ENERGETICS

Neighbourhood/Community Batteries

Final Report

Merri-bek and Yarra City Councils | 15 July 2024 | 127876

Executive summary

Merri-bek and Yarra City Councils are investigating the opportunities available for the installation of neighbourhood/community batteries across a total of 20 Council sites. To support this process, the Councils have engaged Energetics to provide an overview of the current market for neighbourhood/community batteries, both in Australia and internationally, in order to determine the suitability of current commercial models for neighbourhood/community batteries to meet Councils' objectives.

It is acknowledged the definition of a "neighbourhood battery" can have a wide range of meanings. In the context of this study, it is generally understood to mean a battery energy storage system with a power rating in the order of 10's of kW to ~1MW and located within the low voltage part of the distribution network.

To investigate the applicability of each commercial model for Council, some high-level objectives have been identified. These include:

- Increasing local community access to low-cost renewable electricity,
- Contributing to increased rooftop solar hosting capacity in the local network whilst contributing to a reduction in the curtailment of rooftop solar,
- Providing financial benefits either directly to Council or to the community,
- Reducing greenhouse gas emissions in the local network.

In addition, the models must present an acceptable level of operational and contractual risk to Council.

In order to aid in Councils' outcome of "going back to first principles" and supporting decisions regarding what the long-term objectives should be under their respective Community Battery trials, Energetics have undertaken a desktop research study of various models which are active in the market. This report provides details on 10 commercial models for community battery projects currently either in planning or operation (9 in Australia, 1 in the UK). For each of the projects, key commercial model elements including ownership structure, funding, key stakeholders, operating principles and value streams accessed are discussed, as well as a high-level assessment of each model's suitability to meet Councils' objectives.

Following the desktop study of existing commercial models, Councils collaborated to shortlist the three most suitable based on key objectives, to undergo further quantitative assessment at a site-by-site level. The key inputs and outcomes of this financial assessment are summarised in Section 2 of this report.

Finally, Section 3 looks at the potential rollout of community batteries at Council sites under the three shortlisted commercial models, including a summary of market engagement requirements under each model.

Glossary of Council sites

Site	Site name	Site address	Network area
MB1	Saxon St Precinct	33 Saxon Street	CitiPower
MB2	CERES	Cnr Stewart Street & Roberts Street	CitiPower
MB3	Coburg Civic Centre	90 Bell Street	Jemena
MB4	Bob Hawke Community Centre	24-26 Hudson Street	Jemena
MB5	Coburg Basketball Stadium	1 Outlook Road	Jemena
MB6	Newlands Community Centre	20 Murray Road	Jemena
MB7	Jackson Reserve Sports Pavilion	40 Whitton Parade	Jemena
MB8	CB Smith reserve - Pavilion and Netball Lights	Jukes Road	Jemena
MB9	Glenroy Community Hub	50 Wheatsheaf Rd	Jemena
MB10	Walter Street Depot	5 Walter Street	Jemena
MB11	Pascoe Vale Community Centre	7 Prospect Street	Jemena
MB12	Pascoe Vale Pool	Cumberland Road	Jemena
YC1	Victoria Park - Sherrin stand	Lulie Street	CitiPower
YC2	Alphington Park Pavilion	Parkview Road	Jemena
YC3	Fairfield Park Maxwell Sutherland Pavilion	Yarrabend Road	Jemena
YC4	Richmond Library/MCHC	415 Church St	CitiPower
YC5	Mark St Hall	1 Mark St	CitiPower
YC6	Richmond Town Hall	333 Bridge Road	CitiPower
YC7	Richmond Senior Citizens Centre	Hosie St	CitiPower
YC8	Yarra Community Youth Centre	156 Napier St	CitiPower

Contents

1.0 Commercial models overview

1.1 Introduction to commercial models

10 commercial models for existing or planned neighbourhood battery were selected to be included in this analysis. The 10 models, as well as some of the key features of each, are summarised in the table below:

Project	BTM/FOM	Owner	Operating approach
Fitzroy North Battery – Yarra Energy Foundation	FOM	YEF	Solar sponge / spot market and FCAS trading
Alphington Community BESS – Village Power	FOM	Retailer	Virtual storage with peer-to-peer trading offering
Shell Cove Community BESS – Endeavour Energy	FOM	DNSP	Virtual storage offering to participants
Yackandandah BESS – Indigo Power	BTM	Retailer	BTM retail bill optimisation and market trading
Electric Avenue – United Energy	FOM	DNSP	Network support services at constrained locations, with capacity leased to a retailer for trading via a VPP
Power Melbourne – City of Melbourne	FOM / BTM	Council	Combination of BTM retail/network tariff arbitrage and wholesale market/FCAS trading
Cabarita Battery - Ausgrid	FOM	DNSP	Network support and solar sponge
PowerBank – Western Power	FOM	DNSP	Virtual storage offering to participants (exclusive to rooftop solar participants)
Ipswich Neighbourhood Battery - Energex	FOM	DNSP	Virtual storage offering to participants
Trent Basin Project – University of Nottingham	BTM	Community group	BTM retail bill optimisation + spot market trading + FCAS

We see that overall there appears to be key themes which emerge when it comes to the various approaches towards neighbourhood/community batteries, with the primary objectives often linked or influenced by the who are the key project proponents.

For Community battery pilot programs which are being stood up by Distribution Network Service Providers (DNSPs), the primary focus usually begins with the need to alleviate various network related issues at the local level. Typically these issues are of an engineering nature and can include such things as (a) solar hosting capacity limits related to reverse power flows at the local (street level) kiosk transformers, (b) voltage fluctuations linked with high solar export, and (c) solar curtailment at the induvial premises. In order to secure buy in from local residents the DNSPs in this case have often sought to also incorporate a 'solar sharing' - or other value sharing mechanism across the broader local community, such as via a subscription model or specific retailer offering. This enables non solar households (such as apartment dwellers) to also benefit from the neighbourhood solar penetration. In these instances, since the DNSPs cannot themselves participate in contestable market operations (such as spot trading or FCAS) due to ring fencing rules, their business case depends on partnering with a market facing participant (most commonly an electricity retailer) in order to monetise parts of this value stack.

For neighbourhood/community battery projects stood up by community groups or local councils, the primary focus appears to typically be more 'human centred' and with a stronger community equity focus. The review of these projects indicates a strong linkage for councils and community groups to be driven by the desire to demonstrate how community battery projects can increase the local use of locally hosted solar resources.

In both instances, co-operation and inclusion of an energy retailer appears to be a key enabler of community battery projects to proceed and likely to succeed. This is due to the fact that, in the absence of registering the neighbourhood/community battery program as a wholesale market participant (such as via a separate company Special Purpose Vehicle), any wholesale market revenue – e.g. spot arbitrage and FCAS, requires an electricity retailer to pass these value streams through to the project proponent. Furthermore, enabling broader community participation also likely requires the retailer to stand up a distinct offering.

It is for these reasons that a review of the commercial models of the various community battery projects includes repeated themes, such as the desire for the Community BESS to be a "solar sponge" or to maximise local consumption of solar, and similar related outcomes. In this vein, themes such as virtual storage models through subscription models were repeated themes across project proponents. The next section goes into further detail on each of the projects which were reviewed.

1.2 Fitzroy North Battery – Yarra Energy Foundation

Victoria, Australia

Key elements	Description
Ownership structure & funding	Project is a 110kW/284kWh battery owned by YEF. The intention is for community members/groups to become part owners in the project in future if a practical approach to this can be developed. Funding of $800,000 provided through the Neighbourhood Battery Initiative (NBI) grant, with the remainder provided by YEF and CitiPower.
Key stakeholders & roles	Australian National University (ANU) developed the operating software for the project, which co-optimises battery operation across all markets in which it operates. This software is intended to be open source. Mill Software act as the system integrator and provide critical software and support. Acacia Energy are the project's Financially Responsible Market Participant (FRMP), who operate the project based on dispatch instructions from YEF. This includes acting as an aggregator, so as to achieve the 1MW threshold to allow the project to bid into Contingency Frequency Controlled Ancillary Services (FCAS) markets as required by the Market Ancillary Services Specifications. CitiPower, as the local Distribution Network Service Provider (DNSP), provided a bespoke, bi-directional network tariff for the project, which incentivises network supportive operating behaviour (i.e. the tariff is negative for charging during the day, and for discharging during the evening, meaning that the battery receives revenue if operating during these times).
Operating principles	The Fitzroy North battery, through Acacia Energy, trades in the electricity spot market to take advantage of price arbitrage opportunities available. This spot market trading is constrained by dispatch rules that limit battery charging to between hours of high solar generation output (usually between 11AM and 4PM), and limit discharging to the evening peak demand period (5PM – 9PM). The times of charging and discharging are pre-agreed and vary slightly by time of year. The battery cycles once per day, and appears to be a hard limit, likely to conform with OEM warranty requirements. If required, residual stored electricity is discharged in the morning peak period. In late 2023 the battery was also scheduled to begin participating in FCAS markets to take advantage of further revenue opportunities. As the project is <1MW, it is aggregated with other projects by Acacia Energy to allow for Contingency FCAS participation.
Value/revenue stack	The battery benefits from price arbitrage and revenue opportunities in the spot and FCAS markets (limited to the dispatch constraints mentioned above). By limiting charging to solar hours and discharging to peak demand hours when solar is not generating, the battery also maximises its absorption of solar output, in particular rooftop solar that is generated in the local network area and exported to the grid. Furthermore, it is expected that solar export constraints may be relaxed via a dynamic envelope (or similar mechanism), reducing the overall solar curtailments. By discharging during system peak demand times or low renewable outputs hours, it also maximises the use of the stored solar energy locally, offsetting the requirements for generation from other sources including thermal

Key elements	Description
	generators. The trade-off of putting constraints on charge/discharge times is that it may not result in fully optimised price arbitrage benefits. Operating in this fashion has the added benefit of reducing rooftop solar export curtailment due to network limitations, and by extension increasing the rooftop solar hosting capacity of the local distribution network. The project also benefits from a bespoke negotiated, bi-directional network tariff introduced by CitiPower, which allows for a rebate rather than a cost for the battery when operating in a way that is network supportive (i.e. charging during solar hours and discharging during the evening peak). The bespoke tariff also includes penalties for operations that would disadvantage the network, however the project's dispatch rules make it unlikely for this situation to occur. Therefore, each kWh charged or discharged by the battery results in revenue or avoided baseline network cost in the form of a network rebate.
Applicability for Council	

Item	Rating	Comments
Operational complexity		Council transfers most of the operational requirements to the FRMP partner. Council retains maintenance responsibilities.
Contractual complexity		Requires engagement with a retailer to operate the battery, as well as potentially a commercial arrangement with a DNSP to provide bespoke network tariffs.
Value generation		Trading can be mostly optimised for revenue, limited only by solar hour charging constraint. Financial returns under this model are linked to the wholesale market spot price spread in Victoria. Timing of charging to coincide with solar generation in the middle of the day, maximises the volume of renewables being stored and exported back to the grid during the evening peak. By absorbing rooftop solar generation in the middle of the day, the model also provides network benefits including improved rooftop solar hosting capacity.

1.3 Alphington Community Battery – Village Power

Victoria, Australia

Key elements	Description
Ownership structure & funding	Village Power will own and be responsible for maintaining and managing the battery. Village Power is a local community energy group in Victoria. Darebin City Council provided the land where the battery will be located. Village Power was awarded a $750,000 grant through the NBI to fund the project. This project is currently in development and planning is ongoing, as such the full set of commercial details are yet to be finalised.
Key stakeholders & roles	**Village Power** is intended to be the battery operator. **Community participants**, both with and without rooftop solar installed, will be able to buy and sell renewable electricity through the project through a virtual storage arrangement with the project's retail partner. Village Power will engage a **partner** to manage secure transactions between participants.
Operating principles	The project will operate under a virtual storage model, allowing participants to store excess rooftop solar output in the battery, to be consumed later. In addition, the Village Power model allows for trading of stored electricity between solar and non-solar participants. Village Power will be able to trade surplus stored electricity in the spot market to generate additional revenue. The battery will also charge overnight to take advantage of arbitrage opportunities in the spot market.
Value/revenue stack	Storing solar electricity during the middle of the day and discharging the battery in the evening will allow for some revenue generated through spot price arbitrage. Village Power may also sell excess stored electricity to the spot market during peak demand periods, and trade in the spot market during other times. The feasibility study for the project also references potential aggregation opportunities to allow for FCAS market participation. Coincident rooftop solar export and battery charging also provides network benefits by reducing the potential for capacity constraints on upstream network infrastructure during solar hours and peak demand periods. The local DNSP Jemena have also indicated preparedness to entertain a bespoke network tariff for the project, which may provide additional revenue opportunities for network supportive operations. Solar participants are intended to benefit from the project through higher prices received for their traded solar output compared to traditional feed-in tariffs they would otherwise receive from their retailer. It also gives them the ability to virtually store their surplus generation for later use, which may reduce their retail charges during peak periods. It is planned that non-solar participants will get access to locally generated renewable electricity at rates lower than standard renewable electricity costs available through their retailer. Since the project is still in the planning and development phase, no retail partner has yet been made public.

Key elements	Description		
	Item	**Rating**	**Comments**
Applicability for Council	Operational complexity		Council transfers most of the operational requirements to the FRMP partner. Council retains maintenance responsibilities.
	Contractual complexity		Requires engagement with a retailer to create a virtual storage product offering to customer. Inclusion of a peer-to-peer trading platform may increase the complexity of the model for Council.
	Value generation		Direct community benefit mostly limited to a small number of participants (however not limited to solar customers). Trading of surplus capacity improves financial returns available. Virtual storage model maximises the absorption and redistribution of excess rooftop solar energy in the network, maximising renewable consumption in the local area. By absorbing rooftop solar generation in the middle of the day, the model also provides network benefits including improved rooftop solar hosting capacity.

1.4 Shell Cove Community Battery – Endeavour Energy

NSW, Australia

Key elements	Description
Ownership structure & funding	Endeavour Energy is the owner of this 79kWh battery and is responsible for maintaining the project. It is one of 54 planned projects across the Endeavour Energy network. Endeavour received $500,000 worth of funding through the Community Batteries for Household Solar program to support the development of neihgbourhood/community batteries in its network. This program provides funding for community battery projects that will provide shared storage to households.
Key stakeholders & roles	**Participants** include both solar and non-solar customers. There is no requirement for participants to change retailer in order to participate in the battery trial, as participation remains separate from existing retail electricity bills. Participants pay a monthly fee to access the battery as part of a 12-month contract. **Origin Energy** orchestrate the dispatch schedule for the battery and interact with virtual storage participants. **Endeavour Energy** develops and maintains the battery and engages with Origin for network support requirements. It is unclear from information in the public domain whether Endeavour Energy or Origin execute the control protocol to for the batteries in order to manage network constraint issues.
Operating principles	Project involves a direct participation model. Community members can register to participate in the battery via a virtual storage arrangement, where excess rooftop solar can be stored in the battery during the day, to be drawn upon during peak demand periods when the sun is not shining. The model also provides a platform for non-solar participants to access renewable electricity stored in the battery in exchange for a fee. Origin Energy, as the FRMP for the battery, orchestrates the charging and discharging to the spot market, and provides the platform through which participants can access the battery. Origin will also collaborate with Endeavour to utilise the battery in support of network and peak demand management when required.
Value/revenue stack	Solar participants benefit from greater utilisation of their rooftop solar systems, and access to their stored solar energy due non-solar hours. They also receive rebates for excess solar electricity stored in the battery. Access to these benefits comes without the usual high upfront costs of installing household batteries. Non-solar customers benefit from direct access to locally generated renewable electricity, without being required to invest in capital equipment for their household, or if unable to add rooftop solar due to constrained roof, or if living in an apartment. Endeavour Energy and Origin Energy benefit from wholesale market revenue, whilst Endeavour also benefits from stronger network performance and the ability to manage demand pinch points on local network infrastructure during peak intervals.

Key elements	Description		
Applicability for Council	**Item**	**Rating**	**Comments**
	Operational complexity		As the project owner is the DNSP and with a retailer operating the battery, operational requirements for Council would be limited if it was chosen to pursue this model design option.
	Contractual complexity		Requires engagement with a retailer to create a virtual storage product offering to customer. Risk to Council is minimised as model assumes DNSP ownership.
	Value generation		Direct community benefit somewhat limited to participants in the local community. However, Endeavour Energy have initially defined the local area generously so as to attain community acceptance and buy-in, and in this vein have not limited the opportunity to participate to solar customers only, nor have they taken an "electrical design" attitude and considered the beneficiaries to only be those residents directly connected downstream of the community BESS. The DNSP also benefits during peak demand intervals. Lack of Council ongoing involvement may reduce ability to obtain/distribute benefits, depending on the commercial arrangement in place with the battery owner (e.g. DNSP). Virtual storage model maximises the charging and discharging of excess rooftop solar energy in the network, maximising renewable consumption in the local area. By absorbing rooftop solar generation in the middle of the day, the model also provides network benefits including improved rooftop solar hosting capacity.

1.5 Yackandandah Battery – Indigo Power

Victoria, Australia

Key elements	Description
Ownership structure & funding	The 274kWh battery is owned and operated by retailer Indigo Power. It is a pilot project for Indigo Power to demonstrate the feasibility of this commercial model. Funding for the project was partially raised by Indigo Power and Totally Renewable Yackandandah (TRY), a volunteer run community group in Yackandandah. TRY raised $104,000 for the project and Indigo Power took out a $100,00 loan, underwritten by sustainability Victoria. The project also received $171,000 in funding from the Victorian government through the New Energy Jobs Fund. The project location is the site of Agency of Sculpture, which will have a long-term lease agreement for the battery.
Key stakeholders & roles	Indigo Power acts as the battery's owner and FRMP, organising charging and discharging to the spot market. Indigo are a community electricity retailer originally founded by TRY. Agency of Sculpture is the site where the battery is located behind-the-meter. This hosting arrangement is done through a long-term lease agreement. The site benefits from behind-the-meter use of the battery as the project's primary function. The site is a former sawmill and connection infrastructure available onsite has capacity far in excess of the sites current load. Solar Integrity installed the battery on site, and it will be commissioned by the manufacturer Sungrow. The coordination of the battery with the site's consumption, behind the meter solar systems, and dispatch to the wholesale market is done through software developed by Mondo, a subsidiary of AusNet. This software also allows the battery to provide network support services.
Operating principles	The battery's primary function is to provide power to the host site, in collaboration with a large rooftop solar system installed on-site. The battery charges from solar during the day, discharging to provide electricity to the site during non-solar hours. Surplus charge can then be traded in the spot market to generate revenue and providing renewable electricity to the local community. Such arrangement requires the retail arrangement with the site to be on a spot pass through basis (in the absence of a hybridised embedded network arrangement). Exported electricity is tracked by Indigo Power and shared across the local community. Indigo Power have launched energy sharing software which allows customers in the local area to track the proportion of their electricity consumption that has been supplied by local renewable sources.
Value/revenue stack	The host site benefits from optimised and coordinated operations between the battery and rooftop solar systems, maximises its use of cheap renewable electricity. Indigo Power benefit from wholesale market arbitrage opportunities by discharging the battery to the spot market during the evening peak. They also receive revenue through the leasing arrangement with the host site. Indigo Power also return 50% of their profits to the local community, benefitting community members. By locating the battery behind-the-meter it

<table>
<tr><th>Key elements</th><th>Description</th></tr>
<tr><td></td><td>also avoids the double-charging of network tariffs that can be an issue with front-of-meter systems.

Surplus stored electricity is then exported to the grid, allowing for greater self-consumption of renewable electricity within the local community. Community members can also access renewable electricity directly by choosing Indigo Power as their retailer, who ensure that 100% of the electricity they supply is from renewable sources. This is either through renewable electricity stored and exported to the local grid from projects such as the Yackandandah Battery, or through the purchase of renewable energy certificates from partner retailer Energy Locals for any excess volumes.</td></tr>
<tr><td>Applicability for Council</td><td>
<table>
<tr><th>Item</th><th>Rating</th><th>Comments</th></tr>
<tr><td>Operational complexity</td><td></td><td>Council transfers most of the operational requirements to the retail partner. Council retains maintenance responsibilities. BTM location may add to operational complexity and limited to finding a suitable site with appropriate load characteristics.</td></tr>
<tr><td>Contractual complexity</td><td></td><td>Requires engagement with a FRMP to operate the battery and to optimise against site consumption and other behind-the-meter assets.</td></tr>
<tr><td>Value generation</td><td></td><td>Host site will be a major beneficiary. Other benefits available to Council through wholesale market trading of surplus volumes.

Export of rooftop solar to the grid will be minimised which benefits the local network. By absorbing rooftop solar generation in the middle of the day, the model provides network benefits including improved rooftop solar hosting capacity.</td></tr>
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1.6 Electric Avenue – United Energy

Victoria, Australia

Key elements	Description
Ownership structure & funding	The Electric Avenue program involves installing 40 pole-top batteries around Melbourne. Each battery is to be 30kW / 66kWh, giving the initial program roll out a total capacity of 1.2 MW / 2.64 MWh. The batteries are owned and partially funded by United Energy ($7 million) and ARENA ($4 million)
Key stakeholders & roles	United Energy (UE) lease a portion of the battery's capacity to Simply Energy, who are able to trade the battery in the spot market and take advantage of arbitrage opportunities. UE retain control of the battery during periods of peak demand to be utilised for network support purposes. UE, along with other DNSPs, have received a ring-fencing class waiver from the Australian Energy Regulator (AER) for community battery projects which participated in the same ARENA funding round in order to allow neighbourhood/community batteries to provide contestable market services outside of network support only. this class waiver therefore allows enhancement to the business case and lower the hurdle for commerciality. The batteries are made by a local manufacturer Thycon.
Operating principles	Once operational, the 40 batteries will operate as a Virtual Power Plant (VPP). The VPP's primary focus is network support services for United Energy network constraints, with the batteries to provide voltage, frequency and peak demand management when required. UE will operate the batteries to provide these services. The secondary objective of the batteries will be to generate revenue through trading. When not required for network support, UE leases the batteries to Simply Energy, allowing them to trade the VPP in the spot electricity markets. As the aggregated capacity of the batteries will exceed 1MW in capacity, Simply Energy will also be able to trade in the contingency FCAS markets, providing another source of revenue.
Value/revenue stack	UE are able to utilise the battery to support the local distribution network by absorbing more rooftop solar output locally and reducing strain on upstream areas of the network. The batteries are able to provide voltage and frequency management services, improving the performance of the local network. UE also receives leasing fees from Simply Energy for use of the battery for trading outside of times when it is required for network support. Simply Energy benefit from the revenue generated by trading the batteries in the spot and FCAS markets. Local community members are not direct participants in the Electric Avenue battery program. The community will benefit indirectly through better network performance, possible delays or reductions in required network upgrades, greater local rooftop solar hosting capacity, lower curtailment of existing rooftop solar systems and a potentially greater proportion of locally generated renewable energy consumed locally. The batteries are strategically located in areas where they are able to maximise the benefits provided (i.e. areas of high rooftop solar penetration or network congestion).

Key elements	Description		
	Item	Rating	Comments
Applicability for Council	Operational complexity		Council transfers the majority of the operational requirements to the DNSP owner and FRMP partner.
	Contractual complexity		Minimal depending on Council's level of ongoing involvement.
	Value generation		DNSP benefits during peak demand intervals. Value created through market trading and FCAS. Lack of Council ongoing involvement reduces ability to obtain/distribute benefits. This will depend on commercial arrangement with battery owner. Virtual storage model maximises the absorption and redistribution of excess rooftop solar energy in the network, maximising renewable consumption in the local area. By absorbing rooftop solar generation in the middle of the day, the model also provides network benefits including improved rooftop solar hosting capacity.

1.7 Power Melbourne – City of Melbourne

Victoria, Australia

Key elements	Description
Ownership structure & funding	City of Melbourne (CoM) is the battery owner. CoM received funding for the batteries through the Neighbourhood Battery Initiative (Vic Gov), as well as the Community Batteries for Household Solar program (Aus Gov).
Key stakeholders & roles	CoM (project owner and host site) Commercial partner – Origin Energy (retailer, FRMP for FOM BESS allocation, responsible for operation and maintenance of the battery) Retailer (FRMP for BTM BESS allocation, retailer for host site) Community – CoM's allocation of revenues from BESS operation to be passed through to the community via a Community Benefit Fund to support local renewable projects and subscribers to retail electricity product (once developed).
Operating principles	A benefit sharing regime exists between the BESS owner and Commercial Partner, whereby revenues above an agreed level of performance are allocated between the parties. The BESS is configured such that a portion of its capacity can access front-of-the-meter (FOM) and a portion behind-the-meter (BTM) value streams. The FOM and BTM operation of the BESS is allocated to two different FRMPs. This is done through the creation of a private embedded network, with a parent and child NMI arrangement. The BTM component operates to provide retail and network tariff optimisation benefits to the site by shifting grid consumption (by virtue of the BESS) to cheaper Time of Use (ToU) retail tariff periods, as well as targeting the reduction of network based peak demand charges. CoM's retail ToU tariff structure has a traditional retail defined Off – Peak period which occurs at nighttime and on weekends. The FOM component is able to trade in the spot and Contingency FCAS markets to generate revenue. CoM pays the commercial partner for orchestration and O&M expenses.
Value/revenue stack	BTM value streams include retail ToU tariff arbitrage, as well network peak demand management. The battery is able to shift the host site's operational demand (demand from the grid) to times that will attract more favourable pricing. Peak demand charges can also be reduced, noting that network demand charges are often structured as the highest individual 30-minute interval in a year, so battery operational algorithms require very good load forecasting and charging to occur in advance of such peaks. FOM value stream include taking advantage of arbitrage opportunities in the spot market by charging the battery during lower price intervals and discharging during higher price intervals, with the price difference resulting in a profit. The project's FOM FRMP also has an active VPP, allowing it to aggregate the battery with other projects to participate and generate revenue from the Contingency FCAS markets. CoM (owner) receives a guaranteed financial benefit from the program. Any revenue generated above this minimum amount is shared between CoM and its commercial partner.

Key elements	Description		
Applicability for Council	Item	Rating	Comments
	Operational complexity		Minimal operational role for the battery owner (CoM), since commercial partner is undertaking operations.
	Contractual complexity		The pre-existence of a long-term retailer intermediated PPA for CoM sites, and the desire to retain these sites where a BESS was proposed within the PPA meant that a hybrid Embedded Network approach was preferred as a way to isolate the BESS charging and discharging energy flows from the site load. This arrangement therefore required two FRMPs for FOM and BTM. Merri-bek and Yarra Councils can avoid this complexity by siting community BESS as FOM only.
	Value generation		Combines both FOM and BTM revenue streams as well as minimum annual benefits provided to Council. Revenue streams are more diversified than under a pure FOM or BTM model, which may be beneficial in co-optimisation, but depends on the structure of the retail tariff for the site load. By shifting site consumption, the model also provides network benefits including improved rooftop solar hosting capacity.

1.8 Cabarita Battery – Ausgrid

NSW, Australia

<table>
<tr><th>Key elements</th><th>Description</th></tr>
<tr><td>Ownership structure & funding</td><td>Ausgrid funded, developed, installed and own the 412kWh Cabarita battery, with some funding provided through the Federal Government’s Community Batteries for Household Solar Program. The battery is the first of an intended 400 batteries Ausgrid is planning to install across its network.</td></tr>
<tr><td>Key stakeholders & roles</td><td>Ausgrid are the local DNSP, and the battery owner. A class wavier was passed by the AER[1] in February 2023 allowing DNSPs to own neighbourhood/community batteries, and for the batteries to provide services outside of purely network support. This waiver is limited to batteries funded under the government’s Community Batteries program. This allows Ausgrid to act as the owner of the battery, and to enter arrangements whereby a 3rd party (such as a retailer) can operate the battery at times for contestable energy market services.</td></tr>
<tr><td>Operating principles</td><td>Ausgrid state that the battery will be used to support more renewables in the network by ‘bridging the gap between when the energy is generated and when it is needed’. This suggests that the project will operate to soak up excess solar generation during the middle of the day, and discharge during the evenings to meet peak demand. The battery’s primary focus is to support performance of Ausgrid’s network. As the local DNSP, Ausgrid is well placed to operate the battery for network support purposes due to data access regarding areas of constraints in the network.</td></tr>
<tr><td>Value/revenue stack</td><td>Ausgrid can utilise the battery to support the network by identifying areas of high constraints and charging/discharging to relieve these constraints. Ausgrid is the primary beneficiary from the battery operating in this way.

The project has no direct community participation aspects, so community members will benefit only indirectly through possible lower network tariffs in future due to delayed investment requirements, greater rooftop solar hosting capacity and lower curtailment of existing rooftop solar systems.

Ausgrid are also trialling a community battery tariff to other neighbourhood/community batteries connected to the low-voltage network. These tariffs reward network supportive operating behaviour.</td></tr>
<tr><td>Applicability for Council</td><td>
<table>
<tr><th>Item</th><th>Rating</th><th>Comments</th></tr>
<tr><td>Operational complexity</td><td></td><td>The owner and operator of the project take on the majority of the operational requirements under this model.</td></tr>
<tr><td>Contractual complexity</td><td></td><td>The ring-fencing waiver applies only to projects funded under the Community Batteries for Household Solar Program.</td></tr>
<tr><td>Value generation</td><td></td><td>DNSP is the only direct beneficiary. Lack of Council ongoing involvement reduces ability to obtain/distribute benefits, depending on the commercial arrangement with the battery owner.</td></tr>
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[1] Decision - Ring-fencing Class Waiver for Batteries funded under the Community Batteries for Household Solar Program - February 2023_0.pdf (aer.gov.au)

1.9 PowerBank – Western Power / Synergy

WA, Australia

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<tr><th>Key elements</th><th>Description</th></tr>
<tr><td>Ownership structure & funding</td><td>The PowerBank program currently consists of three neighbourhood/community batteries across Perth. Western Power is the battery owner. They are a state-owned network operator in Western Australia.</td></tr>
<tr><td>Key stakeholders & roles</td><td>**Western Power** is the local network provider and is responsible for developing the batteries, determining the optimal locations and monitoring performance. Western Power is also the owner of the batteries.
Synergy is the retail partner for the program. Synergy acts as the operator of the battery, as well as interact will customers to deliver the virtual storage solution.
Tesla provides the battery technology that is utilised for the program.</td></tr>
<tr><td>Operating principles</td><td>The PowerBank program is a virtual storage arrangement available to local customers who have rooftop solar systems installed on their homes. Participants can virtually store excess rooftop solar generation up to 8kWh per day in the community battery and draw on this stored capacity during the evening peak. Any excess stored capacity that is not used by the end of the day (midnight) is deemed to be sold to the grid and paid a standard feed-in tariff. In order to have access to the battery, participants pay a daily fee of $1.20 - $1.40.</td></tr>
<tr><td>Value/revenue stack</td><td>Western Power benefits from stronger network performance through the batteries acting to smooth the demand profile of the local network area by absorbing more solar generation locally and making this generation available in the evening peak.
Synergy trades the battery in the wholesale market and benefits from the price arbitrage opportunities available. They also benefit from greater customer engagement as participants in the program are required to be Synergy customers.
Participating community members benefit from the use of the battery without high upfront costs of installing a household system. These customers also benefit from feed-in tariff payments for surplus volume, as well as access to an advanced meter installed at their property at no cost. Customers can track performance via the Synergy website to ensure they are maximising the benefits received through the program.
Non participating customers may also receive some benefit from the batteries through greater rooftop solar hosting capacity locally and better network performance.</td></tr>
<tr><td>Applicability for Council</td><td><table>
<tr><th>Item</th><th>Rating</th><th>Comments</th></tr>
<tr><td>Operational complexity</td><td></td><td>The DNSP (owner) and retailer (operator) are responsible for the majority of the operational requirements under this model. Council retains maintenance responsibilities.</td></tr>
<tr><td>Contractual complexity</td><td></td><td>Requires engagement with a retailer to create a virtual storage product offering to customer.</td></tr>
</table></td></tr>
</table>

Key elements	Description		
	Value generation		Direct value is mostly localised to a small number of solar households. Virtual storage model maximises the absorption and redistribution of excess rooftop solar energy in the network, maximising renewable consumption in the local area. By absorbing rooftop solar generation in the middle of the day, the model also provides network benefits including improved rooftop solar hosting capacity.

1.10 Ipswich Neighbourhood Battery Trial – Energex

Queensland, Australia

Key elements	Description
Ownership structure & funding	The Ipswich Battery Trial involves Energex installing up to 35x 30kW/60kWh neighbourhood/community batteries across its network. Energex is responsible for buying, installing and maintaining the batteries.
Key stakeholders & roles	**Energex** is the battery owner and network service provider for the local area. Energex has obtained waivers from the AER from ring-fencing regulations in order to allow it to engage partners to trade the battery in the wholesale markets. **Origin Energy** is Energex's retail partner for this program and have developed a trial product offer for participants in the battery. Origin will operate the battery to support the virtual storage offering to participants. Energex utilises two suppliers, **Pixii** and **EcoJoule**, for neighbourhood scale batteries.
Operating principles	The trial operates under a virtual storage model, where participants can rent a portion of the battery to store their excess rooftop solar output and then draw down the stored energy during the evening when solar is not generating. Origin will operate the battery to charge during the middle of the day when solar output is highest and discharging during the evening to offset grid consumption from participants in the trial. Solar customers pay a $15 monthly subscription fee to participate in the program and can access up to 4kWh of storage capacity per day for their surplus rooftop solar generation. Participants do not need to be Origin customers, and still receive their standard feed-in tariff for solar export volumes from their retailer. Non-solar customers can participate in the program in a very similar fashion. They can rent a portion of the battery for a $15 monthly fee, and Origin will charge the battery from the grid during the middle of the day. This volume is then available for the non-solar participants to drawn on during the evening peak.
Value/revenue stack	Energex will benefit from improved network performance. The batteries are located in high rooftop solar penetration areas and will absorb more of this solar output during the middle of the day, reducing constraints on other areas of the network. This may delay or reduce the investment required by Energex in network infrastructure upgrades, which also benefits the local community through lower network tariffs, but with such benefit being amortised across the entire Energex network. Energex will also presumably receive some financial benefit through the battery's operation via their commercial arrangement with Origin, however the exact nature of this arrangement is not public. Origin will operate the battery in the spot market and benefit from charging the battery during the middle of the day when prices are generally cheaper and discharging during peak demand periods for a profit. Whilst there is no requirement for participants to change to Origin as their retailer, the exposure gained through their role in the program is assumed to be an additional benefit to Origin.

<table>
<tr><th>Key elements</th><th>Description</th></tr>
<tr><td></td><td>Ipswich residents may benefit directly through access to the battery via participation in the program. These participants receive the benefits of load shifting their solar generation without having to install expensive equipment on their homes. Both solar and non-solar customers receive rebates for this participation in the program. Non-participating community members may benefit indirectly through the benefit the battery will have on network performance, increased solar hosting capacity, reduced solar export curtailment and increased renewable electricity stored and consumed locally.</td></tr>
<tr><td>Applicability for Council</td><td>
<table>
<tr><th>Item</th><th>Rating</th><th>Comments</th></tr>
<tr><td>Operational complexity</td><td></td><td>The majority of the operational requirements are assumed by the DNSP owner and FRMP partner.</td></tr>
<tr><td>Contractual complexity</td><td></td><td>Requires engagement with a retailer to create a virtual storage product offering to customer. Risk to Council is minimised as model assumes DNSP ownership.</td></tr>
<tr><td>Value generation</td><td></td><td>Direct community benefit mostly limited to a small number of participants (however not limited to solar customers). DNSP also benefits during peak demand intervals. Lack of Council ongoing involvement reduces ability to obtain/distribute benefits, depending on the commercial arrangement with the battery owner.

Virtual storage model maximises the absorption and redistribution of excess rooftop solar energy in the network, maximising renewable consumption in the local area. By absorbing rooftop solar generation in the middle of the day, the model also provides network benefits including improved rooftop solar hosting capacity.</td></tr>
</table>
</td></tr>
</table>

1.11 Trent Basin Project – University of Nottingham

Nottingham, UK

<table>
<tr><th>Key elements</th><th>Description</th></tr>
<tr><td>Ownership structure & funding</td><td>The project is led by the University of Nottingham and funded by Energy Research Accelerator and Innovate UK and is located behind-the-meter at a housing development. For the ongoing ownership of the project, a community energy company has been created, with the option for residents to join and become part owners of the battery.</td></tr>
<tr><td>Key stakeholders & roles</td><td>SmartKlub are responsible for optimising behind-the-meter supply/demand, as well as dispatch to the wholesale and FCAS markets.
Residents of the housing development contribute to the net supply/demand profile of the development. They also have the option to become part owners in the battery.
Blueprint are the developer of the housing estate and have been heavily involved in the development of behind-the-meter resources.
The project has a deal with an aggregator to allow it to provide FCAS services to the market.
Tesla is the manufacturer of the 2.1MW battery, installed by EvoEnergy.</td></tr>
<tr><td>Operating principles</td><td>The battery is co-optimised with the net consumption of the development as well as behind-the-meter solar systems to maximise the benefit from the DER assets. Part of optimisation involves trading surplus volume in the spot and FCAS markets when there is a net benefit in doing so.
A contract with the market operator is in place for the project to provide frequency control services when required, through an aggregator</td></tr>
<tr><td>Value/revenue stack</td><td>Profits generated from the project are shared with residents to offset energy costs. Initial objectives are that savings of up to 30% should be available to residents. In the longer-term profits are intended to be used to offer lower cost heating to residents.
The local network also benefits from optimised coordination of behind-the-meter resources, reducing export of capacity during peak periods, and maximising demand from the development during high supply / cheap price intervals.</td></tr>
<tr><td>Applicability for Council</td><td>
<table>
<tr><th>Item</th><th>Rating</th><th>Comments</th></tr>
<tr><td>Operational complexity</td><td></td><td>Most of the operational requirements are assumed by the retail partner. Council retains maintenance responsibilities. BTM location may add to operational complexity.</td></tr>
<tr><td>Contractual complexity</td><td></td><td>Allowing for community ownership may help to reduce Council’s risk exposure, however, may require ongoing involvement from Council regardless. Also would involve commercial arrangements with a FRMP and an aggregator.</td></tr>
<tr><td>Value generation</td><td></td><td>Host site will be a major beneficiary. Other benefits available to Council (or owner) through wholesale market trading of surplus volumes. Model also assume participation in FCAS markets which provides an additional revenue stream.</td></tr>
</table>
</td></tr>
</table>

Key elements	Description			
	[redacted]			Export of rooftop solar to the grid will be minimised which benefits the local network. By absorbing rooftop solar generation in the middle of the day, the model provides network benefits including improved rooftop solar hosting capacity.

1.12 Shortlisting of commercial models

Initial key workshop objectives

Prior to any quantitative assessment, both Council's underwent a qualitative evaluation exercise of the proposed commercial models. This involved holding several initial workshops between both Councils with the intent to:

- Develop a common understanding of the community battery landscape,
- Confirm the collective intent of the Council group,
- Identify and refine key Council objectives for community batteries, i.e.:
    - What problems is the battery needing to solve?
    - What benefits does the battery need to deliver?
    - Who are to be the beneficiaries of any benefits delivered?

The answers to these questions were intended to be the key input into developing an evaluation framework through which to assess the merits of each commercial model.

This process began by identifying some of the potential key benefits of a community battery, which were broken down into financial vs non-financial benefits. Some of the major benefits identified are summarised in the table below:

Table 1: Community battery benefit / value stack

Financial benefits	Non-financial benefits
• Time-of-day spot arbitrage trading • FCAS provision revenue • Subscription fees from customer retail products (i.e. virtual storage) • Capacity payments / tolling arrangement with an operator / retailer • BTM retail and network tariff time of use arbitrage • BTM peak demand charge optimisation and reduction • Possible reduction in curtailment of on-site rooftop solar export tariffs	Network benefits • Voltage management • Local peak demand management • Resolving capacity limitations on upstream network infrastructure • Reduced or delayed network investment requirements Community benefits • Increases local rooftop solar self-consumption • Reduction in rooftop solar export constraints • Increased rooftop solar hosting capacity • Greater community access to the benefits of batteries, without the upfront costs to individuals

The merit of FOM vs BTM benefits was also discussed, however it was decided that the ability to maximise the magnitude of total overall benefits exceeded any specific pre-determined preference for either front- or behind-the-meter configurations. As such, the models which were shortlisted and the evaluation of these reflect these objectives.

The objectives identified across both Councils as key requirements for the implementation of on-site neighbourhood/community batteries were consolidated and prioritised. The final list is summarised below:

- Providing community members access to lower cost renewables,
- Maximising renewables available in the community at the lowest cost,
- Increasing local network solar hosting capacity / reducing solar export curtailment,
- Reducing local greenhouse gas emissions,
- Financial benefit creation,
- Being executable with an acceptable level of operational and contractual complexity for Council to manage.

Qualitative evaluation and framework

Based on these key objectives, an evaluation framework was developed. Table 2 summarises the evaluation criteria utilised by Council in the shortlisting of commercial models for further assessment. Each Council applied slightly different weightings to the different criteria, based on internal preferences and requirements, however a common shortlist was determined following discussions:

Table 2: Commercial models evaluation framework

Criteria	Description	Merri-bek weighting	Yarra weighting
Value stack		70%	90%
Financial	*What level of certainty and depth of financial return does the commercial model offer?*	*25%*	*15%*
Community access to renewables	*Model provides strong and equitable community access to renewable electricity.*	*25%*	*40%*
Local rooftop solar benefits	*Commercial model provides for an increased rooftop solar hosting capacity in the local distribution network and reduces curtailment of existing rooftop solar systems.*	*10%*	*20%*
Emissions reduction	*Model contributes to a reduction in community emissions.*	*5%*	*10%*
Demonstrability	*Benefits are measurable and can be easily demonstrated to the community.*	*5%*	*5%*
Complexity		30%	10%
Operational	*Commercial model limits Council's level of ongoing operational responsibility and the complexity of operational requirements for Council.*	*15%*	*5%*
Contractual	*Contracting model provides limited complexity and risk to Council.*	*15%*	*5%*

The following tables provide an overview of Council’s scoring for each of the commercial models against this framework. Positive scores are represented in the below tables by green shading, moderate scores by yellow shading, and negative scores by red shading.

Merri-bek Council

		Solar sponge	Network support		Virtual storage			Behind-the-meter		FOM/BTM
Criteria	Weighting	Fitzroy North Battery	Electric Avenue - UE	Cabarita Battery	Shell Cove / Ipswich BESS	Alphington Community BESS	PowerBank	Yackandandah BESS	Trent Basin Project	Power Melbourne
Financial returns	25%									
Community access to renewables	25%									
Local rooftop solar benefits	10%									
Emissions reduction	5%									
Demonstrability of benefits	5%									
Operational complexity	15%									
Contractual complexity	15%									
Total score										

Yarra Council

		Solar sponge	Network support		Virtual storage			Behind-the-meter		FOM/BTM
Criteria	Weighting	Fitzroy North Battery	Electric Avenue - UE	Cabarita Battery	Shell Cove / Ipswich BESS	Alphington Community BESS	PowerBank	Yackandandah BESS	Trent Basin Project	Power Melbourne
Financial returns	15%									
Community access to renewables	40%									
Local rooftop solar benefits	20%									
Emissions reduction	10%									
Demonstrability of benefits	5%									
Operational complexity	5%									
Contractual complexity	5%									
Total (/5)										

Shortlisting process

Based on the evaluation framework and scoring, the 'solar sponge' commercial model, as well as the virtual storage (most similar to Shell Cove / Ipswich BESS projects) were the standouts for both Councils. The final model to shortlist was less clear based on the initial scoring, with Merri-bek Council favouring:

1. FOM/BTM hybrid model

2. BTM model (Yackandandah BESS)

And Yarra Council ranking:

1. A second virtual storage option

2. Network support model

3. FOM/BTM hybrid model

After some discussion which considered the merits of each model, it was decided that for the sake of diversity in the shortlisted options, a second virtual storage option would be excluded. Council's agreed that there were insufficient differences between the three virtual storage models to warrant shortlisting more than one for further assessment.

Finally, a decision was made to exclude network support focused models from further consideration. Councils both agreed that the ability to pursue these types of models would be subject to there being a network constraint which needed resolving in the local network area, as these models would require the local DNSP to either provide the capital for the battery (if the DNSP was to be the BESS owner), or more likely, an agreed upon commercial arrangement whereby the DNSP provided a payment to Council in exchange for access to the battery capacity under certain conditions.

Without sufficient benefit to a DNSP through deferral of other network infrastructure investment or relief of existing constraints, it is unlikely there would be appetite to pursue this option. It was also agreed that should this opportunity arise in future where installation of a BESS would be of greater value to a DNSP than a normal 'poles, wires and transformers' network solution, there was interest from both Council's to consider an arrangement where a DNSP owned battery could be located on Council land in exchange for ongoing leasing payments (possibly linked to battery revenue or deferred investment value). However, for the purposes of this exercise, network support models were excluded, leaving the FOM/BTM hybrid model as the third shortlisted option.

Shortlisted models

Model 1: 'Solar sponge' model (similar to the Fitzroy North BESS) - charging is constrained to solar hours and discharging constrained to the evening peak to maximise absorption of local surplus rooftop solar export and offsetting of fossil fuel generation during the evening.

Model 2: A virtual storage model (similar to Shell Cove community battery and Ipswich community battery trial) - participants both with and without rooftop solar installed on their homes are able to engage with the battery through a 'virtual storage' arrangement. The project will be owned by Council, who will engage a retailer to operate the battery, and administer the virtual storage arrangement with participants. BESS revenue to Council is based on a subscription by community members (e.g. $ per month), in exchange for access to a given amount of kWh storage each day. The BESS wholesale market revenues actually achieved are then refunded pro rata to subscribers.

Model 3: A FOM and BTM hybrid model (similar to Power Melbourne) - a hybrid metering arrangement will allow the battery to access both FOM and BTM value streams.

For each option a summary of the main financial value streams to Council are provided in the table below:

Table 3: Shortlisted models and value streams

Option	Financial value streams accessed by Councils
Model 1	1. Spot arbitrage 2. FCAS 3. Bespoke network tariff revenue
Model 2	1. Tolling payments from retailer
Model 3	1. Spot arbitrage 2. FCAS 3. Retail tariff arbitrage 4. Network tariff arbitrage 5. Peak demand charge optimisation

2.0 Quantitative assessment of models

2.1 Quantitative assessment approach

We have modelled each of the revenue streams from the perspective of Council available within each of the commercial models to inform a total value stack. Each revenue stream has varying drivers, namely:

- Spot arbitrage: is driven by the expectation of available future intra-day spot price spread, as determined by the NEMDE[2] under AEMO management.
- Contingency FCAS: value is less readily modelled from a 'bottom up' perspective. However, historically this has been correlated with increased variability of moment-to-moment power supply imbalance brought about from increased renewable energy penetration. Historical FCAS values are used to inform future expectations, with consideration of the cannibalisation of value from increasing battery deployments.
- Retail Time of Use arbitrage: considers the difference between peak and off peak rates using retailer convention pricing structures. We note these may change as the energy market evolves.
- Network tariff arbitrage: Similarly considers the difference between network peak and off peak volumetric pricing for energy imports. Bespoke network tariffs are considered.
- Peak demand charge optimisation considers the network peak demand that can be reduced for a behind the meter load by virtue of BESS discharging. Notably, this value stream, whilst prospectively high (in particular where demand tariffs themselves are high, e.g. >$100/kVA pa), is a notoriously difficult value stream to get right. This is due to the fact that it requires the entire peak demand period to be reduced, requiring well targeted dynamics load forecasting algorithms to operationalise.

The quantitative assessment for the three shortlisted commercial models was undertaken in Python, having regard to co-optimisation between value streams where BESS operation might otherwise conflict. Spot price arbitrage value was determined using Energetics' in-house developed Plexos® stochastic price forecasts for the Victorian reference node. These forecasts allow for modelling of outcomes under each of the commercial models under a range of plausible market price scenarios on a 30-minute interval level basis.

Figure 1 below shows the distribution of spot prices across the stochastic price forecast scenarios for 2025 – 2039. Shown on the chart is the average annual price, as well and the 10^{th}, 25^{th}, 75^{th} and 90^{th} average annual prices across all scenarios.

[2] National Electricity Market Dispatch Engine

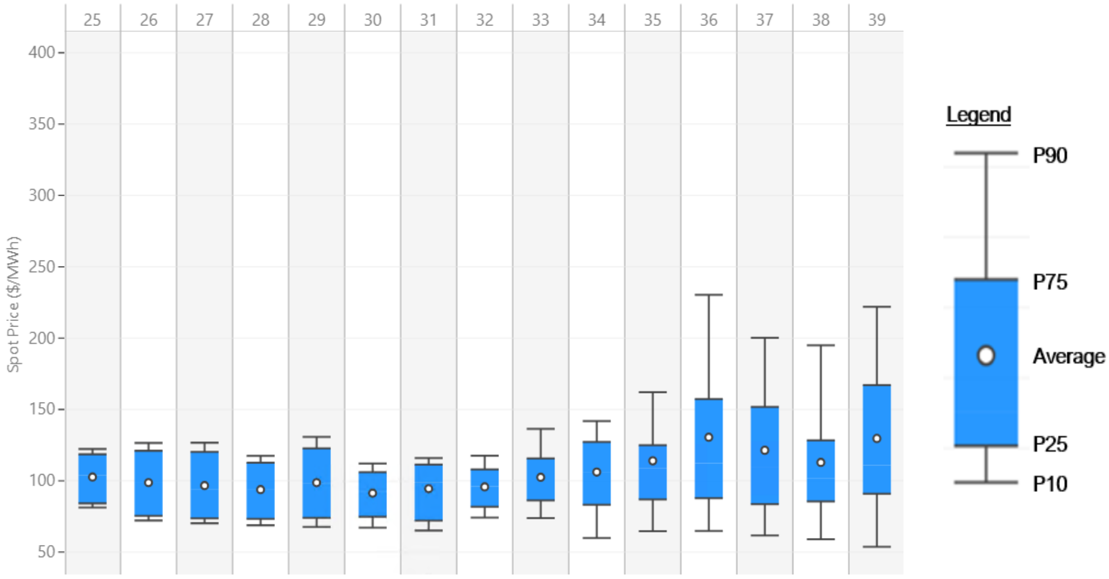

Figure 1: Stochastic price forecast distribution (real2024$ 2025 - 2039)

We note below some of the key modelling considerations and limitations:

FCAS

Contingency FCAS is a potentially valuable source of value for battery projects. Despite this, revenues from FCAS can be highly uncertain in the medium to long term, in part due to the transformation of the supply mix in the electricity market, but also the super profits realised during 'black swan' events which cannot be predicted. There is this a relatively low level of confidence associated with FCAS revenue forecasts, particularly in the longer term.

Noting these modelling challenges, an FCAS revenue forecast has been included in the financial modelling below. Historical FCAS revenue in Victoria, along with enablement volumes were used to develop $/kW pa FCAS price assumptions across the 8 contingency markets. These figures were compared to historical FCAS revenues at different operational utility scale battery projects of various sizes, in order to triangulate an FCAS price forecast that is representative of historical outcomes. We have retained the historical value in the forecast. A more conservative assumption would be to apply an annual discount factor to the FCAS value. Common industry practice is to discount the FCAS value $/kVA pa by between 5-15% annually.

Model 1

The approach to modelling the first 'solar sponge' commercial model involved developing a battery dispatch profile based on the spot price outcomes, within the daytime charging/evening discharging constraints of the model. Energetics battery dispatch optimisation model was used to generate the charging / discharging profiles for each price series. This modelling assumes perfect foresight of spot prices, allowing for a fully optimised dispatch profile. It was also assumed that the battery reserved a portion of its energy capacity to allow it to bid into each of the eight (8) Contingency FCAS markets in parallel to its spot market operations. This co-optimisation constraint was applied since the value of the reserved BESS energy for the quasi-capacity aspect of Contingency FCAS bidding is higher than the spot arbitrage value of that same energy under a 1x cycle per day basis.

The tertiary revenue stream for this model is the bespoke network tariffs, which reward batteries charging during solar hours, and discharging during the evening peak period, encouraging network supportive operating behaviour. Trial community battery tariffs are in place in both the

CitiPower and Jemena network areas, and these tariffs have been applied to batteries under Model 1[3].

Model 2

A slightly different approach was taken for Model 2, as it is assumed that Council will lease operational control of the batteries to a retailer through a tolling arrangement[4]. It is assumed that the retailer will be responsible for engaging with participants of the virtual storage program, including marketing the retail product, accepting subscription payments, managing the BESS dispatch for wholesale market revenues and paying storage rebates. The retailer receives market revenues earned from battery operations and pays a tolling fee to the Councils for this right.

We assume in this instance that a retailer would require operational control of the BESS dispatch (i.e. becomes the BESS FTM intermediary), since it receives all of the actually achieved variable value of the intra-day spot price arbitrage spread. A retailer relationship here is desirable for the Council (BESS owner / developer), since it reduces the operational complexity to Council as they are not responsible for operating the battery and engaging with participants.

The tolling fee reflects a risk adjusted consideration of the anticipated revenues a retailer believes it could receive through operating the BESS for spot arbitrage purposes, less a risk premium to cover the retailer taking the spot price spread capture risk from operating the BESS. It is also assumed that the retailer will price the virtual storage arrangement components (subscription fees, rebates to participants) such that it passes on a certain percentage of the expected value obtained through BESS operations, with the remainder initially being retained by the retailer. A retailer would also likely consider the number of subscribers it believes it could attract to sign onto the program, in addition to other retailer related considerations such as cost to acquire, serve and maintain these customers. These retail considerations are best dealt with by a retailer rather than Council.

In the absence of the specifics of existing virtual storage arrangement characteristics, we assume that the retailer retains 70% of its expected BESS revenue for assuming 100% of the market risk, with 30% passed on to participants of the virtual storage arrangement. This is a modelling assumption that reflects what a retailer may target.

Council provides the capital for the battery and receives the tolling payments from the retailer. With consideration of these costs and revenues to the retailer as well as their risk premia, a figure was determined as to the value of the tolling arrangement payments that would be received by Council. As tolling payments will be based on expectations of market conditions, rather than actual market outcomes, the modelling assumes that the payments will be based on a P50 revenue outcome for the retailer. The design of a tolling arrangement with an operator can also be designed such that Council can ensure payments will cover their cost of capital (i.e. targeted minimum payments or tolling rate).

Model 3

Model 3's FOM value stream are calculated similarly to Model 1, with the exception that there are no explicit time based constraints on charging and discharging. Furthermore it has been assumed that there is not the benefit of bespoke network tariffs for community batteries since the electrical configuration does not meet the required standards.

The main variation as compared to Model 1 is that Model 3 also has the ability of accessing BTM value streams. It is assumed that the model utilises a single battery per site, with 20% of the battery's capacity operating on a BTM basis (up to the maximum BTM BESS size identified in Table 5), giving the site the ability to load-shift to optimise between time-of-use (ToU) designated

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[3] Note that the MB2 site does not include the bespoke community battery tariffs due to the proposed size exceeding maximum thresholds

[4] Tolling arrangements are a vanilla BESS contracting approach whereby a fixed for floating swap is entered on either a $/MWh pa, or $/MW pa basis between the off taker (in this instance a retailer) and the BESS owner / developer, in this case Council. It transfers variable revenue risk to the off taker and aids in bankability of the BESS development.

peak and off-peak retail and network tariffs. Optimisation of the value of any onsite rooftop solar generation is also considered.

It is also assumed that due to the hybrid metering configuration for Model 3, the batteries do not receive the benefit of bespoke community battery network tariff, but rather are subject to standard network tariffs for the local area. This is because the connection configuration is technically 'behind the meter'. It is only that by virtue of this being via an embedded network, that the economic effect of FTM revenues are achieved (without the load also being subject to spot prices). DNSPs have explicitly stated that community battery network tariff applies only to FTM connections (from an electrical engineering standpoint, as opposed to those which achieve FTM economics through other means).

As a general comment, the BTM revenue opportunity occurs at times which conflict with spot arbitrage opportunities – since legacy network and retail tariffs are higher in the middle of the day, when wholesale spot prices are usually low (e.g. legacy retail 'peak' tariff is typically defined as 7am to 10 or 11pm weekdays, with legacy network tariffs similarly defined). Conversely, network and retail tariff off peak definition occur when spot wholesale prices are higher (such as after 10 or 11pm). This is of course dependent on the network area and their specific tariff classes and definitions across residential, commercial and industrial classes, and likewise with the retailer's definition of peak and off peak. Some DNSPs are evolving their ToU to better incentivise and match the times that BTM and FTM value, for example CitiPower, which now defines its residential peak time as 3-9pm for 7 days per week.

2.2 Key input parameters

The following key input parameters were applied through the modelling. We model the net present value (NPV) of net revenues (or EBITDA). The modelling hasn't made consideration for post-tax cashflow items such as depreciation, amortisation (D&A) or cash tax payable. We assume that Council is a tax-exempt entity.

Table 4: Key modelling input parameters

Description	Assumption
Modelling term	2025 - 2039
Discount rate (nominal)	5%
CPI	2.5%
Daily cycling	Constrained to 1 cycle per day
Contingency FCAS value (all markets Vic)	~$29.90/kW/pa

BESS sizing and cost assumptions

The below table highlights some additional site-specific level inputs assumed in the modelling, as informed by Council's engineering consultant. All sites besides MB2 (3-hour) assume a 2.5-hour FOM BESS, and the average cost per kWh for the recommended FOM batteries is $1,313/kWh.

Table 5: Site specific modelling characteristics and inputs

Site	Indicative FOM BESS size (kW/kWh)	Maximum BTM BESS size (kW/kWh)	Supply and installation costs[5]
MB1	100/250	25/40	$367,750
MB2	500/1500	100/250	$1,526,875
MB3	200/500	100/250	$691,250

[5] Based on FOM battery equipment and sizing proposed by Council's engineering advisor

Site	Indicative FOM BESS size (kW/kWh)	Maximum BTM BESS size (kW/kWh)	Supply and installation costs[5]
MB4	200/500	100/250	$678,150
MB5	200/500	25/40	$671,150
MB6	100/250	10/20	$381,675
MB7	200/500	10/20	$675,275
MB8	300/750	100/250	$918,575
MB9	200/500	100/250	$672,400
MB10	100/250	100/160	$381,675
MB11	200/500	25/40	$672,400
MB12	200/500	25/40	$672,400
YC1	100/250	25/40	$371,325
YC2	100/250	25/40	$378,800
YC3	200/500	25/40	$662,050
YC4	200/500	100/250	$675,850
YC5	200/500	25/40	$672,400
YC6	200/500	200/500	$650,550
YC7	100/250	10/20	$378,800
YC8	100/250	10/20	$371,325
Total	3,700/9,500	815/1,770	$12,470,675

Community battery trial network tariffs

The below table shows some of the existing community battery trial tariffs offered by network providers in Victoria. CitiPower and Jemena rates are used in the modelling for the relevant sites.

Table 6: Trial network tariffs for community batteries

Network operator	Time	Fixed charge	Import rate (c/kWh)	Export rate (c/kWh)
CitiPower, Powercor, United Energy	10am – 3pm	$0.45c/day	-1.5	0
	4pm – 9pm		25	-1.0
	All other times		0	0
Jemena	10am – 3pm (Sep-May)	$3,629/year	-1.5	0
	3pm – 9pm		5.266	-1.5
	All other times		0	0

Grant funding assumption

For the purposes of modelling NPV, it was assumed that Council would have the benefit of grant funding through either:

- The Victorian Government's 100 Neighbourhood Batteries Program Grant, which provides up to $300,000 per battery for projects that meet the following criteria:
  - Provide quantifiable community benefits

- Include at least a 10% cash co-contribution
- Each battery much be a minimum of 50kW/100kWh in scale

- The Federal Government's Community Batteries for Household Solar Program, which provide up to $500,000 per battery provided:
  - Each battery is a minimum of 50kW in scale
  - A minimum of five batteries are deployed
  - Funding does not exceed 100% of the battery Capex cost

For the purposes of modelling Council net battery capex, it was assumed that for each battery, Council receives a grant at the lesser of the battery total capex or $500,000, being the Federal Government maximum grant opportunity. MB2 & MB8 are the exception, as they are assumed to receive funding from both schemes ($800,000) due to their greater funding requirements.

For reference, a table of projects to be awarded grants through the Community Batteries for Household Solar program is shown below:

2.3 Assessment of results

The charts below depict the total 50th and 90th percentile financial outcomes (including grant funding) for the three commercial models across all 20 Council sites. In this context:

- 50th percentile outcome refers to the median financial outcome across all of the price forecast scenarios
- 90th percentile outcome refers to the scenario which yields the 90th percentile poorest outcome (i.e. 90% of outcomes are higher than this)

The size of the bubbles represents the standard deviation (or variability) of the outcomes across all stochastic scenarios. Whilst the intention is not necessarily to roll out the same commercial model at all sites, this assessment gives an indication of the overall profitability of each model to Council. This enables a screening of models which might be excluded from consideration altogether. Site-by-site analysis has been included in Appendix A.

Key takeaways from the results will be discussed in more detail in the next section, however in summary:

1. Model 1: relies on daily spot price spreads to generate sufficient returns through spot arbitrage, however these spreads appear to be insufficient to ensure a positive net present value (NPV). The model also has the largest standard deviation of outcomes across price scenarios, as it is most closely linked to spot price outcomes with Council being exposed to the uncertainty of market risk.
2. Model 2: this model results in no spread of outcomes, as Council receives a fixed payments under a tolling arrangement from the battery operator (retailer). Even though the retailer itself would have expectations that market revenues are variable under varying circumstances, their internal view would take this into account when settling on a tolling payment that they can justify. Furthermore, the retailer charges a subscription fee to local subscribers in exchange for rebates. Council does not retain any direct exposure to market conditions, so is a fundamentally different proposition compared to Model 1 and Model 3. This lower risk exposure is reflected in the revenue opportunities; however it must also be noted that a portion of the generated value is passed directly to scheme participants. It is also worth noting that via negotiations with the retailer, Council will have upfront visibility of the tolling payments they will receive throughout the course of the contract. This does give Council a high degree of revenue certainty.

3. **Model 3**: similar to model 1, this option relies heavily on spot price outcomes to generate revenue. Again, daily price spreads are not sufficient to recover costs on a net present value basis, resulting in negative NPV outcomes across P50 and P90 scenarios. BTM revenue offers greater certainty, however, overall is far less lucrative than FOM revenue streams as the daily retail plus network spread between peak and off peak pricing is below that forecast within Energetics stochastic spot price series. Model 3 offers superior returns to Model 1 for certain sites, based on the greater spread in TOU retail and network tariffs for these sites creating greater arbitrage opportunities from the BTM apportionment of the BESS. Model 3 also suffers compared to the other options as it does not benefit from bespoke community battery network tariffs, hence network charges are higher under this option.

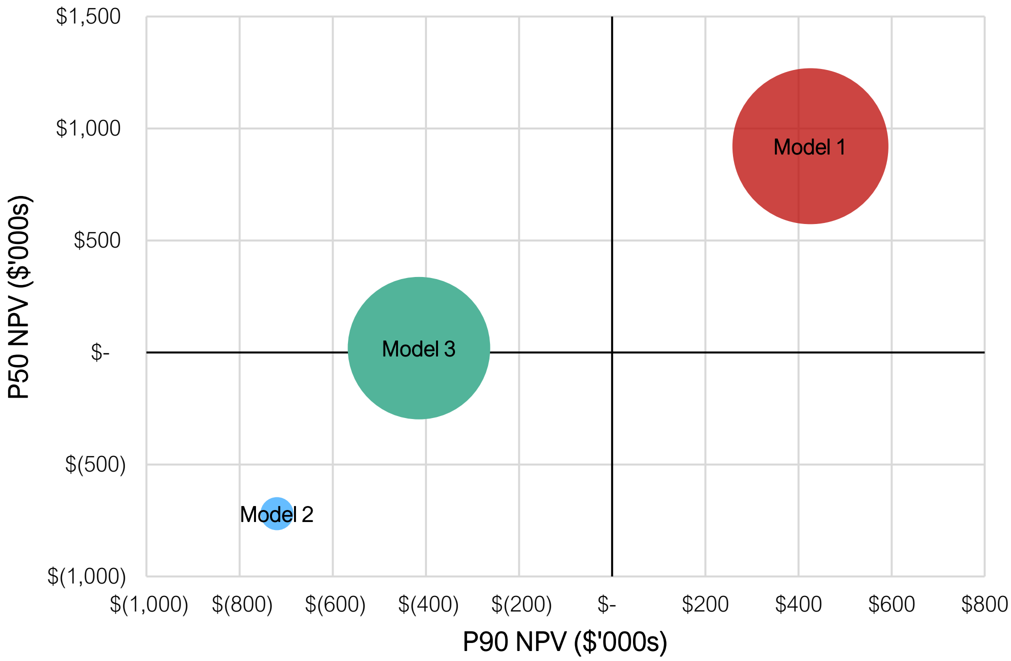

Figure 2: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models across all sites

Without grant funding, the commerciality of all three options is very difficult to demonstrate. Once grant funding is included, positive financial outcomes are able to be achieved for the majority of sites.

2.4 Discussion of results

Model 1: Solar sponge

Across all sites, Model 1 resulted in poor financial outcomes when the benefit of grant funding was excluded. This model derives BESS revenue from through trading daily wholesale electricity spot price spreads, as well as participating in the FCAS markets (through the provision of reserve capacity). The main drivers of the outcomes are:

1. The model has the largest standard deviation of value across the range of price forecasts, as it is the model most closely linked to and reliant on spot price outcomes. High volatility scenarios, with respect to individual stochastic price series, result in larger spot arbitrage returns. Less volatile, lower price scenarios will result in lower daily price spreads and hence lower arbitrage revenue opportunity.

   Overall it is evident that despite the variability of outcomes, volatility within each scenario is insufficient for this Model to generate revenue in excess of capex (on a net present value of net revenues basis, before grant funding). This results in highly negative NPV outcomes. Across all scenarios there is a clear misalignment of costs and revenue opportunities, which is exaggerated at certain sites (MB2 in particular) where potential grant funding is insufficient to cover the larger capital costs.

2. The hard time based constraints on charging and discharging under this model do not result in a fully optimised operating profile (i.e. there may be a way to operate the battery that results in a better financial outcome), however in general the lost value due to these constraints is not significant. The model is limited to cycling once per day, which for the majority of days is fully utilised. This cycling limit is put into place to align with generally expected warranty provisions for community BESS.

3. Network tariff revenue is a critical component to the overall value stack of this model. Sites located in the Jemena network (MB3-12, YC2-3) are subjected to ~20x higher annual fixed network costs compared to sites located in the CitiPower network (>$3.6k pa, vs ~$165 pa for the same trial community BESS tariff in Powercor). Of these sites, the ones with smaller battery sizes (MB6, MB10 and YC2) are impacted most significantly, as lower annual throughput results in lower volumetric network tariff revenue to recover these fixed costs.

4. Once grant funding was introduced to the modelling, Model 1 outcomes become much more favourable. For almost all sites Model 1 becomes NPV positive at a P50 level, with the majority of sites also NPV positive at a P90 level. The only site with a negative NPV at a P50 level is MB2 due to:

   - The larger battery size meaning a smaller percentage of total capex costs are covered by grant funding
   - This site is ineligible for community battery network tariffs

Outcomes for Model 1 are summarised in the below tables, with a comparison of NPVs with and without grant funding. The NPVs shown in the table show the net position based on cashflows at paid/received at each respective time point. The costs in the table represent the estimated capex costs for each battery:

Site	kW/kWhr	Costs	Revenue (50th percentile)	NPV Year 5	NPV Year 10	NPV Year 15
MB1	100/250	$367,750	$156,412	-$309,482	-$279,081	-$245,120
MB2	500/1500	$1,526,875	$606,076	-$1,293,536	-$1,187,386	-$1,048,248
MB3	200/500	$691,250	$285,429	-$584,478	-$529,827	-$466,938
MB4	200/500	$678,150	$285,429	-$572,002	-$517,350	-$454,462
MB5	200/500	$671,150	$285,429	-$565,335	-$510,684	-$447,796
MB6	100/250	$381,675	$115,496	-$334,428	-$313,258	-$286,637
MB7	200/500	$675,275	$285,429	-$569,263	-$514,612	-$451,724
MB8	300/750	$918,575	$455,363	-$756,194	-$668,061	-$568,906
MB9	200/500	$672,400	$285,429	-$566,525	-$511,874	-$448,986
MB10	100/250	$381,675	$115,496	-$334,428	-$313,258	-$286,637
MB11	200/500	$672,400	$285,429	-$566,525	-$511,874	-$448,986
MB12	200/500	$672,400	$285,429	-$566,525	-$511,874	-$448,986
YC1	100/250	$371,325	$156,412	-$312,887	-$282,486	-$248,525
YC2	100/250	$378,800	$115,496	-$331,690	-$310,520	-$283,899
YC3	200/500	$662,050	$285,429	-$556,668	-$502,017	-$439,129
YC4	200/500	$675,850	$315,288	-$561,444	-$500,085	-$431,726
YC5	200/500	$672,400	$315,288	-$558,158	-$496,799	-$428,440
YC6	200/500	$650,550	$315,288	-$537,349	-$475,990	-$407,630
YC7	100/250	$378,800	$156,412	-$320,006	-$289,605	-$255,644
YC8	100/250	$371,325	$156,412	-$312,887	-$282,486	-$248,525

Table 7: Model 1 NPV outcomes without grant funding

Site	kW/kWhr	Costs	Revenue (50th percentile)	NPV Year 5	NPV Year 10	NPV Year 15
MB1	100/250	$ -	$ 156,412	$ 40,756	$ 71,157	$ 105,118
MB2	500/1500	$ 726,875	$ 606,076	$ (531,632)	$ (425,481)	$ (286,343)
MB3	200/500	$ 191,250	$ 285,429	$ (108,287)	$ (53,636)	$ 9,252
MB4	200/500	$ 178,150	$ 285,429	$ (95,811)	$ (41,160)	$ 21,728
MB5	200/500	$ 171,150	$ 285,429	$ (89,144)	$ (34,493)	$ 28,395
MB6	100/250	$ -	$ 115,496	$ 29,072	$ 50,242	$ 76,863
MB7	200/500	$ 175,275	$ 285,429	$ (93,073)	$ (38,422)	$ 24,466
MB8	300/750	$ 118,575	$ 455,363	$ 5,711	$ 93,843	$ 192,999
MB9	200/500	$ 172,400	$ 285,429	$ (90,335)	$ (35,684)	$ 27,204
MB10	100/250	$ -	$ 115,496	$ 29,072	$ 50,242	$ 76,863
MB11	200/500	$ 172,400	$ 285,429	$ (90,335)	$ (35,684)	$ 27,204
MB12	200/500	$ 172,400	$ 285,429	$ (90,335)	$ (35,684)	$ 27,204
YC1	100/250	$ -	$ 156,412	$ 40,756	$ 71,157	$ 105,118
YC2	100/250	$ -	$ 115,496	$ 29,072	$ 50,242	$ 76,863
YC3	200/500	$ 162,050	$ 285,429	$ (80,478)	$ (25,827)	$ 37,062
YC4	200/500	$ 175,850	$ 315,288	$ (85,253)	$ (23,894)	$ 44,465
YC5	200/500	$ 172,400	$ 315,288	$ (81,968)	$ (20,609)	$ 47,750
YC6	200/500	$ 150,550	$ 315,288	$ (61,158)	$ 201	$ 68,560
YC7	100/250	$ -	$ 156,412	$ 40,756	$ 71,157	$ 105,118
YC8	100/250	$ -	$ 156,412	$ 40,756	$ 71,157	$ 105,118

Table 8: Model 1 NPV outcomes with grant funding

Further site-by-site outputs are available in Appendix A.

The ability of the BESS under this commercial model to also serve Contingency FCAS markets allow for a diversified source of revenue. Model 1 also assumes the battery benefits from a bespoke network tariff (with the exception of site MB2 which incurs standard network tariffs due to exceeding the trial tariff sizing parameters), through which it can generate revenue by charging during the middle of the day and discharging during the evening[6]. As shown in the chart below, FCAS accounts for a significant proportion (~30-40%) of total revenue under Model 1 across the forecast horizon. It should be noted that FCAS is a much less robust revenue stream than either the positive value from a bespoke network tariff, or the spot arbitrage revenue expectations.

[6] The inwards energy flow to the BESS receives a revenue from the network for certain hours of the day (10am to 3pm), whilst discharged energy flows from the BESS likewise receives a revenue (negative network tariff) during specified hours (4pm to 9pm). As such, this is one way for the DNSP to provide financial support / incentive to the BESS owner for providing constraint reducing operations.

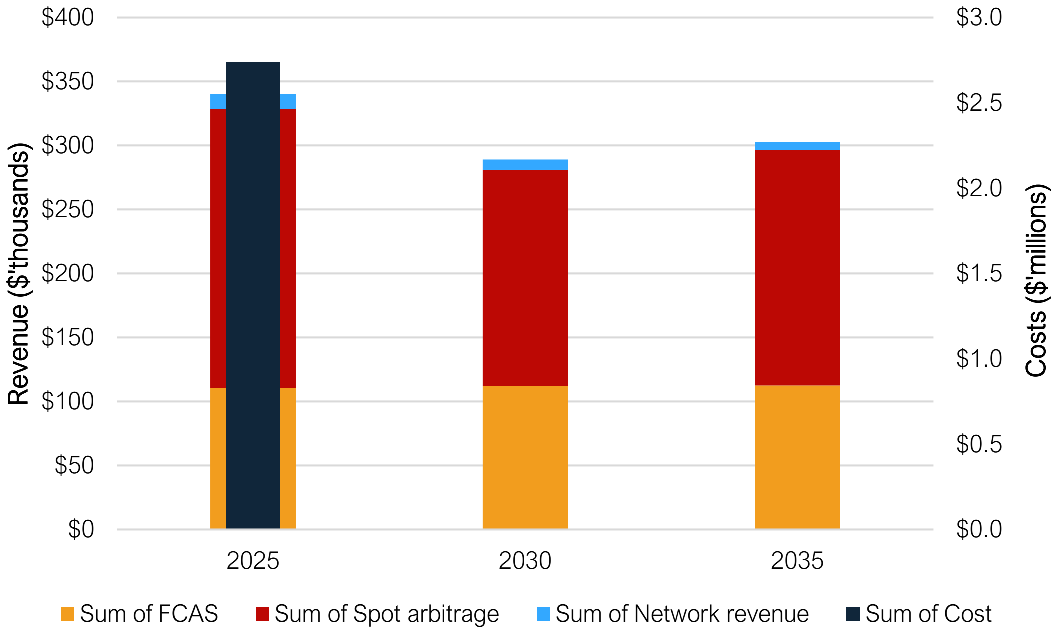

Figure 3: Model 1 cost/revenue outcomes under P50 conditions for all sites (2025, 2030, 2035)

Across all years the modelling results in relatively consistent FCAS and network revenue. Spot arbitrage revenue on the other hand displays greater variability across the various 15 year forecast horizon. This is also the case across different price forecast scenarios, to which the spot arbitrage revenue is reliant. Despite this, spot arbitrage revenue is in all cases the greatest source of revenue under P50 conditions, representing ~60-65% of the forecast revenue stack.

A spot exposed model is inherently risky as financial returns are dependent on daily spreads in the spot price, which cannot be guaranteed to be sufficient to cover BESS capex over the project life. The benefit of this exposure is that in times of high spot price volatility, battery projects are able to profit.

Note on electricity spot price forecasting limitations

Market simulation based spot price forecasts tend to be less volatile than actual observed spot price outcomes as forecasting models simulate more efficient market operations. This can disadvantage revenue forecasts for batteries as the volatility in the market is not always fully represented, and as such actual returns can exceed modelled outcomes. With that being said, modelled NPV outcomes show Model 1 to be highly NPV negative kin the absence of grant funding, and as such it would be difficult to demonstrate commerciality.

Model 2: Virtual storage

Model 2 offers no spread of NPV outcomes across all price scenarios, as the retailer's tolling payments are in all scenarios based on their expectation of revenue opportunities over the term (assumed to be the P50 outcome). Outcomes across all sites are shown below:

Site	kW/kWhr	Costs	Revenue (50th percentile)	NPV Year 5	NPV Year 10	NPV Year 15
MB1	100/250	$ 367,750	$ 82,143	$ (326,868)	$ (310,983)	$ (294,218)
MB2	500/1500	$ 1,526,875	$ 327,814	$ (1,364,197)	$ (1,306,535)	$ (1,233,389)
MB3	200/500	$ 691,250	$ 149,916	$ (615,537)	$ (586,943)	$ (556,137)
MB4	200/500	$ 678,150	$ 149,916	$ (603,061)	$ (574,467)	$ (543,661)
MB5	200/500	$ 671,150	$ 149,916	$ (596,394)	$ (567,800)	$ (536,994)
MB6	100/250	$ 381,675	$ 61,621	$ (345,951)	$ (334,670)	$ (321,631)
MB7	200/500	$ 675,275	$ 149,916	$ (600,323)	$ (571,728)	$ (540,923)
MB8	300/750	$ 918,575	$ 238,211	$ (806,789)	$ (760,882)	$ (712,310)
MB9	200/500	$ 672,400	$ 149,916	$ (597,585)	$ (568,990)	$ (538,185)
MB10	100/250	$ 381,675	$ 61,621	$ (345,951)	$ (334,670)	$ (321,631)
MB11	200/500	$ 672,400	$ 149,916	$ (597,585)	$ (568,990)	$ (538,185)
MB12	200/500	$ 672,400	$ 149,916	$ (597,585)	$ (568,990)	$ (538,185)
YC1	100/250	$ 371,325	$ 82,143	$ (330,273)	$ (314,388)	$ (297,623)
YC2	100/250	$ 378,800	$ 61,621	$ (343,213)	$ (331,932)	$ (318,893)
YC3	200/500	$ 662,050	$ 149,916	$ (587,727)	$ (559,133)	$ (528,328)
YC4	200/500	$ 675,850	$ 165,492	$ (596,578)	$ (564,536)	$ (530,792)
YC5	200/500	$ 672,400	$ 165,492	$ (593,293)	$ (561,250)	$ (527,506)
YC6	200/500	$ 650,550	$ 165,492	$ (572,483)	$ (540,440)	$ (506,697)
YC7	100/250	$ 378,800	$ 82,143	$ (337,392)	$ (321,507)	$ (304,742)
YC8	100/250	$ 371,325	$ 82,143	$ (330,273)	$ (314,388)	$ (297,623)

Table 9: Model 2 NPV outcomes without grant funding

Site	kW/kWhr	Costs	Revenue (50th percentile)	NPV Year 5	NPV Year 10	NPV Year 15
MB1	100/250	$ -	$ 82,143	$ 23,370	$ 39,255	$ 56,020
MB2	500/1500	$ 726,875	$ 327,814	$ (602,292)	$ (544,630)	$ (471,484)
MB3	200/500	$ 191,250	$ 149,916	$ (139,346)	$ (110,752)	$ (79,947)
MB4	200/500	$ 178,150	$ 149,916	$ (126,870)	$ (98,276)	$ (67,471)
MB5	200/500	$ 171,150	$ 149,916	$ (120,204)	$ (91,609)	$ (60,804)
MB6	100/250	$ -	$ 61,621	$ 17,549	$ 28,830	$ 41,869
MB7	200/500	$ 175,275	$ 149,916	$ (124,132)	$ (95,538)	$ (64,733)
MB8	300/750	$ 118,575	$ 238,211	$ (44,884)	$ 1,023	$ 49,595
MB9	200/500	$ 172,400	$ 149,916	$ (121,394)	$ (92,800)	$ (61,994)
MB10	100/250	$ -	$ 61,621	$ 17,549	$ 28,830	$ 41,869
MB11	200/500	$ 172,400	$ 149,916	$ (121,394)	$ (92,800)	$ (61,994)
MB12	200/500	$ 172,400	$ 149,916	$ (121,394)	$ (92,800)	$ (61,994)
YC1	100/250	$ -	$ 82,143	$ 23,370	$ 39,255	$ 56,020
YC2	100/250	$ -	$ 61,621	$ 17,549	$ 28,830	$ 41,869
YC3	200/500	$ 162,050	$ 149,916	$ (111,537)	$ (82,943)	$ (52,137)
YC4	200/500	$ 175,850	$ 165,492	$ (120,388)	$ (88,345)	$ (54,601)
YC5	200/500	$ 172,400	$ 165,492	$ (117,102)	$ (85,059)	$ (51,316)
YC6	200/500	$ 150,550	$ 165,492	$ (96,293)	$ (64,250)	$ (30,506)
YC7	100/250	$ -	$ 82,143	$ 23,370	$ 39,255	$ 56,020
YC8	100/250	$ -	$ 82,143	$ 23,370	$ 39,255	$ 56,020

Table 10: Model 2 NPV outcomes with grant funding

Differences between sites depends mostly on installed battery size relativity and costs of equipment. As with Model 1, it is assumed all sites (with the exception of MB2) benefit from bespoke network tariffs which allow for another source of revenue.

Compared to the other options, Model 2 offers revenue certainty as Council will earn fixed tolling payments from the retailer/operator in exchange for use of the battery. This lower risk also results in lower revenue opportunities for Council, hence a number of sites have NPV negative outcomes even with grant funding as it is assumed that the retailer will not be able to achieve enough revenue from operating the battery such that it can offer a tolling rate to Council that is sufficient to cover capex costs.

Again it is worth noting that under this model a portion of the financial benefits are passed directly to the community through the virtual storage arrangement, hence it makes sense that Council receives less lucrative returns in comparison to the other models.

Model 3: FOM / BTM hybrid

Model 3 is the option that results in the highest variability across the various Council sites, due to its BTM component and differing retail and network tariff structures by site. The tables below show the modelled outcomes under this option:

Site	kW/kWhr	Costs	Revenue (50th percentile)	NPV Year 5	NPV Year 10	NPV Year 15
MB1	100/250	$ 367,750	$ 98,882	$ (322,889)	$ (304,991)	$ (283,433)
MB2	500/1500	$ 1,526,875	$ 535,207	$ (1,307,277)	$ (1,213,135)	$ (1,093,713)
MB3	200/500	$ 691,250	$ 205,349	$ (601,421)	$ (563,930)	$ (519,470)
MB4	200/500	$ 678,150	$ 213,420	$ (586,631)	$ (547,307)	$ (501,417)
MB5	200/500	$ 671,150	$ 204,919	$ (582,452)	$ (545,025)	$ (500,651)
MB6	100/250	$ 381,675	$ 112,740	$ (332,327)	$ (311,845)	$ (287,334)
MB7	200/500	$ 675,275	$ 225,038	$ (580,984)	$ (540,706)	$ (491,247)
MB8	300/750	$ 918,575	$ 291,298	$ (794,308)	$ (741,843)	$ (678,120)
MB9	200/500	$ 672,400	$ 193,396	$ (586,938)	$ (552,138)	$ (509,799)
MB10	100/250	$ 381,675	$ 106,493	$ (333,949)	$ (314,335)	$ (291,430)
MB11	200/500	$ 672,400	$ 215,435	$ (580,870)	$ (542,203)	$ (494,953)
MB12	200/500	$ 672,400	$ 232,693	$ (575,878)	$ (533,264)	$ (482,983)
YC1	100/250	$ 371,325	$ 95,828	$ (327,173)	$ (309,976)	$ (288,956)
YC2	100/250	$ 378,800	$ 96,337	$ (334,145)	$ (316,832)	$ (295,723)
YC3	200/500	$ 662,050	$ 233,599	$ (565,471)	$ (521,586)	$ (472,117)
YC4	200/500	$ 675,850	$ 228,293	$ (580,148)	$ (537,459)	$ (488,934)
YC5	200/500	$ 672,400	$ 190,335	$ (587,822)	$ (553,720)	$ (511,918)
YC6	200/500	$ 650,550	$ 195,698	$ (565,453)	$ (530,139)	$ (487,391)
YC7	100/250	$ 378,800	$ 107,588	$ (331,041)	$ (311,740)	$ (288,136)
YC8	100/250	$ 371,325	$ 107,527	$ (323,943)	$ (304,653)	$ (281,061)

Table 11: Model 3 NPV outcomes without grant funding

Site	kW/kWhr	Costs	Revenue (50th percentile)	NPV Year 5	NPV Year 10	NPV Year 15
MB1	100/250	$ -	$ 98,882	$ 27,349	$ 45,247	$ 66,805
MB2	500/1500	$ 726,875	$ 535,207	$ (545,372)	$ (451,230)	$ (331,809)
MB3	200/500	$ 191,250	$ 205,349	$ (125,230)	$ (87,740)	$ (43,279)
MB4	200/500	$ 178,150	$ 213,420	$ (110,440)	$ (71,116)	$ (25,227)
MB5	200/500	$ 171,150	$ 204,919	$ (106,262)	$ (68,834)	$ (24,461)
MB6	100/250	$ -	$ 112,740	$ 31,173	$ 51,655	$ 76,166
MB7	200/500	$ 175,275	$ 225,038	$ (104,794)	$ (64,515)	$ (15,056)
MB8	300/750	$ 118,575	$ 291,298	$ (32,403)	$ 20,061	$ 83,784
MB9	200/500	$ 172,400	$ 193,396	$ (110,747)	$ (75,948)	$ (33,609)
MB10	100/250	$ -	$ 106,493	$ 29,551	$ 49,165	$ 72,070
MB11	200/500	$ 172,400	$ 215,435	$ (104,680)	$ (66,013)	$ (18,762)
MB12	200/500	$ 172,400	$ 232,693	$ (99,688)	$ (57,073)	$ (6,793)
YC1	100/250	$ -	$ 95,828	$ 26,470	$ 43,667	$ 64,687
YC2	100/250	$ -	$ 96,337	$ 26,617	$ 43,930	$ 65,039
YC3	200/500	$ 162,050	$ 233,599	$ (89,280)	$ (45,395)	$ 4,073
YC4	200/500	$ 175,850	$ 228,293	$ (103,958)	$ (61,268)	$ (12,743)
YC5	200/500	$ 172,400	$ 190,335	$ (111,632)	$ (77,529)	$ (35,728)
YC6	200/500	$ 150,550	$ 195,698	$ (89,263)	$ (53,949)	$ (11,201)
YC7	100/250	$ -	$ 107,588	$ 29,720	$ 49,022	$ 72,626
YC8	100/250	$ -	$ 107,527	$ 29,700	$ 48,990	$ 72,582

Table 12: Model 3 NPV outcomes with grant funding

The main observations are:

1. The 80/20 FOM/BTM allocations and the relatively less lucrative returns available from BTM tariff arbitrage. Due to the 80/20 allocation and the fact BTM is less valuable, the BTM allocation erodes overall value for the Model in most cases.
2. The spread of outcomes is also lower, due to the greater certainty offered by BTM operations.
3. The time-of-use retail and network tariff spreads however are not sufficient to yield any real benefit from BTM operations compared to the capex of installing the battery. The FOM revenue per MWh is slightly improved (~10% on average) compared to Model 1 due to there not being any constraints on charging and discharging, allowing for a fully optimised dispatch profile.
4. However, with less overall battery capacity allocated to FOM operations, returns overall are lower under this model. Certain sites (MB5, MB6, MB12, YC3, YC4) appear to perform better under Model 3, compared to Model 1. This is due to the tariff structure at these sites offering greater daily spreads compared to the other sites, hence greater BTM revenue opportunities.
5. Sites with large rooftop solar systems may benefit under this model due to potential reductions in export curtailment. The battery is able to store this surplus output which can then be exported during times when network congestion is lower. In certain cases where ToU tariff spread is greater than the feed-in tariff rate, it benefits a site to forego export revenue in favour storing this output and shifting it to later in the day.
6. It is also worth noting the for sites with lower consumption, this can limit the effectiveness of the BTM BESS. For example, site YC5 has the same tariff spreads as YC4, however it has much lower net grid consumption and hence receives a much smaller total revenue benefit from load shifting (see site-by-site results shown in Appendix A). In this case, the BTM allocation of the BESS takes away from FOM revenue opportunities that would offer much greater value.
7. All sites pay standard network tariffs under this model, rather than community battery tariffs which offer another source of revenue

8. Site MB2 has no ToU spread in its retail tariff structure, hence it is unable to generate any value from a BTM as modelled

9. Sites located in the Jemena network, in particular MB6, MB10 and YC2 tend to see outcomes under Model 3 that are more comparable to Model 1, as Model 1 for these sites has less benefit from network tariff revenues (see discussion for Model 1).

The following charts illustrates the FOM and BTM annual revenue expectation modelled across all sites under Model 3.

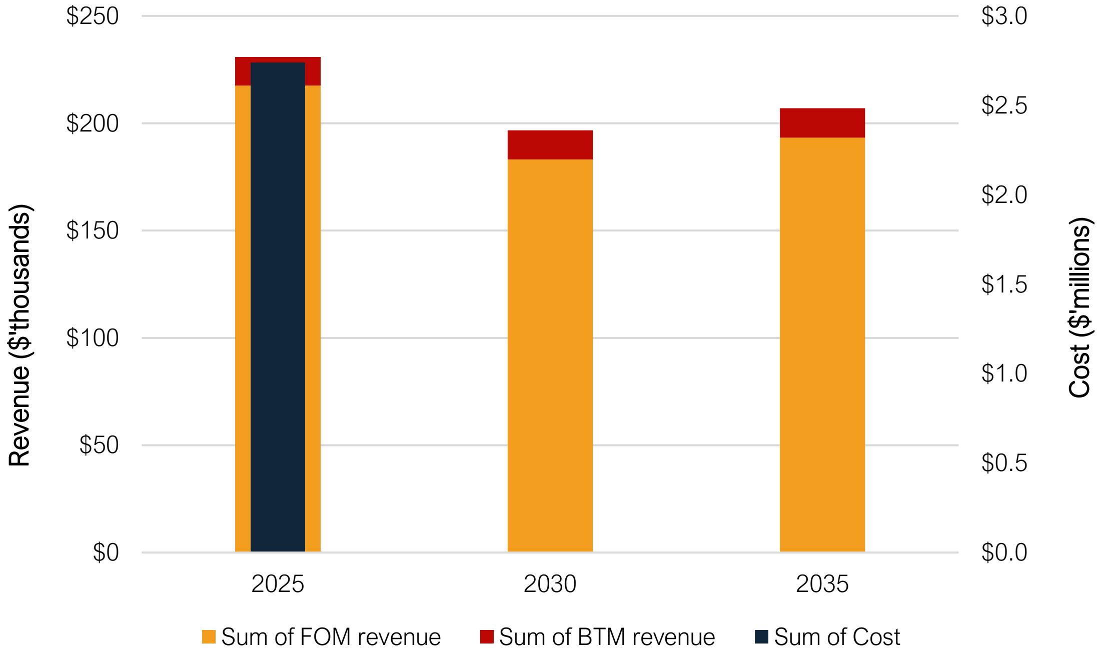

Figure 4: Model 3 revenue/costs under P50 conditions across all sites (2025, 2030, 2035)

BTM revenue is very consistent across all years and there is no variability across price forecast scenarios, as no changes are assumed to the retail tariffs structure across peak and off peak times, and there is no linkage to spot prices. This greater certainty is one benefit of Model 3 compared to Model 1 where revenues are 100% subject to market conditions.

3.0 Deployment approaches / procurement models

3.1 Market approaches and counterparties

A summary of the approach to implementation and rollout of the shortlisted models is discussed in this section. All three models involve different counterparties which therefore drive the approach to market.

Model 1

Model 1 would involve going to market through a competitive tender process for both:

1. the battery equipment to be deployed at the sites; and
2. the counterparty to operate them.

Equipment procurement should be relatively straightforward, and enough suitable local providers exist to ensure a sufficiently competitive process and value-for-money outcome.

The market engagement for an operator may be more involved, as it will need to be determined whether the proponents have suitable systems in place to ensure the batteries are operated in a way that best optimises returns, within the constraints of the operating model. The operator will likely also need to have control of a broader portfolio of battery assets, to ensure Council batteries can be aggregated together in order to meet minimum thresholds for FCAS participation. This model has already been successfully implemented in Victoria, and suitable counterparties should be possible to engage.

The final counterparty to be engaged for this model would be the local DNSP in order to negotiate bespoke network tariffs for grid-supportive operations. Local DSNPs have demonstrated an appetite to provide these tariffs to neighbourhood battery projects in the past, and this is a critical element of the commercial model as it provides an additional source of revenue. Council would need to be demonstrated that by operating the battery, it is providing benefits to the local distribution network, reducing strain on upstream network infrastructure.

This approach is illustrated in Figure 5 below.

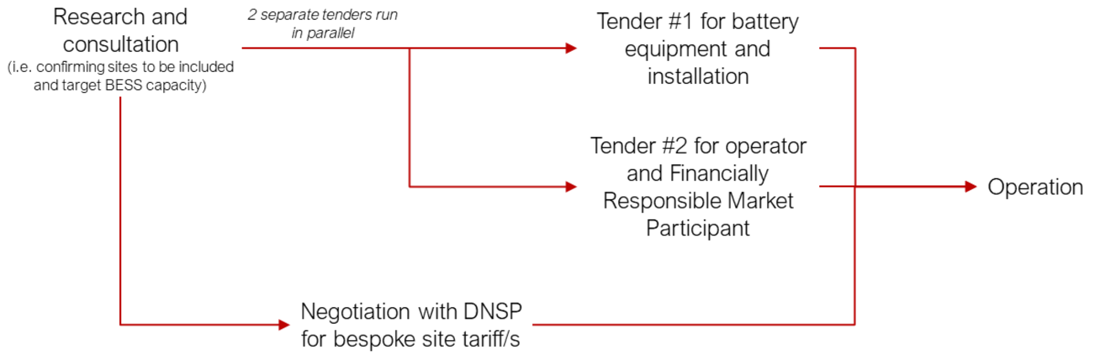

Figure 5: Proposed market approach for Model 1

Model 2

Model 2 is more complicated and likely more difficult to implement, as it requires a direct engagement with a retailer to negotiate the terms for a virtual storage product to be offered to participants. This model involves the retailer taking the majority of the financial and market risks associated with the battery, and the benefit must be sufficient to justify this. Part of the benefits will also be shared 'risk-free' with both Council and participants. Given the retailer will accept the market risk for the project, it is likely Council will have limited negotiating power.

Council will be responsible for sourcing and installing the equipment, which should be a relatively straightforward process.

Through this model, the challenge will be with Council to negotiate an ongoing financial arrangement with the retailer that suitably allocates the benefits of the battery between the retailer, Council and virtual storage participants.

This approach is illustrated in Figure 6 below.

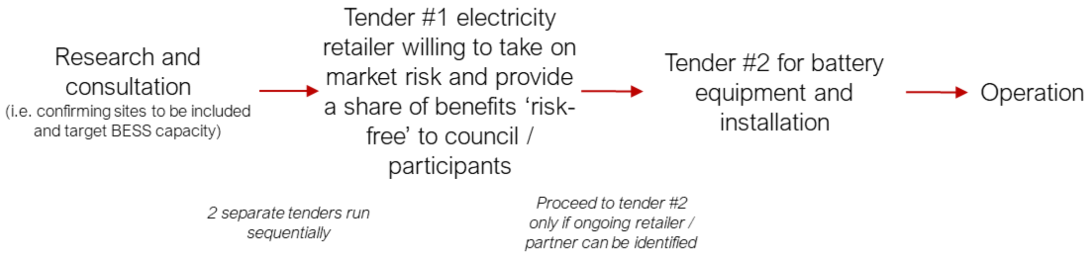

Figure 6: Proposed market approach for Model 2

Model 3

Model 3 would have a relatively similar approach to market as Model 1, with the one difference that the market engagements for the equipment and operator/retailer can be done through a single competitive tender process. It would be expected that the successful counterparty would propose their own battery equipment to be used, which will reduce the administrative effort required by Council to manage multiple market engagements. As with Model 1, the chosen counterparty will need to be able to aggregate the battery in order to be able to provide FCAS services.

This approach is illustrated in Figure 7 below.

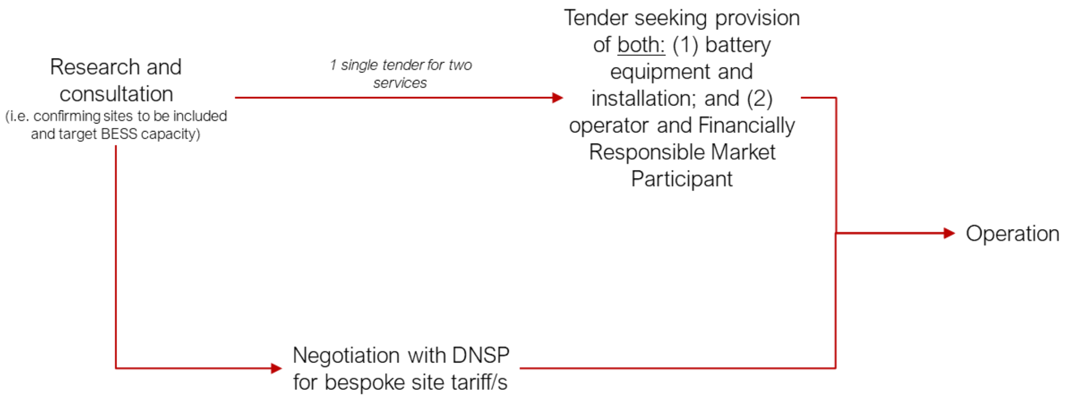

Figure 7: Proposed market approach for Model 3

3.2 Staging of roll-outs

The single largest consideration when staging the roll-out of community batteries is reaching an aggregated capacity which allows for access to FCAS markets. Specifically, this minimum aggregated capacity is 1MW. Whilst planning the process, Council should consider whether it is able to reach this aggregated minimum capacity across the proposed storage assets. If there is, Council should be in a position to explore the market on its own. If not, there may be value in partnering with other councils to increase the aggregated storage capacity.

Note that the ability to access FCAS markets is based on the capacity registered for each market participant. As such, having a portfolio less than 1MW may not prohibit FCAS revenues if the FRMP and operator already have access. Council can specifically engage with a retailer/operator with an existing portfolio of BESS assets to which it can aggregate Council assets.

Appendix A – Site-by-site results

MB1

NPV distribution

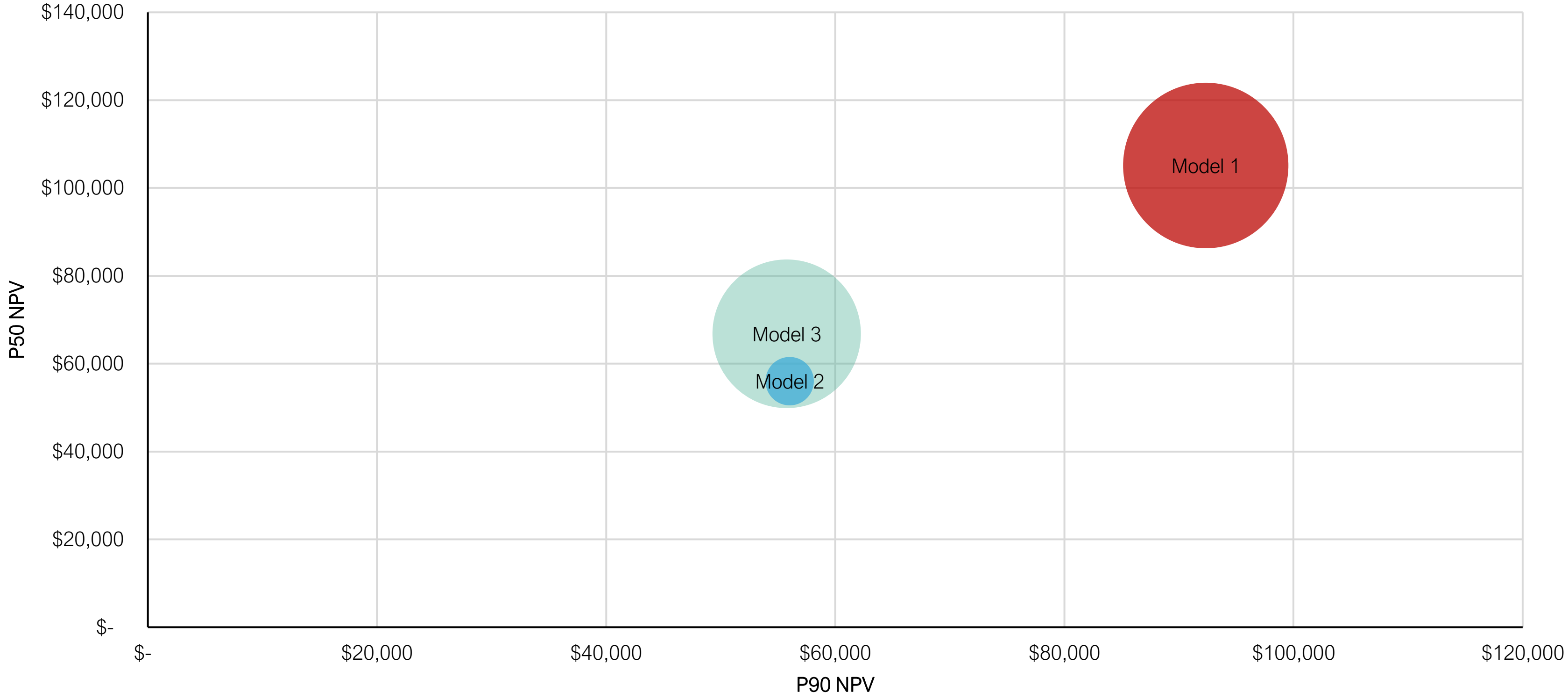

Figure 8: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – MB1

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$367,750	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$367,750	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$9,821	$9,494	$9,168	$9,348	$9,167	$8,947	$9,042	$8,978	$8,851	$8,985	$9,390	$12,511	$13,172	$12,895	$16,645
Spot arbitrage	$5,382	$5,088	$4,793	$4,960	$4,820	$4,615	$4,672	$4,734	$4,578	$4,762	$5,166	$8,290	$8,982	$8,727	$12,518
FCAS	$3,029	$3,050	$3,001	$2,978	$3,001	$3,032	$2,990	$2,986	$3,014	$3,013	$3,047	$3,059	$3,083	$3,092	$3,116
Network revenue	$1,409	$1,355	$1,374	$1,410	$1,346	$1,300	$1,380	$1,259	$1,260	$1,210	$1,177	$1,162	$1,107	$1,075	$1,011
Net profit (running total)	$9,821	$19,314	$28,482	$37,829	$46,996	$55,944	$64,985	$73,963	$82,814	$91,800	$101,190	$113,700	$126,873	$139,767	$156,412
Model 2															
Supply & installation	$367,750	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$367,750	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$5,215	$5,087	$6,123	$5,756	$4,805	$4,692	$4,655	$4,720	$4,667	$4,679	$4,731	$6,695	$6,803	$6,734	$6,781
Tolling payments	$5,215	$5,087	$6,123	$5,756	$4,805	$4,692	$4,655	$4,720	$4,667	$4,679	$4,731	$6,695	$6,803	$6,734	$6,781
Net profit (running total)	$5,215	$10,302	$16,425	$22,181	$26,986	$31,677	$36,332	$41,052	$45,719	$50,398	$55,129	$61,824	$68,627	$75,362	$82,143
Model 3															
Supply & installation	$367,750	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$367,750	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$6,011	$5,794	$7,468	$6,891	$5,423	$5,257	$5,206	$5,309	$5,284	$5,336	$5,460	$8,770	$8,927	$8,811	$8,936
FOM revenue	$5,733	$5,524	$7,203	$6,626	$5,134	$4,969	$4,926	$5,037	$5,018	$5,059	$5,171	$8,481	$8,657	$8,547	$8,671
BTM revenue	$278	$270	$264	$265	$289	$288	$280	$271	$265	$277	$289	$289	$270	$264	$265
Net profit (running total)	$6,011	$11,805	$19,273	$26,164	$31,586	$36,843	$42,049	$47,358	$52,641	$57,978	$63,438	$72,208	$81,135	$89,946	$98,882

Table 13: Annual costs and revenue for commercial models – MB1

MB2

NPV distribution

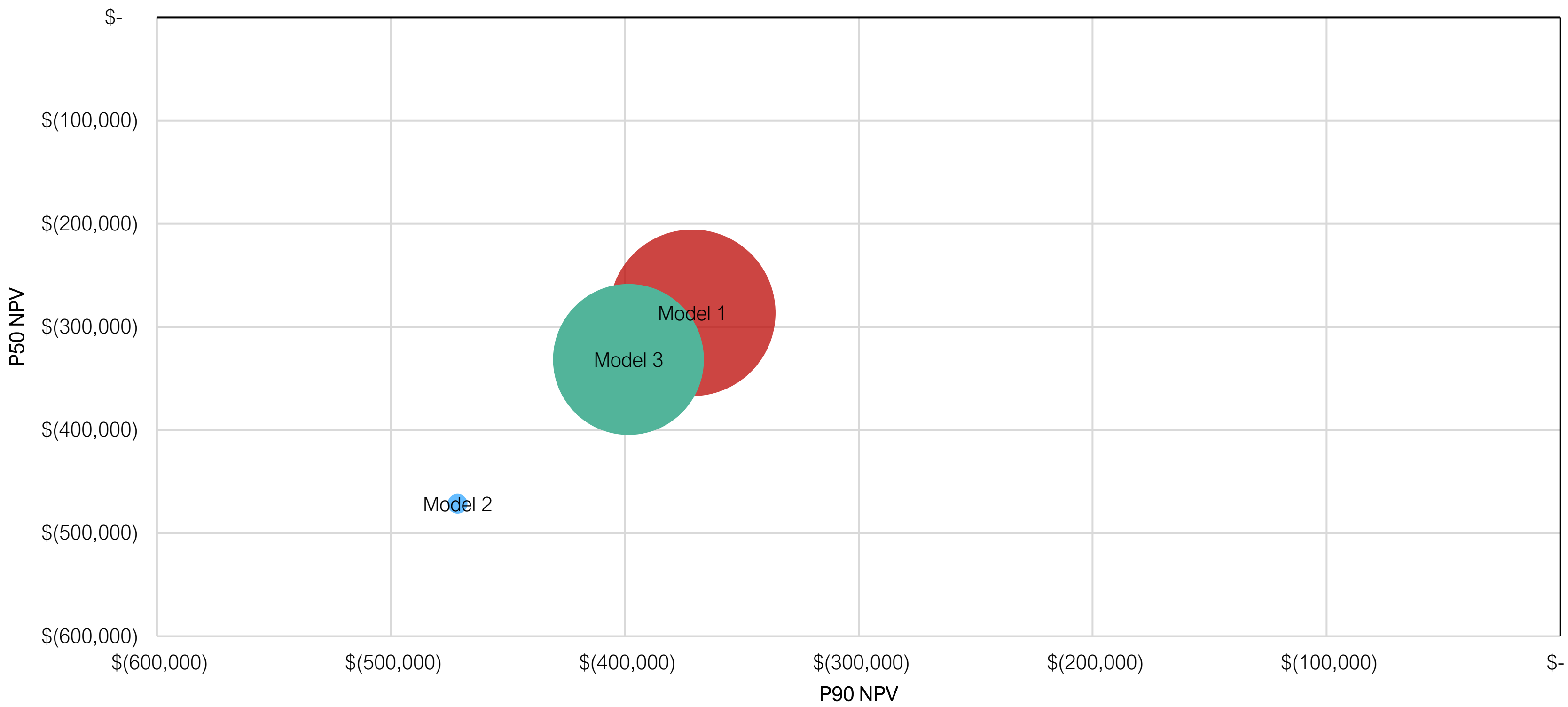

Figure 9: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – MB2

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$1,526,875	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$800,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$726,875	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$36,593	$35,144	$47,008	$34,230	$32,079	$31,141	$30,581	$31,612	$31,382	$31,851	$32,155	$57,199	$58,264	$57,721	$59,115
Spot arbitrage	$33,689	$31,913	$43,985	$31,698	$28,961	$27,378	$27,779	$28,209	$27,765	$27,764	$27,813	$52,053	$52,726	$51,792	$52,431
FCAS	$15,697	$15,795	$15,777	$15,643	$15,661	$15,887	$15,567	$15,702	$15,839	$15,809	$15,912	$16,044	$16,088	$16,321	$16,404
Network revenue	-$12,793	-$12,564	-$12,754	-$13,111	-$12,543	-$12,124	-$12,765	-$12,299	-$12,222	-$11,722	-$11,569	-$10,898	-$10,551	-$10,391	-$9,720
Net profit (running total)	-$690,282	-$655,138	-$608,130	-$573,900	-$541,821	-$510,680	-$480,099	-$448,487	-$417,105	-$385,253	-$353,098	-$295,899	-$237,635	-$179,914	-$120,799
Model 2															
Supply & installation	$1,526,875	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$800,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$726,875	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$19,773	$18,979	$25,334	$22,210	$17,571	$16,939	$16,714	$17,121	$17,046	$17,213	$17,573	$29,957	$30,559	$30,189	$30,637
Tolling payments	$19,773	$18,979	$25,334	$22,210	$17,571	$16,939	$16,714	$17,121	$17,046	$17,213	$17,573	$29,957	$30,559	$30,189	$30,637
Net profit (running total)	-$707,102	-$688,123	-$662,789	-$640,579	-$623,008	-$606,069	-$589,354	-$572,234	-$555,188	-$537,975	-$520,403	-$490,445	-$459,886	-$429,698	-$399,061
Model 3															
Supply & installation	$1,526,875	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$800,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$726,875	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$32,283	$30,986	$41,361	$36,261	$28,688	$27,656	$27,288	$27,952	$27,830	$28,102	$28,690	$48,910	$49,893	$49,287	$50,019
FOM revenue	$32,283	$30,986	$41,361	$36,261	$28,688	$27,656	$27,288	$27,952	$27,830	$28,102	$28,690	$48,910	$49,893	$49,287	$50,019
BTM revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Net profit (running total)	-$694,592	-$663,606	-$622,245	-$585,984	-$557,296	-$529,640	-$502,352	-$474,400	-$446,570	-$418,467	-$389,777	-$340,867	-$290,975	-$241,687	-$191,668

Table 14: Annual costs and revenue for commercial models – MB2

MB3

NPV distribution

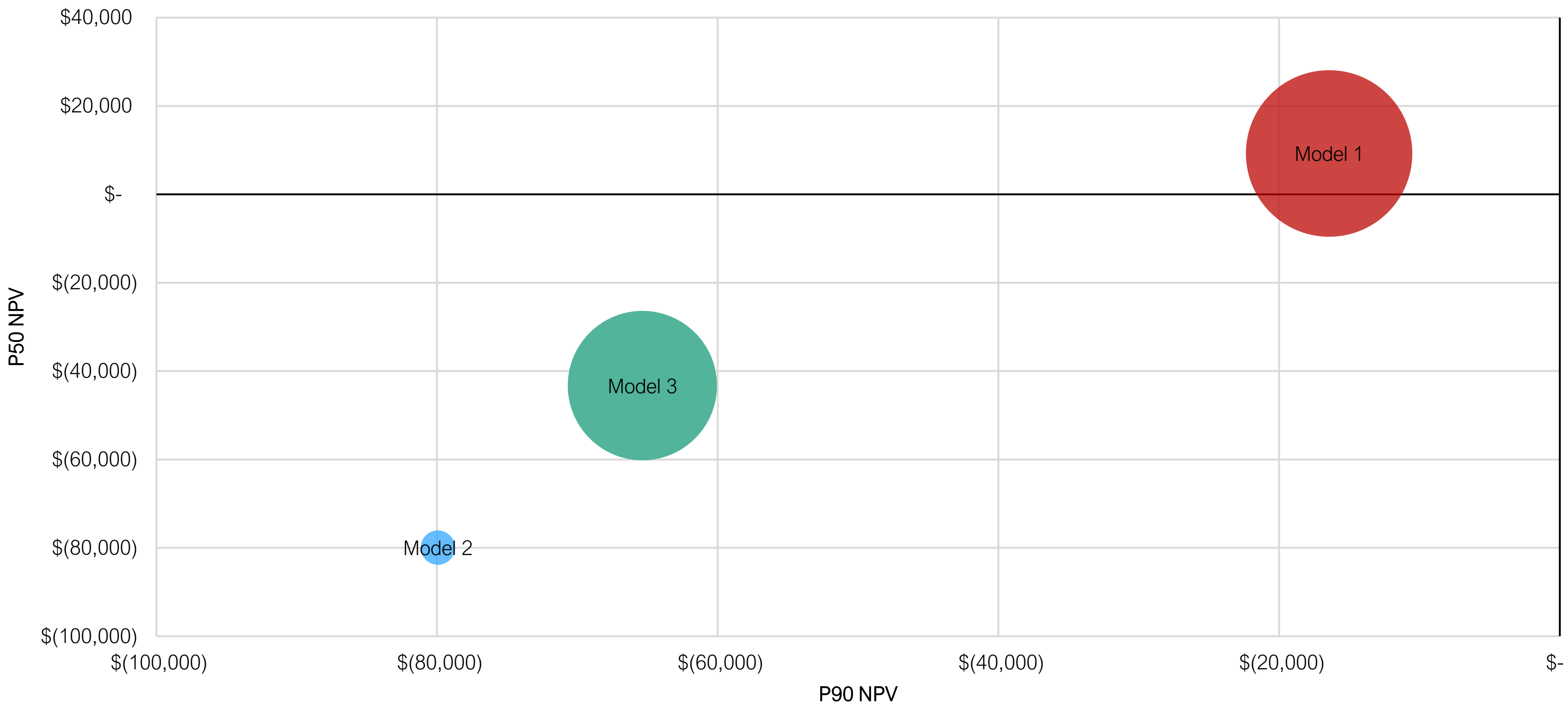

Figure 10: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – MB3

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$691,250	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$191,250	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$17,852	$17,184	$16,585	$16,984	$16,550	$16,096	$16,317	$16,122	$15,892	$16,106	$16,924	$23,163	$24,465	$23,866	$31,322
Spot arbitrage	$10,764	$10,177	$9,585	$9,919	$9,639	$9,230	$9,343	$9,467	$9,155	$9,524	$10,332	$16,579	$17,964	$17,454	$25,036
FCAS	$6,059	$6,101	$6,002	$5,956	$6,002	$6,065	$5,981	$5,972	$6,028	$6,027	$6,095	$6,118	$6,167	$6,185	$6,232
Network revenue	$1,029	$906	$997	$1,109	$908	$802	$993	$683	$709	$555	$497	$466	$334	$227	$54
Net profit (running total)	-$173,398	-$156,214	-$139,629	-$122,644	-$106,094	-$89,998	-$73,681	-$57,560	-$41,667	-$25,561	-$8,637	$14,526	$38,991	$62,857	$94,179
Model 2															
Supply & installation	$691,250	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$191,250	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$9,491	$9,258	$11,352	$10,640	$8,680	$8,445	$8,384	$8,527	$8,387	$8,399	$8,486	$12,360	$12,585	$12,436	$12,487
Tolling payments	$9,491	$9,258	$11,352	$10,640	$8,680	$8,445	$8,384	$8,527	$8,387	$8,399	$8,486	$12,360	$12,585	$12,436	$12,487
Net profit (running total)	-$181,759	-$172,501	-$161,149	-$150,509	-$141,830	-$133,385	-$125,001	-$116,474	-$108,087	-$99,688	-$91,202	-$78,842	-$66,257	-$53,821	-$41,334
Model 3															
Supply & installation	$691,250	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$191,250	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$12,526	$12,117	$15,474	$14,292	$11,318	$10,996	$10,916	$11,147	$11,077	$11,145	$11,393	$18,023	$18,382	$18,161	$18,382
FOM revenue	$11,466	$11,048	$14,407	$13,252	$10,268	$9,938	$9,852	$10,075	$10,037	$10,118	$10,343	$16,962	$17,313	$17,094	$17,341
BTM revenue	$1,060	$1,069	$1,068	$1,040	$1,050	$1,057	$1,064	$1,073	$1,040	$1,027	$1,050	$1,061	$1,069	$1,068	$1,040
Net profit (running total)	-$178,724	-$166,607	-$151,133	-$136,841	-$125,523	-$114,528	-$103,612	-$92,464	-$81,387	-$70,242	-$58,849	-$40,826	-$22,444	-$4,283	$14,099

Table 15: Annual costs and revenue for commercial models – MB3

MB4

NPV distribution

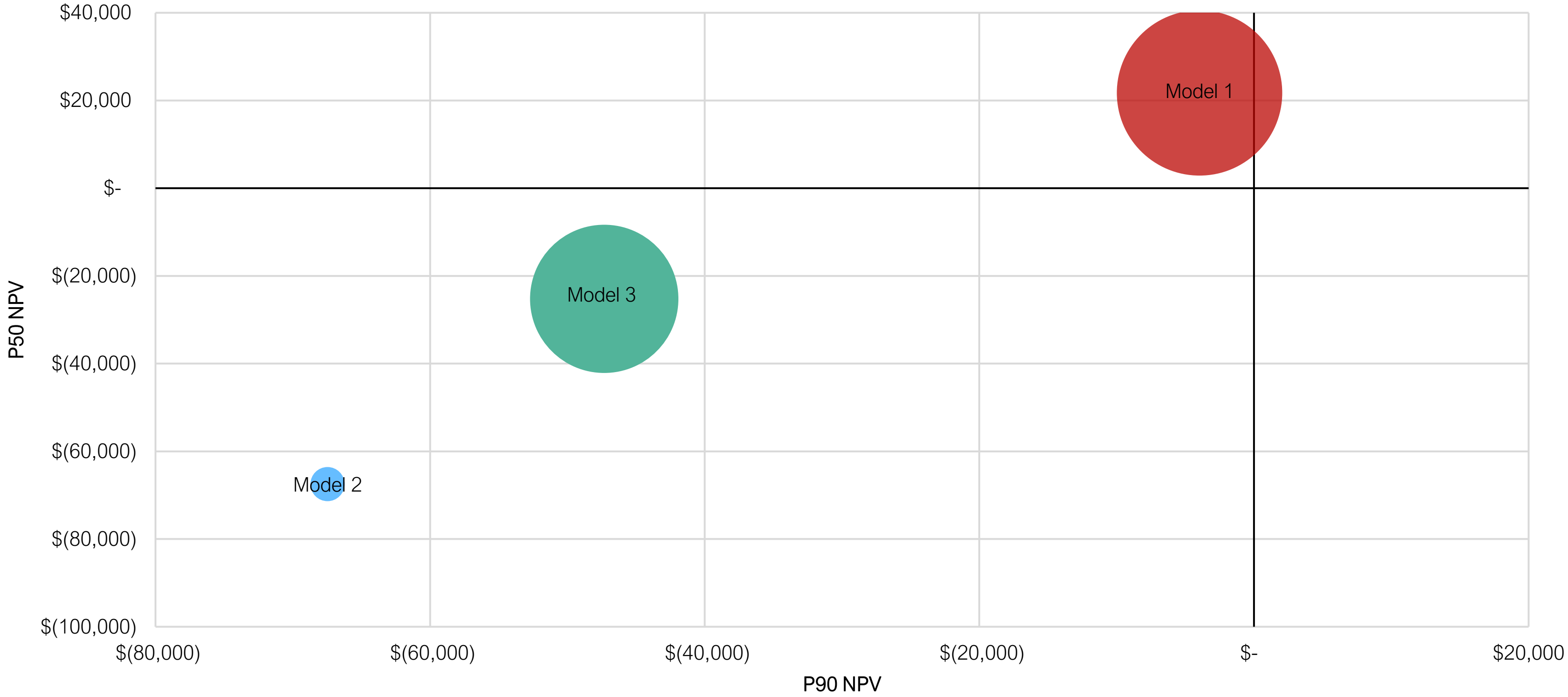

Figure 11: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – MB4

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$678,150	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$178,150	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$17,852	$17,184	$16,585	$16,984	$16,550	$16,096	$16,317	$16,122	$15,892	$16,106	$16,924	$23,163	$24,465	$23,866	$31,322
Spot arbitrage	$10,764	$10,177	$9,585	$9,919	$9,639	$9,230	$9,343	$9,467	$9,155	$9,524	$10,332	$16,579	$17,964	$17,454	$25,036
FCAS	$6,059	$6,101	$6,002	$5,956	$6,002	$6,065	$5,981	$5,972	$6,028	$6,027	$6,095	$6,118	$6,167	$6,185	$6,232
Network revenue	$1,029	$906	$997	$1,109	$908	$802	$993	$683	$709	$555	$497	$466	$334	$227	$54
Net profit (running total)	-$160,298	-$143,114	-$126,529	-$109,544	-$92,994	-$76,898	-$60,581	-$44,460	-$28,567	-$12,461	$4,463	$27,626	$52,091	$75,957	$107,279
Model 2															
Supply & installation	$678,150	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$178,150	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$9,491	$9,258	$11,352	$10,640	$8,680	$8,445	$8,384	$8,527	$8,387	$8,399	$8,486	$12,360	$12,585	$12,436	$12,487
Tolling payments	$9,491	$9,258	$11,352	$10,640	$8,680	$8,445	$8,384	$8,527	$8,387	$8,399	$8,486	$12,360	$12,585	$12,436	$12,487
Net profit (running total)	-$168,659	-$159,401	-$148,049	-$137,409	-$128,730	-$120,285	-$111,901	-$103,374	-$94,987	-$86,588	-$78,102	-$65,742	-$53,157	-$40,721	-$28,234
Model 3															
Supply & installation	$678,150	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$178,150	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$13,053	$12,638	$15,999	$14,839	$11,874	$11,531	$11,443	$11,672	$11,624	$11,718	$11,949	$18,561	$18,904	$18,685	$18,929
FOM revenue	$11,466	$11,048	$14,407	$13,252	$10,268	$9,938	$9,852	$10,075	$10,037	$10,118	$10,343	$16,962	$17,313	$17,094	$17,341
BTM revenue	$1,587	$1,591	$1,592	$1,587	$1,606	$1,593	$1,592	$1,597	$1,587	$1,600	$1,606	$1,599	$1,591	$1,592	$1,587
Net profit (running total)	-$165,097	-$152,459	-$136,460	-$121,621	-$109,747	-$98,216	-$86,773	-$75,101	-$63,477	-$51,759	-$39,810	-$21,248	-$2,344	$16,341	$35,270

Table 16: Annual costs and revenue for commercial models – MB4

MB5

NPV distribution

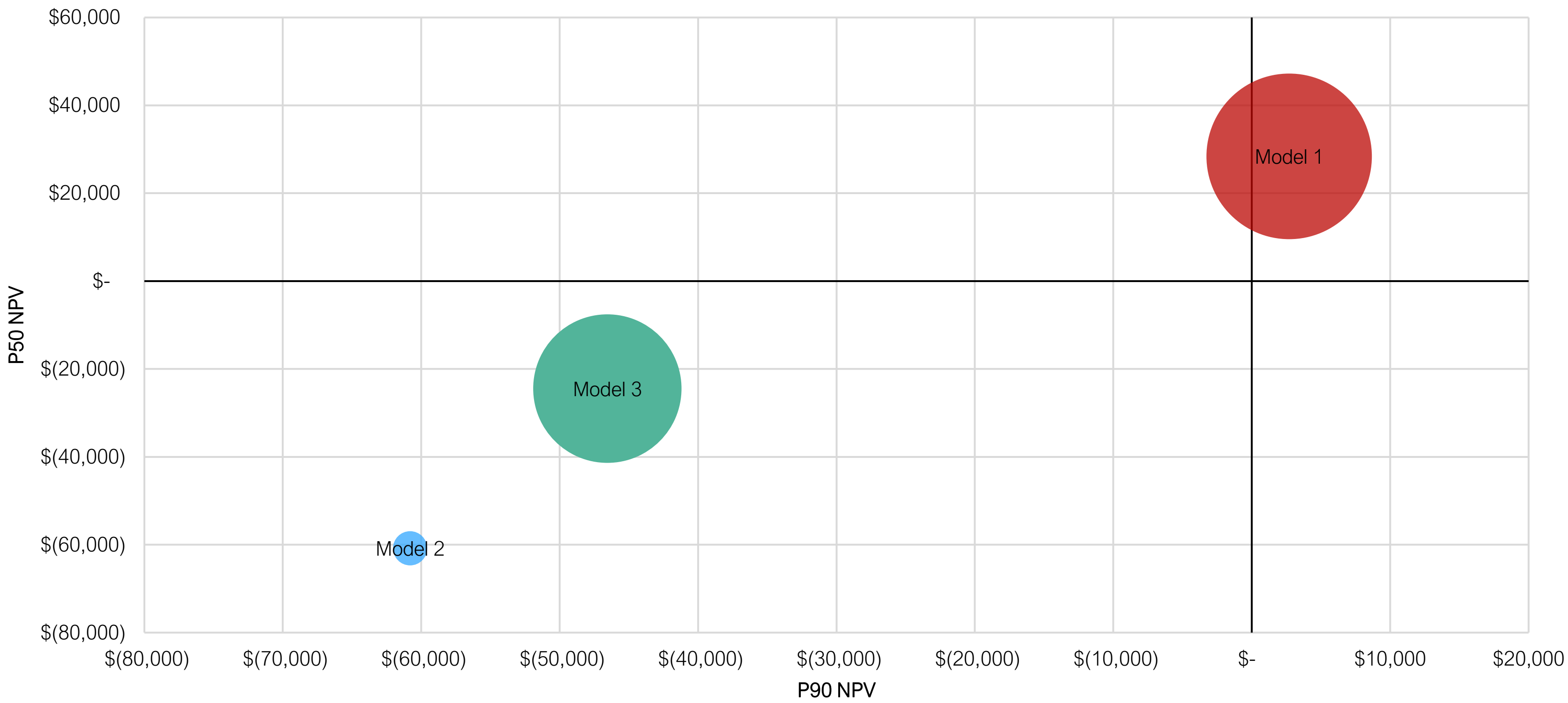

Figure 12: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – MB5

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$671,150	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$171,150	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$17,852	$17,184	$16,585	$16,984	$16,550	$16,096	$16,317	$16,122	$15,892	$16,106	$16,924	$23,163	$24,465	$23,866	$31,322
Spot arbitrage	$10,764	$10,177	$9,585	$9,919	$9,639	$9,230	$9,343	$9,467	$9,155	$9,524	$10,332	$16,579	$17,964	$17,454	$25,036
FCAS	$6,059	$6,101	$6,002	$5,956	$6,002	$6,065	$5,981	$5,972	$6,028	$6,027	$6,095	$6,118	$6,167	$6,185	$6,232
Network revenue	$1,029	$906	$997	$1,109	$908	$802	$993	$683	$709	$555	$497	$466	$334	$227	$54
Net profit (running total)	-$153,298	-$136,114	-$119,529	-$102,544	-$85,994	-$69,898	-$53,581	-$37,460	-$21,567	-$5,461	$11,463	$34,626	$59,091	$82,957	$114,279
Model 2															
Supply & installation	$671,150	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$171,150	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$9,491	$9,258	$11,352	$10,640	$8,680	$8,445	$8,384	$8,527	$8,387	$8,399	$8,486	$12,360	$12,585	$12,436	$12,487
Tolling payments	$9,491	$9,258	$11,352	$10,640	$8,680	$8,445	$8,384	$8,527	$8,387	$8,399	$8,486	$12,360	$12,585	$12,436	$12,487
Net profit (running total)	-$161,659	-$152,401	-$141,049	-$130,409	-$121,730	-$113,285	-$104,901	-$96,374	-$87,987	-$79,588	-$71,102	-$58,742	-$46,157	-$33,721	-$21,234
Model 3															
Supply & installation	$671,150	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$171,150	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$12,463	$12,043	$15,417	$14,291	$11,321	$10,969	$10,866	$11,030	$11,118	$11,219	$11,396	$17,951	$18,309	$18,104	$18,422
FOM revenue	$11,466	$11,048	$14,407	$13,252	$10,268	$9,938	$9,852	$10,075	$10,037	$10,118	$10,343	$16,962	$17,313	$17,094	$17,341
BTM revenue	$997	$996	$1,010	$1,040	$1,053	$1,031	$1,014	$955	$1,081	$1,101	$1,053	$989	$996	$1,010	$1,081
Net profit (running total)	-$158,687	-$146,644	-$131,227	-$116,936	-$105,615	-$94,646	-$83,779	-$72,749	-$61,632	-$50,413	-$39,017	-$21,066	-$2,757	$15,347	$33,769

Table 17: Annual costs and revenue for commercial models – MB5

MB6

NPV distribution

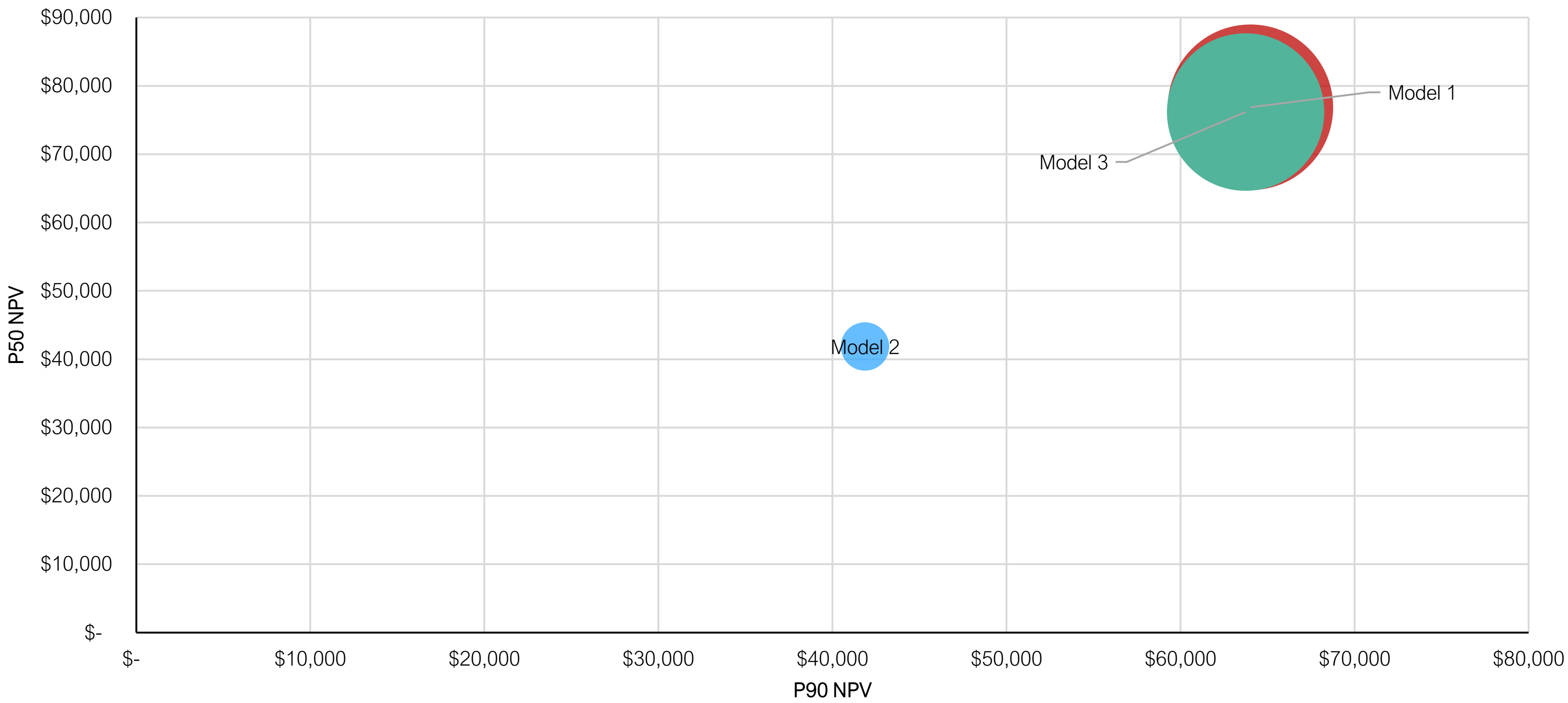

Figure 13: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – MB6

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$381,675	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$381,675	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$7,112	$6,777	$6,478	$6,678	$6,460	$6,234	$6,344	$6,246	$6,132	$6,238	$6,647	$9,767	$10,418	$10,119	$13,847
Spot arbitrage	$5,382	$5,088	$4,793	$4,960	$4,820	$4,615	$4,672	$4,734	$4,578	$4,762	$5,166	$8,290	$8,982	$8,727	$12,518
FCAS	$3,029	$3,050	$3,001	$2,978	$3,001	$3,032	$2,990	$2,986	$3,014	$3,013	$3,047	$3,059	$3,083	$3,092	$3,116
Network revenue	-$1,300	-$1,361	-$1,316	-$1,260	-$1,360	-$1,414	-$1,318	-$1,473	-$1,460	-$1,537	-$1,566	-$1,582	-$1,647	-$1,701	-$1,788
Net profit (running total)	$7,112	$13,889	$20,367	$27,044	$33,505	$39,738	$46,082	$52,329	$58,460	$64,699	$71,346	$81,113	$91,531	$101,649	$115,496
Model 2															
Supply & installation	$381,675	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$381,675	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$3,856	$3,740	$4,787	$4,431	$3,451	$3,333	$3,303	$3,374	$3,304	$3,310	$3,354	$5,291	$5,403	$5,329	$5,354
Tolling payments	$3,856	$3,740	$4,787	$4,431	$3,451	$3,333	$3,303	$3,374	$3,304	$3,310	$3,354	$5,291	$5,403	$5,329	$5,354
Net profit (running total)	$3,856	$7,596	$12,383	$16,814	$20,264	$23,598	$26,900	$30,275	$33,579	$36,890	$40,243	$45,534	$50,938	$56,266	$61,621
Model 3															
Supply & installation	$381,675	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$381,675	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$6,815	$6,581	$8,483	$7,905	$6,231	$5,976	$5,910	$6,035	$6,096	$6,204	$6,273	$9,927	$10,106	$9,994	$10,205
FOM revenue	$6,450	$6,214	$8,104	$7,454	$5,776	$5,590	$5,542	$5,667	$5,646	$5,691	$5,818	$9,541	$9,739	$9,615	$9,755
BTM revenue	$366	$367	$379	$451	$455	$385	$369	$368	$450	$513	$455	$386	$367	$379	$450
Net profit (running total)	$6,815	$13,396	$21,880	$29,784	$36,015	$41,990	$47,901	$53,935	$60,031	$66,235	$72,508	$82,435	$92,541	$102,535	$112,740

Table 18: Annual costs and revenue for commercial models – MB6

MB7

NPV distribution

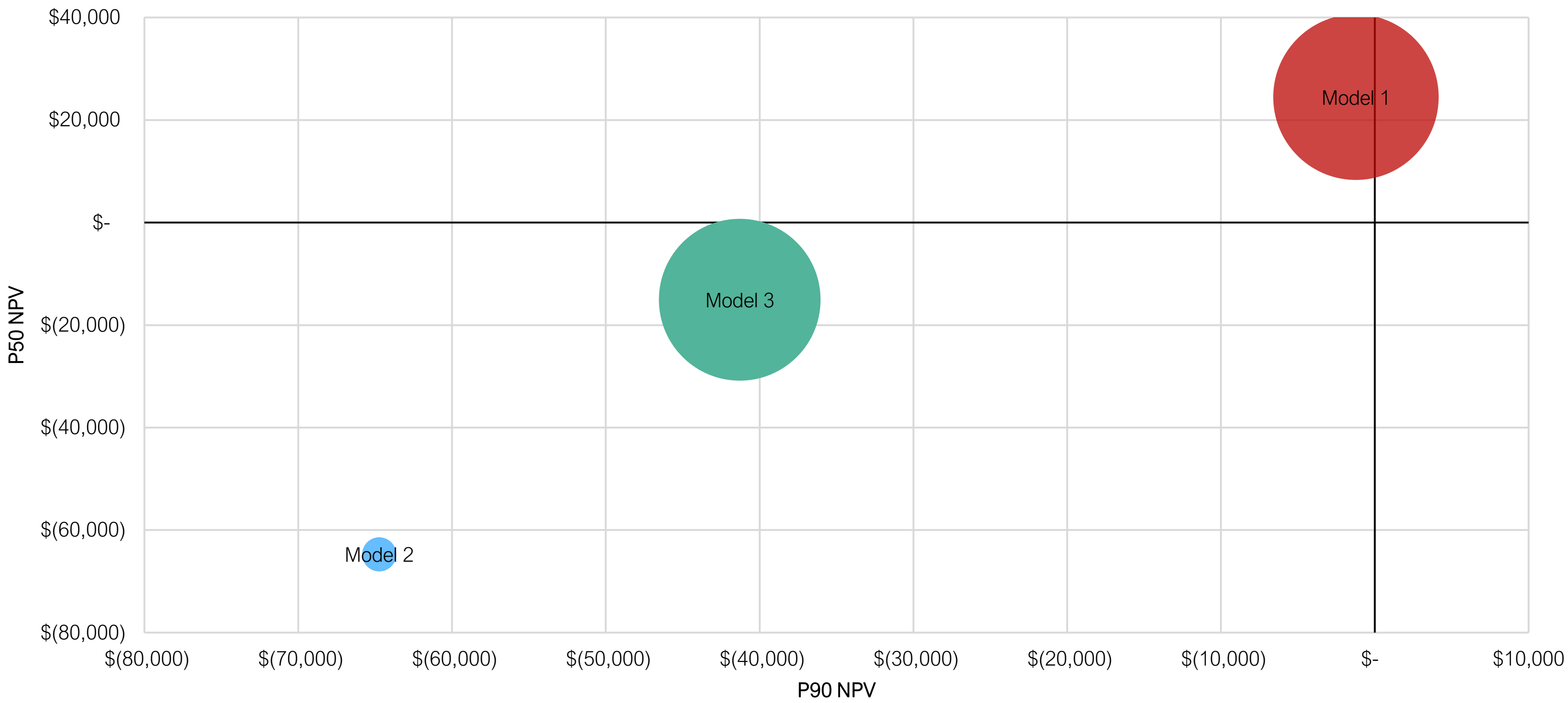

Figure 14: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – MB7

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$675,275	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$175,275	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$17,852	$17,184	$16,585	$16,984	$16,550	$16,096	$16,317	$16,122	$15,892	$16,106	$16,924	$23,163	$24,465	$23,866	$31,322
Spot arbitrage	$10,764	$10,177	$9,585	$9,919	$9,639	$9,230	$9,343	$9,467	$9,155	$9,524	$10,332	$16,579	$17,964	$17,454	$25,036
FCAS	$6,059	$6,101	$6,002	$5,956	$6,002	$6,065	$5,981	$5,972	$6,028	$6,027	$6,095	$6,118	$6,167	$6,185	$6,232
Network revenue	$1,029	$906	$997	$1,109	$908	$802	$993	$683	$709	$555	$497	$466	$334	$227	$54
Net profit (running total)	-$157,423	-$140,239	-$123,654	-$106,669	-$90,119	-$74,023	-$57,706	-$41,585	-$25,692	-$9,586	$7,338	$30,501	$54,966	$78,832	$110,154
Model 2															
Supply & installation	$675,275	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$175,275	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$9,491	$9,258	$11,352	$10,640	$8,680	$8,445	$8,384	$8,527	$8,387	$8,399	$8,486	$12,360	$12,585	$12,436	$12,487
Tolling payments	$9,491	$9,258	$11,352	$10,640	$8,680	$8,445	$8,384	$8,527	$8,387	$8,399	$8,486	$12,360	$12,585	$12,436	$12,487
Net profit (running total)	-$165,784	-$156,526	-$145,174	-$134,534	-$125,855	-$117,410	-$109,026	-$100,499	-$92,112	-$83,713	-$75,227	-$62,867	-$50,282	-$37,846	-$25,359
Model 3															
Supply & installation	$675,275	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$175,275	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$13,604	$13,119	$17,108	$15,736	$12,193	$11,802	$11,699	$11,964	$11,919	$12,016	$12,283	$20,143	$20,559	$20,299	$20,593
FOM revenue	$13,616	$13,119	$17,108	$15,736	$12,193	$11,802	$11,699	$11,964	$11,919	$12,015	$12,282	$20,143	$20,559	$20,299	$20,593
BTM revenue	-$12	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Net profit (running total)	-$161,671	-$148,552	-$131,444	-$115,707	-$103,514	-$91,712	-$80,013	-$68,048	-$56,129	-$44,114	-$31,831	-$11,688	$8,871	$29,170	$49,763

Table 19: Annual costs and revenue for commercial models – MB7

MB8

NPV distribution

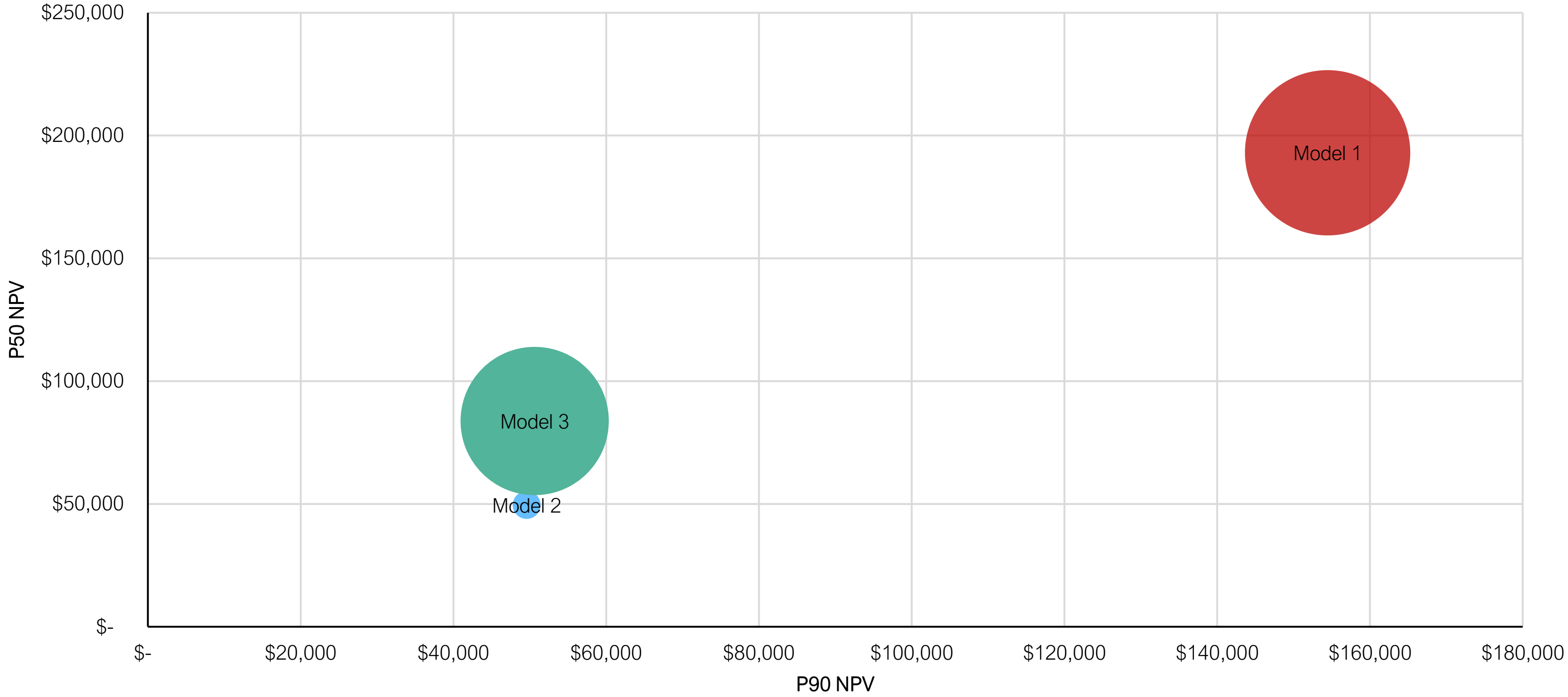

Figure 15: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – MB8

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$918,575	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$800,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$118,575	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$28,593	$27,590	$26,692	$27,291	$26,639	$25,959	$26,290	$25,998	$25,653	$25,973	$27,201	$36,559	$38,512	$37,614	$48,798
Spot arbitrage	$16,147	$15,265	$14,378	$14,879	$14,459	$13,845	$14,015	$14,201	$13,733	$14,287	$15,498	$24,869	$26,946	$26,181	$37,554
FCAS	$9,088	$9,151	$9,004	$8,935	$9,003	$9,097	$8,971	$8,958	$9,042	$9,040	$9,142	$9,177	$9,250	$9,277	$9,349
Network revenue	$3,358	$3,174	$3,311	$3,478	$3,177	$3,017	$3,304	$2,839	$2,878	$2,647	$2,561	$2,514	$2,316	$2,155	$1,895
Net profit (running total)	-$89,982	-$62,392	-$35,700	-$8,408	$18,231	$44,190	$70,480	$96,477	$122,131	$148,104	$175,304	$211,864	$250,375	$287,990	$336,788
Model 2															
Supply & installation	$918,575	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$800,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$118,575	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$15,126	$14,776	$17,917	$16,849	$13,908	$13,557	$13,465	$13,680	$13,470	$13,488	$13,618	$19,429	$19,767	$19,543	$19,619
Tolling payments	$15,126	$14,776	$17,917	$16,849	$13,908	$13,557	$13,465	$13,680	$13,470	$13,488	$13,618	$19,429	$19,767	$19,543	$19,619
Net profit (running total)	-$103,449	-$88,673	-$70,757	-$53,908	-$39,999	-$26,443	-$12,978	$702	$14,172	$27,660	$41,278	$60,707	$80,474	$100,016	$119,636
Model 3															
Supply & installation	$918,575	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$800,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$118,575	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$17,663	$17,040	$22,080	$20,338	$15,880	$15,377	$15,246	$15,582	$15,517	$15,647	$15,993	$25,915	$26,438	$26,110	$26,473
FOM revenue	$17,199	$16,571	$21,610	$19,877	$15,402	$14,907	$14,778	$15,112	$15,055	$15,177	$15,514	$25,443	$25,970	$25,640	$26,012
BTM revenue	$464	$469	$469	$461	$478	$470	$469	$470	$461	$469	$478	$471	$469	$469	$461
Net profit (running total)	-$100,912	-$83,872	-$61,793	-$41,454	-$25,574	-$10,197	$5,049	$20,632	$36,148	$51,795	$67,788	$93,702	$120,140	$146,250	$172,723

Table 20: Annual costs and revenue for commercial models – MB8

MB9

NPV distribution

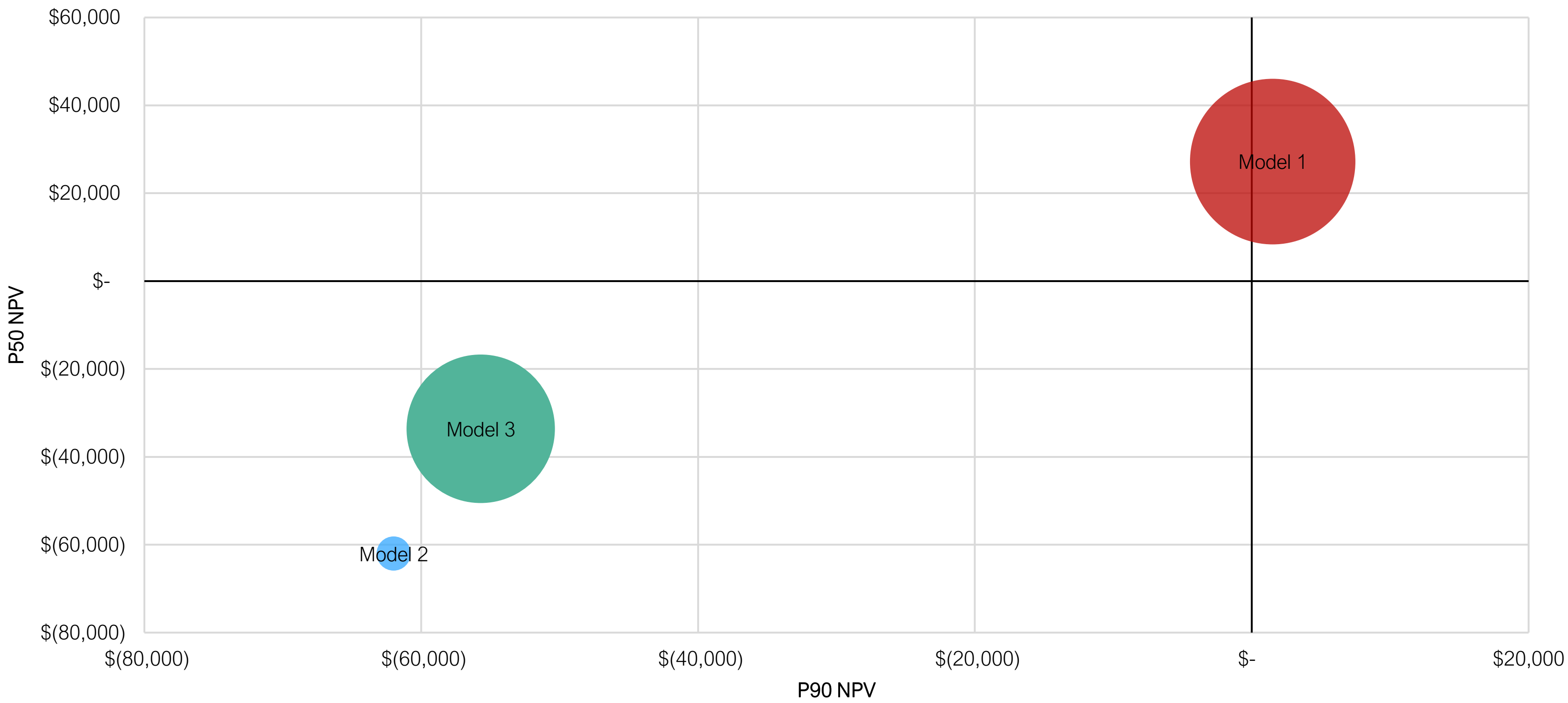

Figure 16: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – MB9

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$672,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$172,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$17,852	$17,184	$16,585	$16,984	$16,550	$16,096	$16,317	$16,122	$15,892	$16,106	$16,924	$23,163	$24,465	$23,866	$31,322
Spot arbitrage	$10,764	$10,177	$9,585	$9,919	$9,639	$9,230	$9,343	$9,467	$9,155	$9,524	$10,332	$16,579	$17,964	$17,454	$25,036
FCAS	$6,059	$6,101	$6,002	$5,956	$6,002	$6,065	$5,981	$5,972	$6,028	$6,027	$6,095	$6,118	$6,167	$6,185	$6,232
Network revenue	$1,029	$906	$997	$1,109	$908	$802	$993	$683	$709	$555	$497	$466	$334	$227	$54
Net profit (running total)	-$154,548	-$137,364	-$120,779	-$103,794	-$87,244	-$71,148	-$54,831	-$38,710	-$22,817	-$6,711	$10,213	$33,376	$57,841	$81,707	$113,029
Model 2															
Supply & installation	$672,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$172,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$9,491	$9,258	$11,352	$10,640	$8,680	$8,445	$8,384	$8,527	$8,387	$8,399	$8,486	$12,360	$12,585	$12,436	$12,487
Tolling payments	$9,491	$9,258	$11,352	$10,640	$8,680	$8,445	$8,384	$8,527	$8,387	$8,399	$8,486	$12,360	$12,585	$12,436	$12,487
Net profit (running total)	-$162,909	-$153,651	-$142,299	-$131,659	-$122,980	-$114,535	-$106,151	-$97,624	-$89,237	-$80,838	-$72,352	-$59,992	-$47,407	-$34,971	-$22,484
Model 3															
Supply & installation	$672,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$172,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$11,712	$11,303	$14,662	$13,513	$10,534	$10,197	$10,106	$10,330	$10,299	$10,388	$10,609	$17,221	$17,569	$17,349	$17,603
FOM revenue	$11,466	$11,048	$14,407	$13,252	$10,268	$9,938	$9,852	$10,075	$10,037	$10,118	$10,343	$16,962	$17,313	$17,094	$17,341
BTM revenue	$246	$256	$255	$262	$266	$259	$254	$256	$262	$270	$266	$258	$256	$255	$262
Net profit (running total)	-$160,688	-$149,385	-$134,723	-$121,210	-$110,675	-$100,479	-$90,372	-$80,042	-$69,743	-$59,355	-$48,746	-$31,525	-$13,956	$3,393	$20,996

Table 21: Annual costs and revenue for commercial models – MB9

MB10

NPV distribution

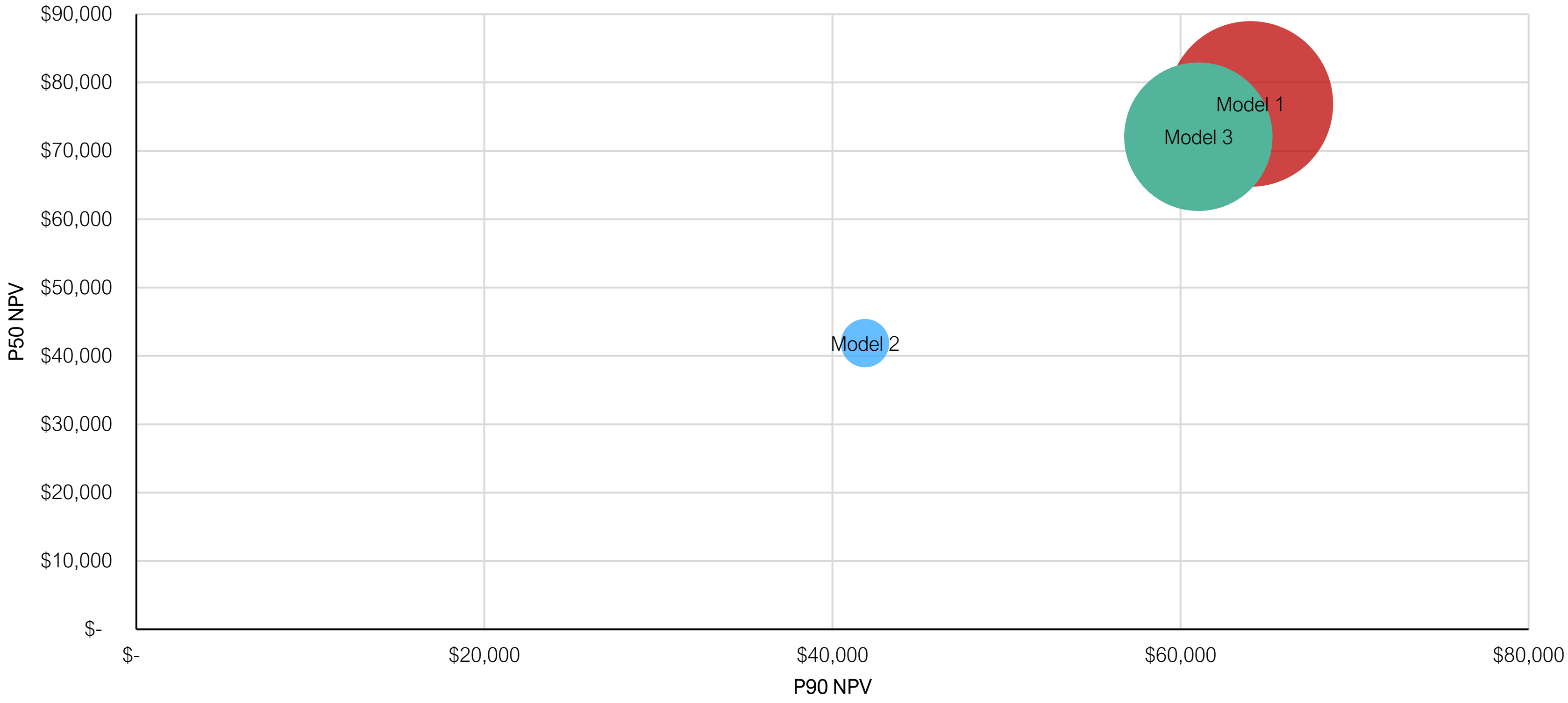

Figure 17: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – MB10

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$381,675	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$381,675	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$7,112	$6,777	$6,478	$6,678	$6,460	$6,234	$6,344	$6,246	$6,132	$6,238	$6,647	$9,767	$10,418	$10,119	$13,847
Spot arbitrage	$5,382	$5,088	$4,793	$4,960	$4,820	$4,615	$4,672	$4,734	$4,578	$4,762	$5,166	$8,290	$8,982	$8,727	$12,518
FCAS	$3,029	$3,050	$3,001	$2,978	$3,001	$3,032	$2,990	$2,986	$3,014	$3,013	$3,047	$3,059	$3,083	$3,092	$3,116
Network revenue	-$1,300	-$1,361	-$1,316	-$1,260	-$1,360	-$1,414	-$1,318	-$1,473	-$1,460	-$1,537	-$1,566	-$1,582	-$1,647	-$1,701	-$1,788
Net profit (running total)	$7,112	$13,889	$20,367	$27,044	$33,505	$39,738	$46,082	$52,329	$58,460	$64,699	$71,346	$81,113	$91,531	$101,649	$115,496
Model 2															
Supply & installation	$381,675	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$381,675	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$3,856	$3,740	$4,787	$4,431	$3,451	$3,333	$3,303	$3,374	$3,304	$3,310	$3,354	$5,291	$5,403	$5,329	$5,354
Tolling payments	$3,856	$3,740	$4,787	$4,431	$3,451	$3,333	$3,303	$3,374	$3,304	$3,310	$3,354	$5,291	$5,403	$5,329	$5,354
Net profit (running total)	$3,856	$7,596	$12,383	$16,814	$20,264	$23,598	$26,900	$30,275	$33,579	$36,890	$40,243	$45,534	$50,938	$56,266	$61,621
Model 3															
Supply & installation	$381,675	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$381,675	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$6,513	$6,305	$7,984	$7,405	$5,922	$5,751	$5,709	$5,822	$5,798	$5,844	$5,959	$9,265	$9,438	$9,327	$9,450
FOM revenue	$5,733	$5,524	$7,203	$6,626	$5,134	$4,969	$4,926	$5,037	$5,018	$5,059	$5,171	$8,481	$8,657	$8,547	$8,671
BTM revenue	$780	$782	$780	$779	$788	$781	$783	$785	$779	$785	$788	$784	$782	$780	$779
Net profit (running total)	$6,513	$12,819	$20,803	$28,208	$34,129	$39,880	$45,589	$51,411	$57,208	$63,052	$69,012	$78,277	$87,715	$97,043	$106,493

Table 22: Annual costs and revenue for commercial models – MB10

MB11

NPV distribution

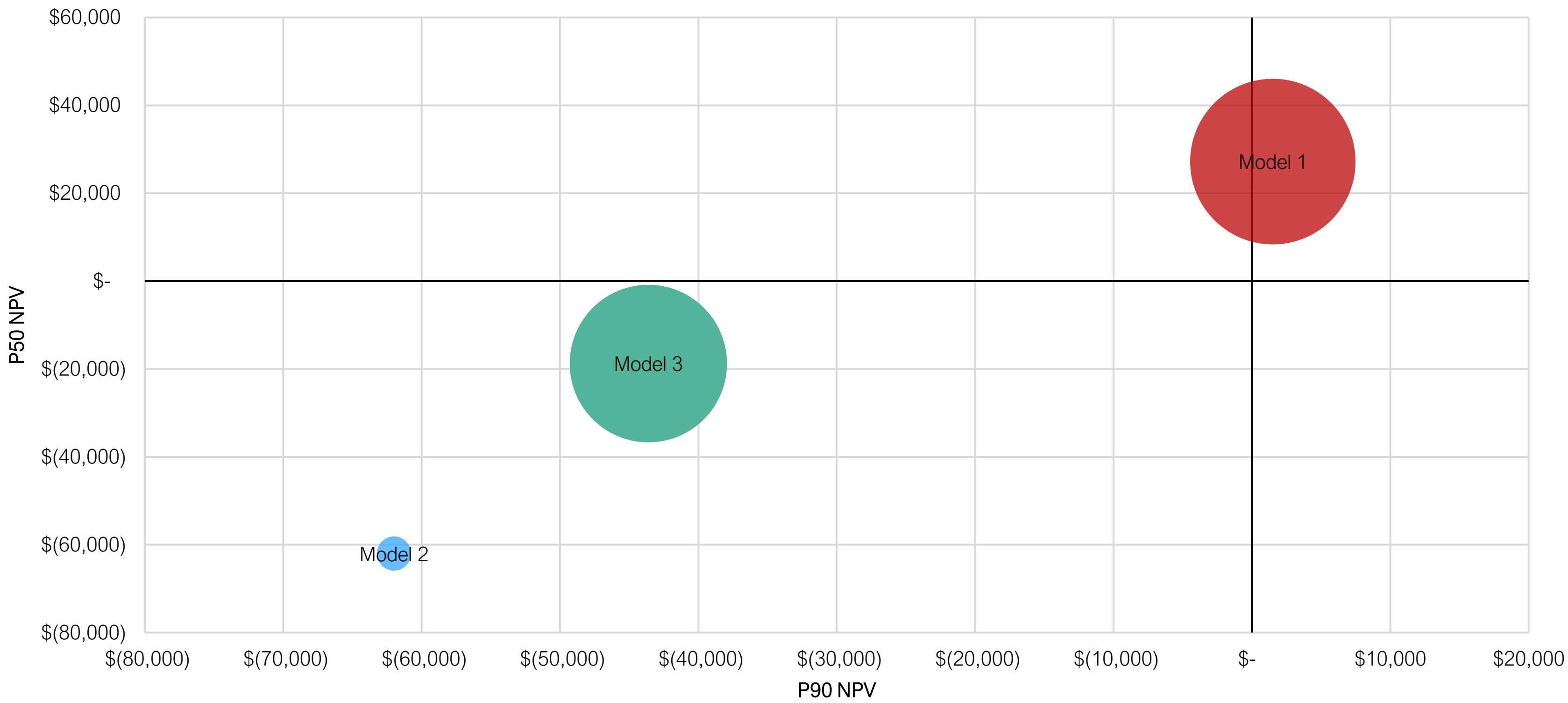

Figure 18: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – MB11

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$672,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$172,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$17,852	$17,184	$16,585	$16,984	$16,550	$16,096	$16,317	$16,122	$15,892	$16,106	$16,924	$23,163	$24,465	$23,866	$31,322
Spot arbitrage	$10,764	$10,177	$9,585	$9,919	$9,639	$9,230	$9,343	$9,467	$9,155	$9,524	$10,332	$16,579	$17,964	$17,454	$25,036
FCAS	$6,059	$6,101	$6,002	$5,956	$6,002	$6,065	$5,981	$5,972	$6,028	$6,027	$6,095	$6,118	$6,167	$6,185	$6,232
Network revenue	$1,029	$906	$997	$1,109	$908	$802	$993	$683	$709	$555	$497	$466	$334	$227	$54
Net profit (running total)	-$154,548	-$137,364	-$120,779	-$103,794	-$87,244	-$71,148	-$54,831	-$38,710	-$22,817	-$6,711	$10,213	$33,376	$57,841	$81,707	$113,029
Model 2															
Supply & installation	$672,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$172,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$9,491	$9,258	$11,352	$10,640	$8,680	$8,445	$8,384	$8,527	$8,387	$8,399	$8,486	$12,360	$12,585	$12,436	$12,487
Tolling payments	$9,491	$9,258	$11,352	$10,640	$8,680	$8,445	$8,384	$8,527	$8,387	$8,399	$8,486	$12,360	$12,585	$12,436	$12,487
Net profit (running total)	-$162,909	-$153,651	-$142,299	-$131,659	-$122,980	-$114,535	-$106,151	-$97,624	-$89,237	-$80,838	-$72,352	-$59,992	-$47,407	-$34,971	-$22,484
Model 3															
Supply & installation	$672,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$172,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$13,039	$12,572	$16,351	$15,062	$11,708	$11,327	$11,228	$11,478	$11,445	$11,547	$11,793	$19,229	$19,620	$19,374	$19,663
FOM revenue	$12,899	$12,428	$16,208	$14,908	$11,551	$11,180	$11,083	$11,334	$11,292	$11,383	$11,636	$19,082	$19,477	$19,230	$19,509
BTM revenue	$140	$143	$143	$154	$157	$146	$144	$143	$154	$165	$157	$147	$143	$143	$154
Net profit (running total)	-$159,361	-$146,789	-$130,438	-$115,377	-$103,668	-$92,341	-$81,114	-$69,636	-$58,191	-$46,644	-$34,851	-$15,622	$3,998	$23,372	$43,035

Table 23: Annual costs and revenue for commercial models – MB11

MB12

NPV distribution

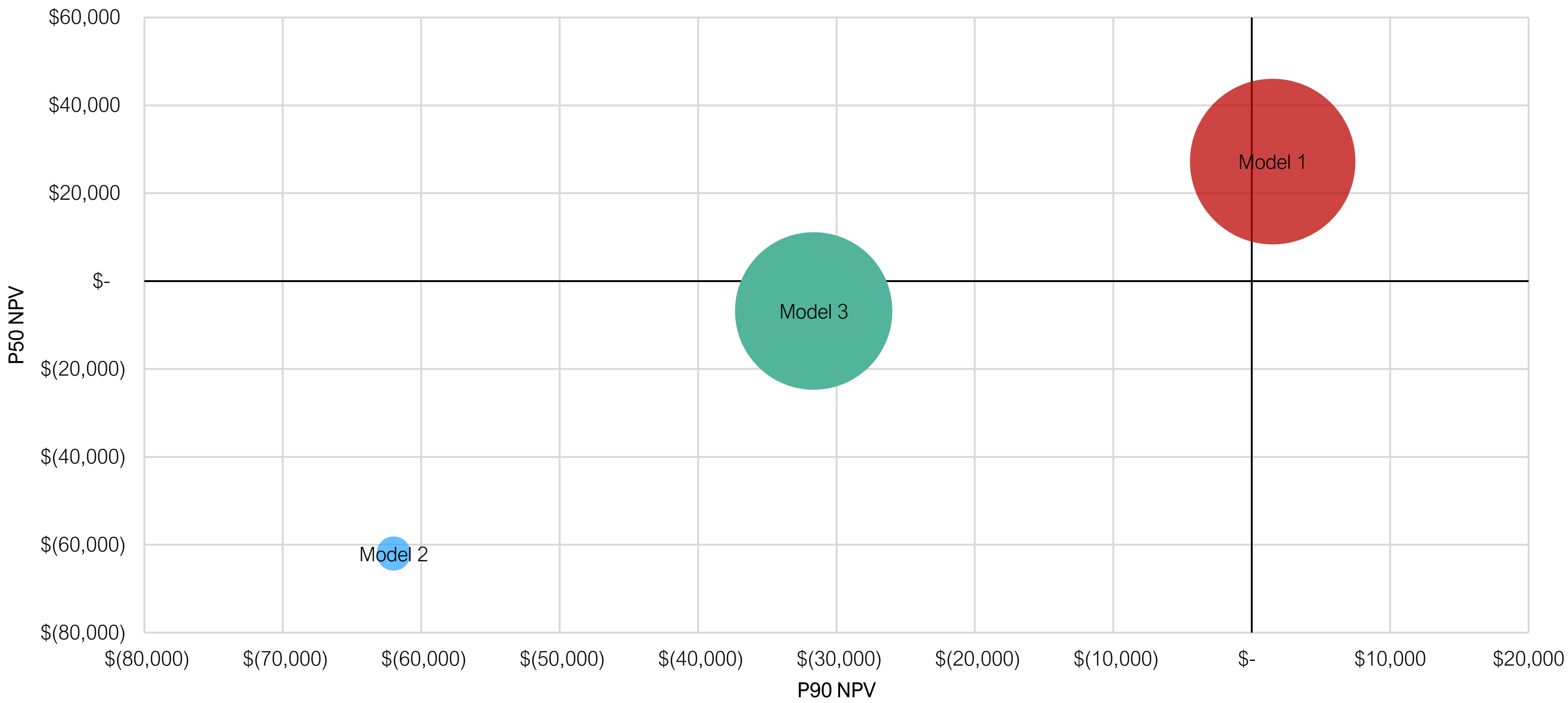

Figure 19: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – MB12

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$672,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$172,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$17,852	$17,184	$16,585	$16,984	$16,550	$16,096	$16,317	$16,122	$15,892	$16,106	$16,924	$23,163	$24,465	$23,866	$31,322
Spot arbitrage	$10,764	$10,177	$9,585	$9,919	$9,639	$9,230	$9,343	$9,467	$9,155	$9,524	$10,332	$16,579	$17,964	$17,454	$25,036
FCAS	$6,059	$6,101	$6,002	$5,956	$6,002	$6,065	$5,981	$5,972	$6,028	$6,027	$6,095	$6,118	$6,167	$6,185	$6,232
Network revenue	$1,029	$906	$997	$1,109	$908	$802	$993	$683	$709	$555	$497	$466	$334	$227	$54
Net profit (running total)	-$154,548	-$137,364	-$120,779	-$103,794	-$87,244	-$71,148	-$54,831	-$38,710	-$22,817	-$6,711	$10,213	$33,376	$57,841	$81,707	$113,029
Model 2															
Supply & installation	$672,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$172,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$9,491	$9,258	$11,352	$10,640	$8,680	$8,445	$8,384	$8,527	$8,387	$8,399	$8,486	$12,360	$12,585	$12,436	$12,487
Tolling payments	$9,491	$9,258	$11,352	$10,640	$8,680	$8,445	$8,384	$8,527	$8,387	$8,399	$8,486	$12,360	$12,585	$12,436	$12,487
Net profit (running total)	-$162,909	-$153,651	-$142,299	-$131,659	-$122,980	-$114,535	-$106,151	-$97,624	-$89,237	-$80,838	-$72,352	-$59,992	-$47,407	-$34,971	-$22,484
Model 3															
Supply & installation	$672,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$172,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$14,270	$13,735	$17,473	$16,182	$12,824	$12,498	$12,456	$12,644	$12,567	$12,668	$12,908	$20,404	$20,783	$20,496	$20,785
FOM revenue	$12,899	$12,428	$16,208	$14,908	$11,551	$11,180	$11,083	$11,334	$11,292	$11,383	$11,636	$19,082	$19,477	$19,230	$19,509
BTM revenue	$1,371	$1,306	$1,266	$1,274	$1,272	$1,318	$1,373	$1,310	$1,276	$1,285	$1,272	$1,321	$1,306	$1,266	$1,276
Net profit (running total)	-$158,130	-$144,396	-$126,922	-$110,741	-$97,917	-$85,418	-$72,962	-$60,318	-$47,751	-$35,083	-$22,175	-$1,771	$19,012	$39,508	$60,293

Table 24: Annual costs and revenue for commercial models – MB12

YC1

NPV distribution

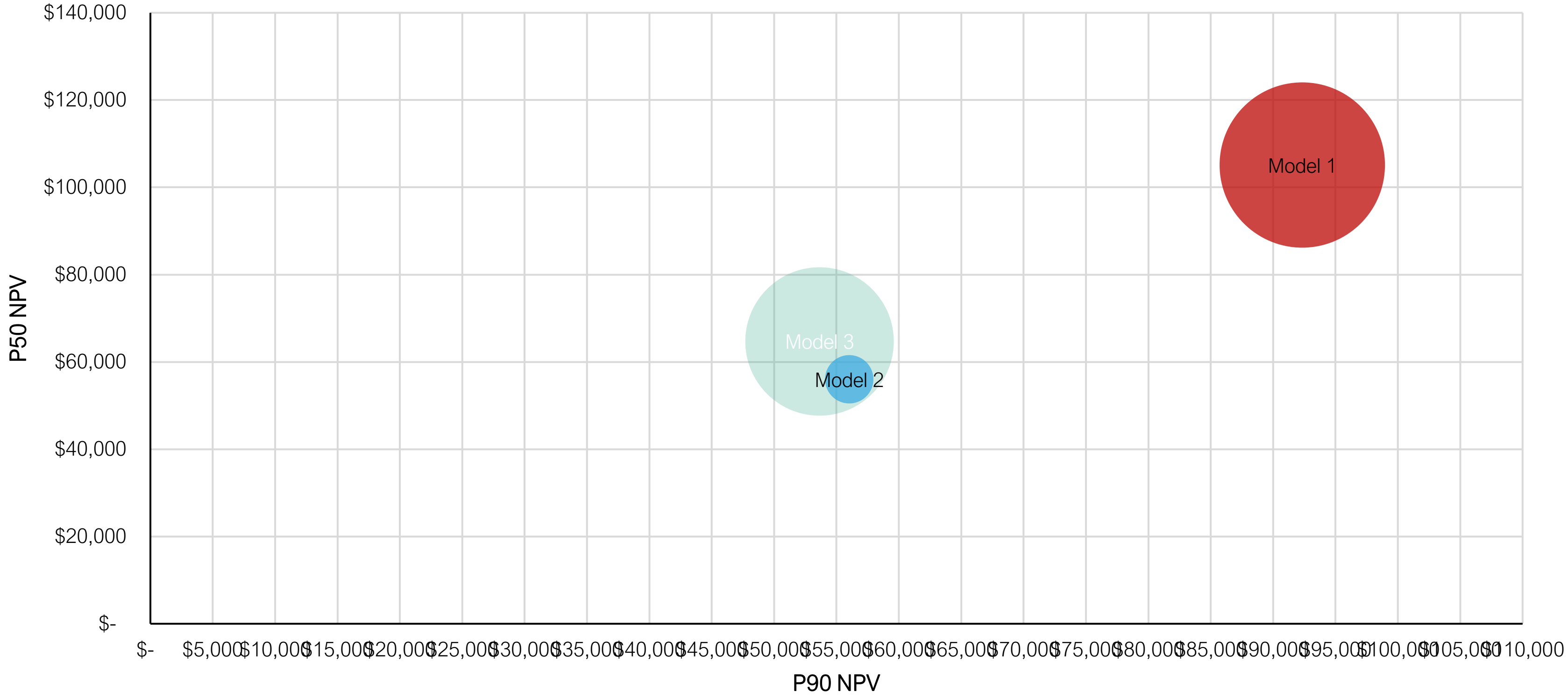

Figure 20: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – YC1

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$371,325	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$371,325	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$9,821	$9,494	$9,168	$9,348	$9,167	$8,947	$9,042	$8,978	$8,851	$8,985	$9,390	$12,511	$13,172	$12,895	$16,645
Spot arbitrage	$5,382	$5,088	$4,793	$4,960	$4,820	$4,615	$4,672	$4,734	$4,578	$4,762	$5,166	$8,290	$8,982	$8,727	$12,518
FCAS	$3,029	$3,050	$3,001	$2,978	$3,001	$3,032	$2,990	$2,986	$3,014	$3,013	$3,047	$3,059	$3,083	$3,092	$3,116
Network revenue	$1,409	$1,355	$1,374	$1,410	$1,346	$1,300	$1,380	$1,259	$1,260	$1,210	$1,177	$1,162	$1,107	$1,075	$1,011
Net profit (running total)	$9,821	$19,314	$28,482	$37,829	$46,996	$55,944	$64,985	$73,963	$82,814	$91,800	$101,190	$113,700	$126,873	$139,767	$156,412
Model 2															
Supply & installation	$371,325	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$371,325	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$5,215	$5,087	$6,123	$5,756	$4,805	$4,692	$4,655	$4,720	$4,667	$4,679	$4,731	$6,695	$6,803	$6,734	$6,781
Tolling payments	$5,215	$5,087	$6,123	$5,756	$4,805	$4,692	$4,655	$4,720	$4,667	$4,679	$4,731	$6,695	$6,803	$6,734	$6,781
Net profit (running total)	$5,215	$10,302	$16,425	$22,181	$26,986	$31,677	$36,332	$41,052	$45,719	$50,398	$55,129	$61,824	$68,627	$75,362	$82,143
Model 3															
Supply & installation	$371,325	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$371,325	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$5,789	$5,598	$7,277	$6,696	$5,213	$5,039	$4,987	$5,111	$5,089	$5,135	$5,251	$8,551	$8,731	$8,621	$8,741
FOM revenue	$5,733	$5,524	$7,203	$6,626	$5,134	$4,969	$4,926	$5,037	$5,018	$5,059	$5,171	$8,481	$8,657	$8,547	$8,671
BTM revenue	$56	$74	$74	$70	$79	$70	$61	$74	$71	$76	$79	$70	$74	$74	$71
Net profit (running total)	$5,789	$11,386	$18,664	$25,359	$30,572	$35,612	$40,599	$45,710	$50,799	$55,934	$61,185	$69,736	$78,467	$87,087	$95,828

Table 25: Annual costs and revenue for commercial models – YC1

YC2

NPV distribution

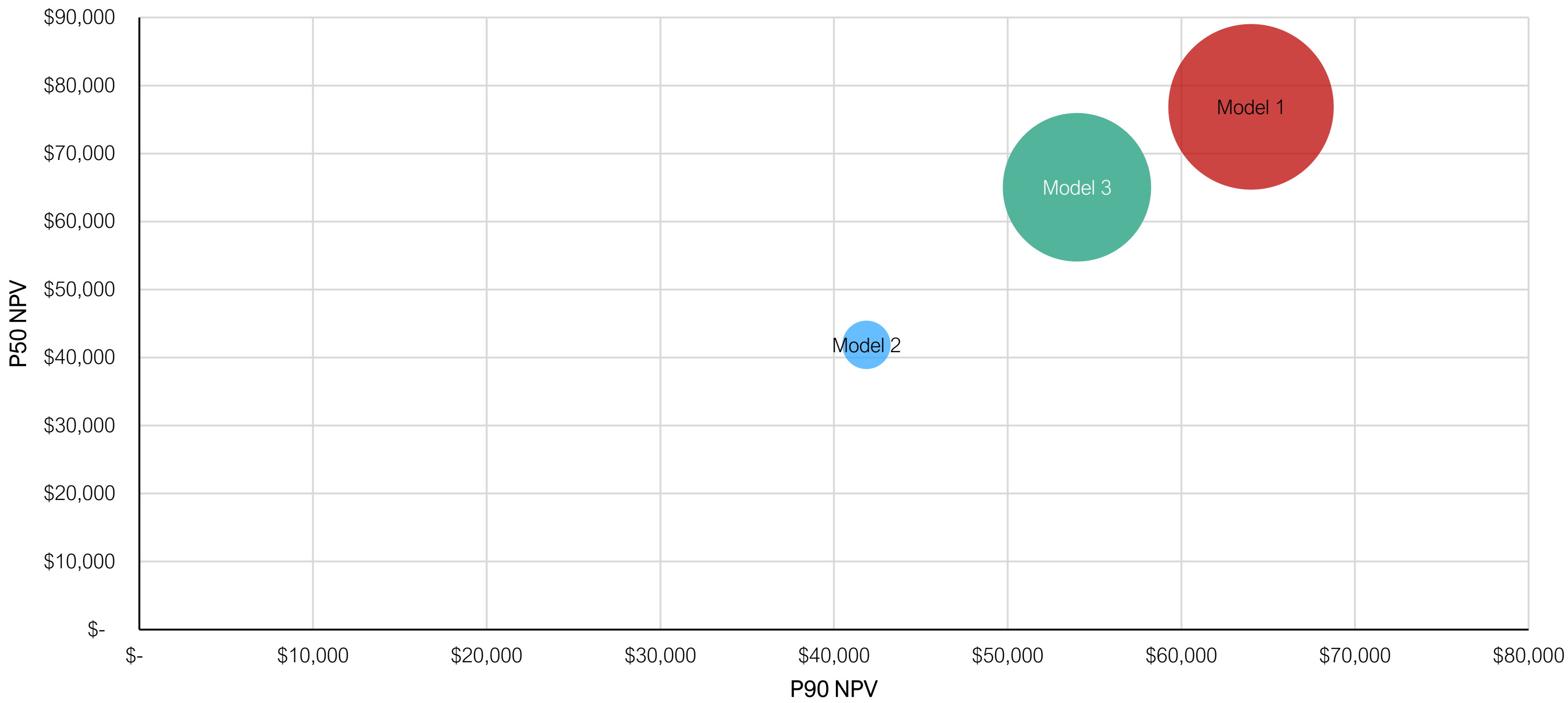

Figure 21: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – YC2

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$378,800	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$378,800	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$7,112	$6,777	$6,478	$6,678	$6,460	$6,234	$6,344	$6,246	$6,132	$6,238	$6,647	$9,767	$10,418	$10,119	$13,847
Spot arbitrage	$5,382	$5,088	$4,793	$4,960	$4,820	$4,615	$4,672	$4,734	$4,578	$4,762	$5,166	$8,290	$8,982	$8,727	$12,518
FCAS	$3,029	$3,050	$3,001	$2,978	$3,001	$3,032	$2,990	$2,986	$3,014	$3,013	$3,047	$3,059	$3,083	$3,092	$3,116
Network revenue	-$1,300	-$1,361	-$1,316	-$1,260	-$1,360	-$1,414	-$1,318	-$1,473	-$1,460	-$1,537	-$1,566	-$1,582	-$1,647	-$1,701	-$1,788
Net profit (running total)	$7,112	$13,889	$20,367	$27,044	$33,505	$39,738	$46,082	$52,329	$58,460	$64,699	$71,346	$81,113	$91,531	$101,649	$115,496
Model 2															
Supply & installation	$378,800	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$378,800	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$3,856	$3,740	$4,787	$4,431	$3,451	$3,333	$3,303	$3,374	$3,304	$3,310	$3,354	$5,291	$5,403	$5,329	$5,354
Tolling payments	$3,856	$3,740	$4,787	$4,431	$3,451	$3,333	$3,303	$3,374	$3,304	$3,310	$3,354	$5,291	$5,403	$5,329	$5,354
Net profit (running total)	$3,856	$7,596	$12,383	$16,814	$20,264	$23,598	$26,900	$30,275	$33,579	$36,890	$40,243	$45,534	$50,938	$56,266	$61,621
Model 3															
Supply & installation	$378,800	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$378,800	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$5,827	$5,622	$7,311	$6,738	$5,245	$5,075	$5,023	$5,136	$5,131	$5,166	$5,282	$8,588	$8,754	$8,655	$8,783
FOM revenue	$5,733	$5,524	$7,203	$6,626	$5,134	$4,969	$4,926	$5,037	$5,018	$5,059	$5,171	$8,481	$8,657	$8,547	$8,671
BTM revenue	$94	$98	$108	$112	$111	$106	$98	$98	$112	$107	$111	$106	$98	$108	$112
Net profit (running total)	$5,827	$11,449	$18,760	$25,498	$30,743	$35,818	$40,842	$45,977	$51,108	$56,275	$61,557	$70,145	$78,899	$87,554	$96,337

Table 26: Annual costs and revenue for commercial models – YC3

YC3

NPV distribution

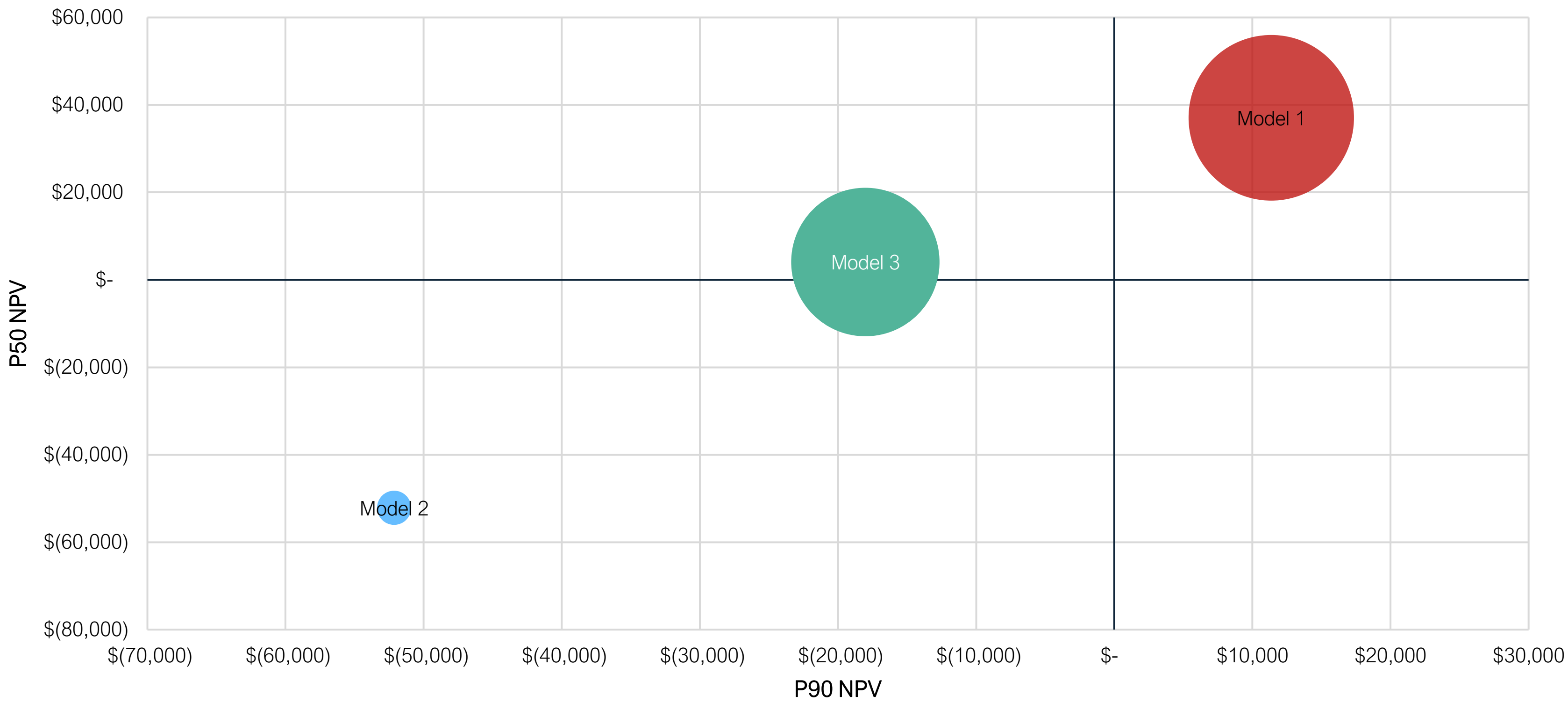

Figure 22: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – YC3

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$662,050	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$162,050	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$17,852	$17,184	$16,585	$16,984	$16,550	$16,096	$16,317	$16,122	$15,892	$16,106	$16,924	$23,163	$24,465	$23,866	$31,322
Spot arbitrage	$10,764	$10,177	$9,585	$9,919	$9,639	$9,230	$9,343	$9,467	$9,155	$9,524	$10,332	$16,579	$17,964	$17,454	$25,036
FCAS	$6,059	$6,101	$6,002	$5,956	$6,002	$6,065	$5,981	$5,972	$6,028	$6,027	$6,095	$6,118	$6,167	$6,185	$6,232
Network revenue	$1,029	$906	$997	$1,109	$908	$802	$993	$683	$709	$555	$497	$466	$334	$227	$54
Net profit (running total)	-$144,198	-$127,014	-$110,429	-$93,444	-$76,894	-$60,798	-$44,481	-$28,360	-$12,467	$3,639	$20,563	$43,726	$68,191	$92,057	$123,379
Model 2															
Supply & installation	$662,050	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$162,050	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$9,491	$9,258	$11,352	$10,640	$8,680	$8,445	$8,384	$8,527	$8,387	$8,399	$8,486	$12,360	$12,585	$12,436	$12,487
Tolling payments	$9,491	$9,258	$11,352	$10,640	$8,680	$8,445	$8,384	$8,527	$8,387	$8,399	$8,486	$12,360	$12,585	$12,436	$12,487
Net profit (running total)	-$152,559	-$143,301	-$131,949	-$121,309	-$112,630	-$104,185	-$95,801	-$87,274	-$78,887	-$70,488	-$62,002	-$49,642	-$37,057	-$24,621	-$12,134
Model 3															
Supply & installation	$662,050	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$162,050	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$14,403	$13,989	$17,348	$16,175	$13,217	$12,879	$12,793	$13,027	$12,960	$13,049	$13,292	$19,915	$20,254	$20,035	$20,264
FOM revenue	$11,466	$11,048	$14,407	$13,252	$10,268	$9,938	$9,852	$10,075	$10,037	$10,118	$10,343	$16,962	$17,313	$17,094	$17,341
BTM revenue	$2,937	$2,941	$2,941	$2,923	$2,949	$2,941	$2,941	$2,952	$2,923	$2,931	$2,949	$2,953	$2,941	$2,941	$2,923
Net profit (running total)	-$147,647	-$133,659	-$116,311	-$100,136	-$86,919	-$74,040	-$61,247	-$48,220	-$35,260	-$22,211	-$8,919	$10,996	$31,250	$51,284	$71,549

Table 27: Annual costs and revenue for commercial models – YC4

YC4

NPV distribution

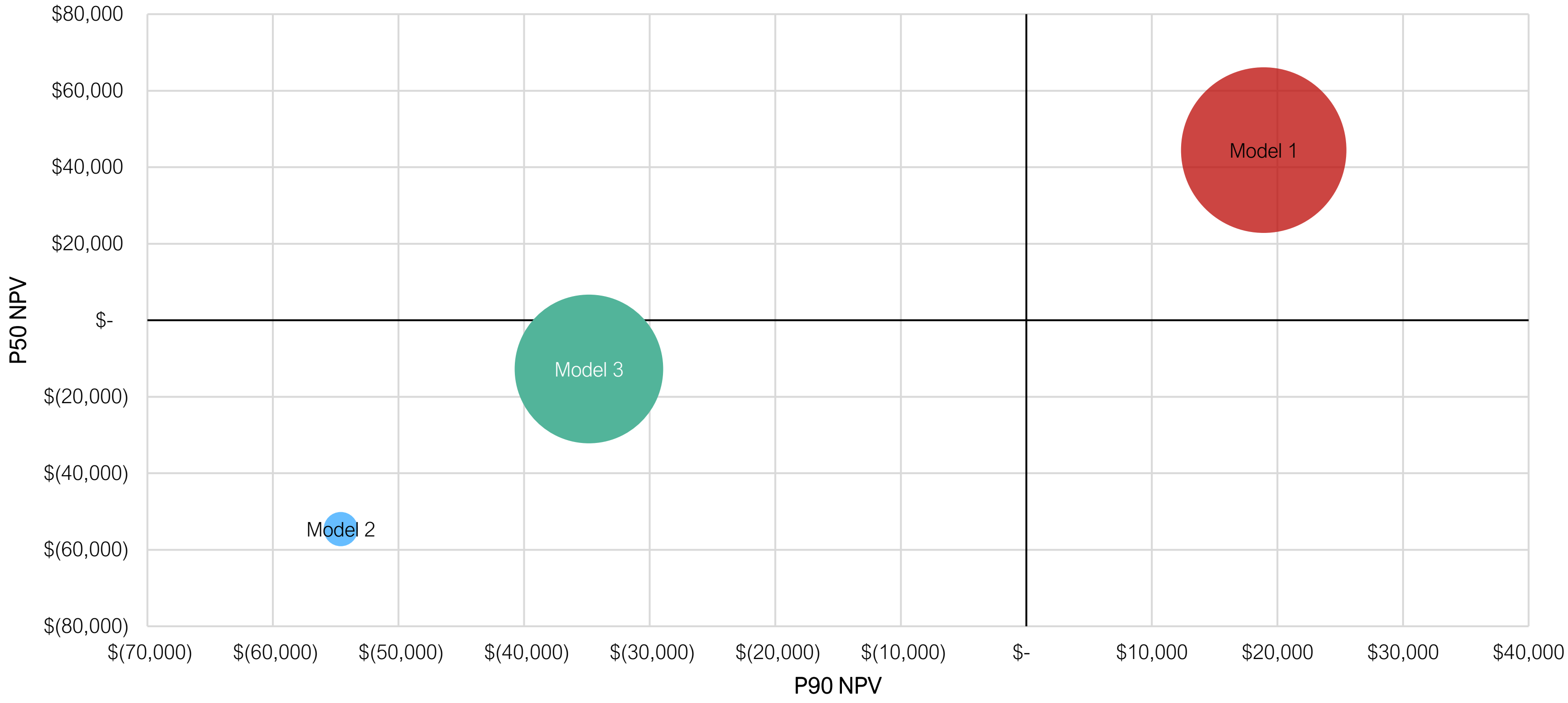

Figure 23: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – YC4

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$675,850	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$175,850	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$19,805	$19,152	$18,499	$18,859	$18,498	$18,059	$18,247	$18,120	$17,867	$18,135	$18,944	$25,186	$26,509	$25,953	$33,454
Spot arbitrage	$10,764	$10,177	$9,585	$9,919	$9,639	$9,230	$9,343	$9,467	$9,155	$9,524	$10,332	$16,579	$17,964	$17,454	$25,036
FCAS	$6,059	$6,101	$6,002	$5,956	$6,002	$6,065	$5,981	$5,972	$6,028	$6,027	$6,095	$6,118	$6,167	$6,185	$6,232
Network revenue	$2,982	$2,875	$2,912	$2,983	$2,856	$2,765	$2,923	$2,681	$2,683	$2,584	$2,518	$2,489	$2,378	$2,314	$2,186
Net profit (running total)	-$156,045	-$136,893	-$118,393	-$99,534	-$81,037	-$62,977	-$44,730	-$26,610	-$8,743	$9,392	$28,336	$53,522	$80,031	$105,984	$139,438
Model 2															
Supply & installation	$675,850	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$175,850	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$10,510	$10,254	$12,327	$11,593	$9,690	$9,464	$9,390	$9,520	$9,414	$9,439	$9,542	$13,470	$13,687	$13,549	$13,642
Tolling payments	$10,510	$10,254	$12,327	$11,593	$9,690	$9,464	$9,390	$9,520	$9,414	$9,439	$9,542	$13,470	$13,687	$13,549	$13,642
Net profit (running total)	-$165,340	-$155,086	-$142,759	-$131,166	-$121,476	-$112,012	-$102,622	-$93,102	-$83,688	-$74,248	-$64,707	-$51,237	-$37,549	-$24,000	-$10,358
Model 3															
Supply & installation	$675,850	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$175,850	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$14,045	$13,633	$16,992	$15,830	$12,859	$12,524	$12,438	$12,668	$12,615	$12,704	$12,934	$19,555	$19,898	$19,678	$19,920
FOM revenue	$11,466	$11,048	$14,407	$13,252	$10,268	$9,938	$9,852	$10,075	$10,037	$10,118	$10,343	$16,962	$17,313	$17,094	$17,341
BTM revenue	$2,579	$2,585	$2,585	$2,578	$2,591	$2,585	$2,586	$2,593	$2,578	$2,586	$2,591	$2,593	$2,585	$2,585	$2,578
Net profit (running total)	-$161,805	-$148,172	-$131,181	-$115,351	-$102,491	-$89,968	-$77,530	-$64,862	-$52,247	-$39,543	-$26,609	-$7,053	$12,845	$32,523	$52,443

Table 28: Annual costs and revenue for commercial models – YC5

YC5

NPV distribution

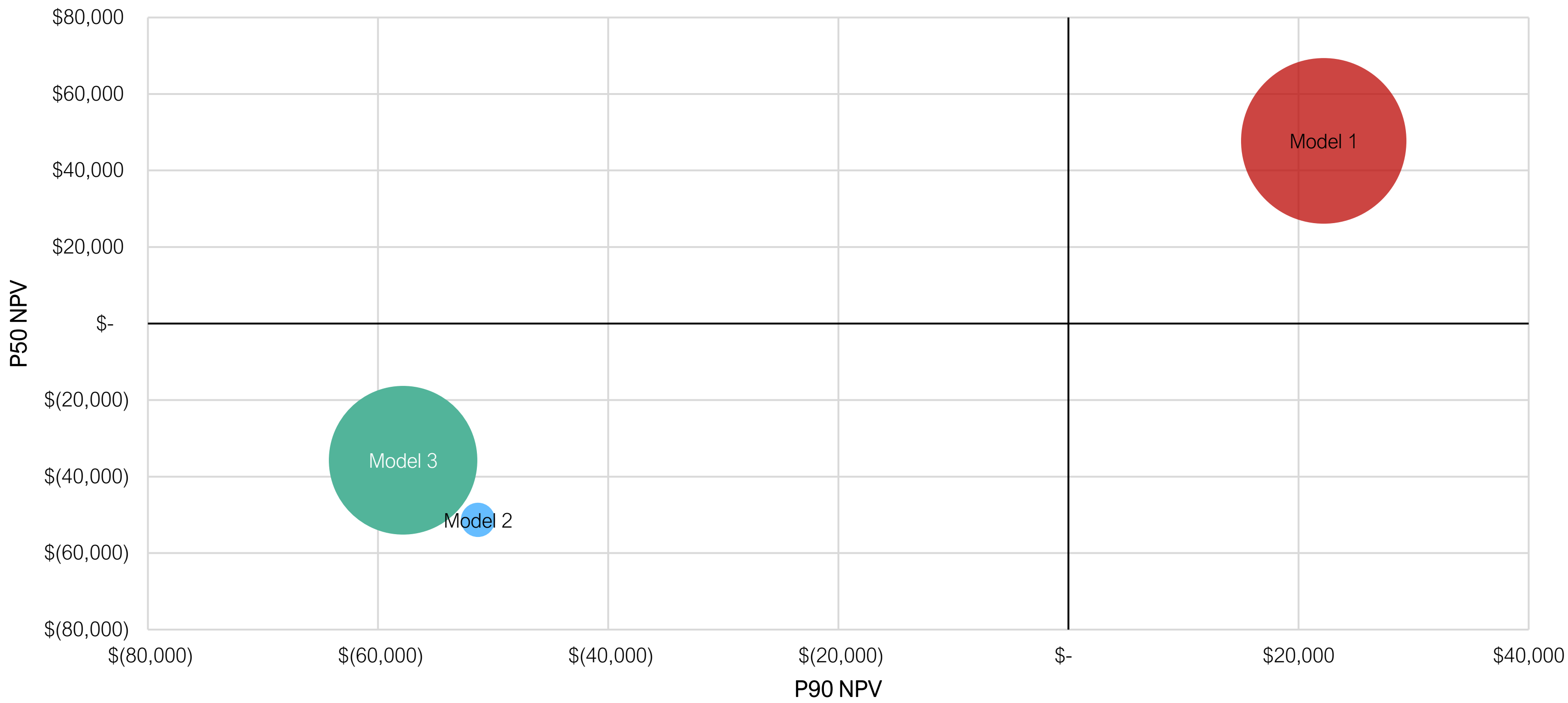

Figure 24: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – YC5

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$672,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$172,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$19,805	$19,152	$18,499	$18,859	$18,498	$18,059	$18,247	$18,120	$17,867	$18,135	$18,944	$25,186	$26,509	$25,953	$33,454
Spot arbitrage	$10,764	$10,177	$9,585	$9,919	$9,639	$9,230	$9,343	$9,467	$9,155	$9,524	$10,332	$16,579	$17,964	$17,454	$25,036
FCAS	$6,059	$6,101	$6,002	$5,956	$6,002	$6,065	$5,981	$5,972	$6,028	$6,027	$6,095	$6,118	$6,167	$6,185	$6,232
Network revenue	$2,982	$2,875	$2,912	$2,983	$2,856	$2,765	$2,923	$2,681	$2,683	$2,584	$2,518	$2,489	$2,378	$2,314	$2,186
Net profit (running total)	-$152,595	-$133,443	-$114,943	-$96,084	-$77,587	-$59,527	-$41,280	-$23,160	-$5,293	$12,842	$31,786	$56,972	$83,481	$109,434	$142,888
Model 2															
Supply & installation	$672,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$172,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$10,510	$10,254	$12,327	$11,593	$9,690	$9,464	$9,390	$9,520	$9,414	$9,439	$9,542	$13,470	$13,687	$13,549	$13,642
Tolling payments	$10,510	$10,254	$12,327	$11,593	$9,690	$9,464	$9,390	$9,520	$9,414	$9,439	$9,542	$13,470	$13,687	$13,549	$13,642
Net profit (running total)	-$161,890	-$151,636	-$139,309	-$127,716	-$118,026	-$108,562	-$99,172	-$89,652	-$80,238	-$70,798	-$61,257	-$47,787	-$34,099	-$20,550	-$6,908
Model 3															
Supply & installation	$672,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$172,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$11,499	$11,105	$14,463	$13,305	$10,330	$9,993	$9,897	$10,132	$10,091	$10,179	$10,405	$17,017	$17,371	$17,150	$17,396
FOM revenue	$11,466	$11,048	$14,407	$13,252	$10,268	$9,938	$9,852	$10,075	$10,037	$10,118	$10,343	$16,962	$17,313	$17,094	$17,341
BTM revenue	$33	$58	$56	$54	$62	$55	$45	$57	$55	$61	$62	$54	$58	$56	$55
Net profit (running total)	-$160,901	-$149,795	-$135,332	-$122,027	-$111,696	-$101,703	-$91,806	-$81,674	-$71,583	-$61,404	-$50,999	-$33,982	-$16,611	$539	$17,935

Table 29: Annual costs and revenue for commercial models – YC6

YC6

NPV distribution

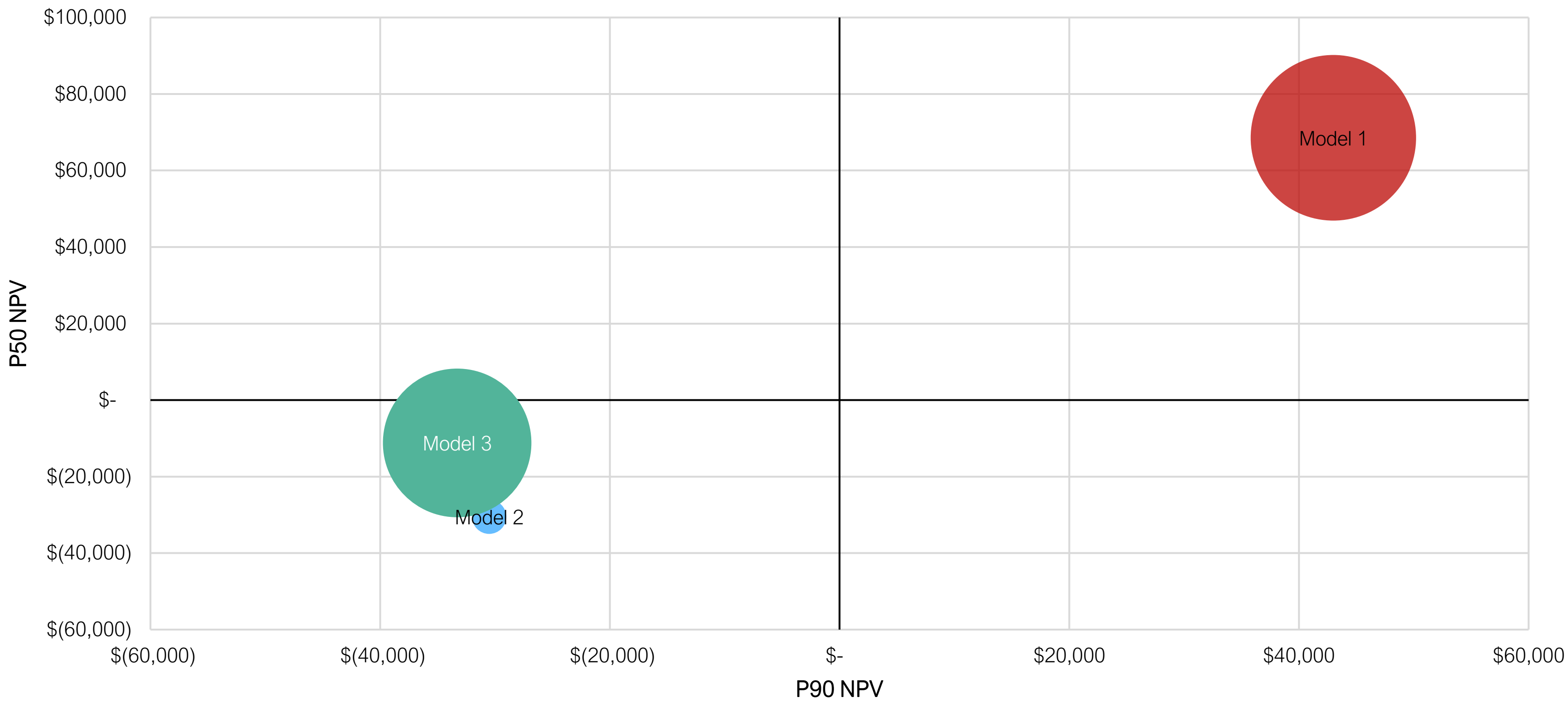

Figure 25: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – YC6

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$650,550	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$150,550	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$19,805	$19,152	$18,499	$18,859	$18,498	$18,059	$18,247	$18,120	$17,867	$18,135	$18,944	$25,186	$26,509	$25,953	$33,454
Spot arbitrage	$10,764	$10,177	$9,585	$9,919	$9,639	$9,230	$9,343	$9,467	$9,155	$9,524	$10,332	$16,579	$17,964	$17,454	$25,036
FCAS	$6,059	$6,101	$6,002	$5,956	$6,002	$6,065	$5,981	$5,972	$6,028	$6,027	$6,095	$6,118	$6,167	$6,185	$6,232
Network revenue	$2,982	$2,875	$2,912	$2,983	$2,856	$2,765	$2,923	$2,681	$2,683	$2,584	$2,518	$2,489	$2,378	$2,314	$2,186
Net profit (running total)	-$130,745	-$111,593	-$93,093	-$74,234	-$55,737	-$37,677	-$19,430	-$1,310	$16,557	$34,692	$53,636	$78,822	$105,331	$131,284	$164,738
Model 2															
Supply & installation	$650,550	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$150,550	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$10,510	$10,254	$12,327	$11,593	$9,690	$9,464	$9,390	$9,520	$9,414	$9,439	$9,542	$13,470	$13,687	$13,549	$13,642
Tolling payments	$10,510	$10,254	$12,327	$11,593	$9,690	$9,464	$9,390	$9,520	$9,414	$9,439	$9,542	$13,470	$13,687	$13,549	$13,642
Net profit (running total)	-$140,040	-$129,786	-$117,459	-$105,866	-$96,176	-$86,712	-$77,322	-$67,802	-$58,388	-$48,948	-$39,407	-$25,937	-$12,249	$1,300	$14,942
Model 3															
Supply & installation	$650,550	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$150,550	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$11,877	$11,463	$14,822	$13,656	$10,684	$10,352	$10,267	$10,492	$10,441	$10,524	$10,759	$17,378	$17,729	$17,509	$17,746
FOM revenue	$11,466	$11,048	$14,407	$13,252	$10,268	$9,938	$9,852	$10,075	$10,037	$10,118	$10,343	$16,962	$17,313	$17,094	$17,341
BTM revenue	$411	$416	$415	$404	$416	$414	$415	$417	$404	$406	$416	$415	$416	$415	$404
Net profit (running total)	-$138,673	-$127,210	-$112,388	-$98,732	-$88,048	-$77,696	-$67,429	-$56,937	-$46,496	-$35,972	-$25,213	-$7,836	$9,893	$27,402	$45,148

Table 30: Annual costs and revenue for commercial models – YC6

YC7

NPV distribution

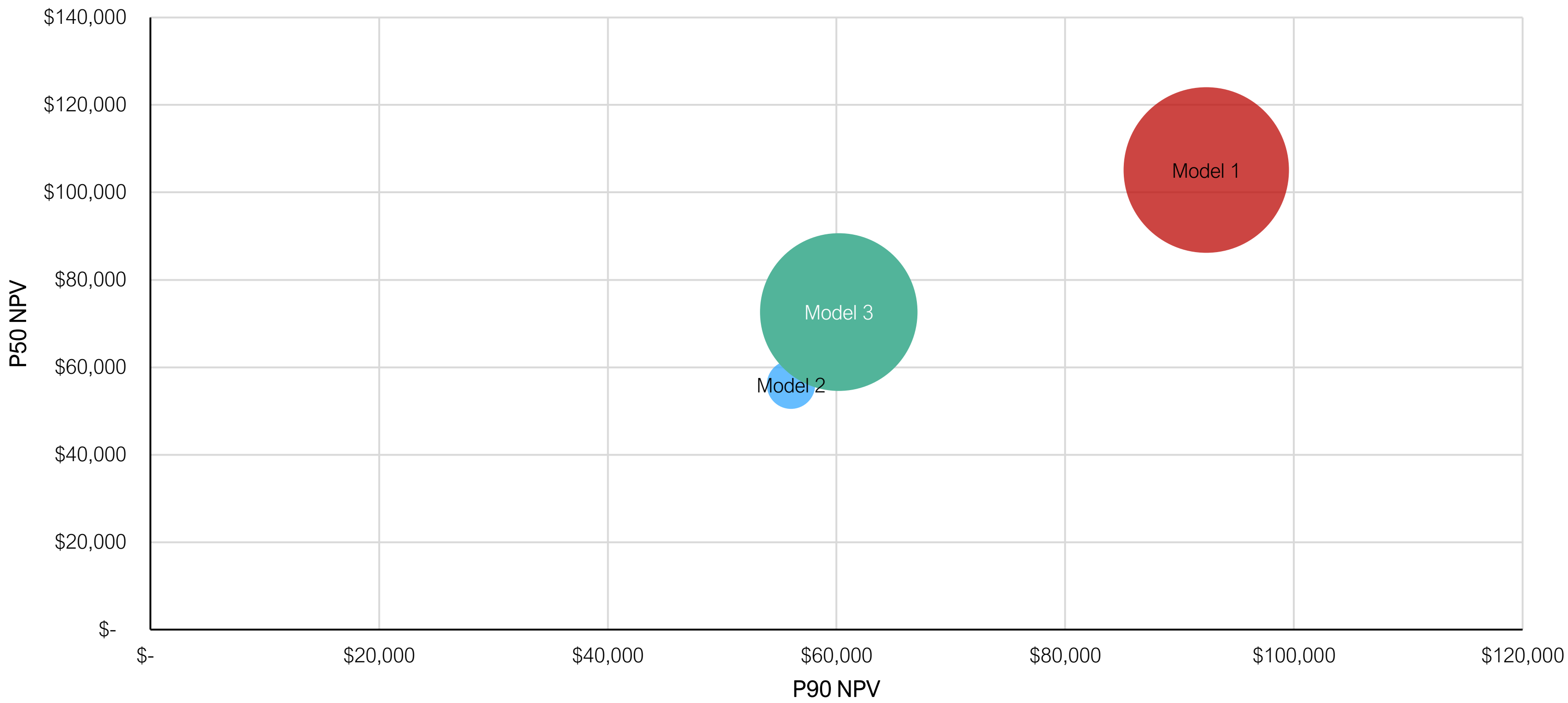

Figure 26: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – YC7

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$378,800	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$378,800	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$9,821	$9,494	$9,168	$9,348	$9,167	$8,947	$9,042	$8,978	$8,851	$8,985	$9,390	$12,511	$13,172	$12,895	$16,645
Spot arbitrage	$5,382	$5,088	$4,793	$4,960	$4,820	$4,615	$4,672	$4,734	$4,578	$4,762	$5,166	$8,290	$8,982	$8,727	$12,518
FCAS	$3,029	$3,050	$3,001	$2,978	$3,001	$3,032	$2,990	$2,986	$3,014	$3,013	$3,047	$3,059	$3,083	$3,092	$3,116
Network revenue	$1,409	$1,355	$1,374	$1,410	$1,346	$1,300	$1,380	$1,259	$1,260	$1,210	$1,177	$1,162	$1,107	$1,075	$1,011
Net profit (running total)	$9,821	$19,314	$28,482	$37,829	$46,996	$55,944	$64,985	$73,963	$82,814	$91,800	$101,190	$113,700	$126,873	$139,767	$156,412
Model 2															
Supply & installation	$378,800	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$378,800	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$5,215	$5,087	$6,123	$5,756	$4,805	$4,692	$4,655	$4,720	$4,667	$4,679	$4,731	$6,695	$6,803	$6,734	$6,781
Tolling payments	$5,215	$5,087	$6,123	$5,756	$4,805	$4,692	$4,655	$4,720	$4,667	$4,679	$4,731	$6,695	$6,803	$6,734	$6,781
Net profit (running total)	$5,215	$10,302	$16,425	$22,181	$26,986	$31,677	$36,332	$41,052	$45,719	$50,398	$55,129	$61,824	$68,627	$75,362	$82,143
Model 3															
Supply & installation	$378,800	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$378,800	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$6,513	$6,278	$8,169	$7,521	$5,844	$5,656	$5,606	$5,731	$5,713	$5,759	$5,886	$9,607	$9,802	$9,681	$9,822
FOM revenue	$6,450	$6,214	$8,104	$7,454	$5,776	$5,590	$5,542	$5,667	$5,646	$5,691	$5,818	$9,541	$9,739	$9,615	$9,755
BTM revenue	$63	$64	$65	$67	$68	$66	$65	$64	$67	$67	$68	$66	$64	$65	$67
Net profit (running total)	$6,513	$12,791	$20,960	$28,481	$34,325	$39,981	$45,587	$51,318	$57,031	$62,790	$68,676	$78,284	$88,086	$97,766	$107,588

Table 31: Annual costs and revenue for commercial models – YC7

YC8

NPV distribution

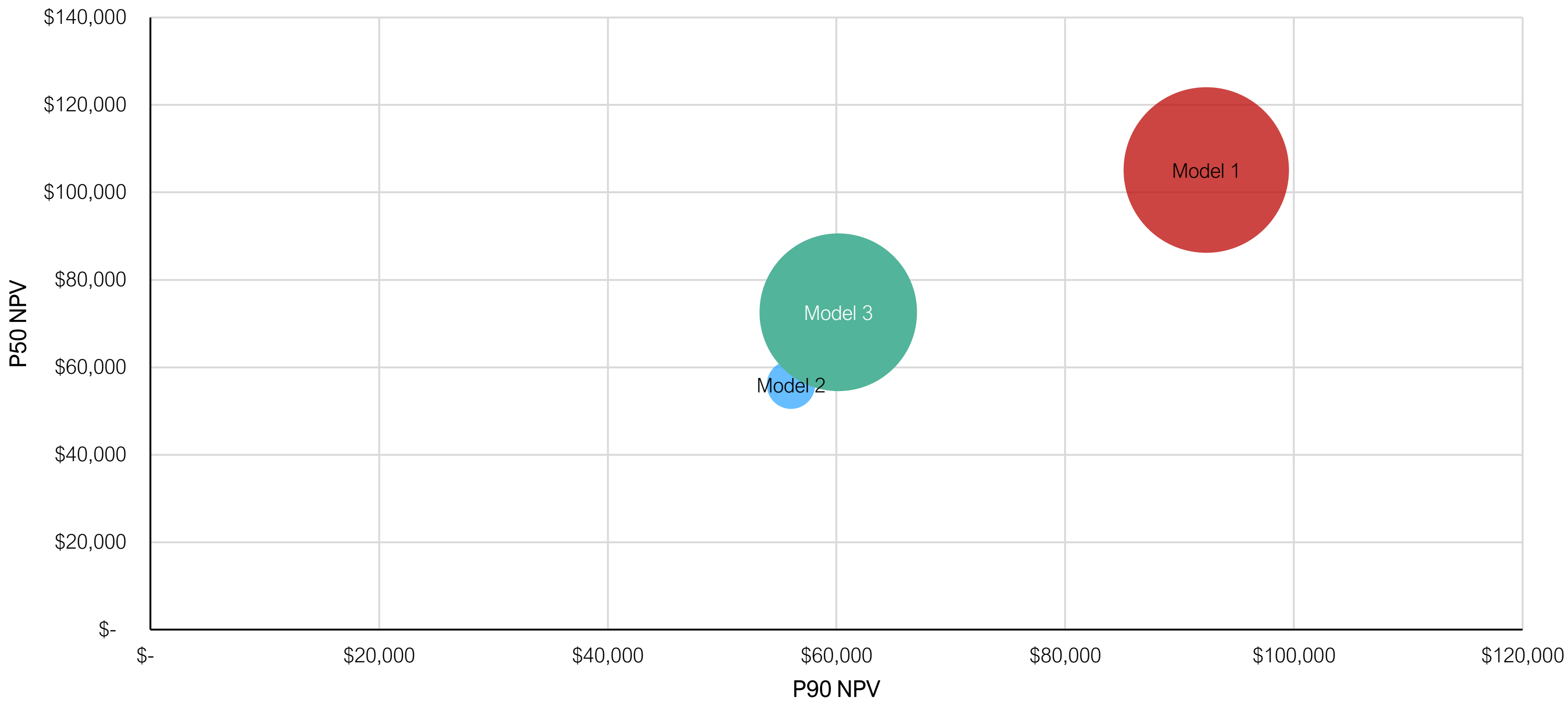

Figure 27: P50, P90 and standard deviation (bubble size) of NPV outcomes for commercial models – YC8

Annual revenues and costs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Model 1															
Supply & installation	$371,325	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$371,325	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$9,821	$9,494	$9,168	$9,348	$9,167	$8,947	$9,042	$8,978	$8,851	$8,985	$9,390	$12,511	$13,172	$12,895	$16,645
Spot arbitrage	$5,382	$5,088	$4,793	$4,960	$4,820	$4,615	$4,672	$4,734	$4,578	$4,762	$5,166	$8,290	$8,982	$8,727	$12,518
FCAS	$3,029	$3,050	$3,001	$2,978	$3,001	$3,032	$2,990	$2,986	$3,014	$3,013	$3,047	$3,059	$3,083	$3,092	$3,116
Network revenue	$1,409	$1,355	$1,374	$1,410	$1,346	$1,300	$1,380	$1,259	$1,260	$1,210	$1,177	$1,162	$1,107	$1,075	$1,011
Net profit (running total)	$9,821	$19,314	$28,482	$37,829	$46,996	$55,944	$64,985	$73,963	$82,814	$91,800	$101,190	$113,700	$126,873	$139,767	$156,412
Model 2															
Supply & installation	$371,325	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$371,325	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$5,215	$5,087	$6,123	$5,756	$4,805	$4,692	$4,655	$4,720	$4,667	$4,679	$4,731	$6,695	$6,803	$6,734	$6,781
Tolling payments	$5,215	$5,087	$6,123	$5,756	$4,805	$4,692	$4,655	$4,720	$4,667	$4,679	$4,731	$6,695	$6,803	$6,734	$6,781
Net profit (running total)	$5,215	$10,302	$16,425	$22,181	$26,986	$31,677	$36,332	$41,052	$45,719	$50,398	$55,129	$61,824	$68,627	$75,362	$82,143
Model 3															
Supply & installation	$371,325	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant funding	$371,325	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue	$6,507	$6,273	$8,162	$7,518	$5,843	$5,652	$5,601	$5,726	$5,709	$5,760	$5,885	$9,603	$9,797	$9,673	$9,818
FOM revenue	$6,450	$6,214	$8,104	$7,454	$5,776	$5,590	$5,542	$5,667	$5,646	$5,691	$5,818	$9,541	$9,739	$9,615	$9,755
BTM revenue	$58	$58	$58	$64	$67	$61	$60	$59	$64	$69	$67	$62	$58	$58	$64
Net profit (running total)	$6,507	$12,780	$20,942	$28,460	$34,302	$39,954	$45,555	$51,281	$56,990	$62,751	$68,635	$78,238	$88,035	$97,708	$107,527

Table 32: Annual costs and revenue for commercial models – YC8

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Description	Prepared by	Reviewed by	Approved by	Approval date
V1	Zac Cahill	Andrew Pintar Mark Asbjerg	Andrew Pintar	5th July 2024
V2 draft for Council's consideration	Zac Cahill Mark Asbjerg	Andrew Pintar	Andrew Pintar	15th July 2024

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