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POWER TO DO GOOD

Household-level Energy Hardship Rating

Energy hardship (EH) or fuel poverty is a term used to describe the inability of households to afford the required energy to maintain a healthy and dignified lifestyle. EH is typically described as being caused by a range of factors including:

- Poverty
- High cost of energy
- Poor house/appliance quality.
- The ability and knowledge of how to increase income, reduce energy costs and create a healthy home is also a key contributor.

Energy Hardship as a term/definition captures the drivers which allows for development of solutions on an individual and/or collective basis.

We are seeking a meaningful metric to enable grass-roots orgs to measure and assist households out of energy hardship.

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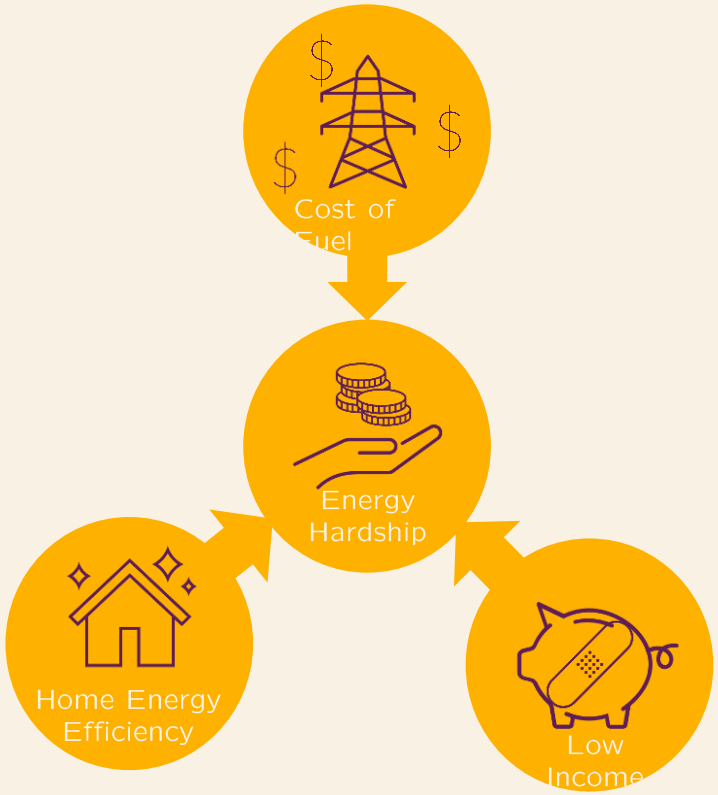
Energy Hardship



Over 100,000 power disconnection notices in New Zealand are issued every quarter.

1500 – 2000 households have their power cut off every quarter.

We estimate between 10-25% of households in Wellington struggle to afford sufficient household energy.

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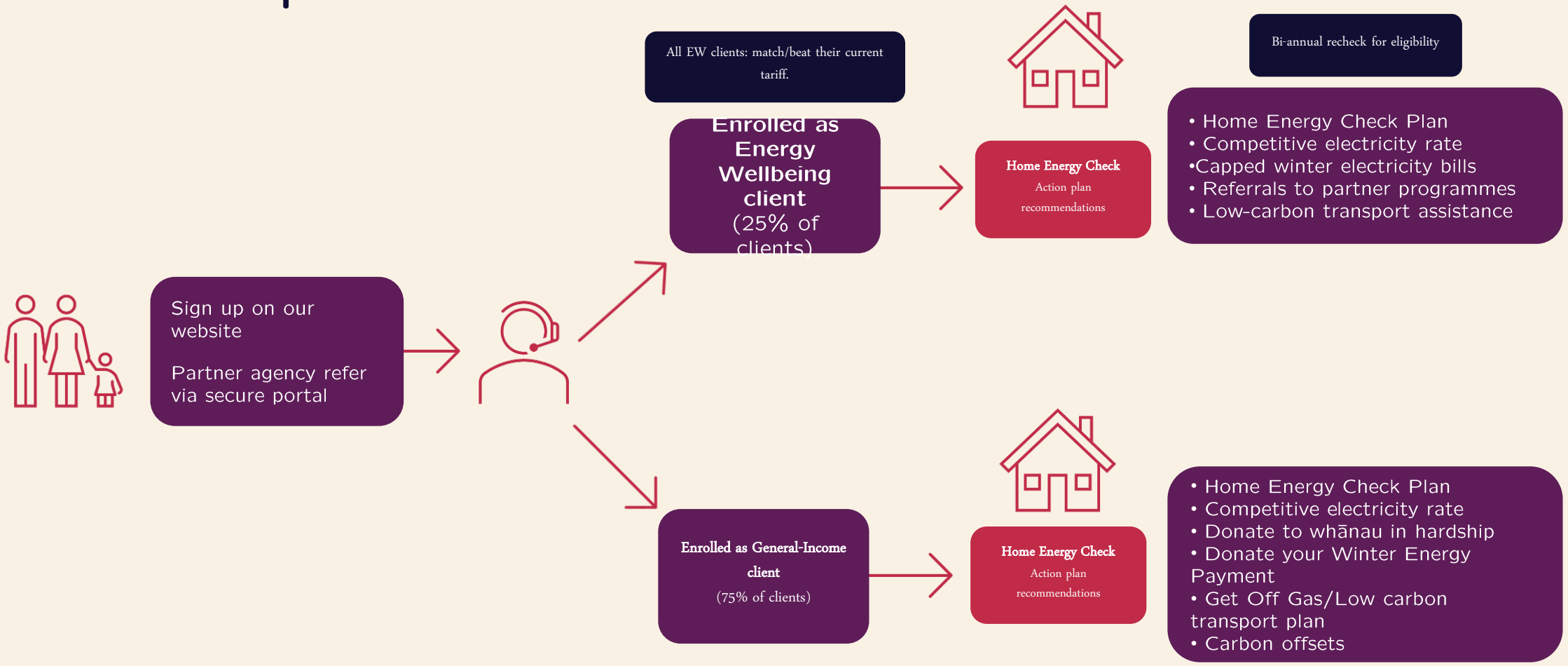
Electricity retailer-solution to energy hardship



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Energy Wellbeing Benefits

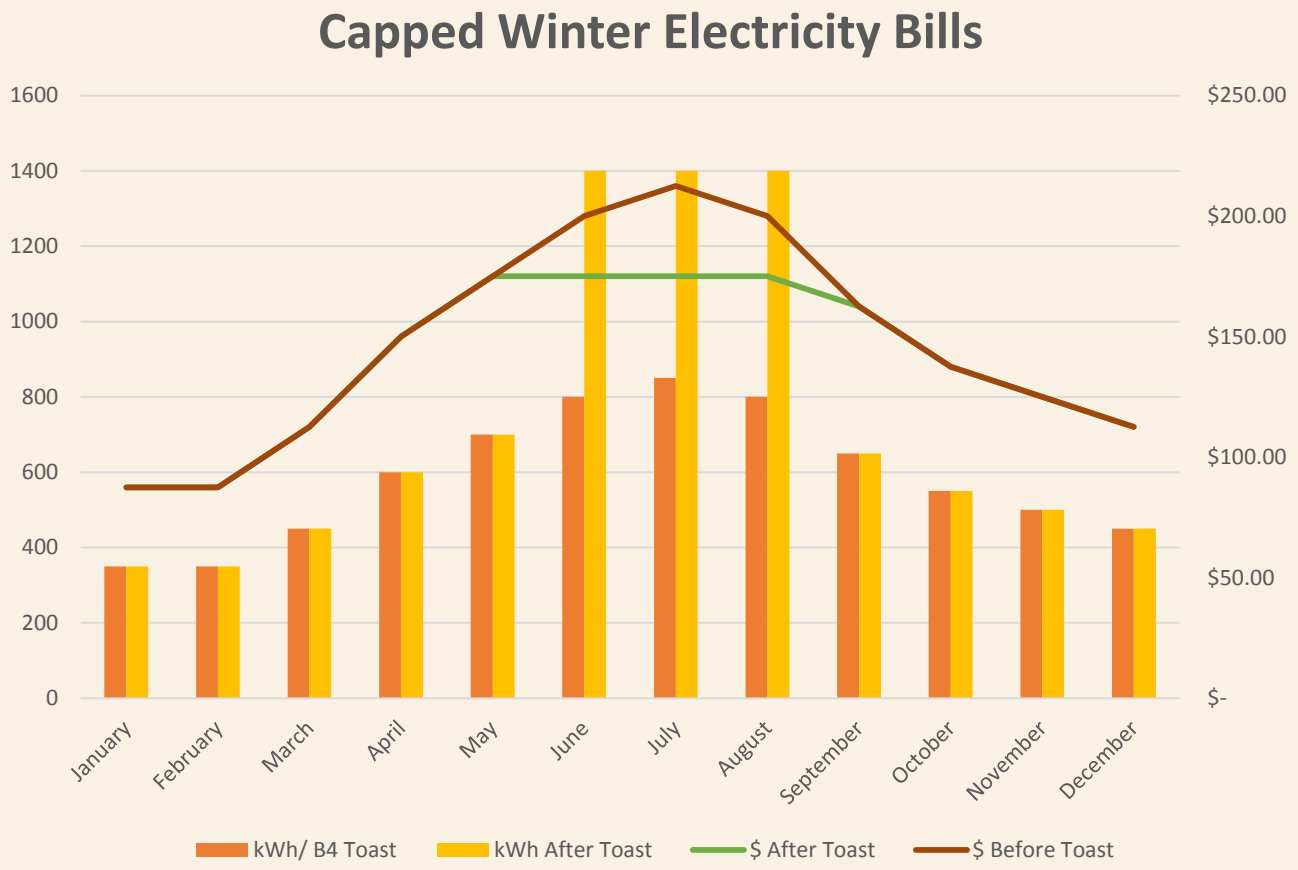
Lower everyday electricity rate than current provider

Complete Home Energy Check

- Determine energy needs
- Advice on using energy and healthy housing
- Interventions and upgrades
- Referrals to partner services
- Advocacy to landlords
- Assign EH rating

Capped electricity bills in winter

- Encourage heating in winter
- Provide bill surety



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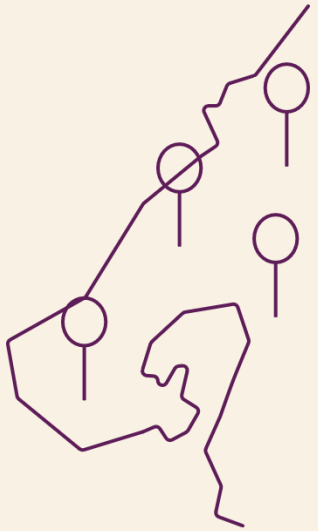
Client Targets

July 2023: 1500+

July 2024: 4000+

July 2025: 8000+

Service Area



Wellington city, Porirua,
Hutt Valley
Kāpiti & Horowhenua

Nationally through
Community Energy Network
members 2023/4?

Vision

Zero energy hardship
by 2030

Net carbon zero by
2050

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Defining Energy Hardship

- Multiple definitions of EH/fuel poverty around the world and in Europe especially.

- Work underway in Aotearoa led by MBIE on definition and indicators
  - MBIE Definition: Energy wellbeing is defined as when individuals, households and whānau are able to obtain and afford adequate energy services to support their wellbeing in their home or kāinga. (inverse for hardship)
  - How to measure it? What factors and indicators contribute to energy hardship?
  - If we only use available national-level data sets, do we get only get a population-level definition (binary or scaled)? How to apply to individual households?

- UK government uses a Low Income/Low Energy Efficiency definition
- Broadly states that a household is in fuel poverty if:
  - they are living in an inefficient house (as measured by a quantitative home assessment) **and**
  - if they spent the money required to heat the home to a healthy level,
  - they would fall below the official poverty line.
  - The fuel poverty gap is the additional income that would be needed to bring a household to the point of not being fuel poor.

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Community-Level Organisations Require a Household-Level Measure

- An EH Rating (EHR) at a household level in Aotearoa:
  - assist benchmarking and tracking changes in energy hardship for an individual household.
  - assess the effectiveness of interventions
  - monitoring a households overall level of EH over time.

- Range of uses for a household-level EHR including:
  - targeting resources,
  - responding to funders and stakeholders desire to see positive outcomes on a household level,
  - determining correlations between EH and a range of structural and demographic indicators.
  - setting eligibility for EH programmes and determining an end point for assistance.

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- A robust EHR would require individual home assessments by trained assessors (ST in 6000 homes/year)
- Formed from metrics important to community orgs and their clients

Toast Electric: Energy Wellbeing Clients – Energy Hardship Rating

- **Objective: Can household afford sufficient energy?** (data to calculate required energy input, cost, affordability)
  - Housing structure – insulation, glazing, orientation
  - Heating appliances, hot water systems, elec/gas/wood use
  - Demographics – no of kids/adults, location,
  - Assessment of existing or future energy spend
  - Household income data or estimation

- **Regulatory: Healthy Homes Standards**
  - Pass/Fail/Exemption status of the house
  - All five standards are assessed – insulation/heating/ventilation/moisture/draughts

- **Subjective: How do household members experience determinants of energy hardship?**
  - General Social Survey questions for determining householders' experience of energy hardship; eg "Was your house so cold in winter that you shivered inside?"

Analysing the Data

Toast Electric energy-wellbeing clients

- Data is predominantly collected electronically within our Salesforce CRM during home visit.
- Heat balance data for household calculated via ALF (BRANZ Annual Loss Factor tool).
- ALF/demographic/hotwater/fuel type/income etc entered into EH calculator
- Outputs to household data file: Required energy – Affordability – Regulatory - Subjective

J14

	D	E	F	G	J	K	N	Q
6	WELLINGTON ALF (kWh per year)	base level	multiplier	Regime		Enter value	Assumptions	Don't adjust
7	A SPACE HEATING				NOTES			
8	**Basecase**	ALF calc			Base case from the ALF model heating regimes. Note ALF assumes the whole house is heated to those schedules and temperature.			
10	**Heating requirement corrected for house and occupant characteristics (kWh per year)**							
11	Utilisation of the house - (multiplier: proportion of house requiring heating)		0.90		Use this multiplier to account for the proportion of the house that is effectively closed off and not heated. Note if (say) 20% of the house is closed off the proportionate heating reduc value of internal walls is generally less than external walls. 'Spillover' is then further dissipated through the external elements of the unheated parts of the house. As a rule of thumb			
12	Occupation of the house - (multiplier: proportion of time house is occupied in heating season)		1.00		Proportion of days where there is no occupancy (and hence no heating) in the heating season. Because of thermal inertia and heat up effects the proportion of heating reduction will proportion of days away. Shorter, and more frequent days away will result in the smallest reduction in heating relative to days away.			
13	Other basecase changes e.g. curtains - (Multiplier: 1 minus proportion of heating saved by measure(s)). Balance remaining is the assumed heating requirement:		0.95	0	Use this multiplier to allow for things ALF doesn't model e.g. curtains, effective draughtstopping. Typical multiplier would be 0.9-0.95 (i.e. 5-10% reduction in heating).			
14	**Heating - allocation of heating requirement amongst heating types (kWh)**							
15	Wood burner - contribution (kWh/yr) - (Multiplier: Proportion heating from wood burner)		0.00	0				
16	Gas - contribution (kWh/yr) - (Multiplier: Proportion of heating from gas)		0.00	0				
17	Electricity - contrib from heat pumps (kWh/yr) - (Multiplier: proportion of heat provided by HP)		1.00	0				
18	Electricity - balance of resistive heating (kWh/yr)		0.00	0	**Note**: cell F18 should be user adjusted; it is set to calculate the balance of heating remaining after the other heating contributions have been accounted for.			
19	**Heating energy needing to be purchased (accounting for heating appliance efficiencies) (kWh)**							
20	Wood (Multiplier: combustion efficiency, expressed as fraction)		0.65	0				
21	Gas (Multiplier: combustion efficiency, expressed as fraction)		0.80	0				
22	Electricity - heat pumps (Multiplier: average COP assumed across heating season (climate adjusted))		3.80	0				
23	Electricity - resistive heating (Multiplier: normally assume a default of 1.0)		1.00	0				
24	**Total Energy Needing to be purchased to meet heating requirements**			0				
25								
26	B HOT WATER							
28								
29	Occupancy for whole year (multiplier: proportion of time house is occupied)		0.94		Note this is whole year occupancy - not the same as heating season occupancy (line 11). For example, if the home is unoccupied for 3 weeks in a year then it is assumed all non-hea days out of 365. There is one exception - see note in line 56			
30	**Hot water usage**							
31	Number of people in household (Adults: Children)	1						
32	**Showers:** Number of showers per day per person (adult showers pp per day / children showers pp per day)	1.00	0.50		Note the units - average number of showers per day per person. For example if someone was showering every 2nd day the number of showers per day would be 0.5			
33	Length of shower (mins) (adults / children)	10	8					
34	Shower flow rate (as measured) (litres per minute)		7.0		Shower flow rates will typically be higher for mains pressure systems unless a lower flow shower head is fitted. It is important to use actual (measured) flow rates.			
35	Water temperature (shower temperature / cold water supply temperature)	40	15					
36	Distribution losses estimate (accounting for HW pipe losses and stagnant losses) (%)		10%		Distribution losses expressed as a % of estimated energy use. Expressed this way % losses will be lower when the volume of HW used per 'event' is higher			
37	**Estimated annual energy use for showers (kWh per year)**			768				
38	**Laundry:** Number of hot washes per week		1.00		For a hot wash every 2 weeks enter 0.50			
39	Quantity of water used with a warm or hot wash (litres/wash / HW temperature adjustment C)	80	-20		Put in the quantity of water used for the wash cycle - if a warm wash use the adjuster (Cell F39) to reduce temp from the tap temp (Cell F54) to the wash temp e.g. if wash temp 40C a			
40	Distribution losses estimate (accounting for HW pipe losses and stagnant losses) (%)		10%					
41	**Estimated annual energy use for laundry (kWh per year)**			125				
42	**Other:** Dishes / dishwasher (number of washes per day)		0					
43	Quantity of water used with a warm or hot wash (litres/wash / HW temperature adjustment C)	10	0		Put in the quantity of water used for the wash cycle - if a warm wash use the adjuster (Cell F43) to reduce temp from the tap temp (Cell F54) to the wash temp e.g. if wash temp 40C a			
44	Hand washing/misc (number of washes per day)		1					
45	Quantity and temperature of HW used per wash (litres per wash / HW temperature C)	4	40					

EH Calculator | Sheet1

Type here to search

18°C Cloudy

ENG 3:34 pm 25/11/2022

Constructing the Rating

At least 4 individual measures are output from data collection:

- Total required energy (can range up to more than 20,000kWh - >$5k/household energy costs)
- Affordability/Income
- Regulatory compliance
- Subjective experience

Measures combined to provide:

- A usable metric such as a 1-10 scale or
- A multi-scale such as a **A-G:1-5**:**Red**/**Orange**/**Green**
  - that expresses the objective, regulatory, and subjective experience of hardship.
- Or?

- Analysis/reporting – pending recruitment of skilled staff

Ngā mihi

Philip Squire: Toast Electric/Sustainability Trust
Phil.squire@sustaintrust.org.nz

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toastelectric.nz