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On the impact of targeted and universal electricity concessions policy on fuel poverty in the NEM's Queensland region

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In Australia's National Electricity Market (NEM), households have faced markedly higher electricity prices following the 2022 war in Ukraine and subsequent energy crisis. Forward prices for coal and gas increased sharply, trading at multiples of historic averages. While initially sheltered to wholesale price shocks through regulatory lag, retail electricity tariffs rose by more than 30% for the 2024 financial year. Impacts of this magnitude warrant adjustment to hardship policy given electricity is an essential service. In the NEM's Queensland region, hardship policy aimed at vulnerable households was more than doubled, and a one-off universal payment was made to all households. In this article, we model the number of households that meet a definition of fuel poverty before, and after, the tariff increases and changes to policy. We find the underlying levels of fuel poverty rose from 6.2% to 11.6% over the period 2022 to 2023. From a horizontal and vertical policy efficiency perspective, the suite of policy initiatives improve outcomes with the headline result being a material reduction in fuel poverty, viz. from 11.6% to 5.4% of households.

Keywords: *Fuel poverty, electricity tariffs, targeting efficiency.*
JEL Codes: *D4, L5, L9 and Q4.*

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1. Introduction

In February 2022, the war in Ukraine led to an unforecastable energy crisis and multi-year energy affordability impacts in many countries, including Australia (Batlle, et al., 2022; Jamasb et al., 2023; Schittekatte and Batlle, 2023). The magnitude of price increases in the forward markets for coal and liquified natural gas were extraordinary by any standard, initially rising 5-6x historic averages (Simshauser, 2023). Exposed to these international coal and gas prices, and experiencing exacerbating domestic conditions including high operational demand and elevated coal plant outages, spot prices in the Australia's National Electricity Market (NEM) rose sharply.

In the early stages of the crisis, the Australian Energy Market Operator (AEMO) suspended the spot market for a period of eight days. Households were initially shielded from wholesale price volatility through fixed annual tariffs. As with Great Britain, during this period several small retail suppliers experienced financial distress and exit. Prior to the next round of annual tariff increases, the Commonwealth Government intervened in fuel markets and set temporary price caps of $125/t and $12/GJ for coal and gas, respectively. This had the effect of reducing the marginal running cost of mid-merit and peaking generators and dampened forward electricity prices. Yet even with these interventions, tariff increases were material. As Table 1 later illustrates, average household increases in the NEM's Queensland region were ~30%. Electricity tariff increases of this magnitude can be expected to amplify affordability problems (Kessides et al., 2009), particularly given the Australian macroeconomic backdrop comprising high inflation, rising interest rates, residual impacts of the Covid-19 pandemic, natural disasters (e.g. Feb 2022, severe flooding in Southeast Queensland) and declining real wages.

Policies typically associated with tackling fuel poverty include those focusing on energy efficiency (i.e. quantity focus) via improvements to housing stock, appliances or even quantity offsets such as rooftop solar PV, (Boardman, 2012; Dodd & Nelson, 2022; Jessel et al., 2019; Mazzone, 2020; Nelson et al., 2019), tariff design (i.e. price focus) and improvements to the relative efficiency of prices (Bennett et al., 2002; Lorenc et al., 2013; Nelson et al., 2012; Simshauser, 2016; Waddams Price et al., 2012) and income supports. The subsequent analysis focuses strictly on the latter.

The purpose of this article is to examine energy customer hardship and in particular, the incidence of *fuel poverty* amongst Queensland's 2.1 million households given sharply rising electricity tariffs before- and after-, Queensland's recently modified targeted hardship scheme *and* universal payment to households. Our modelling is grounded firmly in standard welfare economics with a focus on horizontal and vertical targeting efficiency in a two-period model.

Key findings are as follows. Queensland has a total population of ~5.3 million comprising ~2.1 million electricity household accounts with peak electricity demand of 10,200MW and energy demand 59,800GWh. About 408,000 Queensland households are thought to meet a definition of Low Economic Resource (viz. low income *and* low net assets). Of these, 11.6% or ~247,000 households meet our formal definition of fuel poverty before policy intervention. Queensland's hardship policy settings reduce this to 9.0%, but the 2023 temporary modifications to policy reduce this further, to 5.4%.

This article is structured as follows. Section 2 reviews relevant literature. Section 3 establishes definitions, data and our model. Results are presented in Section 4. Policy implications and concluding remarks follow.

2. Literature Review

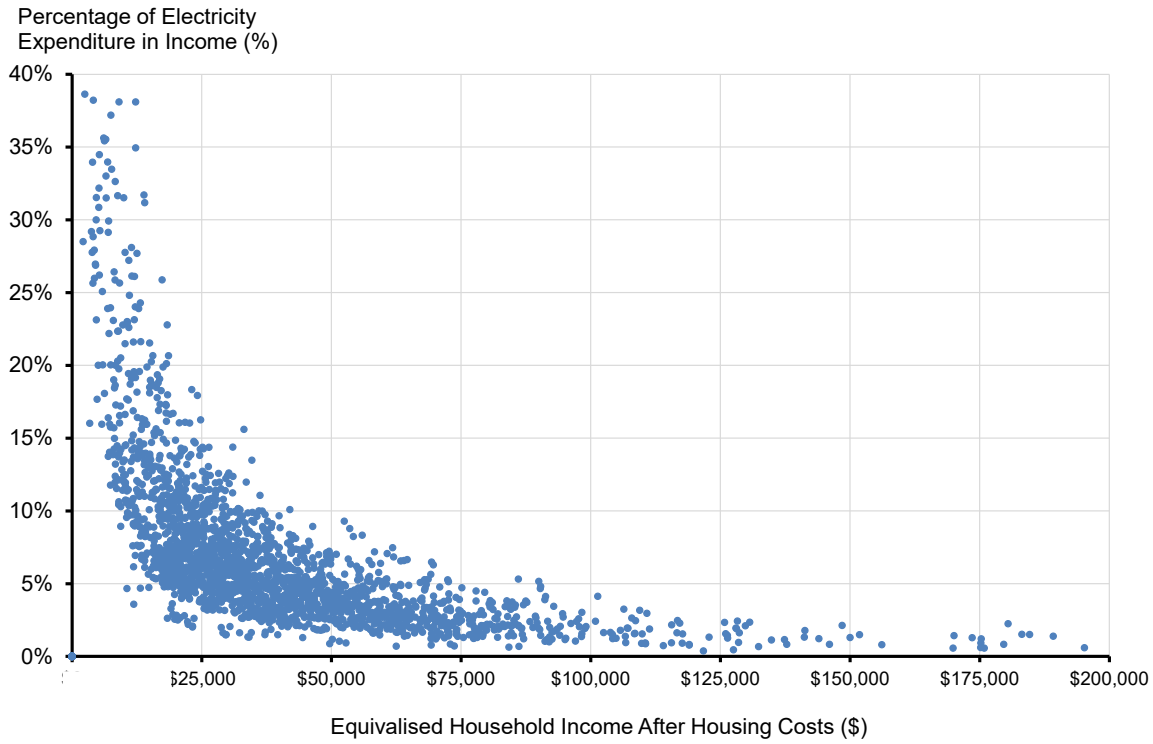
Fuel poverty is a complex problem and needs to be distinguished from conventional notions of poverty (Boardman, 1991; Bennett et al., 2002; Hills, 2012). Our preferred definition of fuel poverty is drawn from Guertler (2012), in which it describes the inability of a household to afford a socially and materially necessary level of energy. Fuel poverty as a concept can be traced at least as far back as Bradshaw and Hutton (1983).

To illustrate the distinction from poverty, a household may be able to afford their energy but have income levels below the poverty line. Conversely, a household not defined as poor per se may find energy costs unaffordable for reasons such as household structure (Bradshaw & Hutton, 1983). Most importantly, not every energy consumer who spends above fuel poverty thresholds feels poor, and conversely, not every household who feels poor meets fuel poverty thresholds (Waddams Price et al., 2012). As Figure 1 illustrates, energy consumption thus follows a complex income expansion path with a 'scatter' rather than 'trend', and explains why fuel poverty warrants attention (Bennett et al., 2002). This relationship is not unique to Australian households. Bennett, et al. (2002) find a similar R^2 for households in Great Britain.

Figure 1: Electricity bill vs equivalised income after housing costs (Queensland, 2023-24)

The relationship between incomes and energy costs dates back to Engels in the mid-1800s. His subsequent re-analysis in 1897 and associated 'Engels Curve' – a staple in microeconomics – showed that for low-income households, certain goods comprise a greater portion of total expenditure (Stigler, 1954). This includes the category of 'fuel and light', which we now refer to as electricity and gas, (see also Bennett et al., 2002; Simshauser, 2021, 2023). An Engels curve for Queensland electricity consumers in 2023/24 is illustrated in Figure 2, with electricity expenditure measured on the y-axis, and equivalised incomes after housing costs on the x-axis.

Figure 2: Engels curve for electricity expenditure (Queensland, 2023/24)



Attaching a basis of measurement to a definition of fuel poverty is necessary for quantifying its prevalence in a population. While no united definition of fuel poverty exists (Thomson et al., 2016; Charlier and Kahouli, 2019) rule-of-thumb thresholds have historically been used to varying degrees to measure different areas of hardship, including fuel poverty. These rules-of-thumb are invariably consistent with reported payment problems (Hills, 2012). In Boardman (1991), fuel poverty was defined as when the *normative cost* of energy exceeded 10% for the lowest 30% of household incomes. More recent measures shifted to relative incomes and observed energy costs. Some analyses use a multidimensional approach incorporating an array of subjective and quantitative and subjective metrics (Charlier and Legendre, 2019; Sokołowski et al., 2020; Awaworyi Churchill and Smyth, 2021; Deller et al., 2021). For our purposes, fuel poor households are those that meet two criteria:

- They are vulnerable as defined as *Low Economic Resource* (see Fig.3); and
- They meet our preferred fuel poverty benchmark, which we define as electricity costs exceeding 10% of equivalised household incomes after housing costs.

A *Low Economic Resource* household is a relative measure with the relative cut-off points being the 40th percentile equivalised household disposable income, and, the 40th percentile equivalised household net wealth (see also Balestra and Tonkin, 2018). As Figure 3 notes, there are 2.1m household electricity accounts in Queensland, and the 40th percentile therefore represents ~856,000 households. 40th percentile 'equivalised incomes after housing cost' equates to $670 per week and the 'net wealth' cut-off is $325,000. The cross-over of these two segments defines the Low Economic Resource target cohort, which as Figure 3 illustrates comprises 408,000 vulnerable Queensland households in 2023-24.

Figure 3: Queensland vulnerable households (2023/24)

Our fuel poverty benchmark of 10% is explained in detail in Simshauser (2021, 2023) and we do not propose to re-examine its derivation here. More important is the use of equivalised incomes after housing costs. The use of equivalised incomes recognises that two households with equal incomes but different compositions (viz. number of people in the household, number of dependents) are not the same – noting household structure is correlated with, and a key driver of, energy use (Chai et al., 2021; Simshauser & Downer, 2016; Simshauser & Nelson, 2012). Additionally, the use of equivalised incomes *'after housing costs'* reflects that rents and mortgages frequently drive the incidence of financial vulnerability in the first instance as it is typically the least flexible, and largest claim over household incomes (Stone, 2006).

3. Model and data inputs

We use the Horizontal-Vertical Fuel Poverty Model HVFP Model set out in Simshauser (2021, 2023) which in turn is largely based on the constructs set out in Beckerman (1979), as modified by Chan (2016) and later Simshauser (2021). The primary purpose of the model is to identify the level and extent of vulnerable customers for a given change in electricity prices, along with analysing the horizontal and vertical performance of targeted and/or universal policy responses with a particular focus on Low Economic Resource households. It is worth noting the difference between horizontal and vertical efficiency of policy targeting, as follows:

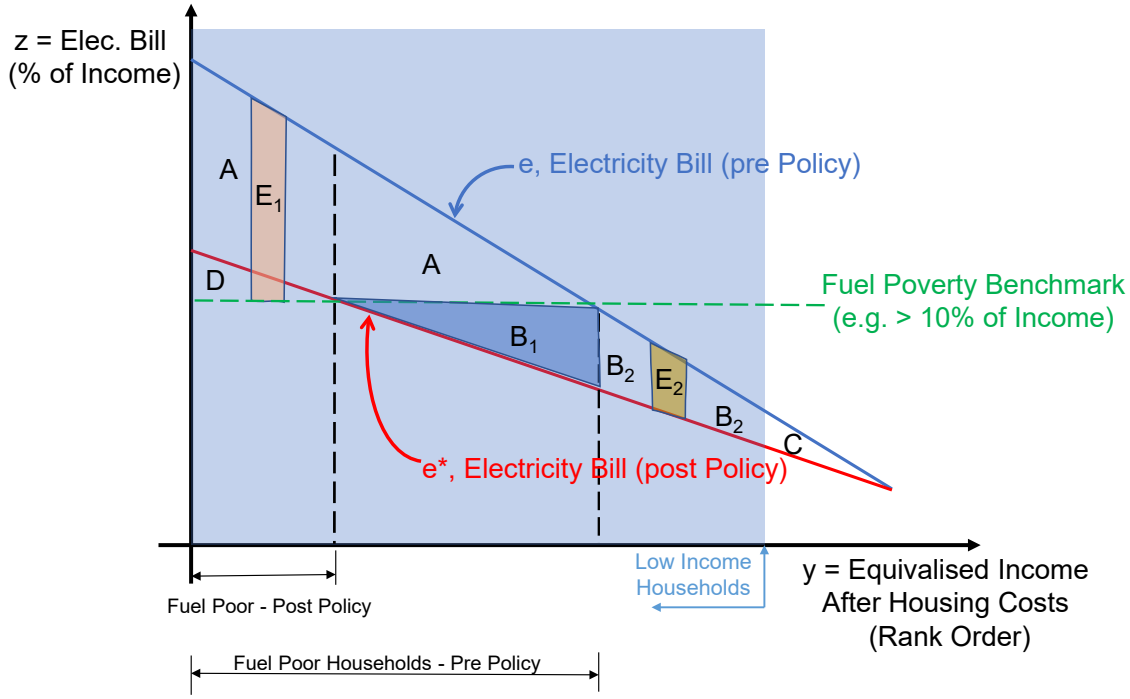
- Horizontal targeting efficiency measures the extent to which a policy targets vulnerable households (i.e. target accuracy of the vulnerable population).

- Vertical targeting efficiency measures the extent to which a policy deals with incidence *and depth* of the fuel poverty problem (i.e. reduction in poverty).

3.1 Model Structure

Figure 4 sets out a conceptual overview of the HVFP Model objectives and associated logic. Households are filtered by their equivalised incomes after housing costs (x axis) along with energy costs before-, and after-, policy assistance (y axis). Low Economic Resource households are flagged within the model based on the criteria illustrated in Figure 3. Additionally, households that qualify for electricity concessions are also flagged in the model – and above all – noting that welfare flags used (viz. means-tested pension cardholders and healthcare cardholders, and non-means-tested Queensland seniors cardholders) are *not* a perfect match. Some non-vulnerable households are included in error (Segment 'C' in Fig.4) while some highly vulnerable households are excluded in error (Segment 'E_1' in Fig.4).

Figure 4: HVFP Model structure



Seven areas (household cohorts) calculated by the model are denoted A..E_2 as follows:

A = Low Economic Resource, Fuel Poor Household, successfully targeted
B_1 = Low Economic Resource, Fuel Poor Household, successfully targeted, spill-over benefit
B_2 = Low Economic Resource, not Fuel Poor, successfully targeted, spill-over benefit
C = Not Low Economic Resource, inclusion error
D = Low Economic Resource, Fuel Poor, successfully targeted, inadequate benefits provided
E_1 = Low Economic Resource, Fuel Poor, excluded. Exclusion error
E_2 = Low Economic Resource Household, not Fuel Poor, excluded. Exclusion error

From these variables, eight ratios of vertical efficiency can be measured:

$$Total\ Policy\ Cost = \int_{y=0}^{z} e(y)d(y) - \int_{y=0}^{z} e^{*}(y)d(y), \quad (1)$$

$$Benefits\ received\ by\ Fuel\ Poor\ Households = A + B_1\ , \quad (2)$$

$$Vulnerable\ Household\ Vertical\ Efficiency = \frac{(A+B_1+B_2)}{Total\ Policy\ Cost}\ , \quad (3)$$

$$Vulnerable\ Household\ Spillover\ Impacts = \frac{(B_1+B_2)}{(A+B_1+B_2)}\ , \quad (4)$$

$$Fuel\ Poverty\ Reduction\ Efficiency = \frac{A}{Total\ Policy\ Cost}, \quad (5)$$

$$Non-Vulnerable\ Inclusion\ Error\ Inefficiency = \frac{C}{Total\ Policy\ Cost}, \quad (6)$$

$$Vulnerable\ Household\ Exclusion\ Error\ Inefficiency = \frac{(E_1+E_2)}{Total\ Policy\ Cost}, \quad (7)$$

$$Fuel\ Poverty\ Inadequacy\ Error = \frac{D}{(A+B_1+B_2)}. \quad (8)$$

3.2 Data

Use of microdata is noted as the gold star standard for the analysis of poverty (Skoufias & Coady, 2007) and for this reason, we use microdata compiled by the Australian Bureau of Statistics (ABS) in their Survey of Income and Housing (Series 6541[1]) and accompanying/matched Household Expenditure Survey (Series 4670[2]) – this being the latest data available. This dataset formed the basis of analysis used in (Simshauser, 2021) and in the present exercise is once again rolled forward using indices in Table 1 (see also Simshauser, 2023). That is, the data is shifted from an existing 2016/17 base year to 2023/24 by drawing on the Consumer Price Index, Wage Price Index, an Electricity Tariff Index, an own-price elasticity of electricity demand *assumption* of -0.1 (the latter being consistent with (AEMO, 2019; Borenstein, 2013; Burke & Abayasekara, 2018; Faruqui, 2008; Faruqui & Palmer, 2011; Simshauser, 2023).

Table 1: Base data indices (Queensland, 2016/17 – 2023/24)

Year	Number of Households	Electricity Tariff Change	Wage Price Inflation	Consumer Price Infl.	Electricity Concession Hardship Payment
2016/17	1,947,496	4.00%	1.90%	1.80%	$324
2017/18	1,984,475	3.40%	2.20%	1.70%	$330
2018/19	2,010,650	-0.80%	2.30%	1.70%	$335
2019/20	2,027,061	-5.30%	1.90%	-1.00%	$341
2020/21	2,050,384	-7.50%	1.60%	4.90%	$337
2021/22	2,078,595	-9.70%	2.40%	5.10%	$354
2022/23	2,109,774	11.00%	3.60%	5.60%	$372
2023/24	2,141,421	33.20%	3.80%^	3.00%^	$372*
Cum. Growth	10.0%	24.7%	21.6%	25.0%	14.8%

Sources: ABS, Commonwealth Treasury, Qld Competition Authority, Queensland Government.
^ Forward estimates
* In 2023/24 the Queensland government did not index the electricity concession.

3.3 Policy Settings and Scenario Build-up

By way of brief history, the Queensland Government originated a targeted income support policy for vulnerable households, known as the 'electricity concessions policy', in the early-1990s. At that time the electricity concessions policy was focused strictly on the aged, and had a '51% target accuracy' (Simshauser, 2021). Households in procession of a (means-tested) 'Pension Card' or a (non-means-tested) 'Queensland Seniors Card' would qualify. In 2016, a major reform of the policy was introduced in order to lift the target accuracy well beyond 51%, noting a rising prevalence of hardship amongst the 'family formation' cohort. Indeed as Simshauser and Nelson (2014) demonstrated, Australian energy hardship is dominated by low-income families. The 2016 reform introduced a new targeted category, 'Healthcare

[1] Series 6541 comprises household-level data from across Australia on incomes, assets and liabilities, housing type, housing costs, and welfare flags (i.e. Commonwealth Cardholders) from a sample of ~14,000 households.
[2] Series 4670 incorporates detailed energy consumption by household type (e.g. dwelling structure, family composition, region and so on).

Cardholders' which had the effect of capturing a much greater share of Low Economic Resource households, especially low income families (Simshauser, 2021, 2023).

The electricity concession policy is managed by the Queensland Department of Energy and in 2023 was $372 per annum. The flow of funds associated with the electricity concessions policy moves from government to electricity retailer, and is automatically applied directly against the qualifying household bill in four equal instalments. From a transaction perspective, the concessions policy is seamless.

In response to the 2022 energy market crisis, a temporary 'cost of living rebate' policy was added for 2023/24. The Queensland Department of Energy initiated two tiers of 'relief payment' as follows:

- A one-off 'universal payment' to all Queensland households of $550
- The 2023 electricity concession of $372, along with the $550 universal payment outlined above, and an additional $150 for vulnerable households. The payment to households qualifying for the electricity concession would therefore total $1072.

4. Model Results

The horizontal and vertical efficacy of the Queensland 2023/24 policy suite outlined in Section 3.3 is able to be analysed within the HVFP Model. In order to understand their marginal contribution to policy outcomes, we have devised three incremental scenarios of the 2023/24 policy suite. Table 2 clearly sets out our modelling approach. The first Variants 1 and 2 comprise a form of rebate available to qualifying households (i.e. targeted), and a third variant comprises a combination of a targeted and universal policy. The variants are shown in Table 3, each variant in effect building on the last with the application of an additional policy measure.

The third variant reflects the actual policy settings implemented by the Queensland government in 2023-24.

Table 2: Policy variants modelled within Queensland households (2023 – 24)

Policy	Category	*Base* *$372*	Variant 1 *$1072*	Variant 2 *$1072 + Universal $550*
$372 Electricity Concession	Targeted	✓	✓	✓
$700 Cost of Living payment A	Targeted*		✓	✓
$550 Cost of Living payment B	Universal (balance of households)^			✓

Notes:
*Eligibility for the targeted *payment A* mirrors electricity concession eligibility category targeting (Section 3.3).
^Modelling does not double-count i.e. this universal payment does not apply to households receiving *payment A*. Applies to 'all' other households.

Table 3 sets out the HVFP Model results. The first point to note from Table 3 is the format of results. Lines 1-8 set out the Vertical Efficiency results in absolute dollar values for budgetary planning and program efficiency analysis, while lines 9-16 present the vertical results in ratio terms. Note these results align to the Model Structure set out in Figure 4 and associated ratios. Horizontal analysis runs from lines 17-34.

4.2 Explanation of Vertical Efficiency for the Base Result (Policy Variant 1)

Focusing on the Base results, the Total Policy Cost (Line 7) amounts to $297 million, of which Successful Targeting (Line 1) amounts to $48 million, and Spillover Benefits for the fuel poor (Line 2) amount to $11

million and Spillover Benefits to vulnerable households (Line 3) of $46 million. Note at Line 9, the sum of these three results (Lines 1-3) represent the numerator of the Vertical Efficiency (%) metric of 35.2%. The Inclusion Expense (Line 4) or segment C in Figure 4 equates to $192 million, and at Line 13 the Inefficiency due to inclusion result amounts to 64.8%. Lines 5 and 6 outline the inadequacy results.

4.3 Explanation of Horizontal Efficiency for the Base Result (Policy Variant 1)

Again focusing on the Base results, horizontal performance is captured through the summary results at Lines 17-34. The underlying level of fuel poverty is 248,000 households or 11.6% (Lines 27-28) and in per capita terms amounts to 709,000 or 13.3% of the population (Lines 31-32). Following application of the policy, these headline results reduce to 194,000 or 9.1% of households, or 596,000 or 11.2% of the population.

From a horizontal accuracy perspective, the number of successfully targeted fuel poor households (Line 17) is 158,000 and spillover benefits to vulnerable households (Line 19) incorporates a further 122,000 households. Households included in error amount to 517,000 households (Line 20).

In terms of horizontal efficiency and the correct targeting of Low Economic Resource households, the current policy can be said to be 69% accurate (Line 26). This is measured by adding the Low Economic Resource households successfully targeted (i.e. Lines 17 + 19), divided by total Low Economic Resource Households (i.e. Lines 17+ 19 + 22). This result compares favourably to the pre-2016 policy in which targeting was solely focused on the aged with a horizontal accuracy of 51% (Simshauser, 2021).

Table 3: Horizontal and Vertical Target Efficiency of Policy (Queensland, 2023-24)

LINE		POLICY VERTICAL EFFICIENCY Policy Settings (Benefit per annum)		Base $372	Variant 1 $1,072	Variant 2 $1072 + $550
1	A.	Successful Targeting (Fuel Poor)		$48,000,000	$98,000,000	$132,000,000
2	B_1	Spillover Benefits (Fuel Poor)		$11,000,000	$71,000,000	$77,000,000
3	B_2	Spillover Benefits (Low Economic Resource, not Fuel Poor)		$46,000,000	$131,000,000	$153,000,000
4	C	Inclusion Expense (Not Low Ec. Resource, not Fuel Poor)		$192,000,000	$554,000,000	$1,222,000,000
5	D	Included but Inadequate (Still Fuel Poor)		$87,000,000	$36,000,000	$89,000,000
6	E_1,E_2	Exclusion Inadequacy (Low Economic Resource)		$48,000,000	$137,000,000	$0
7		Total Program Cost	∑ (A, B1, B2, C)	$297,000,000	$855,000,000	$1,584,000,000
8		Benefits Received by Fuel Poor	∑ (A, B1,)	$59,000,000	$170,000,000	$209,000,000
		POLICY VERTICAL EFFICIENCY (%)				
9		Vertical Efficiency	∑ (A, B1, B2) / Total Prog. Cost	35.2%	35.2%	22.9%
10		Spill-over benefits	∑ (B1, B2) / ∑ (A,B1, B2)	53.7%	67.3%	63.7%
11		Poverty reduction efficiency	A / Total Program Cost	16.3%	11.5%	8.3%
12		Spill-over Excess (% of Total)	∑ (B1, B2) / Total Prog. Cost	18.9%	23.7%	14.6%
13		Inefficiency due to inclusion	C / Total Program Cost	64.8%	64.8%	77.1%
14		Inefficiency due to exclusion	E / Total Program Cost	16.0%	16.0%	0.0%
15		Inadequate concession benefits	D / Total Program Cost	29.5%	4.2%	5.6%
16		Benefit inadequacy	∑ (D, E) / Total Prog. Cost	45.5%	20.2%	5.6%
		HORIZONTAL ANALYSIS				
17	A.	Successful Targeting (Fuel Poor)		158,000	158,000	248,000
18	B_1	Spillover Benefits (Fuel Poor)		54,000	105,000	129,000
19	B_2	Spillover Benefits (Low Economic. Resource)		122,000	122,000	163,000
20	C	Inclusion Expense (Not Low Ec. Resource)		517,000	517,000	1,731,000
21	D	Inadequate Included		106,000	53,000	117,000
22	E_1,E_2	Exclusion Inadequacy		128,000	128,000	0
23		Total Households Included		798,000	798,000	2,141,000
24		Total Households		2,141,000	2,141,000	2,141,000
25		% of Households Included		37.3%	37.3%	100.0%
26		Target Accuracy (LER Households)	$(A + B_2) / (A + B_2 + E_1 + E_2)$	69%	69%	100%
		HORIZONTAL ANALYSIS - Number of Households (N = 2.1 million)				
27		Underlying Fuel Poor Households		248,000	248,000	248,000
28		Underlying Fuel Poor Households		11.6%	11.6%	11.6%
29		Fuel Poor LER Households - Post Policy		194,000	141,000	117,000
30		Fuel Poor LER Households - Post Policy (%)		9.1%	6.6%	5.5%
		HORIZONTAL ANALYSIS - Population (N = 5.3 million people)				
31		Underlying Fuel Poor Population		711,000	711,000	711,000
32		Underlying Fuel Poor Population (%)		13.4%	13.4%	13.4%
33		Fuel Poor LER Population - Post Policy		596,000	467,000	400,000
34		Fuel Poor LER Population - Post Policy (%)		11.2%	8.8%	7.5%

4.4 Analysis of Policy Variant 1 – increasing the 'targeted' payment by $700

Recall from Table 2 that policy Variant 1 combines the existing concession payment of $372 and the $700 'Cost of Living – payment A' – thus totalling $1072. Because the targeting mechanism remains unchanged, policy accuracy will remain unchanged. Consequently, certain horizontal metrics remain constant (e.g. 37.3% of households included, Line 25, and 69% Target Accuracy, Line 26).

However, benefits delivered to vulnerable households have been increased very significantly and this has a material impact on vertical performance (Lines 1-3) and horizontal performance (Lines 29-30, Lines 33-34). Program cost rises from $297 million to $855 million (Line 7).

Other important results include i). a reduction in Benefit Inadequacy (Line 16) given materially higher payments, and ii). no deterioration in horizontal or vertical performance metrics – there are only improvements. The headline gain is the material reduction in the number of households in fuel poverty after the policy, reducing from 194,000 or 9.1% in the Base Case to 141,000 or 6.6% of households in Variant 1. Similar reductions occur at the population level (Lines 33-34).

4.5 Impact of Policy Variant 2 – universal payment of $550

The universal payment of $550 to all remaining households is costly, increasing program costs to $1,584 million. However, in the current environment it has an important benefit – a number of genuinely vulnerable households not currently captured by the electricity concessions policy are now included.

The reality is that targeting, no matter how much care is taken, cannot be expected to capture 100% of vulnerable households. Conversely, and as the results in Table 3 make clear, the existing concessions targeting framework includes 517,000 households that are neither fuel poor nor Low Economic Resource (see Base Case and Variant 1, Line 20). But as Hills (2012) explains, it is simply not possible to target 247,000 households without considerable *inclusion error*.

The Variant 2 universal payment has the effect of further reducing fuel poverty, from 141,000 (6.6%) of households down to 117,000 (5.5%) of households (Line 29-30).

4.6 Household Energy Costs before and after

In the present analysis we have focused on results in the 2023/24 financial year. In the year prior (2022/23), the average electricity bill was $1516 and equated to 1.8% of average household income (and 3.1% of equivalised household incomes). Average results mask distributional effects, and households meeting our definition of fuel poverty in that year were as follows:

- 170,000 (7.9%) Underlying Fuel Poor Households
- Concession policy = $372
- Target Accuracy = 69%
- 132,000 (6.2%) Fuel Poor Households post Policy

When the concessions policy was applied, the average 2022/23 electricity bill was reduced to $1377 and equated to 1.6% of average household incomes. The increase in 2023/24 sent average electricity expenditure to 2.3% of household income (and 4.0% of equivalised household incomes). The impact of the universal payment was to reverse the average to 1.7%. And the targeted payments of $1072 reduce this to 1.4% (cf. 1.6% in 2022/23).

5. Concluding remarks

Queensland has a population of ~5.3 million people and ~2.1 million electricity household accounts. In 2023/24, an estimated 408,000 Queensland households are thought to be vulnerable, of which ~60% face electricity bills above our preferred definition of 10% fuel poverty, 10% of equivalised incomes after housing costs. Absent policy intervention, 248,000 households are thought to meet that criteria. This represents 11.6% of total Queensland households and 13.4% of Queensland's population. Across the three policy options modelled, this incidence reduces from the pre-policy 11.6% down to 9.1% in the Base ($372 payment), 6.6% in Variant 1 ($1072 payment), and 5.5% in Variant 2 ($1072 payment plus a universal payment of $550 to all other households).

Variant 2 achieves a 53% reduction in the number of households experiencing underlying/pre-policy fuel poverty, from 248,000 to 117,000. It achieves this by realising the same gains as Variant 1's higher targeted payment of $1072, *and* new gains from its extended reach[3] via the universal payment.

Modelling in this paper also provided important insight on the impact of the increased targeted payment $1072 (Variant 1), absent any universal payment compared to the $372 Base.

Category targeting is running at an estimated 69% accuracy, which in turn means 37.3% of Queensland households are supported via the concessions policy. Most importantly, 158,000 fuel poor households are

[3] i.e. Number of fuel poor households successfully targeted

successfully targeted. In context, Australia is known to have one of the most accurate tax and transfer systems in the world (Joumard et al., 2012; Simshauser, 2021). But the sobering reality is that our targeting accuracy misses 31% of genuinely vulnerable households. Clearly more research is required to improve this.

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