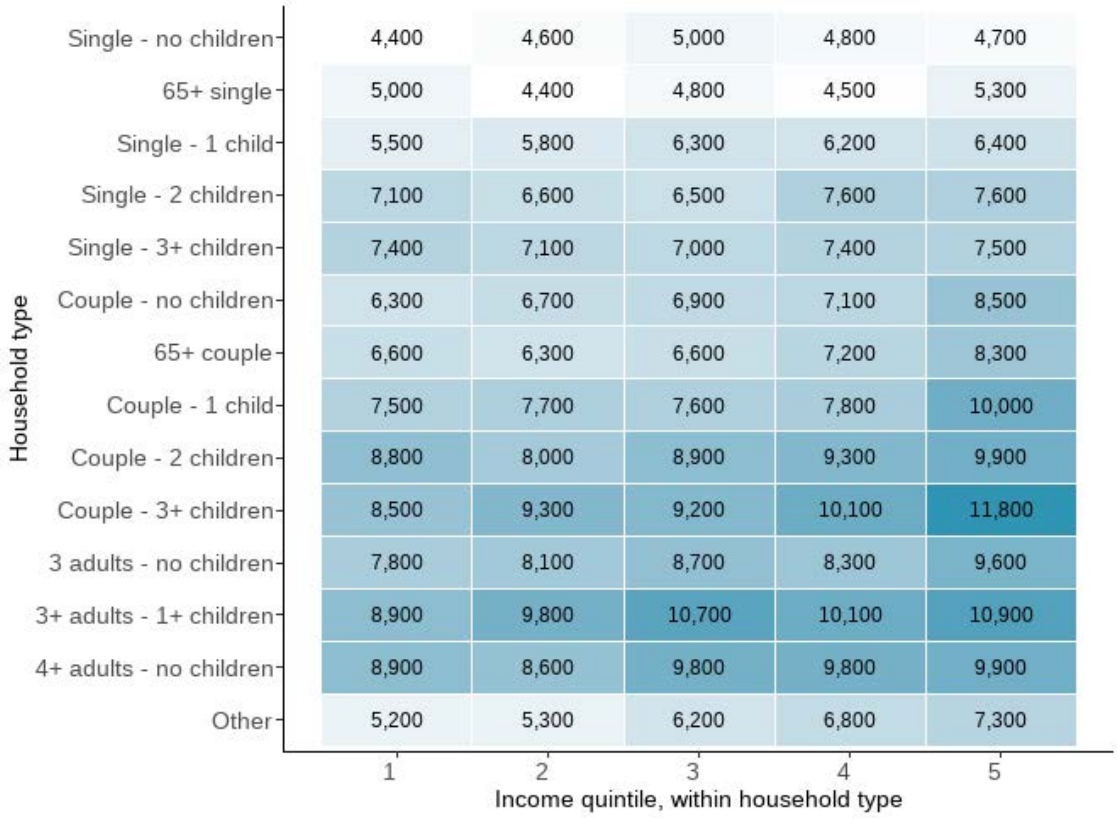
Electricity consumption typically increases with household size and household income. Also, households with children tend to use more electricity per person (see Figure 2).

However, the patterns are different for electricity expenditure as a share of household spending. Electricity expenditure as a share of total household expenditure declines with household size and income. This is because there is a minimum amount of electricity needed to run a home and more occupants enable the cost of that to be shared more widely. Also, low-income households and small households are more likely to contain unemployed people

or retired people, on average, so at home more and using more electricity – other things being equal.

Household expenditure on electricity averaged 2.9% of household income in New Zealand between 2019 and 2023. Around this average there was a wide range, from less than 1.7% on average for larger households with only adults (4+ adults) and high household incomes (5th quintile, or top 20%, in Figure 2) through to 7.4% for single parent households with 3 or more children and low incomes (1st quintile, or bottom 20%, in Figure 2).

FIGURE 2: NATIONAL AVERAGE ELECTRICITY USE BY HOUSEHOLD TYPE AND INCOME
Estimates for 2023. Income quintiles[5] are for after-tax incomes within household types, ordered from low to high income (1 to 5). 65+ indicates households where at least one occupant is aged 65 years or older.



Low electricity users tend to have lower incomes

Broadly speaking, low electricity users have lower incomes on average. For example, 64% of the people in the bottom two income quintiles of Figure 2 are low users while 48% of people in the top two income quintiles are low users.

[5] Quintiles mean five equally sized groups. Here it refers to ranking households, within a given household type, by income and grouping observations into 5 equally sized groups of households. The first quintile is the 20% of households with the lowest incomes. The fifth quintile is the 20% of households with the highest incomes.

There tends to be a material jump in electricity use for most types of households in the highest quintile of income. This jump reflects the jump in average income between the fourth and fifth quintiles.

Increases in household incomes from income quintile 1 to quintile 2 to quintile 3 are not especially large. This is particularly so for the lowest two quintiles, where New Zealand's social welfare system – benefits, income supplements, and New Zealand superannuation payments – create a clustering of post-tax incomes.

That said, it is important to note that a household's income is an incomplete measure of the household's access to resources.

A household may have access to assets or family and/or community support, which means that the household's taxable income does not reflect the household's ability to pay for electricity.[6] A case in point is people with minimal taxable income from e.g. New Zealand superannuation payments, but with assets in trusts or housing assets that do not register income.

And of course, the reverse is true – high debt or health conditions can mean that income, on paper, does not reflect a household's purchasing power or electricity requirements.

That being so, one ought not to draw too strong a conclusion from the observation that low electricity users tend to have lower incomes.

But lower income is an imperfect predictor of low electricity use

The binary classification of household types into low electricity user and non-low electricity user can be misleading. There is much variation in electricity expenditure that is not explained by household types and household incomes. Indeed, there is as much variation within household types and household incomes as there is between them.

People's lifestyles, preferences, living situations and locations result in significant differences in electricity consumption across households with a similar income and household size.

Access to alternative sources of energy supply is also an important factor in the significant variation within household types and household incomes. A household that uses gas, a wood burner or electricity from its rooftop solar photovoltaic installation will use less electricity than an otherwise identical household.

Given this sort of variation, one can only reasonably talk about the probability that a household will be a low user, given income and household composition. A low-income single parent household with three or more children may be a low electricity user on average, but it only takes a small deviation from the average for that household to become a standard user.

[6] Tax data is the main reliable source of income data for New Zealand statistics. However, tax data does not capture sharing, gifting or regular income that is not part of taxable income – such as child support. It also does not include funds that reduce wealth e.g. drawing down on savings.

It is only for small households that one can be reasonably assured that low-income households are mainly low electricity user households, and therefore are beneficiaries of the low fixed charge tariff option. Any benefit that a large low-income household gets from the low fixed charge tariff option is likely to be small by virtue of more people needing more electricity.

3. Electricity industry context

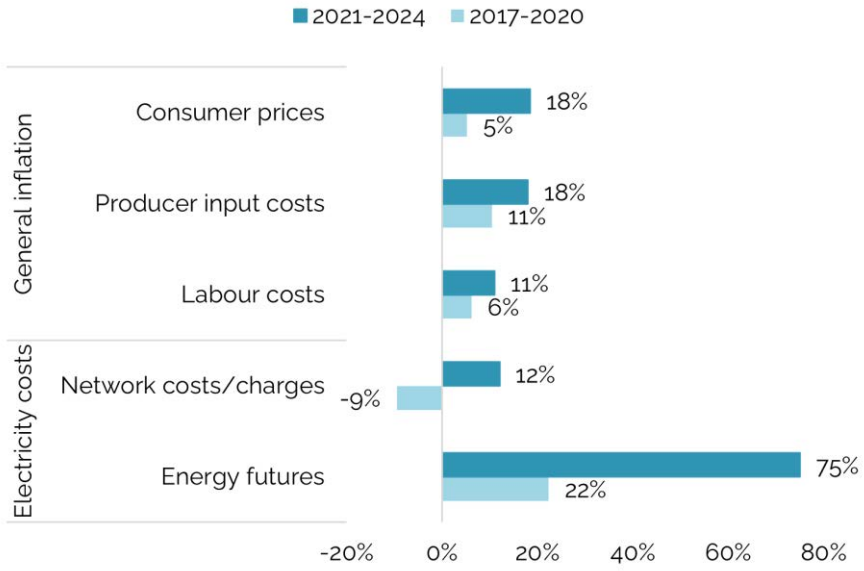
3.1. Rising costs in the electricity industry

Since the LFC regulations phase out began on 1 April 2022, the economic environment in New Zealand has been marked by unusually high inflation. Inflation has been at levels not seen for more than 30 years and, most unusually, has affected almost every consumer good and industry cost.[7]

Coinciding with this recent high inflation period has been a sustained increase in wholesale electricity prices. This started around 2021, following major outages at New Zealand's key gas fields, which led to a shortage in fuel for operating several electricity generating stations.

Figure 3 provides a summary of these factors, comparing costs and prices at the beginning of 2021 against those costs and prices at the beginning of 2024.

FIGURE 3: INDICATORS OF CHANGES IN INDUSTRY COSTS
Percentage changes, 2021 to 2024 and 2017 to 2020. Raw (nominal) prices.



The 75% change in energy futures prices[8], shown at the bottom of Figure 3, illustrates the rise in the cost of the energy component of delivered electricity, faced by many retailers. Most, if

[7] For decades, large classes of consumer goods consistently declined in price – mainly imported products – even during periods of relatively high inflation. But this was not the case during the recent high inflation.
[8] For this indicator, we have adopted a simplified perspective of an electricity retailer making pricing decisions in the first quarter of a calendar year based on the average price of electricity futures contracts in the prior 12 months and with a view to the electricity being delivered 12 or more months ahead (known as long-dated electricity futures contracts). This would be a very unsophisticated strategy. But for our purposes it has the advantage of producing measures of wholesale electricity price/contract changes that are not overly sensitive to the precise dates we choose to compare – i.e. it smooths the numbers out.

not all, retailers buy contracts – whether futures or other contracts – to manage the risk to them of a spike in wholesale electricity prices.

Historically, the price of wholesale electricity has made up around one-third of residential electricity bills, and a significant majority of the costs that must be managed by electricity retailers.

Wholesale electricity prices have been high, by historical standards, for much of the period between 2021 and 2024. This has contributed to retailers facing significant cost pressures, which would be expected to result in higher retail electricity prices, all other things being equal.

The actual impact of relatively high wholesale electricity prices on individual retailers' costs will have varied depending on how each retailer managed their exposure to changes in the wholesale prices.

Retailers that generate electricity would have been less exposed to the risk of rising wholesale electricity prices.

Retailers with little or no electricity generation would have faced periods of rising costs (with some periods of falling costs[9]) through their exposure to wholesale electricity prices.

Electricity network charges (aka transmission and distribution lines charges) are another significant cost that goes into residential electricity bills – making up approximately 38% of the average residential electricity bill. Retailers have essentially no control over these costs, which in most cases are regulated by the Commerce Commission.

Lines charges for the use of transmission and distribution networks declined significantly in the years leading up to the start of the LFC regulations phase out.[10] However, in the past four years network charges have risen 12%.[11] While this is slower than consumer price inflation, it is still a cost that one would expect to be passed on to electricity users.

Over the same period, other costs of electricity retail operations have increased, including general producer input costs (+18%) (like rent) and wages (+11% on average across the economy).[12]

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[9] For example, in the year to March 2024, wholesale electricity prices were 2% lower on average than in the year to March 2021.

[10] Largely due to the Commerce Commission reducing the regulated rate of return on electricity network assets, in line with a period of low interest rates.

[11] This number is the national percentage change in lines charges between May 2021 and May 2024 according to the MBIE quarterly survey of domestic electricity prices.

[12] Here we present very high-level economy-wide indicators of cost inflation: the producer price index (PPI) for inputs for all industries and the labour cost index (LCI) for all industries. Doing this captures the wider economic environment and the associated broad implications for electricity retailers' operating costs. This is not intended to be an assessment of actual cost changes in New Zealand's electricity industry. We prefer not to use industry-specific measures when considering economic context because industry-specific measures very often capture the behavioural responses of firms in that industry, which is not necessarily useful for understanding context.

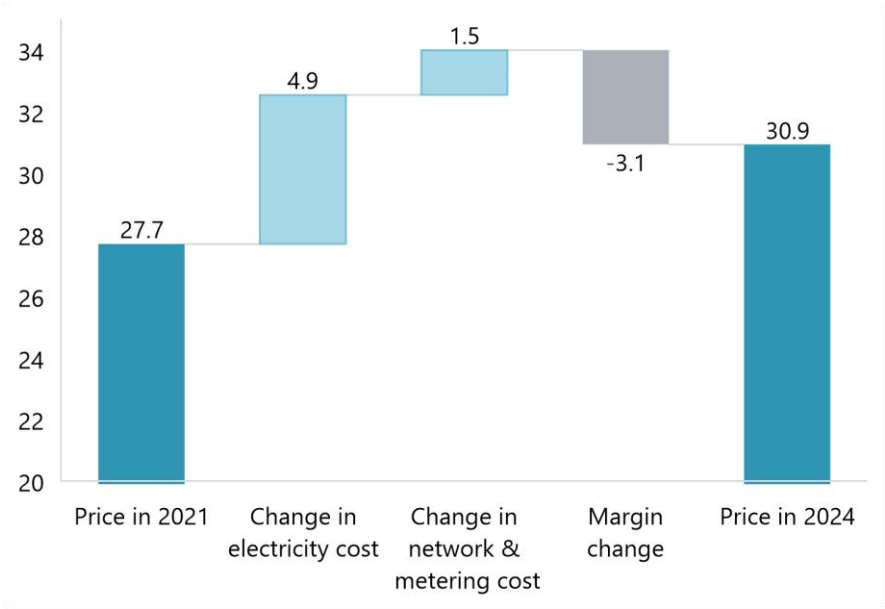
To put some of these cost changes in context, Figure 4 shows changes to electricity costs and network and metering costs between 2021 and 2024, in cents per kWh.

Wholesale electricity prices added 4.9 cents per kWh to the cost of retailing between 2021 and 2024. Increases in network and metering costs added a further 1.5 cents per kWh over this period.

If these costs had been passed on in full to residential electricity customers, residential electricity prices would have been 3.1 cents/kWh higher than what we observed for 2024 – i.e. we would have seen prices of 34 cents/kWh instead of 30.9 cents/kWh.

The 3.1 cent/kWh difference represents a squeezing of retailers' margins – a reduction in the amount of money retailers make, on average, for every kWh of electricity sold to residential electricity customers – as wages, interest, rent and other costs were rising between 2021 and 2024.

FIGURE 4: IMPACT OF COST INCREASES ON RETAIL PRICES AND MARGINS
Approximate[13] effects on average expenditure in cents per kWh



[13] This is a high-level estimate. The size of the margin reduction – 10% of 2024 prices – will not apply to every retailer. See the appendix for data and assumptions used to make these high-level estimates.

4. Impact of phase out

4.1. Direct effect of the phase out on electricity bills

In this sub-section we discuss the impact of the LFC regulations phase out on residential electricity customers' bills. This excludes changes in residential electricity bills due to the sorts of factors discussed in the previous section – factors that are unaffected by the phase out. In the next sub-section, we consider the impact of the LFC regulations phase out relative to other cost of living increases over the same period, including increases to electricity prices for reasons unrelated to the phase out.

The direct effect of the phase out of the LFC regulations over the period 1 April 2022 to 1 October 2024 has been to raise the electricity bills of low electricity users by 2% on average and reduce the bills of all other electricity users (non-low electricity users) by 2% on average.[14]

This direct effect is the difference in electricity bills with and without the phase out, holding all other things constant, such as electricity use (the counterfactual scenario – see this report's appendix for details on our method for calculating counterfactual prices).

This direct effect is entirely distributional in nature, in the sense that there is no change in revenue or profit for electricity suppliers.

The dollar impact on residential electricity customers' bills is shown in Figure 5. The impact ranges from an additional charge of $168 in 2024 for the very small proportion of residential electricity customers (0.04%) using up to 2,000 kWh a year, through to a saving of $156 in 2024 for the slightly larger proportion (2%) of customers using more than 16,000 kWh per year.

The savings for non-low electricity users are larger in absolute dollar terms than are the additional charges faced by low electricity users. This is because the former consume more electricity than the latter, and the main effect of the LFC regulations phase out is to alter the balance between charges levied per day of electricity use and charges levied per unit of electricity used.

This rebalancing of prices also benefits a substantial number of low user households. We estimate that 19% of low electricity users, approximately 260,000 households, had a reduction in their electricity bills in 2024 because of the LFC regulations phase out. These are households

[14] These are weighted averages, with retail prices by brand and geographic area (distribution network area or network reporting region) weighted by customer counts and the average price increase for the two generic types of residential electricity customer (i.e. low electricity users (consumers) and non-low electricity users (all other electricity consumers) weighted according to the proportion of the population (people in households) each customer group represents. The averages shown here are calculated for households above and below the low fixed charge volume benchmarks (the 8,000 kWh and 9,000 kWh benchmarks), irrespective of whether people are on low fixed tariffs. We have insufficient data to quantify the relative size of impacts on households that are on the low fixed tariff but would have been better off on the standard, and vice versa.

with consumption towards the top end of the low user category (7,000 - 9,000 kWh). The average bill reduction for these households was $37 in 2024.

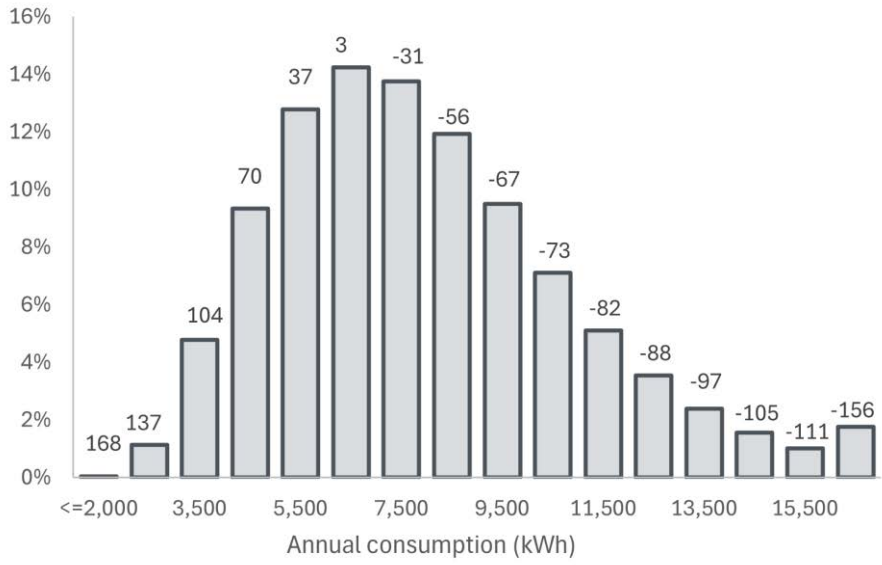
Figure 5 shows the bills of low electricity users consuming 6,000 to 7,000 kWh a year (14% of the population) increased by $3 in 2024, on average. That average includes increases for some households and decreases for others.

There is quite a bit of regional variation in the consumption level at which low electricity users have benefited from the phase out. This is due to differences in the regulatory benchmark for applying the LFC regulations (9,000 kWh in the lower South Island versus 8,000 kWh elsewhere), regional differences in consumption profiles, and regional differences in retail and network pricing.

In percentage terms (i.e. as a proportion of the electricity bill), the size of the phase out's impact is smaller for non-low electricity users and larger for low electricity users. For example, an increase of $70 in the annual electricity bill of a household using 4,000 to 5,000 kWh each year is a 5% increase in the annual electricity bill. This compares to a $70 reduction in the annual electricity bill of a household using 10,500 kWh per year equating to a 2.3% saving.

FIGURE 5: EFFECT OF PHASE OUT ON HOUSEHOLD ELECTRICITY BILLS IN 2024

Values above bars are changes in annual expenditure in 2024 at 'sticker' prices, i.e. including the effect of general inflation. Bars represent the percentage of all New Zealand electricity consumers[15] (measured on vertical axis). Consumption is in 1,000 kWh bands, with labels showing the arithmetic mid-points of bands.



[15] Counts of people as opposed to households or properties connected to the electricity networks.

4.2. Comparison with other changes to living costs

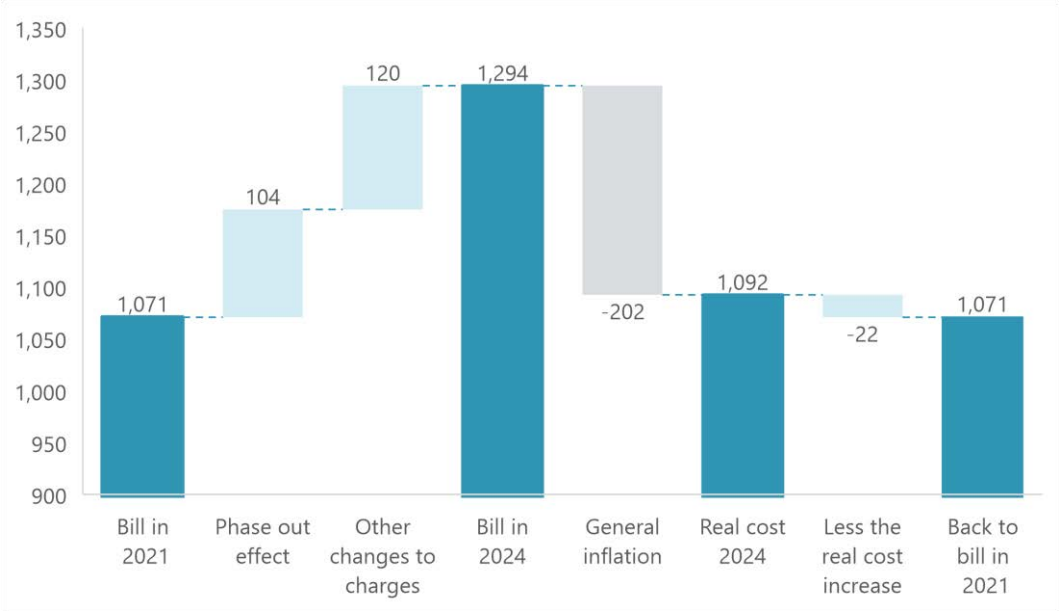
The changes in annual electricity bills shown in Figure 5 ignore general increases in New Zealanders' cost of living, including increases in residential electricity prices for reasons other than the effect of the LFC regulations phase out.

Therefore, we have put the price changes in Figure 5 into the context of general inflation in New Zealand over the 2021 – 2024 review period. We have done this by considering the contribution the LFC regulations phase out has made to changes in residential electricity bills alongside the size of changes in residential electricity bills that would have occurred if residential electricity prices had grown at the same rate as the average of all other consumer prices.

We find that the LFC regulations phase out has meant an increase in 2024 in the real (i.e. inflation adjusted) cost of electricity for residential electricity customers using less than 4,000 kWh. In contrast, for residential electricity customers using 4,000 kWh or more of electricity each year, the cost of electricity has declined relative to the cost of other goods and services in New Zealand.

An example of the increase in the real cost of electricity due to the phase out, is shown in Figure 6. In this example, the annual electricity bill for a household using between 3,000 and 4,000 kWh per year has risen by $224 since 2021, from $1,071 to $1294. Nearly half of that change is due to the phase out (+$104).

FIGURE 6: INCREASE IN REAL COST OF ELECTRICITY FOR A LOW ELECTRICITY USER
Annual bill, evaluated at the mean consumption above 3,000 kWh but below 4,000 kWh



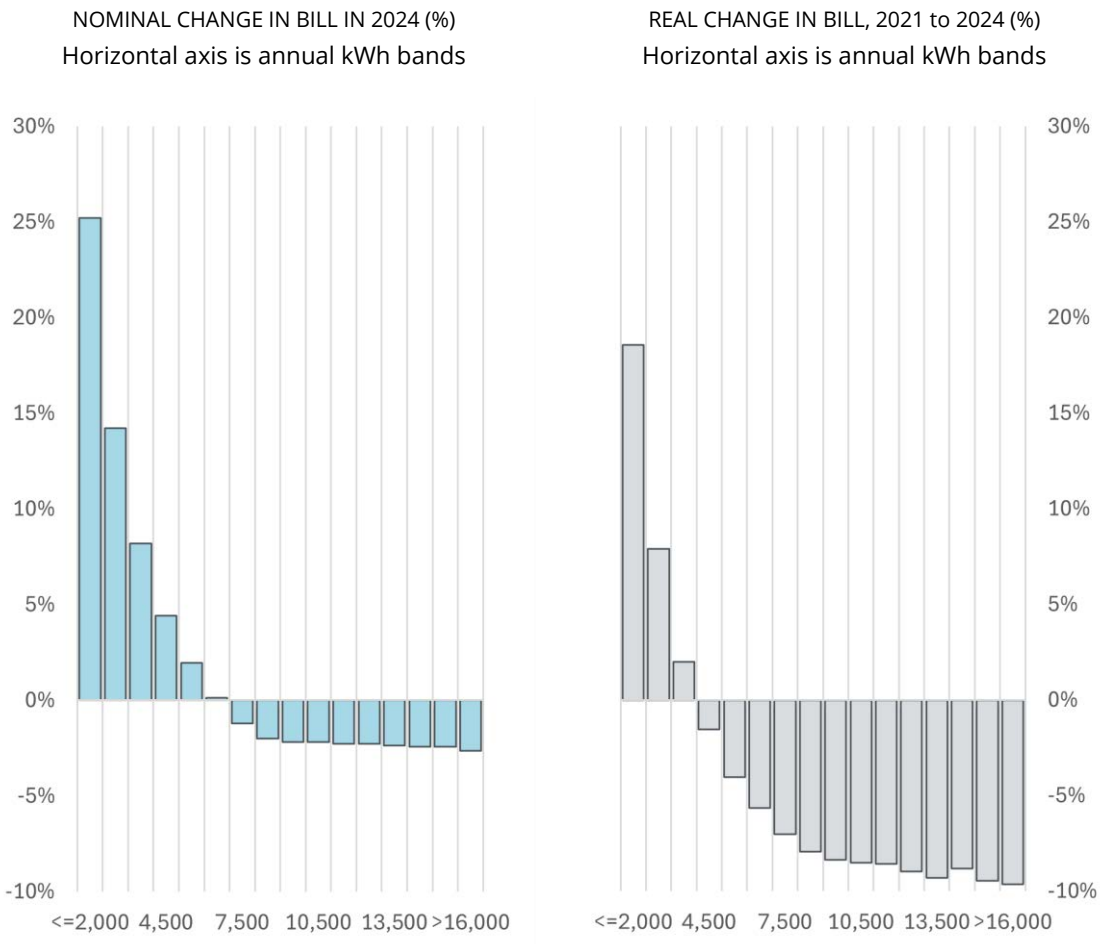
Deducting the impact of general inflation (-$202) provides a measure of the cost increase relative to all other consumer prices i.e. the real cost of electricity; here the real cost in 2024 is $1,092. Comparing that to the household's bill in 2021, we see that the household's real cost of

electricity has risen by $22 since 2021 (a 2% increase). If the phase out had not occurred, the household's electricity cost would have decreased relative to the cost of all other consumer goods and services. Thus, we conclude that the phase out has caused a real increase in the household's electricity costs.

Figure 7 presents estimates of average changes in residential electricity bills, after inflation, for all bands of electricity use (in 1,000 kWh increments). Again, only households consuming less than 4,000 kWh are (on average) facing higher real bills – for now and at least until 31 March 2025.

Importantly, there are variations around these results. These are averages and there have been a range of residential electricity price changes by different retailers and distributors. This is something we examine in the next section of this report.

FIGURE 7: NOMINAL VS REAL CHANGE IN BILLS



It is important to weigh electricity price effects against general inflation

Residential electricity prices do not have to track general (consumer price) inflation closely. But a comparison to general inflation makes sense, because it gives an approximation to changes in households' purchasing power.

Broadly speaking, wages and benefits rise with inflation. So, by comparing changes in residential electricity prices to the general rate of inflation in New Zealand, we get a sense of whether the residential electricity price changes are reducing households' overall purchasing power (i.e. real incomes).

For example, if residential electricity prices grow more slowly than other prices in the economy then households' incomes will go further, which is positive.[16] By way of a further example, New Zealand superannuation rates have increased by almost 20% over the past three years – because they are indexed to economic conditions[17]. It would be somewhat misleading not to consider this sort of (nominal) income increase when judging the impact of the LFC regulations phase out.

It would also be unreasonable to assume, as a starting point, that a subset of New Zealand firms (i.e. firms in the electricity industry), or their workers, might absorb cost increases due to general inflation, including sharp rises in some input costs.

4.3. Effects by household type and income

A useful way to gauge the consequences of the LFC regulations phase out for different households is to measure the size of direct effects on electricity bills as a percentage of household income (see Figure 8).

From this perspective we see that the rebalancing of residential electricity tariffs over the past three years has, on average, had a relatively modest effect on households' purchasing power. Few households have had an increase in electricity bills greater than 0.2% of income.

The largest effect is on low-income single person households where, on average, expenditure on electricity has increased by 0.6% of income.[18] This effect is larger than for a household comprising a single person over 65, where the direct effect on electricity expenditure is 0.3% of income. This is because, in the lower quintile of incomes, people over 65 typically earn more than people under 65. Also, single people under 65 typically use less electricity than single people over 65 and consequently the low fixed charge phase out has increased their bills by more than for people over 65 (see Figure 9).

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[16] Other things being equal (i.e. investment in the economy continues to occur, the lights stay on, and costs are not hidden in public spending/taxation).
[17] The exact method has changed periodically – from indexation to consumer prices to indexation to wages and recently back to indexation to consumer prices.
[18] The effect sizes shown are likely to be a little overstated because we have compared electricity bill changes as at 2024 to incomes in 2023. Income data for 2024 is not yet available.

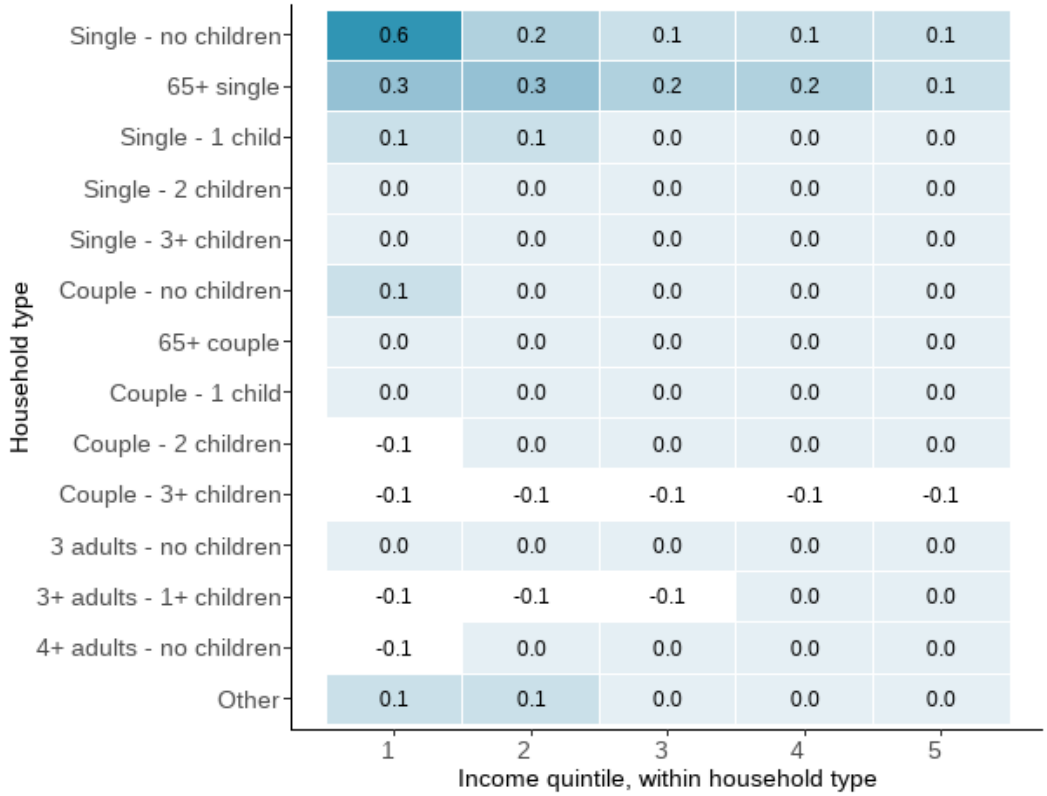
Whether under 65 or over 65, the change in electricity expenditure as a share of income is highest for people living alone – amongst all household types – because electricity is a higher share of total expenditure for these households.

For large households, electricity is a smaller share of total expenditure. Therefore, on average, the savings they get from the LFC regulations phase out, while larger in dollar terms, are a smaller share of total household spending or income.

These are of course only average effects. Within each household type and income quintile there will be households whose electricity bills have gone up due to the phase out and households whose electricity bills have gone down.

FIGURE 8: DIRECT EXPENDITURE EFFECT, AS A PERCENTAGE OF INCOME

Average increase in electricity bill in 2024 as a percentage of 2023 average disposable income by household type and income quintile

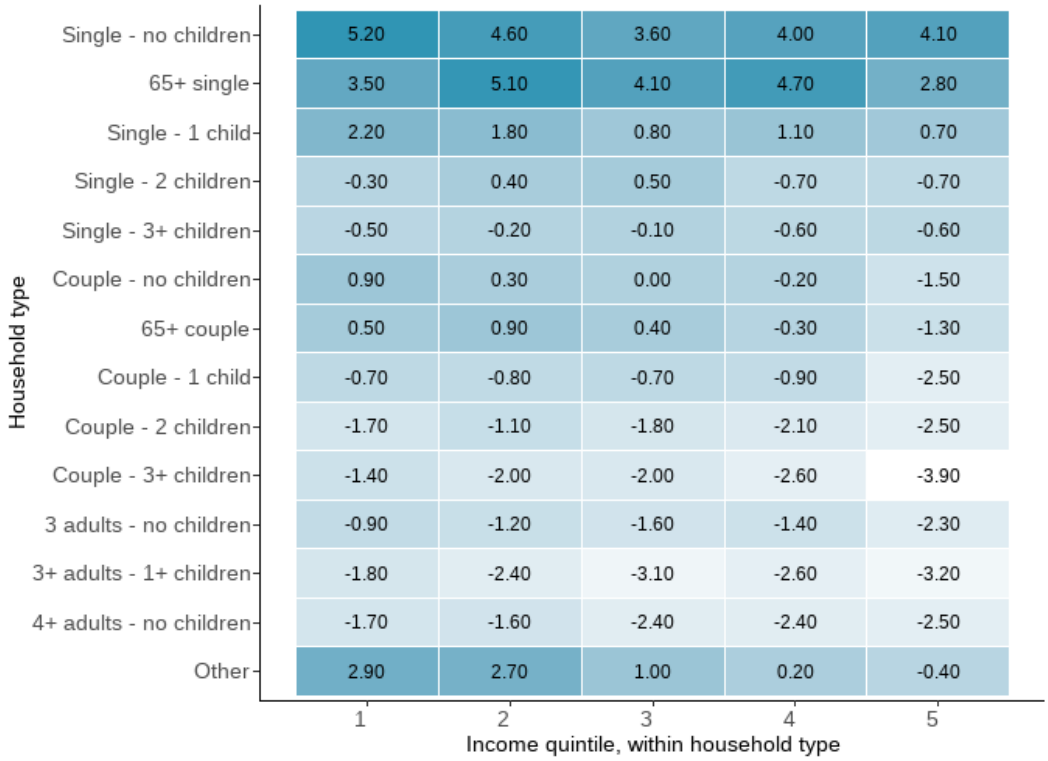


So, it would be incorrect to assume that all large single parent families' electricity bills will have decreased by 0.5% as shown in Figure 9. Some of these households will have had even lower bills while others will have had an increase.

Similarly, it would be incorrect to assume that the change in electricity bills of all low income two-parent two-child families is a reduction of 1.7%, again as shown in Figure 9. Some of these families will have had a much larger reduction and some will have had a smaller reduction or an increase – albeit likely a small one.

We can observe confidently that these numbers imply the LFC regulations before the start of the phase out resulted in a wealth transfer from large households to small households, and that this included a wealth transfer from large low-income households to small high-income households.

FIGURE 9: DIRECT EXPENDITURE EFFECT, PERCENTAGE CHANGE IN BILLS
Average percentage change in bills. Not inflation adjusted.



Furthermore, prior analysis has shown that these effects have tended, on balance, to increase inequality amongst residential electricity customers in New Zealand.[19]

Considering such overall effects of the LFC regulations points to one of the reasons for the phase out – namely to remove distortions in residential electricity pricing and wrong signals about electricity supply costs, both of which have potentially negative effects on social welfare.

The LFC regulations phase out has not directly affected the cost of electricity supply. Consequently, the phase out can have only a very limited effect on the overall net wellbeing or welfare of New Zealanders.

In the longer run, however, the real benefits of the phase out will come from changes in real resources costs, through a closer relationship between electricity prices and electricity supply costs. That should help ensure that increases in electricity use do not face a penalty, by dint of

[19] See Stephenson, J (2021). All you can heat? Welfare implications of high fixed charge tariffs for electricity. MSc Thesis. University of Otago.

regulation, and that people invest in new domestic devices that use or produce electricity with a reasonable degree of certainty that they are getting good signals about the relative (real) costs of alternatives.

5. Changes in distributors' pricing

5.1. Distribution pricing prior to the phase out

Distribution prices are used to pay for network assets

Distribution prices are mainly used to pay for distribution network assets that are in place. Most distributors' revenue is regulated by the Commerce Commission, which focusses on ensuring distributors receive a reasonable rate of return on their assets.

Distribution prices typically rise at the rate of consumer price inflation

Over the past three years distributors' total revenue recovered from residential electricity consumers has risen by roughly the rate of consumer price inflation – 18.5% over three years.

This is in large part because regulated firms, such as electricity distributors, are generally allowed to increase their prices by consumer price inflation. So, they do, which ensures that the costs of distribution network investments are properly recovered.

Range of different methods used for setting prices

Distributors have a range of different pricing practices and price levels, reflecting wide ranges in the economic and geographic character of New Zealand's electricity distribution networks.

Broadly speaking the cost of providing distribution lines services is lower for more densely populated areas. Therefore, distribution prices, on a per customer and per kWh basis, tend to be much lower in New Zealand's cities than in the towns and rural areas.

Distributors have discretion to structure their prices as they see fit. However, they are expected to set their prices in accordance with a set of pricing principles produced by the Electricity Authority.

Distributors have been encouraged to adapt pricing methods

Over the past decade, the Electricity Authority has been actively encouraging distributors to alter their pricing if they need to encourage people to cut back on electricity consumption at times when electricity transferred across the distribution network is nearing the network's capacity. Specifically, the Electricity Authority has been encouraging distributors to reduce their use of prices that are based on electricity use (i.e. kWh used), and to increase their use of fixed charges (e.g. per-day charges) or peak demand charges (e.g. kWh used at those times of the day/night when electricity demand is very high).

The Authority has been encouraging distributors to change their pricing because of:

- falling costs of generating electricity and managing electricity demand in homes (e.g. the improved availability and affordability of solar photovoltaic panels and electricity storage batteries, and the increased effectiveness of IT for coordinating demand)

- a potential step change in demand for electricity, including the possibility of a significant increase in demand at particular times of the day or night (e.g, people charging their electric vehicles at the same time).

Increased consumer participation in electricity supply and demand management means it has become increasingly important not to send false signals about the costs of electricity supply.

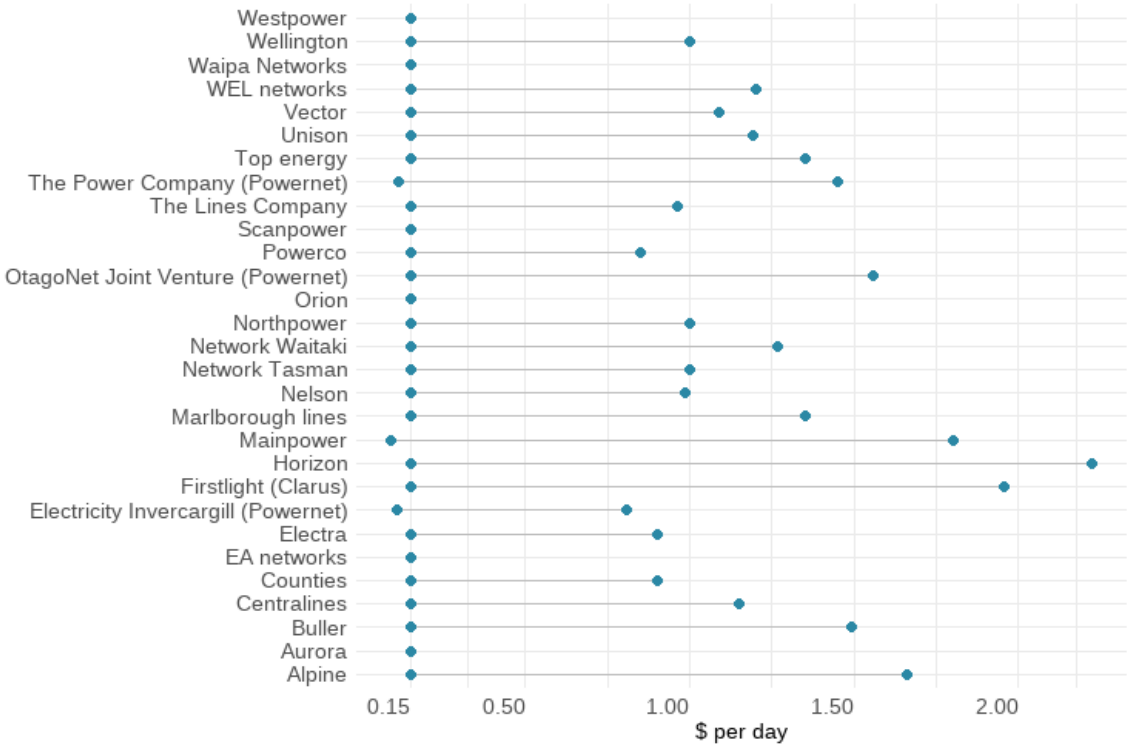
Conversely, the potential for increased demand and costs on local electricity distribution networks means it has become increasingly important to signal actual costs of electricity supply.

Most distributors set low fixed charges at the regulated maximum

Prior to the LFC regulations phase out commencing, six electricity distributors had only low fixed charges (Aurora Energy, EA Networks, Orion, Scanpower, Waipa Networks, Westpower – see Figure 10). A further electricity distributor (Powerco) had only low fixed charges in some of its networks. The distribution network areas with only low fixed charges served 25% of New Zealand households.

Additionally, in 2021 a further three distributors had low fixed charges for residential consumers that were between 4 and 7 cents less than the regulated maximum of 15 cents. All other distributors had low fixed charges set at exactly the regulated maximum.

FIGURE 10: RANGES FOR DISTRIBUTORS RESIDENTIAL FIXED CHARGES IN 2021
Left-most points are low fixed electricity distribution charges. Right-most points are non-low user (standard) fixed electricity distribution charges



All electricity distribution networks with different low user and non-low user (standard) distribution prices had standard daily fixed charges that were many times higher than the maximum low fixed charge of 15 cents – on average 7.5 times higher.

This difference was partially reversed by charging low electricity users higher variable (per kWh) distribution prices than standard users. On average, low electricity users were charged 50% more per kWh than non-low electricity / standard users.

Revenue was recovered from users in proportion to electricity use

Table 1 summarises the share of distribution revenue recovered from low electricity users and non-low electricity users / standard electricity users across New Zealand. We have included those electricity distribution areas where there are no differences between low user and standard user distribution prices, but where we have allocated revenue across low users and standard users based on consumption profiles.

In 2021, low electricity users and standard electricity users collectively paid for distribution services in proportion to the amount of electricity each group used (i.e. on average low users paid 57% of a distributor's network costs while standard users paid 43%). The implication of this for costs per household is that standard users paid on average $990 per household and low users paid on average $613 per household.

This shows the recovery of distribution revenue from electricity customers was dominated by variable (per kWh) charges.

By comparison, for illustration, if all distribution revenue was to have been recovered by fixed charges, 66% of distributors' revenue would have come from low electricity users. The annual cost for a household would have been $734 regardless of how much electricity the household used.

TABLE 1: SHARES OF DISTRIBUTION REVENUE[20]
Distribution prices for the one-year period starting 1 April 2021

Baseline	Low user	Standard user
Share of households	66%	34%
Share of electricity used	57%	43%
Share of fixed charges	22%	78%
Share of variable charges	67%	33%
Share of distribution revenue	57%	43%
Distribution revenue per household	$613	$990

[20] These numbers include transmission charges where these are an explicit part of residential pricing.

5.2. Changes since the start of the phase out

Distributors have raised fixed charges roughly in line with what is allowed

The LFC regulations phase out has allowed electricity distributors' low fixed charges to rise from a maximum of 15 cents per day in 2021 to a maximum of 60 cents per day in 2024.

Since 2021 electricity distributors have raised fixed charges for low electricity users at roughly the rate allowed by the phase out. At 58 cents per day, low fixed charges are on average only slightly lower than the regulated maximum of 60 cents per day (see Table 2).

Since the LFC regulations phase out started, there has been an increase in the number of electricity distributors choosing to set low user fixed charges below the regulated maximum. In 2024, 18 percent of low electricity users are on low fixed charges. On average these low fixed charges are 8 cents (13%) lower than the regulated maximum.

However, all distributors have raised low user fixed charges above the 15-cent maximum that was in place in 2021.

TABLE 2: AVERAGE FIXED CHARGES IN DISTRIBUTORS PRICING
Fixed charge measures are averages across distributors weighted by counts of customers.

Year	Standard fixed charges ($/day)	Low fixed charges ($/day)	Number of low users (millions)	% of customers on low fixed charges	% of low users with fixed rates lower than allowed
2021	1.12	0.15	1.23	66	2
2022	1.18	0.29	1.32	67	10
2023	1.38	0.44	1.34	67	10
2024	1.47	0.58	1.28	64[21]	18
Change 2021-2024	31%	290%	4%	-3%	800%
Change relative to CPI	13%	271%			

Increase in shares of revenue recovered from low users

The share of revenue recovered low electricity users has increased. The precise size of this increase between 2021 and 2024 is uncertain – because volumes of electricity demand for 2024 are not yet available. However, between 2021 and 2023 low electricity users' share of distribution charges increased by two percentage points – from 57% to 59%.

The gap in charges per household, between low electricity users and standard electricity users, has shrunk appreciably, from a 60% difference in 2021 ($377 more per year per household for

[21] This number is from distributors' forecasts/expectations for the 2024 distribution pricing year (1 April 2024 – 31 March 2025). It is not an actual observation.

standard users) to a 40% difference in 2023 ($289 more per year per household for standard users).

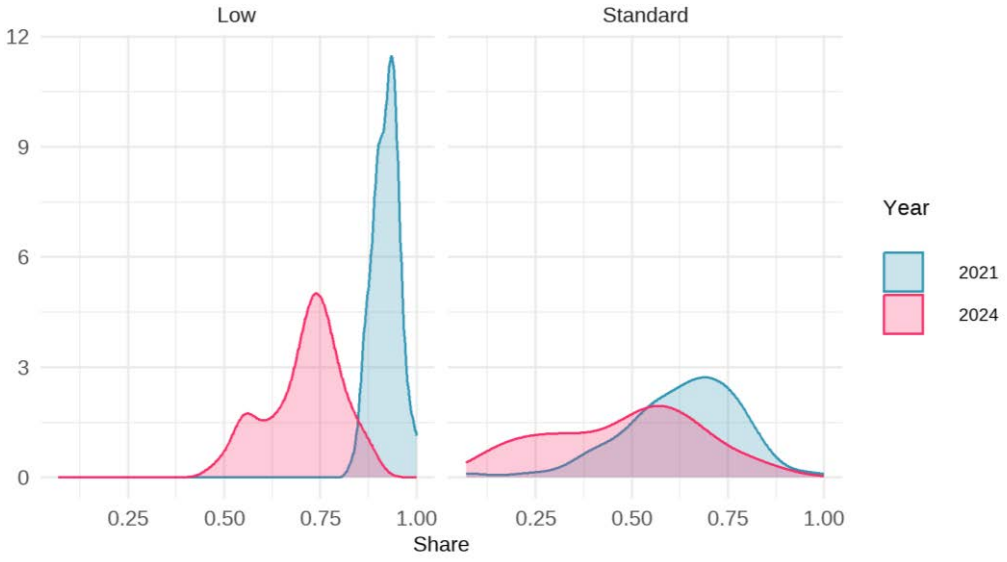
Low electricity users still pay much more in variable electricity charges than do standard users, because the transitional price caps on low user fixed charges maintain a significant difference between low user fixed charges and standard fixed charges. Indeed, low electricity users accounted for 70% of revenue from variable charges, as compared to 67% in 2021.

Reduction in reliance on variable charges

That said, electricity distributors' reliance on variable charges for collecting revenue has reduced. So, while low electricity users' share of variable charges has increased, variable charges now make up a smaller proportion of distribution revenue, for both low user and standard user residential electricity consumers.

Between 2021 and 2023 the share of revenue collected from variable electricity distribution charges fell from 77% to 65%. Forecasts for the year beginning 1 April 2024 suggest it will fall further this year to around 60%. The effect of this for low electricity users is particularly pronounced, as shown in Figure 11.

FIGURE 11: SHARES OF VARIABLE CHARGES IN DISTRIBUTION PRICES
Shares of revenue recovered using variable charges, across all electricity distributors and pricing categories. These are probability densities. The area under each curve is equal to one, accounting for the scaling factor on the left axis.



Variable residential electricity prices have fallen regardless of time of use

In recent years there has been a move towards more cost-reflective distribution prices. This has resulted in an increase in the number of different prices that electricity distributors use, including prices linked to when consumers use electricity (time-of-use prices).

There is a lot of variation in how these time-of-use prices are applied – from different time periods to variations in price differentials across time periods.

Electricity distributors have for a long time had different prices attached to the use of electricity overnight (e.g. between 11pm and 7am), when electricity demand has traditionally been low, and the use of electricity during the day and evening when demand is typically higher. These are the 'Day' and 'Night' tariffs in Table 3 below.

Increasingly, distributors are making more nuanced distinctions between peak electricity demand periods and other times of the 24-hour day and night period.

Electricity demand typically peaks during weekday mornings and weekday evenings in the winter. So, distributors have begun having higher prices for these morning and evening peaks. Daytime demand outside of these peak times is given a 'shoulder' price, and overnight demand and, sometimes weekend demand, is given another "off-peak" price.[22]

We expected the largest reductions in variable charges to be seen in shoulder, off-peak and night distribution prices because these have been the least cost-reflective variable prices.

However, there are no persistent differences between changes in peak demand period distribution prices and changes in distribution prices at other times of use. Variable distribution prices have fallen across the board, excluding a minor change in 'Night' prices, which have increased on average nationally because of changes in tariff structures – i.e. some distributors with lower night prices have stopped using night prices.

This suggests electricity distributors have been careful to manage price changes so as not to cause very abrupt changes in consumers' electricity bills or too much risk to distribution revenue.

This can also be read as an indication that the LFC regulations continue to exert an influence on distribution pricing methodologies and so prevent more cost-reflective distribution prices.

We do not see any convincing evidence that the LFC regulations phase out has prompted innovation in electricity distribution pricing methodologies, yet.

As long as the LFC regulations remain, electricity distributors will continue to be constrained in how they price their services.

[22] We note that some distributors simply use peak and off-peak distribution prices, without shoulder period prices.

TABLE 3: CHANGES IN VARIABLE DISTRIBUTION CHARGES BY TIME OF USE

	Low user tariffs						
Year	Anytime	Day	Night	Peak	Shoulder	Off-peak	**Average**
2021	0.122	0.120	0.056	0.166	0.130	0.080	0.124
2022	0.109	0.113	0.059	0.151	0.117	0.076	0.114
2023	0.105	0.117	0.069	0.138	0.107	0.071	0.109
2024	0.105	0.125	0.069	0.145	0.117	0.071	0.113
Change 2021-2024	-14%	4%	23%	-13%	-10%	-11%	-9%
Change relative to CPI	-32%	-14%	5%	-31%	-29%	-30%	-27%

	Standard user tariffs						
Year	Anytime	Day	Night	Peak	Shoulder	Off-peak	**Average**
2021	0.075	0.076	0.021	0.134	0.089	0.05	0.084
2022	0.072	0.063	0.024	0.115	0.08	0.043	0.08
2023	0.066	0.056	0.025	0.100	0.076	0.043	0.074
2024	0.066	0.061	0.02	0.103	0.076	0.033	0.076
Change 2021-2024	-12%	-20%	-5%	-23%	-15%	-34%	-10%
Change relative to CPI	-31%	-38%	-23%	-42%	-33%	-53%	-28%

6. Changes in retailers' pricing

6.1. Changes since the start of the phase out

Retailers have raised fixed charges more slowly than allowed

Retailers' low electricity user fixed charges have increased since the start of the LFC regulations phase out, but at a rate that is quite a bit lower than allowed by the LFC regulations.

In 2024 the average low user fixed charge, in our sample, was 91 cents per day (see Table 4). That is a substantial increase on the average of 30 cents per day in 2021, but 25% lower than the regulated maximum of $1.20 per day.

A few retail brands with relatively small market shares have increased low user fixed charges to $1.20 per day, but they are the exception.

The level of fixed charges appears to be a point of differentiation for some retail brands. These brands have fixed daily charges that are lower than the fixed daily charges they will be paying to distributors (i.e. lower than 60 cents per day).

Overall, the share of retailer revenue coming from fixed charges has increased from 13% in 2021 to 20% in 2024.

TABLE 4: AVERAGE RETAIL FIXED CHARGES

Averages of prices are weighted by counts of customers i.e. shares of customers by retail price plan.

Year	Standard fixed charges ($/day)	Low fixed charges ($/day)	Number of low users (millions)	% of customers on low fixed charges	% of low users with fixed rates lower than allowed
2021	1.62	0.30	1.02	59	8
2022	1.70	0.39	1.12	59	74
2023	1.82	0.63	1.16	58	68
2024	1.97	0.91	1.06	57	71
Change, 2021-2024	22%	200%	4%	-3%	788%
Change relative to CPI	3%	182%			

Low electricity user variable prices have flatlined

Variable prices for low electricity users have flatlined in nominal terms (i.e. including effects of general inflation). The average variable rate was 27 cents per kWh in 2021, increased a little in the first two years of the LFC regulations phase out, and is currently back at 27 cents per kWh. This is despite the significant inflation in New Zealand over the corresponding period.

This is a surprising result. We expected a reduction in the rate of growth for variable prices for low electricity users – since low user fixed distribution prices have increased and low user variable distribution prices are lower. We did not expect that retailers' low user variable prices would remain essentially unchanged after 3 years.

TABLE 5: AVERAGE CHANGES IN RETAILER TARIFFS

Customer-weighted averages across pricing plans and retail electricity brands and distribution network areas. Average cost is estimated total expenditure divided by estimated kWh.

	Low user tariffs			**Standard tariffs**		
Year	Fixed ($/day)	Variable ($/kwh)	Average cost ($/kWh)	Fixed ($/day)	Variable ($/kWh)	Average cost ($/kWh)
2021	0.300	0.270	0.290	1.620	0.210	0.260
2022	0.390	0.280	0.310	1.700	0.220	0.270
2023	0.630	0.280	0.320	1.820	0.220	0.270
2024	0.910	0.270	0.340	1.980	0.220	0.280
Change 2021-2024	203%	0%	17%	22%	5%	8%
Change relative to CPI	185%	-19%	-1%	4%	-14%	-11%

Residential prices have increased slowly in the past 3 years

On the whole, over the period 2021 – 2024 residential electricity prices in New Zealand have declined, on average, compared to the cost of other goods and services. This is true for both low electricity user households and higher electricity user households.

As shown in Table 5, the average cost of electricity for low electricity users increased by one percentage point less than the consumer price index. The average cost of electricity for standard electricity users increased by 11 percentage points less than the consumer price index.

To further put this into perspective, the median disposable income of New Zealand households grew by 9% between 2021 and 2023 (2024 data is not yet available). And, as noted earlier, some benefit rates such as New Zealand superannuation have increased by more than the rate of consumer price inflation over the past three years.

This is not at all to diminish the difficulties created by high inflation, high interest rates and increasing unemployment. It is just to note that, in light of those things, the changes in residential electricity prices have been small.

Some retailers have raised prices by much more than the average

The variation in residential electricity price changes over the period 2021 – 2024 is illustrated in Table 6.

Price increases for smaller electricity retailers have, on average, been higher than for large electricity retailers with substantial amounts of electricity generation (hence the label 'gentailers').[23]

Several retailers have raised prices significantly – but their customer bases are not sufficiently large to register a notable effect on overall average residential prices.

As Table 6 shows, one retailer has raised prices for low electricity users by as much as 43% since 2021 and prices for standard users by 38%. These sorts of price increases accord more with what we might have expected given the rise in electricity supply costs (e.g. wholesale electricity prices) in recent years.

We think there is a good chance that residential electricity prices will increase in 2025 because of the significant apparent pressure on retailer margins. That said, one of the presumed benefits of having vertically integrated generator-retailers is that it can mute price increases – generator-retailers are better able to absorb cost increases.

TABLE 6: VARIATIONS IN RETAIL BRANDS' PRICES AND PRICE CHANGES

Price per kWh calculated as revenue divided by kWh. Averages do not include any weighting for market shares.[24]

		Large gentailers		Other retailers	
		Low user	Standard	Low user	Standard
2021, $/kWh	Average	0.29	0.25	0.29	0.25
	Minimum	0.25	0.22	0.26	0.23
	Maximum	0.31	0.27	0.31	0.28
2024, $/kWh	Average	0.33	0.27	0.36	0.29
	Minimum	0.28	0.24	0.28	0.24
	Maximum	0.36	0.30	0.40	0.33
% change, 2021-2024[25]	Average	16%	10%	27%	20%
	Minimum	10%	4%	11%	4%
	Maximum	22%	13%	43%	38%

We are unsure why residential electricity prices have not risen more

We still find the extent of the present reduction in margins quite surprising. There could be several factors behind why large gentailers have not raised prices by more than they have.

[23] For this table, we include Genesis Energy, Contact Energy, Meridian Energy, and Mercury as gentailers. Pulse / Pioneer Energy and Nova Energy are not included, though they do have non-trivial amounts of generation.
[24] Brands' average prices are weighted by customer counts per plan.
[25] These are the average, minimum and maximum percentage changes by brand. Thus, they do not align with the other values in the table. For example, the largest (maximum) percentage need not be from the brand with either the maximum or minimum price in 2021 or 2024.

Though we have no data/evidence to be able to identify or quantify those factors, we can at least speculate that it could be due to a combination of any or all of:

- expectations that wholesale electricity price increases were temporary, with the imminent commissioning of new generation (e.g. the recent addition of Contact Energy's new Tauhara generating station)
- sufficient electricity hedges, whether physical or financial, to not "need" to increase residential electricity prices for a time
- concern about losing residential market share
    - in a market that is promising long-run volume growth through electrification
    - as many residential electricity consumers become more price sensitive due to the rising cost of living and any visible effects on electricity bills from the LFC regulations phase out
- a defensive position against an increased likelihood of regulatory intervention due to the rising cost of living and associated political sensitivity to cost increases in basic household expenditure items.

We expect that some commentators would add anti-competitive behaviour to this list (e.g. predatory pricing). While we accept this is always a possibility, we think it is a far too easily inferred answer to questions about electricity prices and too often based on conjecture rather than fact.[26]

There has been an increase in low users' share of electricity costs

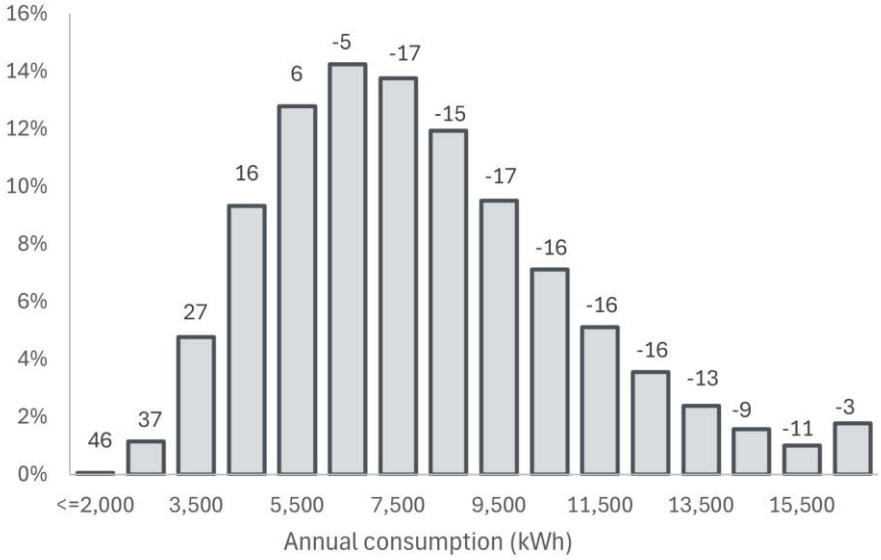
Though headline prices have been subdued, it is the case that the LFC regulations phase out has led to a rebalancing of electricity costs between households who use an above average amount of electricity and households who use a below average amount of electricity.

The retailer portion of electricity bills for low users has increased as a result – albeit the 'sticker' price in nominal terms (including the effect of general inflation).

This effect is shown in Figure 12. This shows the impact of the LFC regulations phase out on electricity bills in 2024, excluding the effects that electricity distributors' prices had on bills.

[26] By which we mean that people accept the premise and blame a lack of workable competition when they see electricity prices rise and then blame a lack of workable competition if they see electricity prices fall.

FIGURE 12: RETAILER COMPONENT OF PHASE OUT EFFECT ON ELECTRICITY BILLS
Values above bars are the change in annual residential electricity expenditure in 2024 at 'sticker' prices, i.e. including the effect of general inflation. Bars are the percentage of all New Zealand residential electricity consumers (measured on the vertical axis)



6.2. Pass-through of distribution price changes

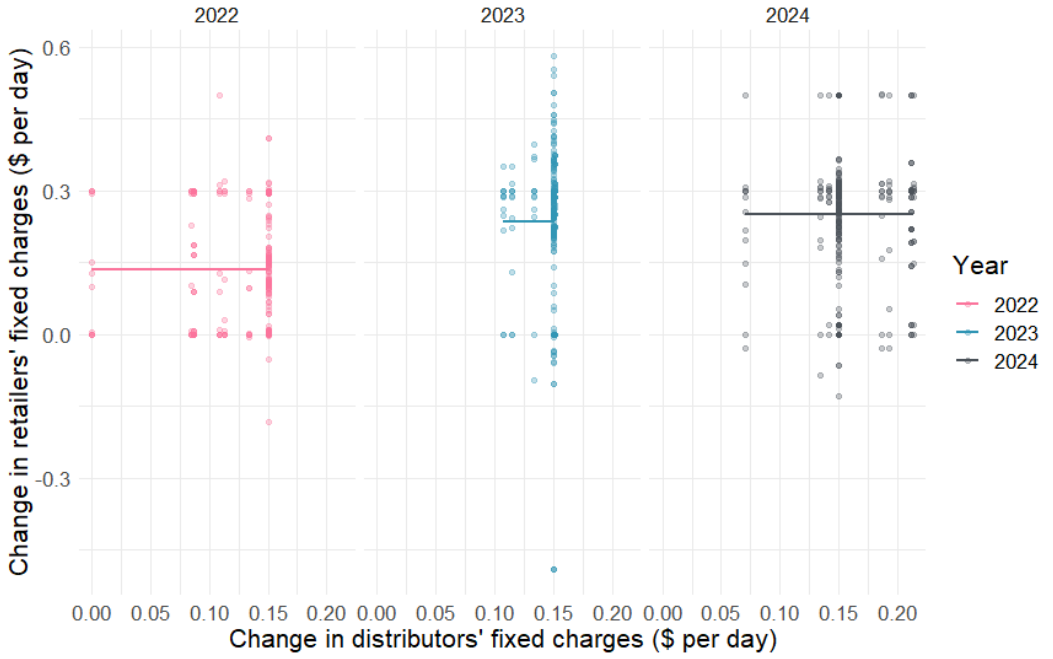
Electricity retailers' pricing has changed the least in respect of low user fixed charges, when one considers the changes to low fixed charges that have occurred in electricity distributors' pricing. This can be seen in Figure 13, where there is no apparent correlation between changes in distributors' low fixed charges and changes in retailers' low fixed charges.

Other changes to residential electricity prices are related to changes in distribution prices – reflecting a pass-through of costs to residential consumers (see this report's appendix for data and charts).

However, in general this relationship does not appear to hold for low fixed charges. This raises the possibility that some retailers are actively managing the effects of LFC regulations phase out on low electricity users.

FIGURE 13: CHANGE IN LOW FIXED CHARGES: DISTRIBUTION VS RETAIL

Dots are observations by retail brand and electricity distribution network. Lines summarise the relationship between retailers' and distributors' prices.[27]



6.3. Regional variation

There are few pronounced differences in the effects of the LFC regulations phase out at a regional level. The one major exception is Otago. The electricity distribution company there (Aurora Energy) uses only low user fixed charges. In some areas of Otago the main beneficiaries of low user charges appear to be those consuming very low amounts of electricity – by national and regional averages. As a result, our estimate of counterfactual prices shows comparatively small increases in the electricity bills of low electricity users in Otago under the phase out.

Elsewhere, the impacts of the LFC regulations phase out by region result from idiosyncrasies and geographic differences. The net effect of these on households' electricity bills is ambiguous – in terms of relativities with the rest of New Zealand.

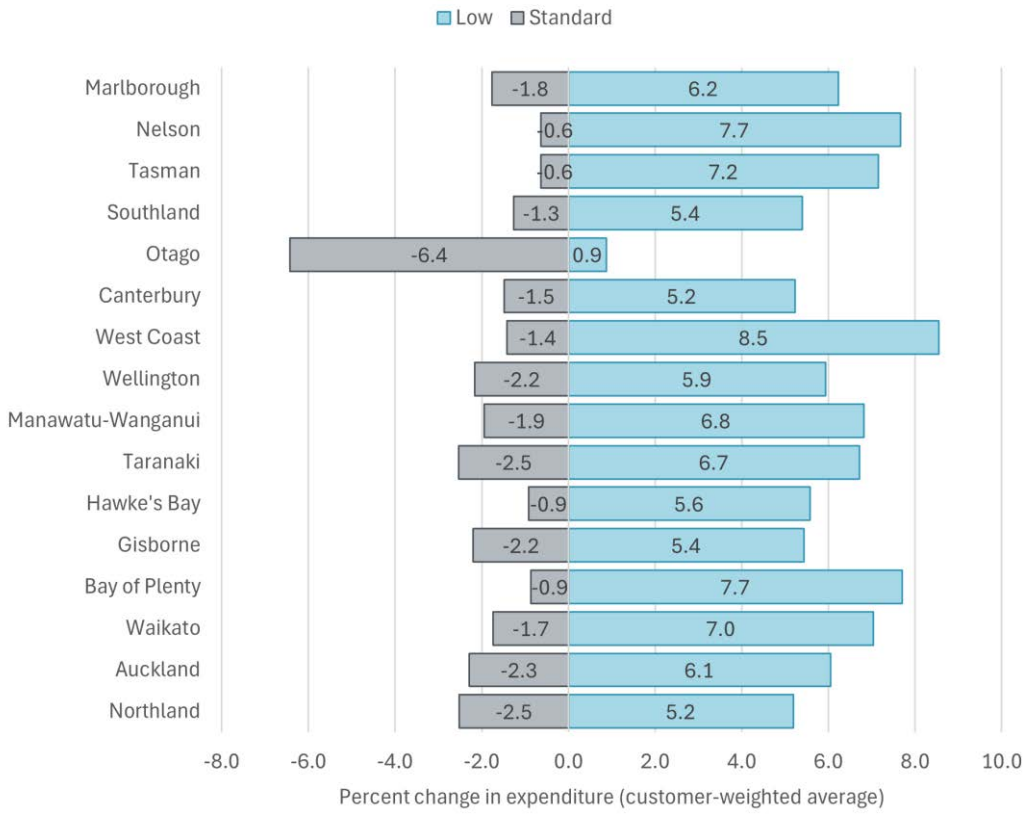
An example of this is Northland. There one might expect potentially larger effects of the LFC regulations phase out on low electricity users – simply because there are relatively more of them in Northland than other regions. However, this does not appear to be the case. A relatively low increase in electricity bills for low electricity users (an 5.2% increase) appears to be a result of higher residential electricity prices in Northland. These higher residential prices

[27] Bivariate linear least-square fits.

are for reasons that have nothing to do with the low fixed charge and the pricing of the electricity distributors in the region (which has favoured low electricity users beyond that required by the LFC regulations).

FIGURE 14: AVERAGE EFFECT OF PHASE OUT ON RESIDENTIAL ELECTRICITY BILLS BY REGION

Percentage change in residential electricity bills in 2024. Nominal (including the effect of general inflation)



Appendix: Data and methods

Typical household electricity consumption

To estimate household electricity consumption by income and household size, we combined data from several sources. The main source was expenditure survey data:

- Stephenson (2021)[28], estimated average electricity consumption by household and income between 2007 and 2019 using unit record data from Stats NZ's household economic survey and representative price measures
- We updated those estimates using
    - Stats NZ's household economic survey of expenditure for 2019 and 2023
    - Stat's NZ's estimates of household income for 2019 and 2023
    - the Electricity Authority's estimates of residential consumption trends, which include estimates of percentiles of residential consumption.

Table 7 presents an example of the household expenditure data we used. It presents mean shares of household expenditure on electricity by household type and income quintile.

The shares in the table are averages over two surveys (2019 and 2023). Combining survey years assists with smoothing out idiosyncratic sampling variation that occurs especially for rarer (larger) household types. Stats NZ's household expenditure survey typically achieves sample sizes of 3,000 households. This means that only a small number of rarer household types are sampled.

To update the kWh consumption estimates in Stephenson (2021) we held constant the differences between households – consumption relative to the New Zealand mean - and updated the levels to align with the Electricity Authority's estimate of mean residential electricity consumption.

This process, along with updated data on household counts and incomes, allowed us to estimate overall consumption of electricity by household type and income.

These estimates are means only and as such they understate the number of households consuming more than 8,000 or 9,000 kWh – the two regulated benchmarks for annual electricity consumption below which low fixed charge tariffs have to be no more expensive than standard tariffs (9,000 kWh in the lower South Island and 8,000 kWh elsewhere).

The household expenditure data suggests that 75% of households consume below the relevant regulatory benchmark – i.e. are low electricity users according to the LFC regulations.

[28] Stephenson, J (2021). All you can heat? Welfare implications of high fixed charge tariffs for electricity. MSc Thesis. University of Otago.

In practice, electricity consumption is skewed, with some households consuming much more than the average.

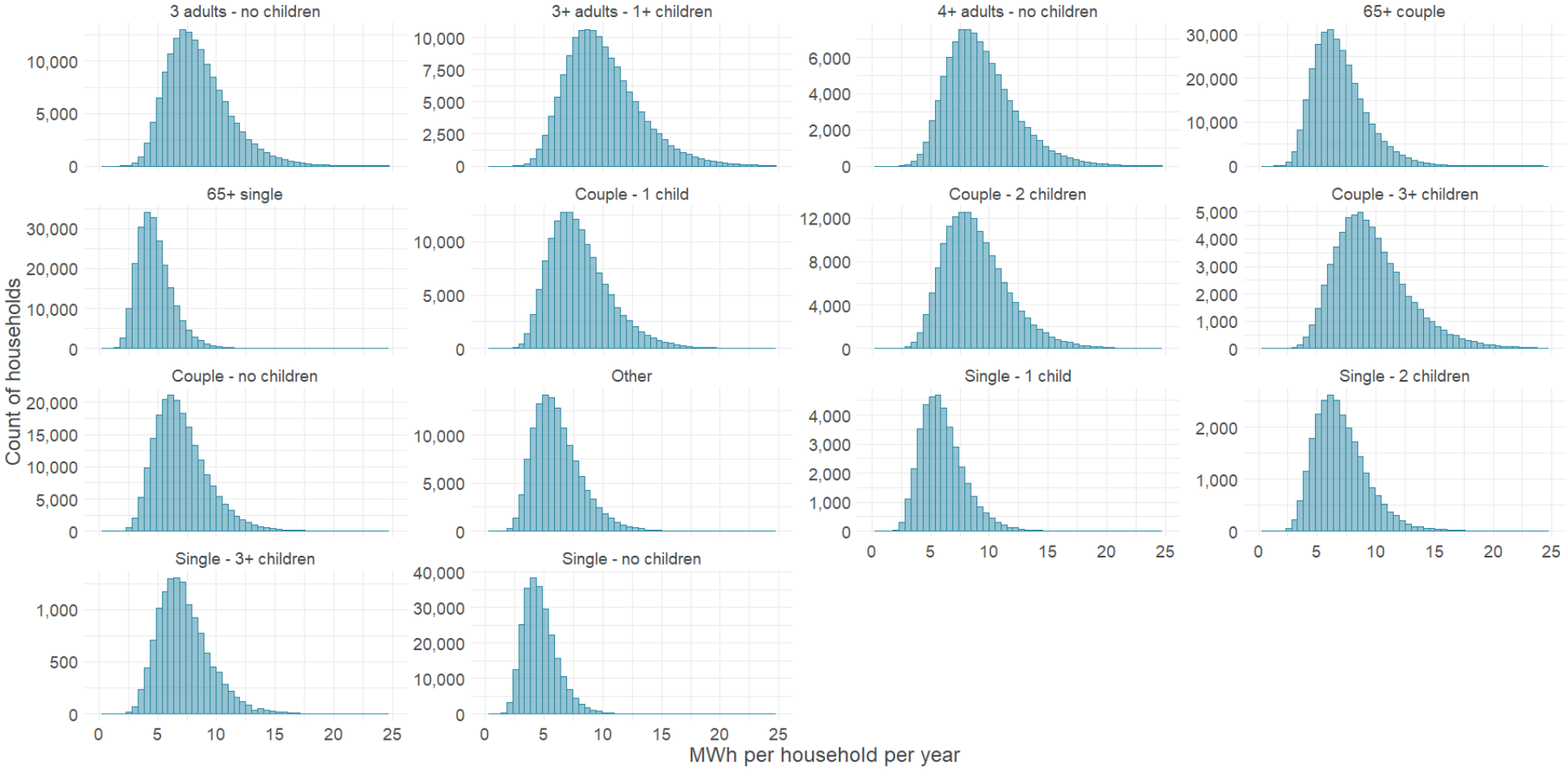
To expand on the estimates of mean electricity consumption from the household expenditure data, we have modelled the full distribution of electricity consumption by household type using data published by the Electricity Authority. Specifically, we have used the Electricity Authority's estimates of percentiles of household electricity consumption to fit lognormal distributions to electricity consumption and to predict distributions of electricity consumption by household type and income. Log normal distributions capture the patterns we see in household consumption, with small numbers of households consuming much more than the median (mid-point).

We have used the estimated means from household expenditure data to calibrate the distributions while also enforcing adding up constraints so that total residential electricity consumption matches the estimates by the Electricity Authority.

TABLE 7 SHARES OF HOUSEHOLD SPENDING ON ELECTRICITY
Averages combining the 2019 and 2023 editions of StatsNZ's household expenditure surveys.

	Real disposable income quintiles:					
Household type	1	2	3	4	5	Total
Single - no children	0.047	0.062	0.043	0.031	0.024	0.037
65+ single	0.064	0.053	0.051	0.046	0.034	0.047
Single - 1 child	0.053	0.052	0.043	0.038	0.026	0.040
Single - 2 children	0.056	0.063	0.040	0.034	0.032	0.042
Single - 3+ children	0.074	0.052	0.058	0.052	0.038	0.052
Couple - no children	0.035	0.028	0.026	0.025	0.018	0.025
65+ couple	0.045	0.045	0.038	0.033	0.025	0.035
Couple - 1 child	0.036	0.026	0.030	0.025	0.018	0.025
Couple - 2 children	0.031	0.033	0.029	0.023	0.018	0.025
Couple - 3+ children	0.038	0.040	0.032	0.021	0.019	0.027
3 adults - no children	0.038	0.034	0.031	0.024	0.022	0.028
3+ adults - 1+ children	0.039	0.034	0.029	0.023	0.020	0.028
4+ adults - no children	0.035	0.026	0.022	0.020	0.017	0.023
Other	0.052	0.044	0.037	0.032	0.022	0.035
Total	0.040	0.036	0.032	0.027	0.021	0.029

TABLE 8: ESTIMATED DISTRIBUTION OF CONSUMPTION BY HOUSEHOLD TYPE



Distribution pricing assumptions and adjustments

We have made a series of assumptions about electricity distribution networks and electricity distribution prices, to enable both aggregation and disaggregation of data.

Time-of-use pricing: electricity demand during different time periods

To aggregate electricity distribution prices into variable and fixed components – to simplify our reported findings – we have made some assumptions about shares of electricity distributors' revenue from time-of-use distribution pricing.

In most cases, we have data from electricity distributors that allows us to directly measure volumes of electricity demand during the different time-of-use pricing periods that distributors use (noting these times vary across distributors).

Where this data is not available, we infer shares of electricity demand volumes by time-of-use periods using prototypical demand profiles at three points of connection between distribution networks and New Zealand's electricity transmission network. These three 'grid exit points' have comparatively high shares of residential demand:

- Kaitimako for the upper North Island
- Pauatahanui for the lower North Island, and
- Halfway Bush for the South Island.

Allocation of prices and revenues to distribution network reporting regions

We have made assumptions about shares of electricity demand on different electricity distribution networks within distributors' pricing regions, in order to attribute changes in distribution prices to distribution network reporting regions.[29]

Our method for doing this to apportion electricity demand and customer numbers to network reporting region on the basis of residential installation control points (ICPs)[30].

The distribution pricing regions we have split into network reporting regions are:

- Unison Networks' Rotorua/Taupo distribution pricing region has been split into
    - Rotorua (64%)

[29] Some of New Zealand's electricity distributors own several regional networks for which the distributors make available certain information. The Electricity Authority uses the term 'network reporting region' as a label for these regions, of which there are 40 in New Zealand. See for example, the Electricity Authority's Electricity connections snapshot.

[30] For the purposes of our analysis, an ICP is the point at which an electricity consumer's premises are connected to an electricity distribution network.

    - Taupo (36%)
- Powerco's Western A distribution pricing region has been split into
    - Taranaki (39%)
    - Whanganui (22%)
    - Manawatu (39%)
- Powerco's Western B distribution pricing region has been split into
    - Taranaki (23%)
    - Whanganui (13%)
    - Manawatu (23%)
    - Wairarapa (41%).

These splits are necessary not only to enable reporting by network reporting region, but also to enable us to connect impacts by network reporting region to impacts by regional council.

We have also calculated impacts of the LFC regulations phase out on households by regional council using a concordance between network reporting regions and regional council areas based on regional council shares of ICPs by network reporting region.

Shares of ICPs in a network reporting region attributable to a regional council area are calculated using a matching between network supply points[31] and regional councils and ICP counts by network supply points.

Adjusting distribution prices for transmission prices

We have made one adjustment to electricity distribution pricing data to account for electricity transmission charges. This adjustment was made to Vector's distribution prices. It was necessary because Vector changed its distribution pricing methodology part way through the LFC regulations phase out period (in 2023), to remove electricity transmission charges from Vector's distribution pricing schedule.

We have added an additional per kWh charge to Vector's low user and standard user variable charges to account for this change. The uplift in variable charges is 0.0225 cents per kWh in 2023 and 0.0222 cents per kWh in 2024. These uplift values are calculated by dividing Vector's total transmission costs by the total (sum of) metered kWh at Vector's points of connection to the national electricity transmission network.

[31] For the purposes of our analysis, a network supply point is the point at which an electricity distribution network connects to New Zealand's national electricity transmission network.

Counterfactual prices

We calculated representative electricity bills for households using:

- customer-weighted[32] average fixed and variable prices of retailers by distribution network, and
- estimates of mean low electricity user and standard electricity user consumption by distribution network.[33]

The estimates of mean consumption by user type were informed by distributors' data provided to MBIE for our analysis. In most cases, we could infer electricity consumption volumes by user type, and simulated consumption profiles by distribution network reporting region.

We estimated what electricity bills would have been without the LFC regulations phase out by:

1. Adjusting distributors' prices, as follows:
    a. fixing distributors' revenue from residential customers at the levels reported by distributors
    b. changing distributors' fixed charges to a maximum of 15 cents per day (the regulated 2021 level)
    c. increasing low electricity user variable charges to make up the lost revenue from lower fixed distribution charges
    d. increasing standard electricity user variable charges and reducing low user variable charges to the point where the difference between low user and standard user expenditure on electricity is equivalent at 8,000 kWh (9,000 kWh for the lower South Island) and distributor revenue from residential customers matches the reported levels.
2. Adjusting retailers' prices, as follows:
    a. estimating each retailer's revenue from residential customers, from low and standard electricity users
    b. holding fixed each retailer's revenue net of distribution charges, calculated from each retailer's actual/reported residential prices

[32] I.e. weighted by customer counts per fixed and variable price plan.
[33] We do not have data on consumption by electricity retailer or by price plan. This means our calculations have had to assume there are no significant persistent differences between households' mean consumption across different price plans or across retailers, within a given network reporting region. One suspects this would be an unreasonably strong assumption if we were analysing individual retailers or price plans – especially those retailers with relatively few customers. But, in the aggregate, this should not bias the results in any significant way because the results will inevitably reflect average customers, average consumption and average prices.

c. recalculating each retailer's net revenue given the change in distribution charges calculated in step 1. above and capping retailers' low fixed charges at 30 cents per day

d. increasing variable electricity charges to make up any lost revenue, applying a constant $/kWh mark-up across all customers

e. increasing standard electricity user variable charges and reducing low user variable charges so that the point of equality, in kWh, between low user and standard user expenditure on electricity is unchanged from what we see in reality and retailer revenue (net of distribution charges) from residential customers matches retailers' reported levels.

This approach is similar to what an electricity distributor or retailer would do when setting prices to ensure compliance with the LFC regulations. However, we do not attempt to apply any strategic judgment or moderation to our counterfactual prices. In practice, distributors and retailers are likely to adjust their residential prices – e.g. to avoid large price changes for particular customer groups.

That being so, our counterfactual prices are only an approximation of what would have happened without the LFC regulations phase out.

In practice, there are a few cases of distribution prices including a significant step change between low electricity user and standard electricity user distribution prices – e.g. at 9,000 kWh a low user tariff is much cheaper than a standard user tariff. Our rebalanced counterfactual tariffs do not accommodate such step changes. For distribution charges we target equivalence at the regulated consumption levels of 8,000 kWh and 9,000 kWh.

Retail cost inflation and associated margin squeeze

We have estimated the effect of rising costs on retailers' gross margins using

- data on retail gross margins published by the Electricity Authority for 2022 and 2023
- data on distribution and retail prices, annually, for 2021 to 2024
- estimates of changes to wholesale electricity contract costs, between 2021 and 2022, and 2023 and 2024 (as discussed in footnote 8 in section 3.1).

We assumed:

- residential metering costs are the same as retail metering costs on average and have risen at the same rate, between 2021 and 2024, as distribution prices
- residential electricity costs are 15% higher than average retail electricity costs, inferred from the observations that
    - residential consumption is around 40% of wholesale energy consumption but 60% of wholesale energy costs due to high demand during peaks
    - residential consumption is approximately 78% of retail consumption.

Distribution vs retail residential price changes

Changes in low fixed charges

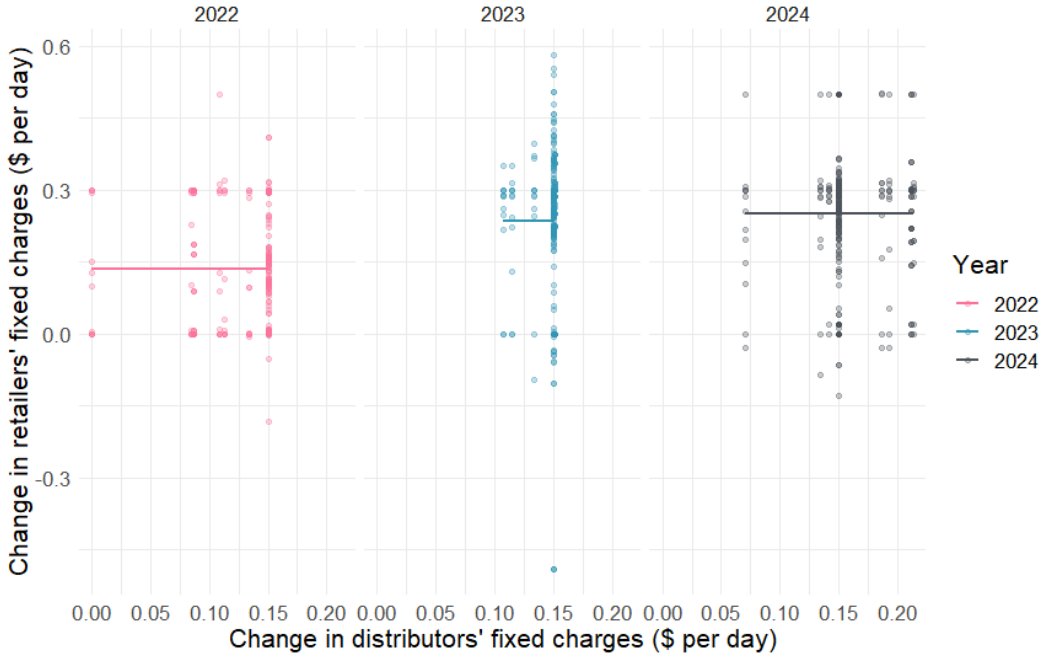
TABLE 9: CHANGES IN LOW FIXED CHARGES - SUMMARY STATISTICS

Change in $ per day (nominal). Means are weighted by counts of distributors' and retailers' customers.

	Distributors		Retailers	
Year	Mean	Std deviation	Mean	Std deviation
2022	0.14	0.031	0.10	0.133
2023	0.15	0.009	0.25	0.123
2024	0.15	0.026	0.26	0.135

FIGURE 15: CHANGES IN LOW FIXED CHARGES

Dots are observations by retail brand and electricity distribution network. Lines are linear least-square fits.



Changes in standard fixed charges

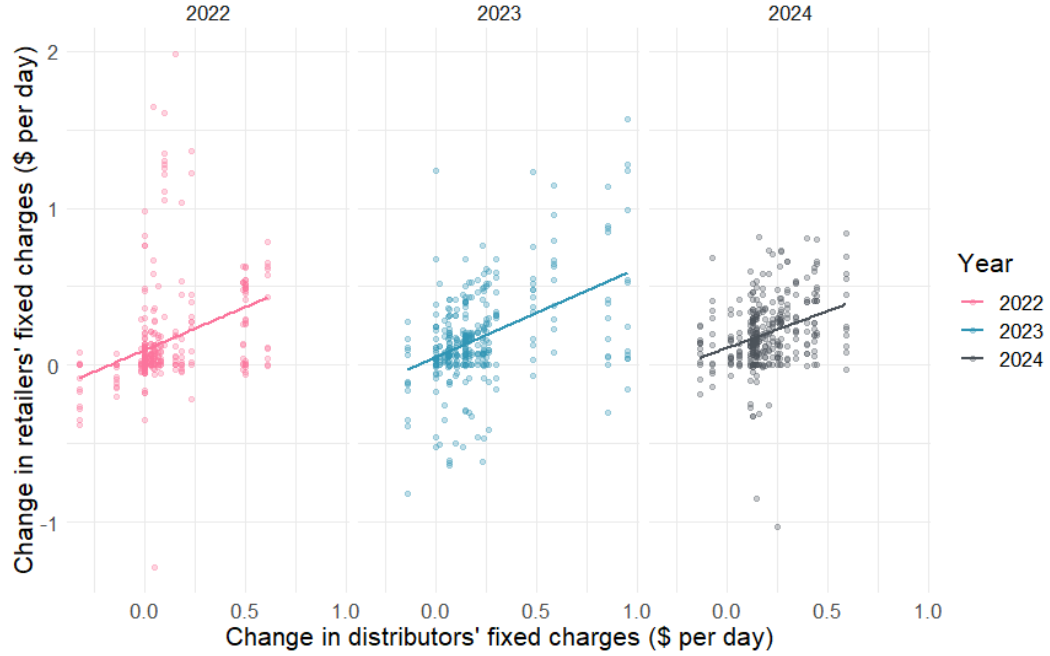
TABLE 10: CHANGES IN STANDARD FIXED CHARGES - SUMMARY STATISTICS

Change in $ per day (nominal). Means are weighted by counts of distributors' and retailers' customers.

	Distributors		Retailers	
Year	Mean	Std deviation	Mean	Std deviation
2022	0.068	0.203	0.076	0.225
2023	0.204	0.236	0.12	0.269
2024	0.156	0.146	0.155	0.211

FIGURE 16 CHANGES IN STANDARD FIXED CHARGES

Dots are observations by retail brand and electricity distribution network. Lines are linear least-square fits.



Changes in low user variable rates

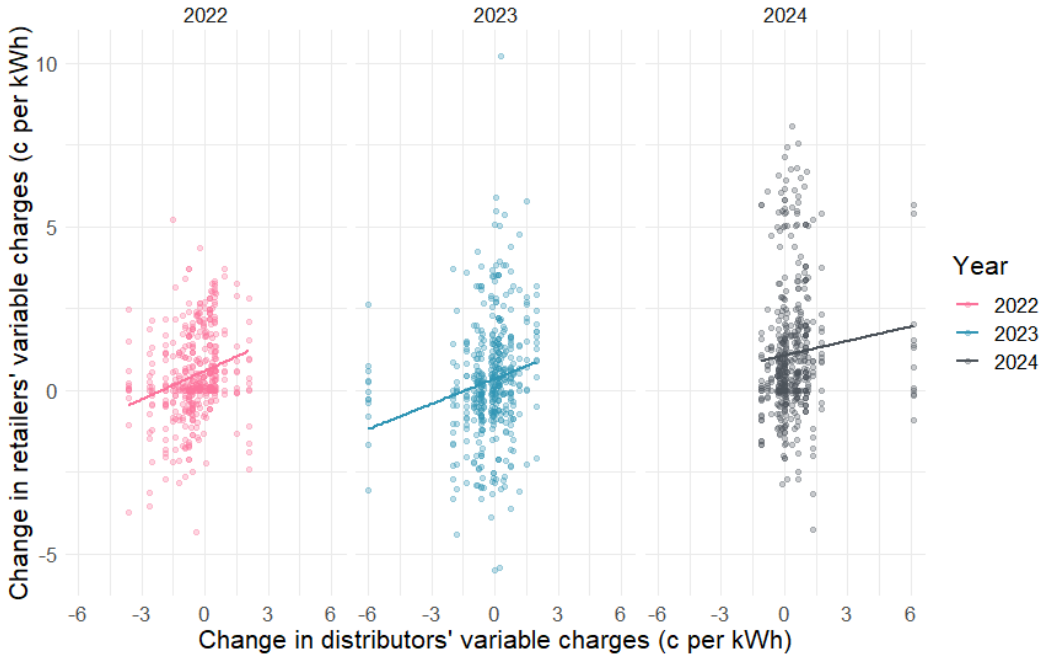
TABLE 11: CHANGES IN LOW USER VARIABLE CHARGES - SUMMARY STATISTICS

Change in $ per kwh (nominal). Means are weighted by counts of distributors' and retailers' customers.

	Distributors		Retailers	
Year	Mean	Std deviation	Mean	Std deviation
2022	-0.005	0.011	0.003	0.013
2023	-0.005	0.012	-0.001	0.016
2024	0.003	0.011	0.002	0.019

FIGURE 17: CHANGES IN LOW USER VARIABLE RATES

Dots are observations by retail brand and electricity distribution network. Lines are linear least-square fits.



Changes in standard variable rates

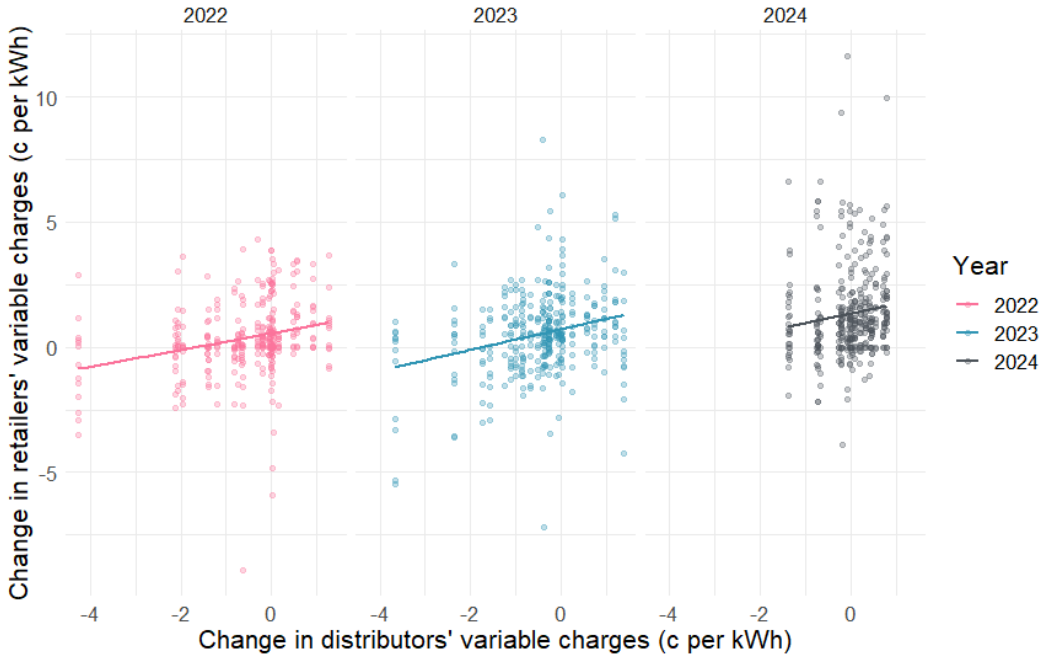
TABLE 12: CHANGES IN STANDARD VARIABLE CHARGES – SUMMARY STATISTICS

Change in $ per kwh (nominal). Means are weighted by counts of distributors' and retailers' customers.

	Distributors		Retailers	
Year	Mean	Std deviation	Mean	Std deviation
2022	-0.003	0.011	0.003	0.014
2023	-0.008	0.01	0.005	0.015
2024	0	0.006	0.007	0.018

FIGURE 18: CHANGES IN STANDARD VARIABLE RATES

Dots are observations by retail brand and electricity distribution network. Lines are linear least-square fits.



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