Rewiring Aotearoa submission on:
Targeted reform of distribution pricing

Summary:

The EA has the ability to take a leadership role in the energy transition on behalf of electricity consumers. Far more than the Commerce Commission's oversight of EDBs investment plans, the EA's network pricing workplan gives consumers agency in the development of the electricity system. When consumer agency is stifled, they will likely have significantly worse financial outcomes on their bills. Much of the necessary changes have been demonstrated already locally or overseas, and the remaining question is not if the changes are possible but if we as a nation will have the courage to implement them on the timeline required to drive better energy transition outcomes for consumers.

- There are two primary pathways to our future energy system. One - centred on massive expansion of large scale generation and high capacity network infrastructure - is high cost to consumers and low resilience, the other - centred around distributed energy systems and demand flexibility - is low cost to consumers with accelerated high resilience. We are losing focus on the most beneficial pathway to the New Zealand people.
- Time is running out - We must remain cognisant of the closing window of opportunity to create the distribution network environment that can significantly improve our energy system trajectory and likely save us billions in transition costs. Flexibility won't matter if it doesn't come before the network upgrades it will offset.
- Two way tariffs are needed - peak tariffs should symmetrically reflect both consumption and flexible contribution. E.g. if business consumption is priced at 20c/kWh during congestion, a -20c/kWh tariff should be provided. For residential, we should provide peak feed-in tariffs similar to the ones being deployed in Australia e.g -26 cents per kWh at peak (i)(ii)(iii).
- Support EDB and consumer pilot projects that will rapidly develop necessary knowledge and pathways to a lowest cost highest resilience energy system.
- Suport EDB finance pilots to develop new ways for consumers (especially renters) to finance energy infrastructure that will support the nation. Ensure EDBs have the ability to integrate such processes.
- New Zealand could lead the world with innovative work in this area. It will be among the first countries worldwide to reach the electrification tipping point and could provide global precedence and demonstration of how to deliver on a consumer focused energy transition.

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About Rewiring Aotearoa
Rewiring Aotearoa is an independent non-partisan non-profit. We represent everyday New Zealanders in the energy transition, working to build an abundant electrified future where every kiwi saves money on their energy bills and every community has the resilience to keep it's lights on and homes warm. Our founding team are local and international experts in climate data, energy policy, and community engagement.

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Distribution pricing will have a significant impact on community cost of living in the energy transition.

We should not underestimate the impact that distribution pricing will have on cost of living for New Zealand communities as infrastructure is built for the energy transition. Cost reflective two way distribution pricing has the ability to empower communities, save billions in infrastructure costs, and enable a faster transition to zero emissions. On the contrary, continuing a business as usual one-way tariff approach is likely to leave consumers with significantly higher energy bills, and risks sparking an inequitable spiral of grid disconnections as battery cycle and solar prices drop below distribution and transmission prices.

There are two pathways to the future energy system. We are not on track for a consumer focused pathway.

New Zealand is writing the history of the energy system that will carry our nation into a zero emissions world. There are two primary pathways to this future, one is high cost to consumers and slow progress towards emissions reduction, the other is low cost energy abundance with accelerated emissions reduction.

The later pathway requires maximisation of rooftop solar, community solar, and local demand flexibility (orchestration, shifting, response). We are not currently on this pathway.

High cost, slow decarbonisation pathway

- Build 2-3x generation, transmission, and distribution infrastructure which is likely to be a sunk cost in time after DER saturation.
- Do not evolve existing electricity tariff structures that were designed for a one-way fossil fuelled energy system and could be far more cost reflective and reduce system costs.
- Pass the costs of the above through to the consumer, increasing costs of electricity with low income homes being most impacted.
- Miss the opportunity for the fastest and lowest cost emissions reduction possible this decade - accelerated community electrification.
- Miss the opportunity for soft cost reduction in gas retrofit electrification, that could lower transition costs for the nation if done in time.

Low cost, accelerated decarbonisation pathway

- Maximise lowest cost energy generation (below the substation rooftop solar) and lowest cost infrastructure build out.
- Evolve electricity tariff structures to be more cost reflective of both existing infrastructure costs and deferred infrastructure costs from consumer contribution to the energy system at peak (two way tariffs).
- Enable smart sharing of energy below the substation through technological, behavioural, and practical orchestration.
- Create the lowest cost consumer (and business) energy bills driving an abundant future for New Zealand communities where the benefits of the energy transition reach every kiwi.
- Accelerate emissions reduction by leveraging the negative per ton cost of community electrification to deliver permanent emissions reduction at pace this decade.

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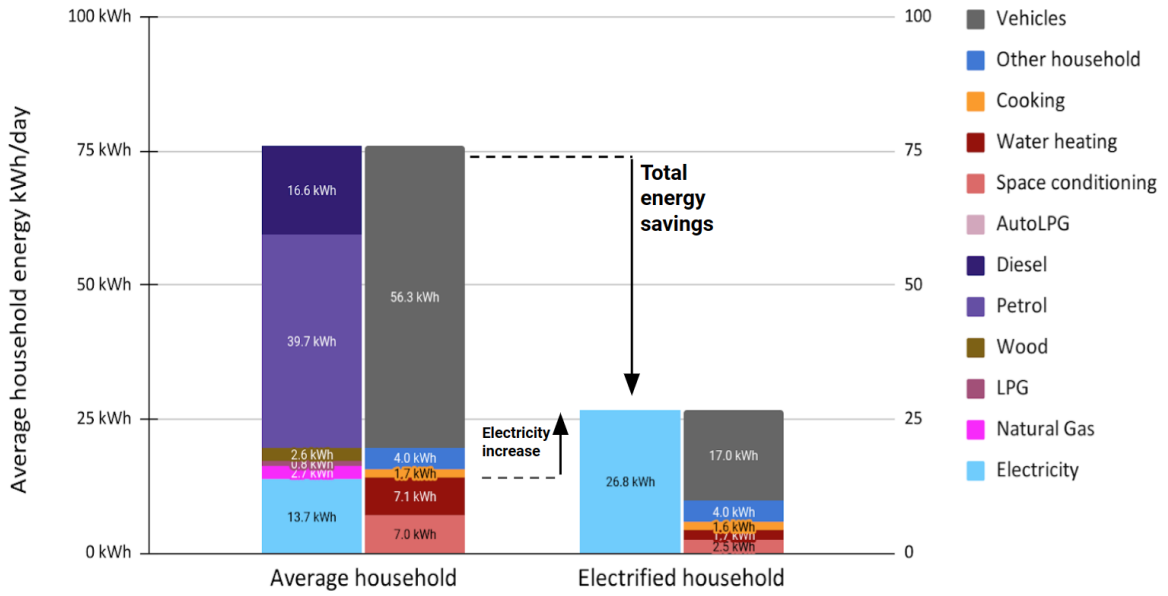
We are going to need less energy, but a lot more electricity delivered to homes. The lowest cost source of that electricity is maximising rooftop solar and demand flexibility in communities.

Today's average household energy use looks like the first column of the chart below. The lowest cost, lowest emission way to run a home is with electrified appliances and vehicles, the right column. Electrification will decrease overall energy use through the thermodynamic efficiency of electric machines compared to fossil fuel machines. Yet this will still necessitate an increase in total electricity required. If we are to reach our climate commitments, every community across the nation will need to make their electrification journey over the next 15 years or so.

NZ average household energy use, current versus electrified.

Source: Residential Baseline Study NZ. Rewiring Aotearoa



The transition will be a monumental shift in the energy system.

For this new demand to be met unmanaged, or relying solely on traditional infrastructure, it would require immense upgrades to generation capacity, transmission, and distribution. Perhaps a near tripling in capacity across all three, including distribution networks where beyond a tripling is possible due to the disproportionate impact on peak loading driving costs. These immense upgrades would be likely to delay decarbonisation and come at a high cost to the New Zealand people.

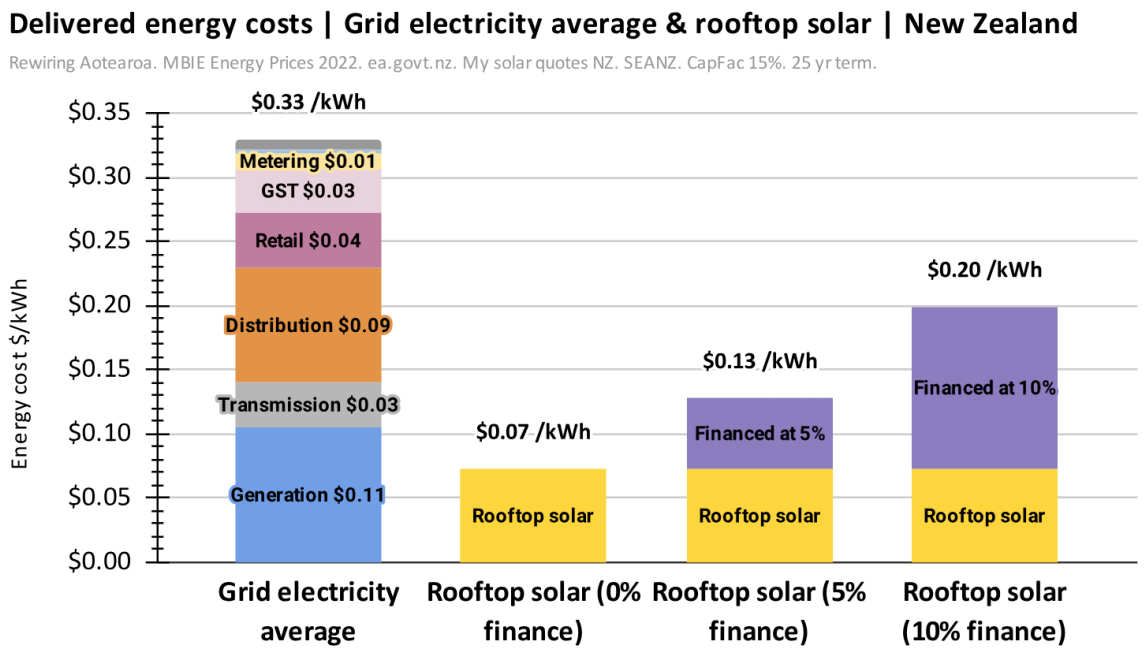
The scale of "smart" energy use will drive economic outcomes for New Zealand communities.

How well we can meet this monumental shift through "smart" energy use will drive the economic outcomes for the New Zealand people. We need to maximise lowest cost energy generation, and maximise the smart energy use that will reduce infrastructure needs.

The lowest cost source of energy is maximising rooftop solar potential in communities.

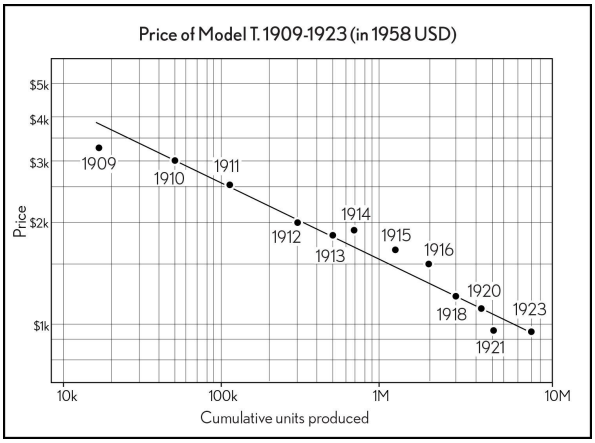
New Zealand's rooftop solar is still not quite as cheap as Australia's global solar success story(i), it is still the lowest cost source of delivered energy in New Zealand and will continue to get even cheaper. Figure 4 shows the comparison of average electricity costs between the grid and solar & battery installations. Seasonal variations and fluctuating wholesale prices of course add nuance to this picture, but the point it conveys is clear - even free generation/wholesale would arrive at NZ homes at a higher cost than their solar.

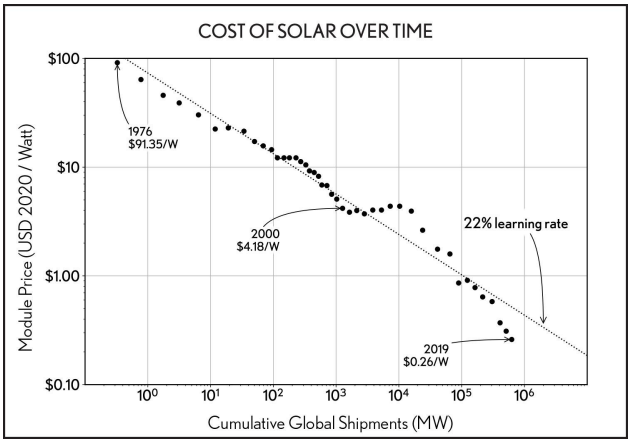
Batteries are just passing the tipping point of for homes, and the prices of both are predicted to continue dropping. Further to this, the availability of batteries to homes will only grow when they have two EV's parked in their garage. To be clear - we are not suggesting these homes should be disconnected from the grid. Managing the inherent variable nature of renewable energy means these homes will have lower cost energy if they are grid connected, and the strength of our grid will be crucial in the energy transition. What this conveys, is that if we are to look for more energy, rooftop PV is the lowest cost place for most of that energy to come from - and it will need to be supported by storage and grid scale renewables that counter correlate with the natural solar windows of our communities. Further, it will need to be smartly integrated into networks of homes that can shift their energy demand.



Solar and battery installations will continue to drop in price.

Solar already makes sense for many New Zealand homes. The deployment question is one of commercial models, finance offers and product offerings, rather than a technology question at this point. It will continue to drop in price further. We have seen these cost curves time and time again throughout history, from the Ford Model T manufacturing cost curve to computational processing power. We are now seeing those same curves with batteries, and including those curves in our picture of the future energy system is vital.





While residential batteries are still only just reaching economic tipping points, we must remember that they will continue to drop and are already dropping. For example, while residential batteries are installing at $1300/kWh, a Tesla with a 60kWh battery can be purchased for $60,000, functionally a $1000/kWh battery with a free car attached to it. Wholesale battery prices are already about 5 times lower than that in the USA.

This is important to consider for demand side saturation, and avoiding sunk costs in infrastructure build out. Facilitating an energy system that makes the most of this lowest cost energy will enable a system that minimises sunk costs.

Don’t forget the volume of batteries that will come into the system at near zero cost. (e.g. V2G)

Storage capacity is an often raised and important concern, batteries are beginning to reach LCOE tipping points where cycle costs are lower than peak feed in tariffs. We should not underestimate the amount of batteries homes and businesses will naturally adopt over time to lower their bills and increase their resilience.

Simultaneously we should not underestimate the amount of storage that will come into the system at near zero cost through vehicle to grid. Our light vehicles parked in driveways combined will have about 500Gwh of storage capacity, parked about 23 hours of the day. The cost to have these participate in the system will be minimal as V2G progresses because the batteries are already there as part of an existing purchase. Practically everything that has a petrol tank today will be in this same scenario, whether it’s a boat, jetski, motorbike etc. All parked for most of the day every day, all with large batteries which could be participating smartly in the energy system if we need them to. There will obviously be a balance to strike between convenience and cost incentive here, but we should not discount the volume of storage available and the ability of our households to act as infrastructure.

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The cost of incentivising DER is likely to be significantly lower than prioritising network expansion. We should maximise DER.

NZ rooftop solar prices are already the lowest cost delivered energy available to homes, and will continue to get cheaper. Both in the short-term (i)(ii) and the long term through industrial learning rates. A worthwhile reminder that Australian solar installs are less than half the price of NZ installs already, even when adjusting for GST and the (now small) Australian government subsidy, they are near half the price of NZ installs. Similarly, EV's and batteries are on some very steep learning rates and will also continue to get much cheaper (iii). Historic predictions have repeatedly underestimated how fast the prices drop across renewable technologies (iv).

Homes and businesses will naturally install solar and batteries as they are in their economic best interest in addition to the resilience benefits. The question is whether we plan for this. or be caught off-guard by it with significant sunk costs going into infrastructure that ultimately has to be paid for by consumers. The question is not if homes with electrify and install solar and batteries, the question is whether we enable this to happen before we build out too much infrastructure. To be clear, we are supportive of energy infrastructure upgrades to support the energy transition, but these upgrades must be balanced with consumer outcomes and maximisation of low cost local energy generation.

If we compare the costs of accelerating this solar battery electrification of homes (and businesses), it is likely to be significantly lower cost than building out the infrastructure to support their added energy needs through traditional means. This is supported by international investment in this direction, for example the large portion of demand side investment of the Inflation Reduction Act which includes over $140 billion in tax incentives to accelerate household electrification.

New Zealand has energy system advantages (strong hydro, geothermal) that will further support this direction, but we are well behind our neighbour Australia who has 1 in every 3 homes benefiting from rooftop solar - the lowest cost delivered energy on earth. New Zealand has rooftop solar on just 2.5% of homes. We have catching up to do.

Households <u>are infrastructure</u>.

One of the biggest levers to accelerate DER is to give consumers (homes and businesses) the recognition they deserve as being able to contribute to the energy system. We are no longer in a world where energy infrastructure is only on the supply side. Consumers have the ability to contribute significant amounts of generation, peak reduction, storage, and system security.

Right now, as shown in the examples included in this document, some homes and businesses can already economically transition to zero emissions with zero impact on peak network needs. But for many homes this is not yet economical because they are not fairly rewarded for their contributions to the energy system. E.g the Cromwell home and farm example is charged a network fee of $21/kWh at peak, and yet is rewarded $0/kWh to contribute energy back to the network at peak from the properties batteries. This creates an environment where upgrades to the network are done that then end up increasing the bill of the consumer who could have reduced the need for the upgrades in the first place.

Treating consumers fairly in distribution pricing requires rewarding them for their ability to contribute to the system, and not just punishing them for using it. This two way pricing has already been deployed in multiple networks in Australia and is significantly improving DER economics.

Time is running out - The EA needs to act fast

As quoted by the Authority, research - funded by large generators and distributors - has suggested that $22b of distribution network infrastructure alone is required by 2030. To our knowledge, BCG has not published the source of this figure, or the assumptions that underpin it - hence we should be careful before accepting it as a 'given', around which we should anchor our expectations of improvements. However, even taking that figure at face value, assuming 50% of that figure is ultimately charged to households, this amounts to each household picking up an extra $5,500, simply for investment needed within the next decade.

As noted by the Authority (para 4.10), it is common practice for distributors to invest ahead of demand. We should find it alarming, then, that BCGs level of distribution investment is accompanied by advocacy for changes to the regulatory regime (overseen by the Commerce Commission) that would allow distributors to invest even further ahead of the need. This strongly implies that these investments would be approved by the Commerce Commission under a higher degree of uncertainty about the need.

Of course, except for the largest consumers (who will individually have a significant effect on particular distribution investments), most consumers have very little say in how these decisions are made. Essentially, they must trust the Commerce Commission to be their agent in the assessment of the degree to which distributors have considered non-network alternatives.

However, Rewiring Aotearoa strongly believes that proper network tariffs enhance consumer agency - across the consumer spectrum. We endorse the Authority's conclusion that "*In this context, it can also be practical, efficient, and effective for distributors facing demand growth to use TOU pricing for small users, rather than more dynamic or targeted price signals. This reflects that the main decisions that price signals influence are investment (such as appliance or fuel choices) and set-and-forget usage decisions (such as whether to habitually shift some usage away from mornings and evenings). TOU can send an efficient signal for these types of decisions, while being comparatively effective due to their predictability and ease of understanding.*"[1]

However, we would go further and argue that it is <u>absolutely imperative</u> that these types of tariffs are implemented as a minimum standard, and as quickly as possible. Every year that passes sees distributors' perceived need for investment grow, and the appetite for further delay diminish - understandably. Even implementing a new TOU tariff for the 2024/25 pricing year may take more than a year or more for a retailer to adopt - either by passing the tariff through, or by designing its own approach to incentivising demand response (e.g., a managed tariff). The inertia in consumer behaviour, driven by awareness, biases, and information gaps means that 5 years could pass before a meaningful array of consumer-driven investments could be made that could defer - or avoid - the distribution investment. Hence we ask the Authority to

[1] para 4.11 page 22

- Be ambitious in its requirements for distributors to adopt TOU tariffs (we support para 4.29), and strong monitoring and oversight of retail tariff development. We support a base level of control (prohibiting uniform prices) with a right for the Authority to exercise a targeted call-in.
- Design an information campaign targeted at consumers (much like the "what's my number' campaign) to drive up awareness of the benefits of TOU tariffs and demand-shifting (and Rewiring Aotearoa would be delighted to assist, leveraging off its current community work)
- Work with the Commerce Commission to strongly incentivise EDBs to pilot new, customer-centric tariffs[2]. We note and congratulate Orion and Wellington Electricity for their "Resi-flex" trials.
- Work with the Consumer Advocacy Council and Rewiring Aotearoa to consider the impact of TOU tariffs on energy hardship[3].

Finally, we strongly encourage the Authority to not only require TOU consumption tariffs, but also peak-targeted export tariffs for batteries (two-way tariffs). Despite paragraph 3.8 in the consultation paper, this cannot be separated from this targeted reform, as it is intrinsically connected. As it stands, using distributed batteries to reduce metered consumption at any premises will be rewarded by the reduction in the variable component of the retail tariff - including the distribution component. However, if the use of the battery resulted in a net export from the meter, then - at best - the export may be rewarded through a buy back from the retail at a wholesale-reflective rate. However, as far as we are aware, EDBs do not reward peak-aligned export, despite the fact that the impact of the marginal kW is identical between the last unit of import reduction, and the first kW of export. This is why the issue cannot be treated in isolation as part of the EA's Part 6 review.

We understand that, due to lack of low voltage visibility and concerns about two-way flows, EDBs are being very cautious about export. However, we fear that this caution is driven by EDBs experience with rooftop solar - where export is likely to coincide with only modest levels of network demand. Batteries, however, are controllable and can be controlled to export during peak times - if the peak-targeted export pricing signals exist. Controllable batteries (including V2G) could be a significant resource that could assist EDBs in managing peak demand increase. If these price signals do not exist, investors (householders) cannot be expected to take this potential into account when deciding whether to invest in batteries. With battery costs coming down, there is a need to ensure that decision makers in households and businesses have the right price signals to make investments. Equally, there is the very real risk that conservatism, and lack of ambition, sees battery prices come down, but the resulting investment by consumers happen too late to defer billions of dollars of network investment.

As a result, the country could sleep-walk its way into the 2030s, incur a massive network bill, and - only after it has occurred - realised that it would have been more economic to invest in accelerating demand side flexible electrification and batteries. We appeal to the EA to do everything in its power - through pricing, to incentivise efficient decisions - to avoid this happening.

Finally, to truly empower the consumer, we reinforce that a consumer's access to their half-hourly consumption data[4], and their ability to effortlessly assign that data to a third-party service provider is an absolutely fundamental requirement of a speedy transition to a lower cost future for consumers. All effort applied to TOU pricing may have limited impact if a consumer cannot evaluate the impact of their actions on their bill. Noting the Authority's recently revised statutory objective, this issue is most acute for domestic consumers. Two issues that must be immediately rectified are:

- The continued presence of profiling (which we understand to be around 40% of non-industrial volumes, as reported by the Market Development Advisory Group) is resulting in some retailers meeting their requirements under the EIPC clause 11.32A by only providing monthly consumption data - even if half-hourly information is available through the consumer's meter.
- The delay of 5 days allowed for retailers to produce this information is unacceptable, and reflects an outdated view of data systems and management. Given that exchange protocols - albeit voluntary - have been established, this exchange should be instantaneous, as should the ability to assign this to a third party.

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[2] The EA could, for example, incorporate whether the EDB is piloting/trialling new tariffs in its pricing scorecards

[3] Rewiring Aotearoa is discussing pilots and trials in both the North and South Islands focused on energy hardship with the energy hardship panel.

[4] As noted by the Authority, half hourly usage is possible at almost 90% of ICPs

Real world examples

These are real examples. We have summarised them to make this document shorter yet can easily expand on them in great detail if and when required.

Wellington house

This semi-rural household just outside Wellington electrified their household and vehicles, including installing 13kW of rooftop solar, two 13.5 kWh batteries, two electric vehicles, heat pump, smart solar diverter to electric hot water and EV charger.

Overall they now save about $9,500 per year on energy bills including vehicle fuels. Perhaps even more importantly, they draw practically zero peak electricity while having increased their total electricity consumption by over 300%. No new transmission, distribution, or generation infrastructure is needed to facilitate this full electrification. In addition to saving money, the household is now significantly more resilient, having smoothly sailed through multiple 6+ hour power outages able to continue regular activities.

	Before electrification	After electrification
Energy bills (including vehicle fuels)	**$11,000 / year**	**$1,500 / year**
Total electricity use	**4,000 kWh / year**	**15,000 kWh / year**
Peak usage	**Average**	**~Zero (offset by solar+battery)**
Payback period		**10-12 years**
Comments from case study	r solar diversion system will automatically divert excess solar based on a configurable prity. First, the house batteries will charge, then the hot water is heated, then the EV's will arge. Finally any excess is exported to the grid. The hot water and EV solar diverters will omatically use solar if available and off peak night rate if needed. This system is mpletely set and forget. Due to the amount of solar diversion, our self consumption is h and export to grid relatively low. Living rural, we've had a few 6+ hour power cuts since tall, and the system has backed up our essential loads perfectly.	

Cromwell Cherry Orchard

	Before electrification	After electrification
Energy bills (including vehicle fuels)	**$66,000 (estimated)**	**$5300**
Total electricity use	**11,000kWh / year**	**97,000 kWh / year**
Peak usage	**2kWh**	**1.8kWh**
Payback period		**10-12 years**
Comments from case study	Removing gas and diesel heating from our household and adding in an EV increased usehold electricity usage by 400%. The farm was a green fields development that added urther 500% electricity consumption. ar generation on site allows us to reduce our grid take by 60% with the potential to scale s further to 80% with an expansion of our PV array. olesale spot price market allows us to arbitrage the spot price and offer value at the neration layer of our energy system. We could offer considerable value at the distribution er by responding to their peak signals however there is only limited reward for doing so.	

Beyond tariffs into facilitation of a smarter energy transition

EDBs have further roles to play. The future of our energy use will be swapping a large portion of our fossil fuel bills for finance, e.g. when you buy solar you buy 25 years worth of energy upfront, when you buy a battery you buy 15 years worth of energy storage cycling.

Finance through fixed daily rates from the EDB could help the renter/landlord split incentive problem and directly connect finance to the energy bills it is lowering, making decisions and energy literacy easier for consumers. This is already being explored by distribution networks in Australia. It could be passed on directly through to a bank green loan, or backed by government or local government finance, demand flexible homes with storage and generation are energy infrastructure and deserve finance facilitation suited to their role of supporting the national energy system.

This same approach could be considered for offering the ability to finance transformer upgrades which will be required for some businesses and farms to electrify. It should be possible for this infrastructure upgrade to be gradually paid of through on bill finance, in the same way network upgrades are gradually paid off on bill. Without this, networks will place unnecessary financial barriers on the electrification of New Zealand homes and businesses