ROBINSON BOWMAKER PAUL

ARA AKE

FINDINGS FROM TWO MULTIPLE TRADING RELATIONSHIPS PILOTS

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Contents

GLOSSARY

Acronym	Definition
BTM	Behind-the-meter
EA	Electricity Authority
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
ICP	Installation Control Point
KO	Kāinga Ora
MEP	Metering Equipment Provider
MTR	Multiple Trading Relationships
PV	Photo-voltaic
VKT	Vehicle kilometres travelled

1 INTRODUCTION

Following a lack of industry uptake after The Electricity Authority's (the Authority) investigations into Multiple Trading Relationships (MTRs), Ara Ake looked to understand the potential of MTR further through commissioning several real-world pilots. Data collected from the pilots would be used to provide real data for cost-benefit analyses (CBAs) assessing a nationwide roll-out.

The pilot had four main objectives:

1. **Real-world Testing:** Provide a practical test for MTR, evaluating its performance and functionality in a live environment.
2. **Viability and Customer Attractiveness:** Assess if MTR is a viable and attractive option for customers, justifying the amendment of the Electricity Industry Participation Code (the Code) to introduce MTR.
3. **Risk and Constraint Identification:** Identify potential risks and constraints that could make MTR roll-out more difficult than expected or have a negative impact on electricity markets.
4. **Business Model Exploration:** Understand the potential development of different business models and offerings which MTR could enable.

To achieve these objectives, Ara Ake put out a call for trial participants and initially designed two different small-scale pilot studies:

1. **Multiple Installation Control Points (ICPs):** MTRs were used to provide a customer with the ability to shift behind-the-meter (BTM) solar photovoltaic (PV) energy between multiple ICPs. This trial was performed as a collaboration between Flick Electric: an electricity retailer with a wide range of tariff structures, and Our Energy – an electricity retailer specializing in community energy initiatives and local energy matching.
2. **Retail + EV charging:** MTRs were used to allow consumers access to low-cost EV charging rates using a different company to their household retailer. This trial was performed as a collaboration between Our Energy and Thundergrid: an electric vehicle charging company.

This report reviews the outcomes and lessons of these two pilots and key lessons learnt to help inform Ara Ake's internal processes and how it will conduct future trials.

Ara Ake is also in the process of coordinating another MTR pilot with Kāinga Ora (KO). In this pilot, KO will choose a retailer to operate and distribute the excess energy from the solar PV installed on resident's houses, while residents will still be able to pick a retailer of their choice. This trial looks to address MTR's potential to enable community engagement in renewable energy solutions, including for those who do not own properties. This pilot is in an early stage and will not be addressed in this report.

2 Multiple ICPs Details and Results

2.1 Description of the Pilot

The multiple ICPs pilot was designed to test the practical feasibility of sharing solar generation between multiple ICPs through matching their export and import profiles. As requested by the customer, charges for all ICPs were provided on the same bill.

2.2 Setup

To get the pilot running, Flick sought out suitable customers for the pilot. There was no shortage of interest, yet the majority of interested customers weren't suitable. To be suitable for the pilot, a customer needed to have:

- A manageable number of ICPs (billing calculations were performed manually so lower numbers of ICPs kept the billing effort manageable)
- A modern smart meter with 30min measurement (to match solar output with consumption)

Among the interested participants, a farmer in the Waipukurau region of rural Hawkes Bay stood out as an ideal choice for the pilot. Having previously taken part in Flick Electric's solar trial, the farmer already had a strong relationship with Flick, and had a manageable number of ICPs, making him an excellent fit. In addition to his own ICPs, a family member of the farmer lived down the road in the Waipukurau township.

The farmer's solar arrays were primarily used during the summer for irrigation purposes. This meant that during the off-season his solar arrays had a significant amount of generation in excess to energy demand at the ICP.

Table 1: Pilot participants and roles

Participant	Role
Ara Ake	Pilot Coordinator
Jade	ICP Registry Operator
Our Energy	Retailer
Flick Electric	Retailer

Farmer	Consumer

2.3 PROCESS

In total the pilot was comprised of a total of 6 ICPs:

- 5 ICPs owned by the farmer, including:
    - One farm ICP with a 50kW solar array
    - One home ICP with 8kW solar array
- 1 ICP owned by the farmer's family member

Energy matched between ICPs was charged a small network services fee by Our Energy, which was not the registered retailer for any of the ICPs as it was not providing retail services in the Hawke's Bay at the start of the trial. Energy imported from the grid was paid for using tariffs set by Flick. At the end of a billing period, Flick and Our Energy would collaborate to send the customer a single bill. The customer's family member continued to pay for fixed charges, while the customer was able to gift his surplus energy.

The pilot lasted for 13 months from the 1st of May 2022 until 31st May 2023.

2.3.1 Metering and billing

All data used for settlement was provided through the main ICP meter. Due to Electricity Industry Participation Code (Code) requirements stating that Metering Equipment Providers (MEPs) may only share meter data with the retailer assigned to the ICP, Flick Energy remained the legally assigned retailer at all ICPs. Any other arrangement would require a change to the Code or an exemption from current clauses. In this instance, Our Energy functioned as the provider of supply and demand matching services. The billing process worked as follows:

1. Flick gets meter data from MEP
2. Flick calculates its portion of the bill
3. Flick sends the incomplete invoice to Our Energy
4. Our Energy makes its calculations and adds the final data to the bill
5. Our Energy sends the billing data to Jade and Flick
6. Jade validates that the claims made by each retailer sum to the values at each meter
7. Flick issues the invoice to the customer

2.4 Pilot results

Over the pilot's 13 months, the solar PV injected 70.83MWh onto the grid. 17.5% of this injection was consumed at the other ICPs. Our Energy was able to match 45% of the customer's family member's demand with the solar export at other ICPs.

Table 2: Key statistics

BTM PV export (kWh)	70,828.48
Surplus PV consumed at other ICPs (kWh)	12,366.44
Percentage of PV surplus used at other ICPs	17.5%
Percentage of the family member's energy covered by PV exports	44.8%

2.4.1 Incentives and cost savings

For a customer with multiple ICPs and solar installed, there is an incentive to match consumption at one ICP with another, however net metering is not typically enabled or provided for by electricity retailers. Customers are offered fixed solar buy-back rates which are typically much lower than the rates a customer pays for energy imported from the grid. A customer selling energy to the grid at one ICP and consuming at another will typically pay significantly more than if all energy was consumed at the same ICP. While at least one company offers services which enable solar sharing between ICPs by exposing the customer to spot-prices (Our Energy), options for matching solar import and exports are limited for customers who cannot take on the risk of spot price exposure.

Assuming that the customer in this pilot was on a typical energy tariff at all ICPs, and was paid a typical solar buy-back rate, their potential savings from sharing electricity across ICPs total over $2,300 per year, as detailed in Table 3 below.

Table 3: Solar import export rates and potential cost savings for customer

Average residential tariff ($/kWh)[1]	$0.31

[1] The MBIE Quarterly Survey of Domestic Electricity Prices (May, 2023) reports an average $/kWh electricity cost for New Zealand as a whole, and for each region. This cost is calculated by dividing the bill total by the number of kWh consumed. This means that the $0.40/kWh headline figure for Waipukurau includes fixed daily charges and variable energy charges. Net metering offsets the variable charges, but not the daily charges, so using the headline figure would overestimate the potential savings. We have assumed an average $2/day daily fixed charge in order to calculate the variable component.

Average solar buy-back rate ($/kWh)[2]	$0.12
Energy savings/kWh	$0.19
Energy shared between ICPs (kWh)	12,366
Energy savings for customer across pilot period	$2,350

Some of the cost savings experienced by the customer decrease retailer profits, yet new value is added through the stronger incentive to use cheap renewable energy when it is being created.

If this type of sharing became widespread, retailers and EDBs would face heightened commercial pressure to offer competitive tariffs.

2.4.2 National context

Scaling the pilot's numbers to a national level using simple assumptions can inform the potential market MTR could unlock. While the customer's energy arrangements only give a few data points, and a larger sample size would be more suitable, scaling the pilot's insights to a national level helps put things into perspective. These figures represent a generous estimate of market size potential as they assume that if MTR was made available 100% of current solar or distributed generation would share energy at the same rate as the customer in the pilot.

New Zealand currently has around 280 MW of distributed solar capacity. If all distributed solar exported energy to the grid at the same ratio as in this trial, MTR would enable the assignment of over 300,000[3] MWh of solar a year to other ICPs, roughly 0.8% of annual net demand[4]. If this same approach was applied to all types of distributed generation, MTR would enable up to 2.1 TWh or 5.4% of annual demand to be net metered, returning significant value to customers .

The customer's family member consumed 5.51% of the total electricity exported from other ICPs. If scaled up to all distributed solar generation in New Zealand we can look at the potential cost savings of renewable energy sharing which MTR could unlock.

Table 4: Potential of gifted solar energy

Installed distributed solar Jun 2023 (kW)	279,191

[2] Powerswitch (March, 2023)

[3] EMI: Installed distributed generation trends (2023)

[4] New Zealand consumed 38.985 TWh of electricity in 2022

Assumed solar average CF	16%
Distributed solar output all of NZ assumed from average capacity factor (GWh p.a.)	391.3
Potential energy sharing (GWh p.a.)	21.6
Assumed energy tariff ($/kWh)[5]	0.24
Potential gifted energy value ($m p.a.)	5.1

If MTR was made available, there is potential that households and businesses installing distributed generation would share (gift or offer at discounted rates) surplus energy with family, friends, and employees. This would provide greater incentive for those without distributed generation in their homes to match their demand with the output of intermittent distributed generation elsewhere.

Where ICPs are located in the same distribution network, the retailers would face the same wholesale spot energy price for imports at one and exports at another. Where they are geographically separated, a locational price difference would apply. In this pilot, such a price difference would have been borne by (or to the benefit of) Flick.

2.4.3 Customer feedback

The customer reported high satisfaction with the MTR process. The benefits included:

1. Ability to directly share energy between properties without taking on spot price risk or paying increased tariffs
2. Ability to gift energy to his family-member without taking on their entire bill
3. Simplicity of one single bill.

MTR may lead to proliferation of different energy bills as BTM services as unbundled, say one bill from Flick and another from Our Energy. An analogy here would be unbundling gas or broadband from an electricity contract, into three distinct bills, where a provider offers all three. If unbundling offers a customer more choice and value, without being locked-in, the convenience of a single bill might become less significant.

[5] This figure is based on the NZ-wide figure of $0.33/kWh from the MBIE survey, assuming a $2/day fixed charge.

2.5 FINDINGS

2.5.1 Meter data estimation

During the pilot, an issue with metering data estimation emerged for the collaborating retailers.

When a meter drops out of communication with the metering provider, data may be missing for a short period of time. In this case, interpolation is required to estimate the 30min supply/demand of an ICP.

In one instance following a lapse in meter communication, and a rush to provide the customer with an invoice, the typical process for generating a bill was bypassed and both companies generated metering data estimates. When it was found that the estimates did not match, the companies had to deliberate on which estimates to use and reissue the bill.

This instance highlighted two issues with the pilot:

- The manual nature of the calculation process was too cumbersome for efficient operation;
- Clear codified processes for edge cases such as metering estimation are important for scaling up the study.

2.5.2 Scaling the pilot study using automation

Both retailers worried that automating the MTR billing process required a significant time investment and were apprehensive to spend time doing so as it was unlikely that the automatic processes constructed in a pilot would be suitable if MTR was rolled out nationwide.

2.5.3 High operational costs and low benefits for retailers

Retailers found the amount of effort required was much greater than they initially anticipated, and yielded limited financial benefit. Estimation of effort was difficult due to the novel nature of the pilot. Meeting the pilot's initial expectations proved difficult due to constraints in personnel and funding. While Ara Ake provided funding for pilot infrastructure, funding was not available to offset the greater-than-expected retailer operational costs. Ara Ake is open to increasing funding as needed for future trials. Ara Ake could also have provided more upfront and on-going support whilst pilots are being set up and run by participants.

Benefits of pilot participation for retailers were restricted to the exploration of new business models. While the pilot delivered benefits to the customers involved, there was little or no financial benefit for the retailers. This may be why large retailers have chosen not to participate in the MTR pilot.

Nevertheless, benefits do accrue directly to consumers, which if scaled-up across the country could be quite significant. Consumer choice and benefit are key goals of MTR, if enabled nationwide.

3 EV CHARGING DETAILS AND RESULTS

3.1 DESCRIPTION OF THE PILOT

The EV charging pilot was designed to test the practical feasibility of an EV charging company offering a consumer differentiated rates for energy consumed by the EV charger, while an electricity retailer provides rates for the consumption of energy for the rest of the household.

Table 5: Pilot participants and roles

Participant	Role
Ara Ake	Pilot Coordinator
Jade	ICP Registry Operator
Our Energy	Retailer
Thundergrid	Electric Vehicle Charging Company
Customer 1	Consumer
Customer 2	Consumer

3.2 SETUP

To get the pilot running, Our Energy sought out suitable customers. 33 customers expressed interest, but most were unsuitable for several reasons including:

- Many were tech enthusiasts who were already optimizing their electricity usage on time-of-use or spot price-exposed tariffs. This meant there wasn't further progress to be made in changing their charging behaviour.
- Some customers were not prepared to switch retailers to Our Energy. Our Energy passes through spot energy prices, so many potential customers were concerned about spot price volatility.
- The upfront cost of purchasing EVSE was too much for many customers.

After filtering out unsuitable applicants, only two remained. One who purchased new EVSE, and another with EVSE already installed.

3.3 Process

The EV charging pilot gave Thundergrid full control of the EVSE to schedule EV charging at times when the electricity spot price was low. Each customer had two measurement devices: the main ICP meter which gave readings at 30min intervals, and the EV charger meter. This allowed consumption to be matched with different uses and charged by either Our Energy or Thundergrid.

For energy used by the smart charger off-peak, Thundergrid offered a fixed rate, roughly half that of a typical retail rate. There were no restrictions on the amount which Thundergrid could delay EV charging, customers simply wanted their vehicles to be charged by the morning. The pilot lasted from October 2022 to May 2023.

3.3.1 Metering/billing

As Thundergrid is not a registered electricity retailer and did not want to become one, Our Energy was the only organization that could access the MEP's ICP data. The billing process would happen in several steps:

1. Thundergrid uses EV charger meter data to perform calculations and claim a certain portion of the metered data from the ICP
2. Thundergrid sends calculations to Our Energy
3. Our Energy calculates charges for the remaining portion of consumption
4. Our Energy adds Thundergrid's data to the bill as a separate line
5. Final billing data is sent to Jade for validation
6. Our Energy issues bill to customer

Figure 1: Example bill with both household and energy charging

Description	Quantity	Unit Price	Amount NZD
Our Energy - electricity from your community	83.52	0.12	10.02
Our Energy - electricity from the grid	83.51	0.0842	7.03
Network use charges – local flexi - off peak	112.86	0.0258	2.91
Network use charges – local flexi - peak	54.18	0.0758	4.11
EA Levy	167.03	0.0013	0.22
Daily network charges	7.00	0.9975	6.98
Metering charges	7.00	0.24	1.68
Weekly subscription fee	1.00	5.00	5.00
Thundergrid Managed EV charging	57.79	0.16	9.25
Adjusted Consumption Amount	1.00	(0.41)	(0.41)
		Subtotal	46.79
		TOTAL GST 15%	7.02
		TOTAL NZD	**53.81**

As the billing process was performed manually, there was a significant time investment for each bill. Our Energy took about 1-2 hours to process each bill, while Thundergrid required about 30mins for each billing period.

3.4 Results

Over the eight-month trial period, Customer 1 required 1734.55kWh for EV charging. 76.1% of this was performed off-peak. Data for customer 2 was not available as trial participants had not yet completed joint billing.

Table 6: Key statistics – Customer 1

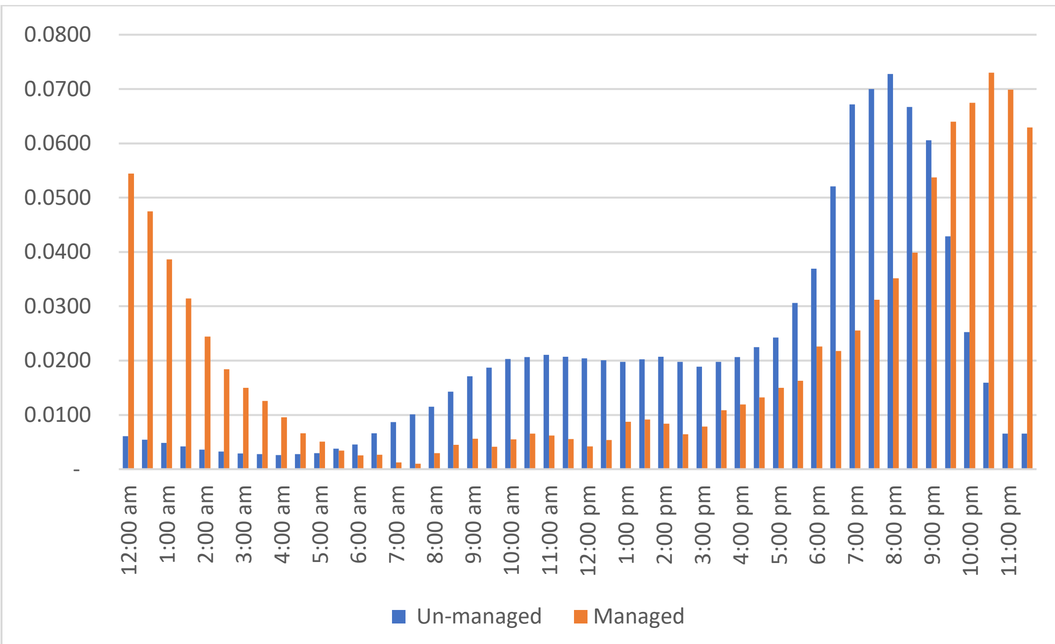
Total charging (kWh)	1734.55
On-peak hours	7-11am, 5-9pm
Off-peak hours	11am-5pm, 9pm-7am
Off-peak charging (kWh)	1,319.99

Off-peak charging (%)	76.1%

Figure below shows the average proportion of total charging performed in each half hour period for the customer, and for an unmanaged national-average[6]. During the pilot, most charging occurred off-peak between 9pm and 7am, though a significant portion of charging was still performed on-peak between 5-9pm.

Comparing managed charging to an unmanaged profile shows a significant difference in time of use.

Figure 2: Unmanaged and managed charging profile



Analysis of the managed and unmanaged charging profiles shows a significant reduction in the peak energy demand. 54.2% of EV load left unmanaged fell in peak hours. Over half of this peak charging could be shifted through the control of charging using MTR.

Table 7: Percentage of EV charging on-peak, off-peak, and shifted through management over trial period

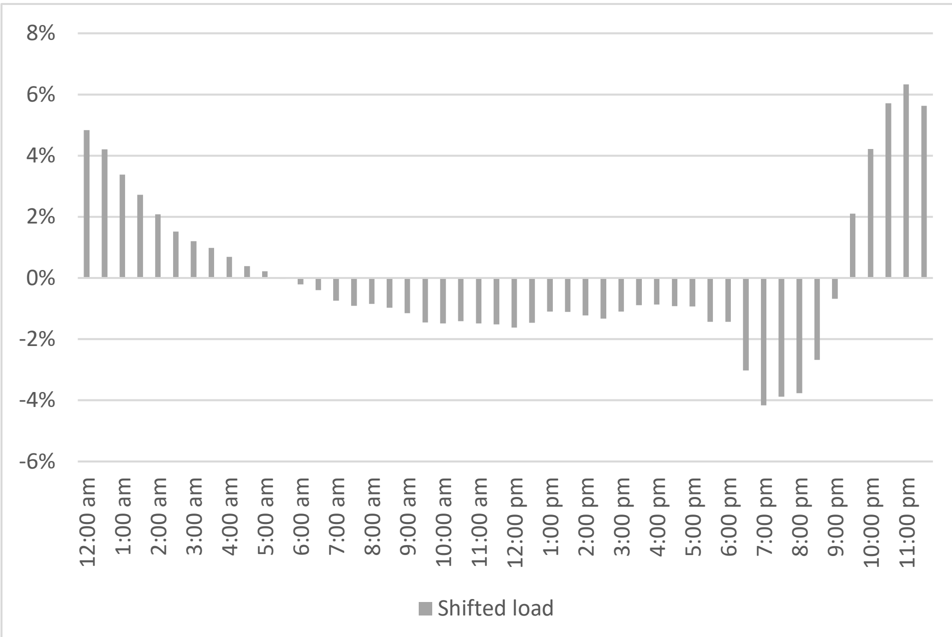
% of EV load falling on-peak without management	54.2%
% of EV load falling on-peak WITH management	23.9%

[6] CSIRO 2021: Unmanaged profile is based on Australian and international charging data assuming that consumers charge when it is most convenient to do so. https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2021/csiro-ev-forecast-report.pdf

% of on-peak demand shifted to off-peak	55.9%

Figure 3 below shows when EV load has been shifted from the unmanaged to the managed charging profiles.

Figure 3: Shifted load



3.4.1 Customer savings

Customers in the pilot paid a set per kWh rate for energy used to charge their EV through the managed charger. For other energy usage, they paid Our Energy's standard tariffs which use a combination of wholesale spot-prices and community solar sharing prices. This makes it difficult to calculate a counterfactual specific to the pilot customers. Because spot prices were actually lower than the managed charging rate during the pilot period, these specific customers would have been financially better off not participating in the trial. However, the managed charging rate provided in the trial represents a significant energy saving for a customer who would otherwise pay a standard energy tariff. Table 8 shows the hypothetical savings for a pilot customer not on a spot price based plan.

Table 8: Customer savings over trial period

Total EV charging use (kWh)	1,734.56
Typical variable tariff ($/kWh)	0.24[7]
Discounted managed charging EV tariff ($/kWh)	0.16
Cost with typical tariff ($)	416
Cost with discounted tariff ($)	278
Savings ($)	138

3.4.2 National context

Scaling the findings from the pilot to a national level provides insight into the potential market size of MTR EV charging. It is important to keep in mind that these estimates are generated from a single data-point. They represent a high bound of potential market size as it is assumed that 100% of EV owners would ignore tariff structures and charge when it is most convenient, but if provided with MTR would utilize managed charging at the same rates as the customer in the pilot.

Table 9 below lists the inputs and assumptions used when scaling the pilots results to a national level.

Table 9: Potential EV load shift assumptions 2023

EV km/kW	6.00
Pure EVs in New Zealand (May 2023)[8]	58,139
NZ average EV distance travelled (km/year)[9]	8,481
Total EV load (GWh)	82.2
Potential load shifted from on-peak to off-peak (GWh)	44.5

[7] Uses average 2023 $/kWh rate and adjusts to remove a $2 per day fixed charge. Source: MBIE 2023

[8] https://www.transport.govt.nz/statistics-and-insights/fleet-statistics/sheet/monthly-mv-fleet

[9] https://www.transport.govt.nz/statistics-and-insights/road-transport/sheet/vehicle-kms-travelled-vkt

As New Zealand chases its net-zero ambitions, EVs begin to dominate the total vehicle kilometres travelled (VKT). Using the assumptions in Table 9 above, we may extrapolate EV electricity demand and the potential for shifting demand from off-peak to on-peak.

Table 10: Potential for EV charge management 2023-2050

Year	VKT (billions)	EV VKT (billions)	EV energy demand (GWh)	EV energy demand falling on-peak without management (GWh)	EV energy demand shiftable to off-peak periods using MTR (GWh)
2023		0.82	82.18	44.52	24.89
2025	49	1.7	283.33	153.48	85.81
2030	51.8	8.8	1,466.67	794.47	444.20
2035	54.5	22.3	3,716.67	2,013.27	1,125.65
2040	57	40.1	6,683.33	3,620.27	2,024.16
2045	59.3	55.7	9,283.33	5,028.66	2,811.61
2050	61.5	61.3	10,216.67	5,534.23	3,094.28

Source: Transpower Whakamana i Te Mauri Hiko (2020)

3.4.3 Customer feedback:

Customers were happy to be a part of the pilot and reported no adverse impacts. In particular they were pleased to receive both services on the same bill, though combined bills are not likely to be a convenience that MTR models can ensure.

3.5 Findings

3.5.1 Pilot length and commercial feasibility

Thundergrid was initially considering offering a free EVSE, with fixed costs recovered through tariffs. As the upfront cost of the charger was significant compared to the length of the pilot period, amortizing the charger cost and adding it to the tariff would have increased prices to much more than a typical electricity tariff. Thundergrid considered that this business model was difficult to explore given the length of the pilot..

3.5.2 Network flexibility

Thundergrid was able to adjust charging times to reduce the overall cost of electricity required to charge a vehicle. Energy arbitrage is a relatively small potential revenue stream, with the biggest potential benefit pool being avoided distribution network expenditure. As no network was involved in the pilot, this revenue stream was not available.

3.5.3 Difficulty to sign up participants

The difficulty of finding participants willing to expose themselves to the spot-price under Our Energy's tariff shows that it may be easier to gain participants for further MTR pilots if they can access a fixed-price plan. This highlights the benefits of more retailers taking part in MTR pilots.

3.5.4 Pilot scalability

During the pilot, communications outages with the meters led to manual work to estimate missing data. If the pilot was to scale up further, automated systems would be required to prevent the time costs from snowballing.

3.5.5 Sub-ICP metering

When a company sells energy through a sub-ICP meter which it also operates, there is a potential financial incentive to alter meter volumes to achieve better energy arbitrage profits.[10] In ICP-level reconciliation, this issue is addressed through the separation of metering and retailing businesses, and rules for meter data processing.

The potential for this behaviour could be addressed with third party audit requirements for business which sell electricity through a meter they also manage.

There are also lessons for future pilots. In this pilot, where Our Energy's retail plan exposed the customer to spot prices, there was limited consequence for Our Energy if Thundergrid determined incorrect sub-ICP volumes, as the over or underestimation of metering volumes to increase/decrease profit/loss would be passed on to the customer. If Our Energy had provided a tariff with a flat rate, there would be potential for unhelpful incentives to arise between Our Energy and Thundergrid. This highlights the importance for clear sub-ICP metering standards in future pilots.

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[10] For example, if the spot price was much higher than anticipated and the EV charging company was selling energy at a loss, they could underestimate their charging volumes to lose less money.

4 Lessons for future studies

MTR is fundamentally about unlocking value in BTM flexibility and providing for a more consumer-centric electricity system that offers a wider range of services and more value to consumers. There are three main ways it can do this:

1. By enabling business models whereby flexibility aggregators manage BTM devices and provide flexibility services to parties who value them.
2. By enabling communities to share or trade across local networks without having to be with the same retailer.
3. By allowing entities who are not retailers to provide electricity services without having to take responsibility for the whole ICP.

The Thundergrid/Our Energy trial tested #3, showing that it is possible.

The Flick/Our Energy pilot went some way towards testing #2, but was essentially carried out inside a single retailer. Nevertheless, it did prove there's value for customers in net metering and it gave the customer a choice regarding who he would like to gift excess solar generation to, namely his mother-in-law.

The Kainga Ora pilot will test #2, with multiple retailers involved.

No trial to date has really tested #1. This is a gap that a future MTR study should focus on.

The two initial pilot's findings on the costs and benefits of MTR for retailers and third-party energy service providers in the real-world have been limited due to its small scale, yet the pilot process has been fruitful for understanding ways to better structure future pilots.

Ara Ake identified that for future trials it plans to design a data collection and analysis methodology upfront, to better measure and understand benefits for consumers in these trials, without relying on small businesses (the trial participants) with limited resources to carry out this analysis. Since a key goal of these trials is to assess consumer benefits, any future trials should carefully consider how this will be measured and assessed.

4.2 Network flexibility services are key for successful MTR business models

Much of the value in flexibility services comes from delayed or avoided investment in distribution network infrastructure[11]. As the flexibility of controllable appliances to reduce the need for network investment is likely to be one of the most beneficial uses of MTR, the lack of ability to access these revenue streams at present limits the commercial feasibility of many potential MTR-based retail schemes.

As network flexibility is likely to play such a major role in the profitability of many MTR based business structures, future pilots should involve network companies.

4.3 Data-sharing

Under the Electricity Code, only one retailer may access ICP data from the MEP. This has several downsides such as:

- Forced collaboration of potentially competing companies: the officially assigned ICP retailer must send meter data to other businesses.
- Difficulty accessing raw data for Electricity Distribution Businesses (EDB)[12] and other retailers

Future pilots should trial MEPs sending data to more than one party or provide a mechanism where parties other than the primary retailer receive the data they require without the assistance of the ICP's registered retailer. This should be achievable with customer permission, and would test MTR's cost feasibility for MEPs while also providing retailers with a pilot environment closer to the reality of a nationwide roll-out. It would provide a space in the pilot to address potential privacy concerns regarding the sharing of customer data with multiple parties.

4.4 Sub-ICP metering

There are several surmountable, yet consequential issues with sub-ICP measurement data:

- The quality of sub-ICP meters is currently unregulated, raising issues with data quality.

[11] For example, see https://www.ea.govt.nz/documents/1742/Sapere_CBA.pdf

[12] If distribution network flex is to be realized, EDBs will want to verify that they are receiving the service they are paying for.

- There is currently no protocol for the estimation of sub-ICP data, this has the potential to cause disagreements between businesses servicing the same ICP.
- If BTM measurement data is managed by the party selling that energy to the consumer, there is potential for them to misrepresent that data.

The Innovation and Participation Advisory Group's (IPAG's) Input Services project[13] considered these issues, and identified some potential solutions, including:

- Creating a whitelist for trusted sub-ICP meters or adopting an international metering standard.
- Setting clear protocols for meter estimation. The Code provides metering estimation protocols that could be adapted to sub-ICP level estimation.
- Setting third-party verification and audit requirements for entities selling energy through a meter which they also manage.

Future pilots should include clear protocols for meter estimation, and Jade as registry manager could take a more hands-on role in the process.

4.5 Limited data points to draw conclusions

The limited number of ICPs in both pilots makes extrapolating any data gained from the process to a national level difficult.

Further pilots should seek to include as many ICPs as practically feasible.

Both pilots showed difficulty in finding suitable and willing customers. Expanding the number of retailers in the trial, especially those with fixed rate tariffs would make participation easier for customers.

Bringing more retailers into the pilot may prove challenging as the financial incentive for participation is low. Future pilots could consider funding for retailer efforts.

Having more ICPs in a pilot will increase the need for automation.

[13] See the final advice paper: https://www.ea.govt.nz/documents/524/IPAG_advice_on_access_to_input_services.pdf

4.6 LACK OF AVAILABLE DATA TYPES

The types of data made available from the pilot were limited in scope, and reduced the potential learnings of the pilot. In the future, Ara Ake should consider data collection throughout a pilot, to better measure and understand benefits for of MTR in these trials, without relying on trial participants to carry out this analysis. Future data collection methodologies should specify:

- Time granularity: Trading period/monthly aggregate
- Metering granularity: individual meter data/all meter aggregates
- Counterfactual data: pre-pilot, or synthetic “what if” metering data for comparison
- Data types: Consumer satisfaction scores/KWh demand etc