Financial transmission rights Market review

Decision paper

6 June 2023

ELECTRICITY AUTHORITY
TE MANA HIKO

Foreword

The FTR market is likely to have a critical part to play in the renewables-based transition. It is important that the market design is framed in a way that provides market participants with the ability to adequately hedge locational price risk, which is expected to increase through the transition. In addition, to ensure the efficient use of funds, the market design should be for the long-term benefit of consumers.

This paper updates the findings from the previous review of the FTR market in 2019. The actions by the Authority from this latest review will further enhance the efficiency of the market and its desired outcomes. The Authority will need to be deliberate in setting the priorities in the coming years, as actions taken now will have profound impacts on the future direction of the electricity sector, and its ability to respond to market changes from the renewables transition.

This paper closes off one aspect of this work; and leaves the door open for the continued review of another. Both of these are in respect to the Authority's review of the financial transmission rights (FTR) market.

There are some operational issues the Authority is proposing to address in the short term, including:

- improved information transparency (a nodal price map and a yield/price curve)
- working with the FTR manager on enhancing governance, support for market participants, and review of revenue adequacy and capacity settings
- trading conduct rules for the market.

Further work is required on the remaining issue on market funding and design. Analysis indicates there is an issue in whether the current market design is allocating funds efficiently, and whether this use of LCE and auction revenue is causing a loss to consumers. There are further lines of enquiry with respect to market funding and design options for the FTR market that have been identified and can be followed.

In addition to other priorities across its entire policy function, the Authority will also consider the upcoming final recommendations from the Market Development Advisory Group on '*Price discovery in a renewables-based electricity system*', before committing to a further review of the design of the FTR market.

I wish to thank market participants and submitters who have contributed to the Authority's review of the FTR market, and for your continued engagement as the Authority seeks the optimal outcome for consumers during this period of transition.

Sarah Gillies
Chief Executive, Electricity Authority

Executive Summary

The Electricity Authority (Authority) has concluded one stage of a review into the market for financial transmission rights (FTRs)[1]. This paper outlines our findings from this work.

Findings and next steps

The Authority has decided to conclude its current stage of this review of the FTR market, noting that:

(a) The Authority's findings indicate that the FTRs are fairly valued *at time of auction* and the FTR market is assisting market participants to manage their locational price risk. The fair-value finding does not indicate or conclusively answer that current market settings provide the most efficient use of LCE to the net benefit of consumers.

(b) The current use of loss and constraint excess (LCE) and auction revenue to fund the market, and whether this is its most efficient use, is less certain. Further analysis of the market settings is required to address this issue. A review of the appropriateness of the funding and market design settings will be undertaken in a future review of the market. The timing of this future review needs to be considered within the framework of the Authority's wider work programme for the transition to a renewables-based electricity system.

(c) The Authority will take the following actions stemming from the FTR review to-date:

  (i) assess options to increase the market conduct rules that regulate the FTR market

  (ii) continue to engage with EMS (FTR Manager) on governance issues, further ways to support and inform market participants, and the operational settings for revenue adequacy and capacity settings in the market

  (iii) publish a nodal price map and yield curves for the FTR market

  (iv) continue to monitor price outcomes between the FTR and ASX markets to assist in a future review of market settings and design.

Analysis of issues

In undertaking this review, the Authority focused on how the FTR market can be improved, in line with our main statutory objective to "…promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers."

The Authority's review focussed on 11 issues that related to: whether FTRs were meeting their original policy intent and represented a good return on investment for the diversion of LCE to support the market, competition issues, participation, and additional issues around the way in which the market is operating.

Following stakeholder consultation in May 2022, the Authority narrowed the 11 areas to four issues:

(a) whether FTRs are priced at 'fair-value'

(b) the sources of funding for FTR settlement, and in particular the transfer of a portion of LCE away from consumers[2]

(c) additionality/co-benefits from the current market design

(d) market regulation, governance issues, and information provision.

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1 FTRs are financial contracts that help parties to manage the risk of wholesale electricity prices being different between two points on the grid ('locational price risk' or LPR).

2 SRAM: https://www.ea.govt.nz/development/work-programme/pricing-cost-allocation/settlement-residual-allocation-methodology-sram/.

Fair-value

The Authority and some market participants were concerned that FTR holders, at the aggregate level, were consistently making a risk-free 'profit' from FTRs. That is, FTRs appeared to be available to purchase at below their 'fair value'. If this is the case, it could suggest barriers to entry, subsidy, or some other market failure.

The Authority commissioned quantitative analysis from Concept Consulting to help determine whether FTRs are trading at fair-value *at time of auction*. Concept did this by comparing Benmore to Otahuhu (BEN_OTA) obligation FTRs to the equivalent BEN_OTA ASX[3] exchange traded baseload electricity futures differential. This is an important comparison because the equivalent financial product can be replicated in both markets. The analysis showed reasonable alignment between the BEN_OTA obligation FTRs and the equivalent BEN_OTA ASX exchange traded baseload electricity futures differential.

In addition, BEN_OTA obligation FTRs were compared against alternative FTR pathways using cleared prices and shadow prices for a selection of component paths between BEN_OTA. The analysis showed reasonable alignment between the BEN_OTA obligation FTRs and component paths between BEN_OTA.

The results for the FTR time periods analysed indicate the two markets are reasonably aligned and there is no clear evidence that FTRs are systematically mispriced or that the FTR market is operating inefficiently.[4] The fair-value finding does not indicate however whether the current market settings provide the most efficient use of LCE to the net benefit of consumers. Further analysis of funding and market design options will be necessary to determine this.

The Authority will repeat this fair-value analysis in future periodic reviews, particularly as the market experiences further price cycles, and with the increase in price volatility expected as the wholesale market transitions to a renewables-based system.[5]

Market funding and design

The current funding design sees LCE and auction revenue from the FTR market available to settle FTR contracts. This provides a high level of firmness and confidence in revenue adequacy in the market, which is beneficial during the transition stage in the early period of a market's development. The increased confidence from firmer pricing is likely to have assisted in increasing participation and increasing market liquidity.

This initial firmness in funding to encourage market growth has the potential to become an increasing cost to consumers as the market matures, through the transfer of LCE from transmission customers to FTR market participants.[6] Funding the market by LCE alone, removing auction revenue, while decreasing firmness/market resilience, may increase pricing efficiency by reducing the transfer of LCE from transmission customers.

This review suggests a more efficient funding design may be to use LCE to fund the market, with LCE (the FTR rental) going to the holders of FTRs, while the auction revenue from market participants bidding for FTRs would be returned to transmission customers through the Settlement Residual Allocation Methodology (SRAM).[7] This requires further analysis and consultation in a future review before considering any change to the current funding and design of the market.

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3 Australian Securities Exchange

4 This alignment in market outcomes is to be expected given participants are trading in both markets to manage their LPR.

5 Noting that this encompasses the aspirational target of 100% renewables by 2030.

6 The average monthly LCE cost of the FTR market is $5.2 million per month for calendar years 2018-22.

7 The latest work on the Settlement Residual Allocation Methodology (SRAM) suggests that making LCE available to transmission customers (as settlement residual rebates) will have efficiency benefits for consumers. https://www.ea.govt.nz/development/work-programme/pricing-cost-allocation/settlement-residual-allocation-methodology-sram/

In the transition to a renewables-based system, the increasing share of intermittent generation will lead to increased price volatility and increasing locational price risk (LPR) for market participants. If current funding and design settings are maintained, it is likely that an increasing share of LCE may be required to fund the market, to the detriment of consumers.

An international comparison of how other jurisdictions fund their FTR markets shows that New Zealand's market is an outlier relative to other nodal FTR markets in the Ernst & Young (EY) review. There are examples of alternative funding and design options in the PJM[8], CAISO[9], and ERCOT[10] in the US that addresses the LCE allocation issue, where auction revenue is not used to fund the market. Further analysis is required to assess the benefits of these funding options, which is beyond the scope of this current review.

The issue of financial intermediaries' participation in the market was raised by some submitters, and whether this is to the benefit of consumers. The Authority's view is that financial intermediaries are an essential part of the market. Financial intermediaries bring increased benefits to consumers through enhanced price discovery, innovation, increased liquidity, and increased competition through a reduction in barriers to entry and greater options for market participants to trade.

The issue of revenue adequacy and scaling of the FTR market also requires further review. The Authority will work with the FTR Manager on whether the current revenue adequacy and capacity settings are leading to efficient outcomes in the market to the benefit of consumers.

Additionality/co-benefits of market design

FTRs were originally designed to address participants' LPR. Analysis of the market settings suggests that using LCE and auction revenue to fund the market is a relatively resource intensive approach. This has implications for whether this is the best use of these resources or whether they could be more efficiently used elsewhere. Feedback from a number of submitters and discussions with market participants noted however that the current market settings have created other unintended benefits:

- facilitates additional liquidity in the exchange traded futures
- facilitates additional liquidity in the secondary markets such as the over-the-counter market; provides a tool for market makers to manage risk and reduce cost to provide market making services
- contributes to information flow and price discovery in the hedge markets
- hedging against peak price risk
- provides an energy hedge.

These co-benefits potentially provide positive impacts for market participants to the long-term benefit of consumers. Further analysis would be required to quantify these benefits, which is outside of the scope of the current review. Any change to the current market funding and settings has the potential to impact these co-benefits depending on the change in market structure. Any future review of market funding and design will need to take these factors into account.

Regulation, governance, information provision

A number of potential issues were identified around governance, regulation, and information provision, that if addressed are likely to improve efficiency and transparency in the FTR market, potentially lower barriers for entry, and enhance competition.

Regulation of trading conduct/prohibition of insider trading:

Although most submitters did not see this as a pressing issue, the Authority is concerned that a regulatory gap exists that has the potential to be exploited. The trading conduct rule the Authority uses to actively monitor and address trading conduct is not designed for insider trading.

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8 Pennsylvania-New Jersey Interconnection.
9 California Independent System Operator.
10 Electric Reliability Council of Texas.

Misconduct issues in the FTR market are otherwise only broadly covered by various pieces of New Zealand legislation. The Authority noted in the Issues paper its concern that regulatory oversight of the FTR market could be improved. The Authority has decided to investigate this issue in greater depth and intends to release an issues paper for consultation in mid-2023.

Governance:

Issues of concern around governance in the FTR market were raised by some submitters. One of the key concerns that was raised was the impact that the non-physical participants by weight of numbers have on voting on issues managed by EMS (the FTR manager). The Authority will consider further operational improvement to the FTR market following the conclusion of this review and will continue to engage with the FTR manager on any governance issues that have been raised.

Information provision:

An initial concern at the start of the current review was that there appeared to be lower than expected participation in the market, and that this may be evidence of possible barriers to entry. A theme from consultation was that the complexity of the market was seen as a barrier to entry by some market participants. To this end the Authority will increase transparency in the market by publishing a nodal price map and forward price curves of pathways in the FTR market. The Authority will work with the FTR manager as part of its regular contract management discussions to consider what further measures may be taken to facilitate continued access to the market.

Contents

1. Purpose

1.1. The purpose of this paper is to provide industry and stakeholders with the findings, recommended actions, and decisions from the FTR market review of 2022.

1.2. The review has resulted in two stages, with all but one of the key findings being covered within the first stage of the review, and with further analysis and consultation required in a possible second stage.

2. Background

2.1. The Authority established an FTR market in 2013. FTRs were designed to assist wholesale electricity market participants to manage LPR.[11] This in turn was expected to benefit consumers by enabling greater competition in wholesale and retail markets.

2.2. The Authority completed its first post-implementation review of the FTR market in 2019. The 2019 review found that "…the introduction of the FTR market has been a success. Evidence suggests that FTRs contribute to spot price risk management, increase the efficiency of other risk markets, have contributed to retail competition, and have been used in innovative ways that were not anticipated when FTRs were introduced."

2.3. Periodic reviews of the FTR market policy settings, including its funding arrangements via LCE, are necessary to ensure that the market promotes competition in the electricity industry for the long-term benefit of consumers, in accordance with the Authority's main statutory objective. This is particularly important as risks change, and new risks will arise during the transition to 100% renewable generation. The functioning of the FTR market will also have to take the practical implications of the transition into account, such as fixed-volume FTRs not being as appropriate in effectively hedging variable wind generation.

This current review (2022-2023) has had the following stages

2.4. The May 2022 Financial Transmission Rights Market Observations: Issues Paper.[12] This raised 11 observations about the market, seeking stakeholder feedback on issues. These issues ranged from the market's impact on retail and wholesale competition, impact on participants' investment decisions, fair-pricing, use of LCE/market funding design, regulation, barriers to entry, and participation.

2.5. From May 2022 to July 2022, the Authority received submissions from 17 stakeholders, including generator-retailers, independent retailers, financial intermediaries, and other third-party entities.

2.6. This Decision paper, detailing our findings from the May 2022 consultation process with stakeholders, represents the end of this first stage of the current review.

This review process is aligned with two broader pieces of work

2.7. The Authority's wider Hedge Market Enhancements project has an objective to ensure market participants can access appropriate tools to undertake effective risk management. This review fits with this through providing mechanisms for participants to better manage their LPR, enhancing competition in the wholesale and retail markets, to the long-term benefit of consumers.

2.8. The Authority's Energy Transition Roadmap[13] is also designed to aid in delivering fit for purpose risk markets. The aim is to enable firms greater ability to adapt to the transition to a renewables based system, increasing electricity market efficiency, to the long-term benefit of consumers The current review seeks to address this by considering how and to what extent the FTR market facilitates new generation investment, whether the FTR market is

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11 Locational price risk (LPR) is defined in paragraphs 2.1 and 2.2.

12 https://www.ea.govt.nz/documents/1513/FTR_market_observations_Ensuring_arrangements_are_fit-for-purpose_-_issues_paper.pdf

13 Transition to Low Emissions Energy System — Electricity Authority (ea.govt.nz)

addressing LPR efficiently, and by considering how the risks that participants manage via the FTR market may evolve over time.

How FTRs work

2.9. FTRs were designed to manage LPR. Locational price differences arise from the nodal nature of New Zealand's electricity market and its transmission system. The transmission system used to transport electricity over long distances is subject to:

- losses (energy losses increase as distance increases; scale is predictable)
- constraints/congestion (where a shortage in the transmission capacity to supply the demand leads to more expensive sources of generation being used to supply electricity demanded; constraints are difficult to predict relative to losses)
- risk of failure of critical elements (generation or demand reduction must be on standby to cover an event, referred to as 'instantaneous reserves').

2.10. These factors can result in large and sometimes unpredictable price differences across the electricity grid that result in LPR. LPR affects generators and purchasers, and without an adequate management tool it can lead to lower levels of competition in wholesale and retail electricity markets.

2.11. Participants in the FTR market can be physical or non-physical entities. Physical participants generate or consume electricity and are looking to hedge operational risks associated with their business. Non-physical participants are financial intermediaries that undertake trading in electricity products. Physical participants may also engage in trading of electricity products beyond managing any operational risks.

2.12. FTR payments are funded from the revenue generated from the auction of FTRs (ie, money paid by market participants purchasing FTRs) and allocated LCE (also known as FTR rentals) is used to cover the shortfall. The order of payment is immaterial.

2.13. LCE is the surplus collected from the wholesale electricity spot market once payment is collected from buyers, and generators are paid for their supply of generation. LCE exists because there are price differences between grid nodes from transmission losses and grid constraints.

2.14. Any LCE funds not required to fund FTRs are provided to the grid operator who allocates[14] the funds to transmission customers.[15] If FTR auction revenue and the LCE are not adequate to fund the FTR payments, the FTR payments are scaled to the level of FTR auction revenue and LCE available.[16]

2.15. The decision to use a combination of auction revenue and LCE was justified on the basis it would increase revenue adequacy,[17] underpinning confidence in the market, and ensuring that FTRs are a reliable tool for managing LPR.[18] The extent to which auction revenue can offset loss of LCE to transmission customers depends on how fairly priced FTRs are at auction (ie, if FTRs are consistently under-priced then there will be a wealth transfer from transmission customers to FTR holders irrespective of the use of auction revenue to fund

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14 For more details on the allocation of LCE to transmission customers please refer to the Settlement Residual Allocation Methodology (SRAM) consultation - Consultation — Electricity Authority (ea.govt.nz)

15 Transmission customers are typically generators, distributors and large industrial companies that are directly connected to the grid. These customers pay transmission charges to Transpower, the grid owner for use of the electricity transmission grid. LCE funds from the electricity transmission grid are ultimately borne as a cost to transmission customers.

16 The FTR market is designed so that, on average, one in every 12 months would experience revenue inadequacy. In the eight years since the FTR market started there have only been two months when there was FTR "revenue inadequacy" leading to the scaling of FTR payments.

17 Revenue adequacy is when the FTR settlement amount (funding for FTRs) is sufficient to settle all FTR Hedge Values in full for a particular FTR period.

18 Paragraph 3.4.137, Electricity Authority, *Consultation Paper: Managing locational price risk: Proposed amendments to Code.* Available here: Consultation Paper (ea.govt.nz). In the classical Hogan FTR design, only LCE is used to fund FTR payouts and all the auction revenue goes to the parties who previously received LCE [maybe need to check exactly how this worked – this should be covered in the circa 2011 consultation papers].

FTR payouts). A trade-off with this decision is that auction revenue may not fully offset the impact on transmission customers who would not receive the full allocation of LCE.[19]

2.16. The FTR allocation plan sets the Revenue Adequacy Objective. This has two parts:

- the primary objective is for Revenue Inadequacy to occur one month in twelve
- the secondary objective is for the annual average scaling factor to be 98%.

2.17. These objectives assist the FTR Manager (EMS), who is responsible for developing the FTR policy on the FTR grid, to achieve a balance between ensuring sufficient revenue is available to settle FTRs and a sufficient volume of FTRs are available for purchase.[20]

3. Feedback on the Authority's diagnosis and actions

Assessing financial transmission rights against consumer benefit

3.1. The above section outlines the operation of FTRs in theory; the Authority's review processes have identified some challenges and issues in practice.

3.2. This paper does not seek to re-examine the findings of the 2019 post-implementation review. Instead, its focus is on the Authority's May 2022 Issues paper, the submissions received on that, and the Authority's further analysis.

3.3. In May 2022, the Authority published the Financial Transmission Rights: Market Observations Issues Paper, seeking stakeholders' views on the current design settings of the market and the outcomes, for market participants and consumers. The paper set out the Authority's observations and concerns about the operation of the FTR market.

3.4. The Issues paper presented 11 observations and 21 questions. It sought feedback from stakeholders on issues ranging from competition in the retail and wholesale markets, to the question of market structure and funding, fair-value, additionality (unintended benefits), regulation and governance, complexity, and information issues.

3.5. The 11 observations from the Issues paper were:

(a) observation 1: Changes in the make-up of renewable generation will see LPR continue to change over the next 10 years.

(b) observation 2: Retail competition has increased over time however it is difficult to determine the influence that FTRs have on retail competition.

(c) observation 3: There has been no apparent impact on generator competition from FTRs.

(d) observation 4: FTRs currently use an average of $5.29 million per month from LCE (~47% of total LCE21) to settle.

(e) observation 5: Some parties may be consistently profiting from FTRs without a clear benefit to consumers.

(f) observation 6: The LPR due to losses is highly correlated with energy prices while LPR due to constraints is not.

(g) observation 7: Many parties (particularly direct connect consumers and independent retailers) who are subject to LPR are not using the FTR market.

(h) observation 8: FTRs tend to trade somewhat below 'fair-value'

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19 Because this outcome was considered to be a wealth transfer, the Authority at that time (28 April 2011), did not consider there to be negative efficiency effects. See Paragraph 3.4.137, Electricity Authority, *Consultation Paper: Managing locational price risk: Proposed amendments to Code.* Available here: Consultation Paper (ea.govt.nz)

20 Section 4.8, Financial Transmission Rights, *FTR Allocation Plan 2018.* Available here: FTR_Allocation_Plan_2018(2).pdf.

21 This figure was correct at the time of publication of the Issues paper in May 2022.

(i) observation 9: Some features of the FTR market appear unintended and have no direct link to consumer benefit.

(j) observation 10: The Financial Markets Authority does not regulate trading conduct in the FTR market.

(k) observation 11: Revenue adequacy settings of the FTR market contribute to the profitability of FTR.

3.6. The broader high-level concern, lying behind the observations in the Issues paper, was that FTRs may not be effective at addressing the problems they were created to solve, and consequently may not be aligned with the Authority's then statutory objective (now the main statutory objective). More specifically, these observations suggested:

(a) the FTR market is not tightly targeted at the problem: FTRs were created to manage risk but FTRs pay out on nodal price difference due to both constraints and losses even though losses are relatively predictable

(b) the link between FTRs and the intended improvement in retail and generation competition appears to be limited

(c) many parties (particularly direct connect consumers and independent retailers) who are subject to LPR are not using the FTR market, but are instead managing LPR in other ways, despite these alternative market solutions being limited

(d) non-physical financial parties appear to be profiting from the FTR market, with the link to consumer benefit from this unclear.

Identifying key issues from submissions to the consultation paper

3.7. The Authority received submissions from 17 parties. The list of submitters can be found in Appendix A. A summary of submissions can be found in Appendix B.

3.8. The Authority has endeavoured to accurately summarise the views expressed in the submissions in Appendix B and below. However, the summaries are not exhaustive and necessarily compresses the information provided in submissions. The individual submissions should be read to obtain a full account of submitters' views.

3.9. From the Authority's initial work, its review of the submissions, and its analysis since, the Authority has identified four groups of issues. Not only are these key to further developing the FTR market; they are important to the continued fulfilment of the Authority's main statutory objective: including promoting competition and efficiency, in the electricity industry for the long-term benefit of consumers.

3.10. These four groups of issues are:

(a) *Fair-value/pricing of FTRs*: In their submissions, submitters were split almost evenly on this question. Meridian and Genesis noted the participation of financial intermediaries as an issue, extracting profits in a systemic way from the market given its funding structure, due to FTRs trading below fair-value. Dissenting from this view, Mercury and many of the financial intermediaries see the market trading at fair-value at the time of each auction, with price based on a variety of factors as in any normal competitive market with equality of access for all market participants.

(b) *LCE/market funding*: A number of submitters raised the issue of financial intermediaries' extraction of LCE, and how they see this as detrimental to the market, resulting in lower benefits to consumers. These submitters would like to see financial intermediaries' participation in the market limited, or alternatively LCE share shifted back to physical participants exposed to LPR. This position was strongly opposed by the majority of submitters, comprising of Mercury, financial intermediaries, independent retailers, and EMS. These submitters see the use of LCE to fund the market, and financial intermediaries' participation, enhancing market efficiency, lowering costs to FTR market participants to the benefit of consumers.

These submitters felt that using LCE and auction revenue to support the market increased trust in the market by firming FTR settlement.

(c) *Additionality/co-benefits from the current market design*: A number of submitters noted that the FTR market had 'additional', unintended positive benefits beyond simply managing LPR. Submitters noted that FTRs also provide market participants with an energy hedge, and FTRs increase demand/liquidity in the futures market.

(d) *Market regulation, governance issues, and information provision*:

(i) *Market regulation*: A small number of submitters indicated a need for additional regulation/oversight of the market.

(ii) *Governance*: A small number of submitters raised concerns around governance of the market by the FTR Manager, Energy Market Services (EMS). As an example, Genesis noted that non-physical participants can have greater voting power in decision making processes with EMS given their higher numbers compared to physical participants who have different interests.

(iii) *Information provision:* Submitters identified complexity, information and prudential requirements, and lack of transparency as factors affecting market participants' participation in the market. These factors can be a potential barrier to entry, and/or reduce trading activity of market participants.

3.11. The Authority's analysis of the four issues is covered in more detail below in sections 4-7.

3.12. A number of submitters also raised the issue of financial intermediaries' activity in the market and whether their activity is detrimental to the market, and physical firms' participation, and how this may reduce benefits to consumers. This question is closely linked to the use of LCE to fund the market and whether the current design is the best use of this resource. This view is strongly contested by other market participants, who see financial intermediaries' participation providing considerable benefits to the market.

3.13. Financial intermediaries bring specialist experience and skills to the market, they provide services market participants would otherwise find difficult to transact in the market in financial intermediaries' absence. The suggestion by some participants to limit/remove financial intermediaries from the FTR market has the potential to cause considerable harm to the market, through reduced liquidity, a reduction in activity in the market, increasing barrier to entry, and therefore a reduction in competitive pressure and efficient pricing. The Authority does not see any merit to changing the current market structure to limit the ability of financial intermediaries to participate in the market.

3.14. Other issues raised in the submissions were as follows:

(a) Market participants expect LPR to increase and that there will be increasing volatility of spot prices with the transition to renewables, decarbonization, intermittent wind generation, and electric vehicle rollout. Market participants noted there will be increased demand for investment in new generation, an increased need for additional FTR products and further evolution of the FTR market to meet these demands.

(b) Market participants noted that FTRs have improved their ability to compete for consumers across all regions. Independent retailers said the FTR market is the single most critical element to enhance competition in the electricity market since the Authority's inception (although they did not state whether this was due to FTRs enabling them to manage LPR, or through some other mechanism).

(c) All market participants agree that the FTR market has brought real benefits to consumers, the question is the scale of the benefits.

(d) Physical participants noted that FTRs have had limited if any impact on generation investment decisions.[22]

[22] This suggests that the additional co-benefits of the current settings may be more limited than suggested.

(e) Nearly all market participants noted that changes were required to further improve outcomes for consumers (although there were varied replies on what sort of changes were necessary to improve the market).

4. Issue one: Fair-value: FTR valuation

4.1. Market participants and the wider industry have often questioned if FTRs are transacted at fair-value at the time of auction.[23] Fair value is viewed as the price a participant would reasonably pay for the FTR at a point in time. Since the inception of this market, they have presented submissions across consultations held by the Authority, both supporting and opposing this proposition.

4.2. There has been no consensus on the topic. This has led to the questioning of policy settings and scrutiny of barriers to market entry. This is a concern for the Authority; if the FTR market is not a competitive and efficient market then the market may not be operating in a way that delivers the highest level of benefits to consumers. Also relevant is the perception of fair-value in the market (ie, even if FTRs are trading at fair-value, if there is a widespread perception that this is not the case, this could lead to reduced benefits to consumers due to some market participants actions due to a perceived lack of fair-value in the market).

4.3. This issue was raised again in the latest round of consultations. A number of market participants raised concerns that due to their design and the current market structure, FTRs are undervalued at time of auction, allowing consistent profits to be made by holders of FTRs, and that this inefficiency causes harm to market participants and consumers.

4.4. This view was strongly contested by other submitters. In addition, this would be a significant shift from the evidence the Authority found from the 2019 post-implementation review, which found that FTRs were generally fair-valued. This section considers feedback from some submitters that FTRs are not fair-valued.

Determining fair-value

4.5. There are a range of factors that can influence FTR valuation and fair-value (listed below):[24]

(a) FTR market supply and demand: The supply volume released for each FTR path and participation leading to demand in FTR auctions determine the clearing price for FTRs. This is complex due to the feedback between pathways for FTRs - ie, the supply and demand for some pathways can impact the supply and demand for others given physical constraints in the system and the volume of FTRs available.

(b) Grid power flows: The quantity of expected power flows along a path typically gives a good estimation for losses. However, outages, hydrology changes and network configuration alterations can result in changes to normal state resulting in directional changes to power flows and congestion on the transmission network. Forecasted power flows, planned outages and risk of unplanned outages are all considered in the FTR auction model and hence auction price. This phenomenon is also the reason why FTR option and obligation products are offered. An FTR option has unbounded upside but limits the downside risk to zero, whereas an FTR obligation has both unbounded upside and downside.

(c) Transmission capacity: Power flows are constrained by the physical properties of the conductors on the transmission network. These conductors can be overhead lines or underground cables. HVDC power flows can also be constrained by the availability

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23 Post implementation review 2019: https://www.ea.govt.nz/monitoring/enquiries-reviews-and-nvestigations/2019-2020/post-implementation-review-of-the-ftr-market/
Authority open letter 2021: https://www.ea.govt.nz/assets/dms-assets/29/Letter-to-the-requestor-26-November-2021.pdf.
FTR observations paper 2022: https://www.ea.govt.nz/assets/dms-assets/30/Financial-Transmission-Rights-FTR- -Loss-and-Constraint-Excess-LCE-Review-2022-issues-paper1320090.51349371.5.pdf

24 Many of the listed factors are the reason that market participants purchase FTRs to hedge against these risks.

and price of instantaneous reserve in the receiving island. Constraints can lead to significant price differentials between two nodes.

(d) Revenue adequacy: The probability of an FTR payment being realised and not scaled back due to revenue inadequacy is factored into pricing. Greater auction revenue and LCE available to settle FTRs results in a firmer hedge and higher price.

(e) Hydrology: New Zealand electricity generation is predominately made up of hydro generation, much of it in the lower South Island, with the majority of load centres located in the upper South Island and North Island. The predominant electrical flow is from South to North, with lower prices in the South Island than the North. At times of lower rainfall and hydrological storage, the electrical flow is reversed, with higher prices in the South Island than the North.

(f) Fuel Costs: Thermal generation is required when renewable generation in the form of hydro, geothermal, wind and solar are insufficient to meet electricity demand. Thermal generation costs are underpinned by the cost to procure fuel sources in the form of coal and natural gas, and carbon prices. Market expectation of thermal prices in the future affects the current and future spot prices.

(g) Future spot prices: Future spot prices influence the magnitude of FTR payments and can deviate from expectations at the time of auction. For a given percentage difference between nodes, higher than expected spot prices will result in greater price differential between nodes and vice versa for lower-than-expected spot prices.

4.6. Market participants who purchase FTRs consider such factors when determining the price to bid. Market participants can be placed into two categories:

(a) physical participants, who are involved in the production or consumption of electricity and have exposure to electricity spot market volatility including exposure to LPR

(b) non-physical participants, being those firms that have no exposure to physical spot market volatility and LPR.

4.7. For physical participants exposed to LPR, their willingness to pay is dependent on future spot price expectations and potentially a premium for the insurance provided, and how FTRs fit is as part of their portfolio of risk management response options. The value of the premium is regarded as the monetary consideration paid for the insurance policy against uncertainty in future costs.

4.8. For non-physical participants not exposed to LPR, their willingness to pay is any price below their expectation of the value they can derive from the FTR, where there is an opportunity to arbitrage or profit from holding or trading the acquired FTR. Also, FTRs are being held as part of a wider portfolio of assets to manage risk. In addition, physical participants may also choose to undertake for-profit trading.

4.9. The FTR's fair-value and clearing price at the time of auction are key metrics to determine if auction revenue and LCE are allocated in an efficient manner by the FTR market. Fair-value does not indicate if auction revenue and LCE have been most efficiently utilised for the maximum long-term net benefit of consumers, instead it is an indication if the FTR policy settings have been implemented as intended.

Analysis indicates that financial transmission rights are priced fairly at the time of auction

4.10. The Authority commissioned Concept Consulting to undertake the fair-value analysis (see Appendix C).

4.11. An inefficient FTR market will result in a wealth transfer of loss and constraint excess (LCE) from transmission customers to FTR participants.

4.12. In principle, fair value can be assessed by comparing the prices paid for FTRs (at initial auction) with the settlement cashflows subsequently received by FTR holders. A material and sustained difference would likely indicate market inefficiency and vice versa.

4.13. While this approach is valid in principle, to make robust comparisons requires an extensive dataset covering a wide range of market conditions.[25]

4.14. The situation is analogous to assessing whether flood insurance is fairly priced. If only a small sample of policies/years is assessed and these exclude any flood events, the insurance fee will appear excessive relative to pay-outs. Conversely, if the limited dataset includes some flood events, the insurance fee will likely appear to be inefficiently low relative to pay-outs.

4.15. In the case of FTRs there is an alternative approach available which overcomes this data limitation issue because it is based on comparing the cost of FTRs with the cost of obtaining equivalent insurance from the exchange traded futures market. The price of flood insurance from one insurer is compared to the price of equivalent insurance from another source. No information is needed on the actual level of flood pay-outs under the insurance policies, and hence there is no need to obtain a dataset covering the full range of risk outturns.[26]

4.16. In essence, the analysis relies on the fact FTRs provide insurance to mitigate locational price differences – for example an FTR product can hedge the price difference between Benmore (BEN) and Otahuhu (OTA) nodes. Parties can synthesize the equivalent[27] insurance cover by selling an OTA futures contract and purchasing the same volume of BEN futures contract (or vice versa depending on which direction they wish to hedge).

4.17. The analysis identifies instances where it is possible for FTR prices to be compared with exchange traded futures at time of FTR auction. This is critical because participants in both markets will be trading on identical information in that time period. Hence, it is expected the two markets will be well aligned and any mispricing will be arbitraged away if the markets are efficient.

4.18. In April 2021, the Authority published a commentary piece on the accuracy of the ASX forward curve that is derived from exchange traded futures. The analysis demonstrated that in the near term, the forward curve is an unbiased (though highly volatile) estimator of the final spot/settlement price for the period.

4.19. In the longer term, a persistent bias was observed in the years leading up to 2021. This is likely attributable to higher wholesale prices over this period linked to issues such as gas availability.

4.20. As the settlement price at any point in time reflects the expected value of the final price for a future period, this indicates that the high wholesale prices observed in recent years were not expected events, and hence forward prices were significantly lower in advance of these high price events.[28]

4.21. Misalignment between the two markets may indicate there are unacceptable inefficiencies in the FTR market and the policy settings are not implemented as intended.

4.22. The fair-value analysis focused on the FTR primary auctions that correspond to equivalent futures quarterlies two years out from expiry, and FTR variation auctions that correspond to equivalent futures monthlies at timeframes of three, two and one month out from expiry. These auctions were identified to be in the best alignment with ASX exchange futures.

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25 Changes in the spot price of electricity and changes to the underlying grid will impact the settlement price and can lead to significant changes in market participants price expectations. As these factors change, this will impact trade and pay-out prices in different ways.

26 This approach implicitly assumes that prices in the exchange traded futures market are fair value, ie. not systematically mispriced. Concept considers this a reasonable assumption.

27 Strictly speaking, they are very close substitutes rather than perfectly equivalent for reasons discussed later in this extract.

28 Market commentary: https://www.ea.govt.nz/news/eye-on-electricity/accuracy-of-the-forward-price-curve/

Findings and next steps: fair-value

- Analysis indicates that there is reasonable alignment between the Benmore to Otahuhu (BEN_OTA) obligation FTRs and the equivalent BEN_OTA ASX exchange traded baseload electricity futures differential; analysis also indicates that there is reasonable alignment between the BEN_OTA obligation FTRs and intermediary paths between BEN_OTA. It is not surprising that outcomes in the two markets are well correlated as participants trade in both markets to manage their risk.
- It is reassuring that the theoretical outcome from the FTR auction software is reflected in the empirical data. This also suggests that pricing efficiency for FTRs on routes other than BEN_OTA route do not differ systematically from that on the BEN_OTA route.
- The results for the four FTR time periods analysed indicates that the two markets are reasonably well aligned and that there is no clear evidence that FTRs are systematically mispriced or that the FTR market is operating inefficiently.
- Although the Authority's analysis indicates that FTRs are fair value at time of auction, this analysis does not address the issue around the current use of LCE to fund the market, and whether this is the most efficient use of LCE to the greatest net benefit of consumers. This will require further analysis of different funding and market design options to determine.
- The Authority is developing metrics of the differentials between the FTR and ASX markets, using the method described in Appendix C. These metrics will be published in EMI in the second half of 2023.

5. Issue two: Funding the market: LCE and auction revenue

5.1. The current funding design sees LCE and auction revenue from the FTR market used to settle prices. From submissions, some participants expressed concern at what they see as an extraction of LCE from transmission customers, and ultimately consumers, to non-physical participants; transmission customers would have received the LCE overpayments through the Settlement Residual Allocation Methodology (SRAM) in the absence of non-physical participants.[29]

5.2. The Authority's view, however, is that the funding issue is wider than just non-physical participants. The current funding model sees all FTR holders, whether physical or non-physical participants, acquiring LCE and auction revenue from holding FTRs; this leads to a transfer of LCE from transmission customers to FTR market participants.[30] It is this inclusion of auction revenue to fund the FTR market that may not be to the long-term benefit of consumers.

The current funding design

5.3. The market is currently funded via LCE and auction revenue, with the FTR Manager (EMS) maintaining a revenue adequacy target. In the current FTR allocation plan the revenue adequacy objective comprises two objectives:

(a) primary objective: one in twelve-month revenue inadequacy

(b) secondary objective: an annual average scaling factor to be 98%.

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29 SRAM: https://www.ea.govt.nz/development/work-programme/pricing-cost-allocation/settlement-residual-allocation-methodology-sram/

30 The average monthly LCE cost of the FTR market is $5.2 million per month for calendar years 2018-22 (using monthly FTR data).

5.4. The aim of the revenue adequacy objective is for EMS to ensure that there is sufficient revenue available to settle the FTRs and ensure that there is the necessary volume of FTRs available to meet demand.[31]

Accounting for losses and constraints

5.5. There is a complex interaction between the FTR model determining volume to be auctioned, and pricing in the spot market from the System Operator's Scheduling, Pricing and Dispatch (SPD) model. The FTR model determining the volume of FTRs to be auctioned, and awarded for each path, is an electrically lossless DC model with no consideration for system reserves. Final prices for the spot market are calculated by the SPD model, an electrical loss DC model, which also takes account of system reserves.

5.6. Final prices from the SPD model are required for the settlement of FTRs. There is a discrepancy between the two models that means that the simultaneous feasibility condition is not met.

5.7. In theory if the FTR model and SPD model are in alignment then the maximum volume of FTRs awarded should be feasible in both models, meaning there will be enough FTR rentals[32] to account for FTR payments. However, this is not the case in practice due to the discrepancies in how electrical losses are accounted for between the models and outages that occur.[33]

5.8. Schedule 14.3 in the Electricity Industry Participation Code 2010 (the Code) provides the calculation for the portion of LCE to be allocated as FTR rentals.

5.9. FTR rentals are combined with auction revenue to settle the FTR payments. If there is not enough funding to settle the FTR market, then revenue inadequacy occurs. In a revenue inadequate situation, post-auction scaling is required (applied equally to all FTRs for that month), and not all FTR payments are fully paid. The sources of funding for settling the FTR market and the capacity scaling factor are key parameters that impact revenue adequacy. Greater funding and a conservative capacity scaling factor would increase the firmness of FTR payments.

5.10. The theoretical relationship between the firmness of FTRs with auction revenue and FTR rental is described in Table 1.

Table 1: Influence of revenue adequacy on funding consumption

Firmness	Auction revenue	FTR rental consumed
High probability of revenue adequacy	Greater auction revenue	This depends on the capacity scaling factor[34], LCE available and Schedule 14.3
Low probability of revenue adequacy	Less auction revenue	

5.11. Given the current market settings, where LCE and auction revenue is funding the market, this is creating a situation where the market firmness is seeing a transfer of LCE from transmission customers to FTR market participants (and from physical to non-physical participants within the FTR market), ie. a portion of FTR rental is being consumed by participants who do not face LPR. These settings may be creating an incentive for speculation due to over-firmness in market funding.

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31 FTR allocation plan 2018: https://www.ftr.co.nz/documents/200/FTR_Allocation_Plan_2018.pdf

32 FTR rental: The portion of losses and constraints of LCE used to fund the FTR market.

33 Due to the discrepancies between the FTR model and SPD model, the FTR model without losses and consideration for reserves may award more volume than is feasible on certain paths. A capacity scaling factor is required in the FTR model to account for this to scale back volumes auctioned; it is expected the factor chosen has a neutral effect on the revenue adequacy objective.

34 The capacity scaling factor affects FTR volumes and therefore both auction revenue and (unscaled) payouts.

Funding sources

5.12. There are three sources of funding for settling FTR payments: losses, constraints, and auction revenue. LCE is the surplus created in the electricity spot market once purchasers have been invoiced and generators have been paid. Auction revenue is what successful market participants pay to obtain the FTR. A combination of the different sources is available for settling FTR payments. The hedge scenarios and features of each funding option are provided in Table 3 below.

Table 2: Funding sources

Funding Option	Hedge scenarios	Features
Constraint excess only via FTR rental	• Locational price risk (excluding risk from losses, however losses are highly correlated with spot prices) • Intra-day peak hedge	• Losses and auction revenue are reserved for purchasers under SRAM[35] • FTR payments are the firmest/best specified in terms of matching demand and supply modelling compared to the status quo[36], with least likelihood of scaling required (the market's resilience/robustness may be lower as fewer funding options for FTRs could constrain the overall market's growth).
Constraint and loss excess only via FTR rental	• Locational price risk • Intra-day peak hedge • Energy hedge	• Auction revenue is reserved for purchasers under SRAM, • FTR payments are moderately firm in terms of revenue adequacy (less than constraints only). The overall market resilience is higher as available funding increases (compared to constraints only).
Constraint excess, loss excess via FTR rental, and auction revenue	• Locational price risk • Intra-day peak hedge • Energy hedge	• Only settlement residual is available for purchasers under SRAM. This results in the transfer of LCE from physical participants to non-physical participants, which may lead to less efficient pricing and possible welfare loss to consumers (compared to LCE funding only). • FTR payments are moderately firm in terms of revenue adequacy (less firm than constraints only). The current settings provide the highest level of firmness/resilience in the market in terms of funding for increased demand (if the market is growing), at the cost of the transfer of LCE to non-physical participants.

5.13. The three funding options summarised in Table 2 show that LCE and auction funding provides the highest degree of firmness/resilience in the market. This is beneficial during the transition stage in the early period of a market's development; the increased confidence from firmer pricing encourages participation and increasing market liquidity.

5.14. As the market matures, this initial firmness in funding to encourage market growth has the potential to become an increasing cost to consumers, with the transfer of LCE from transmission customers to FTR market participants. Funding the market by LCE alone, while decreasing firmness/ market resilience, increases pricing efficiency by reducing the transfer of LCE from transmission customers. The net impact of these funding options requires further analysis, to determine which option is likely to best support firms manage their LPR, to the long-term benefit of consumers. Analysis of different market funding

35 SRAM: https://www.ea.govt.nz/development/work-programme/pricing-cost-allocation/settlement-residual-allocation-methodology-sram/

36 As congestion is modelled accurately in the auction grid (in contrast to losses), the FTR should be firmer than under the status quo.

options is outside of the scope of the current review; this will be undertaken in a future review of the market.

Increased price volatility in a renewables-based system

5.15. The transition to a renewables-based electricity system and the introduction of further intermittent generation will likely exacerbate participants' LPR. The simulation modelling from the MDAG issues paper 'Price discovery under 100% renewable electricity supply', indicates physical system conditions will fluctuate more frequently than at present, as a result of greater contribution from intermittent generation. These system fluctuations mean that spot price volatility is likely to increase significantly compared to past experience. In particular, there is likely to be greater short-term volatility in spot prices and increasing LPR.

5.16. This is a concern for the Authority because the fundamental revenue adequacy parameters for the FTR markets have not changed since FTR market inception in 2013. It is critical to assess if the current revenue adequacy settings remain 'fit for purpose'.

5.17. The Authority will review the revenue adequacy question as part of the normal review process of market settings with EMS. This will include:

(a) review of historic revenue adequacy performance

(b) review of the revenue adequacy objective and capacity scaling factor.

5.18. As the share of intermittent generation increases this will lead to increased locational price risk, due to the greater volatility in the spot market price. This means that there is an increasing risk that if the current funding system using LCE and auction revenue remains unchanged, that this may lead to an increasing share of LCE being consumed by the FTR market to the detriment of consumers. This requires further analysis to determine the scale of this risk.

International review of how other jurisdictions manage locational price risk

5.19. The Authority was keen to establish whether the market structure and design of New Zealand's FTR market was similar to other FTR markets overseas, particularly in the way the market is funded and in particular whether there is increasing share of LCE that is being used to settle the market.

5.20. Ernst & Young (EY) was commissioned to review how other jurisdictions manage their markets. EY reviewed the range of FTR policy frameworks found in nine different jurisdictions.[37]

5.21. The key findings by the Authority based on the market information from the EY review are as follows:

(a) The review of the nine markets demonstrates that there is no "one-size solution" that fits all markets in any jurisdiction; this will depend on the nature of the market (energy only v capacity market; zonal versus nodal pricing, scale and liquidity of the market, number of participants, and maturity of the market).

(b) New Zealand's FTR market is an outlier in terms of its funding and design structure in comparison to the FTR markets in the United States.

(c) If a jurisdiction has a nodal market, then it is rational to have an FTR market to manage the associated locational price risk.

[37] Nordpool, United States (PJM, ERCOT, CASIO), UK, France, Germany, Japan, and Canada.

(d) From the EY review the evidence suggests that in a nodal energy market, using LCE and auction revenue to fund the FTR market often led to over firmness in the market, leading to increased costs to consumers.[38]

(e) PJM[39] and ERCOT[40] provide an alternative framework for market funding as they do not use auction revenue to directly firm the market. This is a more efficient use of LCE than the funding structure in New Zealand and reduces the over-firming effect that including auction revenue in the market funding creates.

(f) It is a common feature across the FTR markets examined that FTRs *appear* to be under-priced/valued and that the surpluses/profits from FTR markets accrue to FTR holders and predominantly to financial intermediaries. This is not an issue unique to the New Zealand market but is all found in FTR markets in the United States including in the PJM, CAISO[41] and ERCOT.

(g) As in other markets the issue of the increasing cost/share of L/CE going to fund the market is an issue that is also a concern with participants and regulators in other much larger more mature markets.[42]

(h) There are different ways that markets design rules around non-physical participants' access to the market. In the US, regulators allow financial intermediaries/non-physical participants to trade in FTR markets; however, the initial allocation of rights which can then be converted to FTRs is restricted to physical participants.

(i) Initially, using LCE and auction revenue to fund the market may be appropriate when the market is relatively new and there is a need to firm the market, creating incentives for participation, increasing market liquidity and confidence. As market participants knowledge, participation and liquidity increase, there is less need for this firming of the market through including auction revenue in addition to LCE, and this additional firming can be detrimental in more mature markets.

Financial intermediaries' participation

5.22. The issue of financial intermediaries' participation in the market was raised by some submitters in the review, and whether this is to the benefit of consumers. There is clear evidence in economic and financial literature of the benefits that financial intermediaries bring to enhancing market pricing efficiency.[43] Findings in the academic literature support the position that financial intermediaries are essential participants in the market, improving market outcomes through enhanced price discovery, innovation, increased liquidity, and increased competition through a reduction in barriers to entry and greater options for market participants to trade.

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38 This was particularly apparent in the case of the California Independent System Operator (CAISO); prior to 2019, it used LCE and auction revenue to fund its market. This created significant subsidies for FTR holders and led to losses for consumers. To address this, CAISO removed auction revenue from its funding structure in 2019, using only LCE to fund the market.

39 PJM comprises an electric transmission system serving all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia.

40 Electric Reliability Council of Texas.

41 California Independent System Operator.

42 This problem is likely to be greater in markets which use LCE and auction revenue to fund the market, in comparison to markets using LCE funding only.

43 For example see Allen F., Santomero A., "'The Theory of Financial Intermediation', Journal of Banking and Finance, Vol 21, December 1997.

Findings next steps: funding and market design

- This review indicates that using LCE and auction revenue to fund an FTR market is likely to be inefficient and may be negatively impacting outcomes for consumers.
- Alternative market funding approaches can be found in the US, in the PJM and ERCOT, where auction revenue is not used to directly firm the market. Although this approach would be more efficient, and is likely to offer greater benefits to consumers, further analysis is required to provide clarity of the impact of different funding options in terms of their quantitative net impact on consumers.
- Financial intermediaries are an essential part of the market, enhancing price discovery and liquidity, and providing alternative options for participants to trade in the market.
- The Authority will undertake further analysis of the funding and design issue in the next stage of this review. The scale and timing of this future review is currently being scoped.
- The Authority will continue to engage with the FTR Manager (EMS) on whether the current revenue and capacity settings are appropriate.[44]

6. Issue three: Additionality/co-benefits from the current market design

6.1. FTRs were originally designed to address participants' LPR. Analysis of the market suggests that this is a relatively resource intensive approach, in terms of the use of LCE. This has implications for whether this is the best use of these resources or whether they could be more efficiently used elsewhere. Feedback from a number of submitters noted however that the market has created other unintended benefits.

6.2. A number of the additional co-benefits derive from the source of funding of the FTR market; the use of losses in particular drives many of the unintended benefits that arise the market (eg. the use by participants of FTRs as an energy hedge). The funding source and market design is therefore closely linked to the additionality/co-benefits that are derived from the FTR market. Any changes to the current market funding design have the potential to impact and change these benefits.

6.3. The following additional benefits have been identified following review of submissions[45] and further analysis by the Authority:

(a) facilitates additional liquidity in the exchange traded futures

(b) facilitates additional liquidity in the secondary markets such as the over-the-counter market, including repackaging into other products

(c) provides a tool for market makers to manage risk and reduce cost to provide market making services

(d) contributes to information flow and price discovery in the hedge markets

(e) provides a method of hedging against peak price risk

(f) provides an energy hedge.

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44 Any change in these settings would first require consultation with market participants ahead of any possible Code change.

45 Most participants did not reply to this question. A number of participants who did noted that the FTR market has actually had additional, positive, unintended benefits. The two most common reasons noted are that FTRs provide an energy hedge (emhTrade, Electric Kiwi+Haast, Acropolis), and increase liquidity in the futures market (Contact, emhTrade), to the benefit of consumers.

6.4. The co-benefits are related to the current market structure and source of funding. Although these additional benefits are material, they would need to be considered against the loss to consumers that comes from the current market funding settings.

6.5. The previous section identified that the inclusion of auction revenue may be over-firming the market, leading to a potential loss in benefit to consumers. The option to remove auction revenue from the funding model would not remove the identified benefits in para 6.3; it is likely that this may reduce the beneficial scale of some of these factors. The net impact of any change will require further analysis of any change in funding options.

Findings and next steps: co-benefits

- Further work is required to estimate the value from the additional "unintended" co-benefits that arise from the current market design. This is not part of the current review. This will be necessary when a future review of market design is considered, in which case these benefits will need to be valued as part of the analysis of the different market design options.

7. Issue four: Further issues: market regulation, governance issues and information provision

A: Market Regulation

7.1. In the May 2022 issues paper, the Authority noted that regulatory oversight of the FTR market could be improved. The trading conduct rule the Authority uses to actively monitor and address trading conduct is not specifically designed to address the risk of insider trading. Misconduct issues in the FTR market are otherwise only broadly covered by various pieces of
New Zealand legislation.

7.2. Although most submitters did not see this as a pressing issue, the Authority is concerned that a regulatory gap exists that has the potential to be exploited. Since the release of the Issues paper and after receiving submissions, the Authority has further considered the issue of regulation of the FTR market, and whether greater oversight is needed of trading conduct on the FTR market.

7.3. The Authority has now decided to pursue this issue in greater detail and intends to release an issues paper seeking stakeholder consultation in mid-2023.

B: Governance Issues

7.4. A submission to the Issues paper suggested that the current governance of the FTR market is not appropriate. Genesis suggested that "Non-physical participants with no LPR currently outnumber FTR participants with LPR, they have the ability to approve additional hubs that benefit speculators rather than parties seeking to manage LPR".

7.5. Notwithstanding the distinction between physical and non-physical participants, the Authority notes that the current governance regime for deciding on operational changes to the FTR market, such as changes to hubs, is broader than suggested by Genesis. For example, if a change to the number or location of hubs were proposed by the FTR Manager following a suggestion by the FTR user group, then any change is required to undergo a cost-benefit analysis and is then proposed to the Authority to vary the FTR allocation plan.

7.6. As noted in the FTR allocation plan, the Authority's decision to approve the variation will include consideration of the cost-benefit analysis and does not include considerations of the number of votes, or who provided those votes. In all situations, the Authority's decisions will be determined by the long-term benefit for consumers.

7.7. The Authority acknowledges that there has not been any development of the FTR market in some time, and that proposals for operational changes to the FTR market have been paused because of the ongoing overall review of the FTR market.[46] The Authority will consider if further operational improvement to the FTR market is necessary during its normal review process with EMS. Any changes to the FTR market will be conducted in line with the Authority's statutory objective such that any changes are for the long-term benefit of consumers and would be consulted on with stakeholders as part of any periodic review of the market in the future.

C: Information flow

7.8. Complexity is a feature of the FTR market, with physical conditions, power flow dynamics and transmission line constraints overlaid with price expectations making the FTR market more complex than other risk management products such as electricity futures contracts or over the counter contracts.

7.9. The Authority is interested in reducing barriers to enter the FTR market. An initial barrier that has been noted is the complexity of the market; and there have been requests for further support to market participants in terms of information provision. The FTR Manager has previously provided the Authority with proposals on ways to further support and inform market participants. The FTR Manager paused this process while the Authority's latest consultation and review process for FTRs has been underway.

7.10. At this stage, the scope and scale and provision of any training session are yet to be determined, and any central funding of training would be subject to an assessment if the cost would be in the long-term benefit for consumers. However, the Authority will actively consider the case for making increased training available to current and future FTR market participants. The Authority will re-engage with the FTR Manger on its proposals for providing training to interested market participants, following publication of this decision paper.

The FTR forward price curve is not currently explicitly available

7.11. An outcome of the FTR market is a complex set of data that arises from each auction. The price outcomes from the auction hold specific value. The FTR market produces a great deal of price information at each monthly auction. In each month, 12 different future months are auctioned. The current FTR market has 28 different paths between each combination of source and sink. For each of the 28 paths, there are four potential prices, an obligation and an option price across both directions. In total, each FTR auction has 112 potential prices.

7.12. The auction results provide FTR market participants' expectations of locational price differences for each monthly auction. When combined with the price expectations delivered by trading market expectations, the FTR market can provide expectations of monthly price levels and locational price differences across the FTR grid.

7.13. Each future month is auctioned multiple times. The multiple auctions can be combined to give an evolution of price changes that gives a time series of the market's perception of price.

7.14. The Authority's previous goals in enhancing the hedge market through the commercial market making project, has been to ensure a robust forward price curve. The importance of the forward price curve allows for efficient decisions around:

(a) whether or not to make an investment in generation, demand response or distributed energy resources (DER), or in some other sector where electricity is used as an input to production

(b) whether or not to operate generation plant, undertake demand response or operate DER, or run an industrial plant or process for which electricity is used as an input

[46] https://www.ea.govt.nz/assets/dms-assets/27/Update-on-Proposed-Changes-to-the-FTR-Market.pdf

(c) the value a generator places on its ability to store fuel

(d) what price to offer to sell electricity to retail customers.

7.15. The forward price curve produced by the FTR market can be regarded as a public good, in the sense that term is used by economists: it should be non-excludable and non-rivalrous. It is non-rivalrous because one party using the forward price curve (for example, to inform a decision to compete in a new retail area) does not prevent other parties from also using it (for example, to inform a different and competing retail competition decision, or to inform an entirely different decision).

7.16. However, the non-excludable nature of the FTR forward price curve is weaker. A purely non-excludable price curve is one where futures prices are published and freely available to all parties and therefore is not possible to exclude any parties from using the information the forward price curve contains.

7.17. Market data from the FTR market is available from FTR Manager, however accessing that data is not simple for non-FTR participants.

7.18. The current availability of auction results is limited to successful bid/offer results, and frequently not all potential paths result in cleared bids or offers. Between two nodes there are four potential prices, being an option and an obligation in each direction. Of the four prices, not all result in cleared bids. However, shadow prices are produced in the FTR auction as a result of the FTR auction clearing engine. The Authority intends to expand the information available to include these shadow prices.

7.19. The absence of an easily accessible forward locational price curve is an information challenge that the Authority intends to address. To improve transparency and to increase the benefits of the forward price curve, the Authority intends to publish auction data.

7.20. An additional feature of the FTR market is the current publication of outcomes from each FTR auction only shows the successful results of the auctions. There is not publication of unsuccessful bids. This is in contrast to the situation in the physical market where all bids and offers for energy and reserves are published afterwards. The Authority intends to consider if there is value to price discovery and monitoring of trading behaviour to enabling the publishing of all FTR bids, both successful and unsuccessful in each auction.

Findings and next steps: regulation, governance, information provision

- *market regulation*: given concerns raised around whether there is adequate regulation of the FTR market, the Authority will release an Issues paper in mid-2023 on options for possible market regulation of the market
- *governance issues*: the Authority will engage with the FTR Manager on the governance issues raised during the 2022 FTR review process, and will consult with industry stakeholders during the next contract negotiations for the FTR Manager contract
- *information provision*: the Authority will engage with the FTR Manger on ways to further support and inform market participants
- *market data*: market complexity was raised as an issue by some participants; to aid market transparency, from mid-2023 the Authority will publish on an ongoing basis a nodal price map and yield curves for the FTR market.

8. Next steps

8.1. This Decision paper is being published, notifying stakeholders of the next steps in the latest review of financial transmission rights.

8.2. The Authority will undertake the following:

(a) *stage one*: June-December 2023

(i) fair-value analysis has been completed and FTRs have been found to be fair-valued *at time of auction*. The Authority will continue to monitor the forward prices in the FTR and ASX markets through subsequent price cycles

(ii) the Authority will continue to engage with the FTR manager on:

- governance issues
- further ways to support and inform market participants
- revenue adequacy and capacity settings

these issues will be considered when amending or updating specifications in future FTR Manager contracts

(iii) the Authority will publish a forward price curve and nodal price map for the FTR market

(iv) the Authority will develop options for consultation that address potential regulatory issues regarding trading conduct on the FTR market and publish an issues paper for consultation mid-2023.

(b) *stage two*: scoping for a potential review of market funding and design options

(i) the Authority will undertake further scoping for a more comprehensive future review of options around market funding and design settings in the FTR market.

9. Attachments

9.1. The following appendices are attached to this paper:

APPENDIX A LIST OF SUBMITTING FIRMS

APPENDIX B SUMMARY OF SUBMISSIONS

APPENDIX C FAIR-VALUE ANALYSIS

Appendix A List of submitting firms

Submitter	Category
Contact Energy	Generator/Retailer
Genesis Energy	Generator/Retailer
Meridian Energy	Generator/Retailer
Mercury Energy	Generator/Retailer
Nova	Generator/Retailer
Electric Kiwi +Haast	Independent retailer + financial intermediary
Flick Electric	Independent retailer
Independent retailers' group: (combined submission from: 2Degrees, Electric Kiwi, Flick Electric, and Pulse)	Independent retailer
Acropolis Trading	Financial intermediary
Bold Trading	Financial intermediary
emhTrade	Financial intermediary
Nodal Traders	Financial intermediary
Smartwin	Financial intermediary
Alpine Energy	Infrastructure (lines)
EMS: FTR Manager	FTR Market operator
Electricity Networks Assoc	Network participants' representative body
Major Electricity Users Group (MEUG)	Commercial industry representative group

Appendix B Summary of submissions

Issues paper: Observation	Question	Principle issues raised in question	Authority response
Observation 1: Changes in the make-up of renewable generation will see LPR continue to change over the next 10 years.	1. What is your view on how LPR might evolve over the next decade?	Participants noted that LPR is expected to increase and that there would be increasing volatility of spot prices with transition to renewables, decarbonisation, intermittent wind generation and EV rollout. Participants also noted there would be increased demand for investment in new generation, an increased need for additional FTR products and further evolution of the FTR market to meet these demands. Smartwin noted the adaptability and flexibility of the FTR market as an LPR solution. EMS noted the level of change to LPR will likely depend on whether the transmission assets are in place or additional investment is made to deliver the generation.	As noted by participants, the transition to 100% renewables, and climate change policy response, will likely see LPR increase through the transition as intermittent renewable generation increases as a share of generation.[47] The Authority expects the FTR market may assist participants manage their LPR risk through the transition and will be an increasingly important risk management instrument for participants managing their LPR.
	2. Do you see LPR as a genuine risk to your business?	All gentailers and retailers noted that LPR is a risk to their business that they need to manage.	Although participants noted that FTRs are an important instrument for managing their LPR it does not appear that many are actively using the market to do so. As this risk increases market activity and participation is expected to increase.
Observation 2: Retail competition has increased over time, however it is difficult to determine the influence that FTRs have on retail competition.	3. What influence has the availability of FTRs had on your decision to compete for consumers?	Participants noted that FTRs have improved their ability to compete for consumers across all regions. Independent retailers noted this is the single most critical element to enhance competition in the electricity market since the Authority's inception. There was a dissenting opinion from the Electricity Networks Association (ENA), who felt that the FTR market had failed to deliver enhanced competition in either the retail or generation markets. MEUG also questioned the scale of the impact in the wholesale market from a competition perspective. MEUG believes the impact is more limited.	Participants replies indicate that the FTR market has had a positive impact on participants' ability to compete for consumers and created a more efficient market. This brings positive benefit to consumers through lower electricity prices by enabling participants to better manage their LPR. It is difficult however to directly attribute the improvement in retail competition to activity in the FTR market, given other changes that have occurred in the wider electricity market. The question of what impact the FTR market has had on wholesale competition is less clear. The Authority will continue to analyse the FTR market's impact on the wholesale market in future reviews.

[47] Reference: https://www.ea.govt.nz/assets/dms-assets/29/01-100-Renewable-Electricity-Supply-MDAG-Issues-Discussion-Paper-1341719.4.pdf

	4. What benefits do you see the FTR market providing in terms of consumer outcomes?	Almost all respondents believe the FTR market has led to benefits to consumers by enabling participants to better manage LPR. There are differing views of the extent of these benefits between submitting participants. Mercury and financial intermediaries tended to be more positive of the level of consumer benefit. Mercury noted that FTRs enabled better management of LPR and increased liquidity in the futures market, leading to increased consumer benefit. Genesis and Meridian noted that Products that allow physical participants to hedge their LPR flow through to stable and efficient pricing for consumers (however they have considerable concern about the impact of financial intermediaries on FTR pricing and availability) Independent retailers see FTRs as beneficial but not substantially addressing competition issues they see remaining in the wholesale market. All appear to agree the market is beneficial in terms of consumer outcomes but differ in the scale of these benefits.	All participants agree that the FTR market has brought real benefits to consumers, the question is what is the scale of these benefits. The suggestion to limit financial intermediary participation in the market has the potential to cause significant harm to the market through reduced liquidity and impaired price discovery. Although participants note the benefits that the market has brought to consumers, some have raised concerns around how effectively the market is working and whether there are changes that can be made that would provide a more efficient market and greater level of benefit to consumers. These points are raised below, particularly around the question of fair-value and funding design issues in the FTR market.
Observation 3: There has been no apparent impact on generator competition from FTRs.	5. What influence has the availability of FTRs had on your generation investment decisions?	The gentailers all note that the FTR market has a marginal/limited impact on investment decisions for new generation. The timelines between the FTR market (2y) versus the 10-30y horizon for new generation means there is limited information benefits for long-run investment decisions.	Participants' responses confirm the Authority's analysis that FTRs have had limited if any impact on generation firms' investment decisions.
	6. Has the FTR market allowed your business to build new generation plant in new geographic areas?	No generators indicated that FTRs had directly enabled participants to invest in new generation. This is not a key driver for investment decisions according to generators (Mercury did note that FTRs have had a positive, but minor influence on investment decisions).	Participants' responses confirm the Authority's analysis that FTRs have had limited if any impact on generation firms' investment decisions.
Observation 4: FTRs currently use an average of $5.29 million per month from LCE (~47% of	7. Does the current use of LCE to support the settlement of the FTR market deliver the best	There was a variety of views on the question of the use of LCE in the market. Mercury, the financial intermediaries and almost all independent retailers see the current use of LCE to fund the FTR market as a key component of market stability, supporting price settlement, and increasing liquidity in the market. However, other participants were less supportive, raising questions whether the current use of LCE does deliver the best	The market funding issue was one of the key differences in opinion between participants and one of the top four issues the Authority identified from the consultation process. The concern that some participants have raised about the increasing share of LCE passing to non-physical participants is a valid, if this is leading to a lower level of benefits for consumers.

total LCE) to settle.	outcomes for consumers?	outcomes for consumers. Meridian and Genesis in particular see the extraction of LCE by financial intermediaries in the market as a wealth transfer that pushes up prices and costs for participants exposed to LPR and increasing costs to consumers.	The Authority's view is that further analysis is required around funding and market design options before any decision can be taken to change the current structure. Initial findings from this review indicates that there is an issue with transfer of LCE to non-physical participants, potentially negatively impacting consumers. A review of overseas markets indicates that using LCE and auction revenue to fund the market may be detrimental to consumers, and that LCE funding alone to fund the market, with auction revenue being passed back to grid customers, may be a more efficient funding design. Further analysis is required of what the net impact that any such change would have on the outcomes for consumers. This will require further detailed market options analysis and consultation with market participants. The Authority disagrees with the view expressed by some submitters that financial intermediaries' participation in the market is increasing costs and reducing consumer benefit, and that their ability to participate should be limited or capped (suggested by Genesis and Meridian), The Authority does not see a need to reduce the ability of financial intermediaries to participate in the market, as this would likely reduce activity and liquidity in the market, have a negative impact on price discovery, and reduce competition. The impact of such changes would likely be a reduction in benefits to consumers in the long term.
Observation 5: Some parties may be consistently profiting from FTRs without a clear benefit to consumers.	8. Why do you think some FTR participants are profiting from FTRs more than others?	There was a varied reply to this question. Genesis and Meridian see the presence of non-physical participants/financial intermediaries focused on speculation compared to physical participants using the market to manage LPR. In comparison, Mercury and financial intermediaries highlighted the difference was down to different investment/business strategies, different skills in each firm, differing views on forward prices, leading to different trading strategies and outcomes.	As noted by a number of participants, higher profits may reflect larger holding or differing trading strategies. Some participants may be taking certain positions to reflect their portfolio risk - they may not be concerned with the level of profit but rather managing LPR. In an open and competitive market, one would expect to see different profit outcomes by participants using different business and investment strategies. A valid question has been raised around complexity and transparency in the market.
Observation 6: The LPR due to losses is highly correlated with energy prices while LPR due	9. Is it for the benefit of consumers to use loss rentals, constraint rentals and auction	Just as in question 7, participants' views split into quite different positions on the LCE/market funding question. The majority of participants felt that using LCE and auction revenue to support the market created the greatest benefit by ensuring the integrity of FTR settlement.	The LCE/market design funding issue is one of the critical questions identified from the consultation process. This is highlighted above in participants' replies as well in question 7. Is the current funding model for the FTR market optimal, for participants and consumers?

to constraints is not.	income to support the settlement of the FTR market?	Nodal noted that covering loss rentals in an FTR is in part an energy hedge rather than solely a LPR hedge. If loss rentals were to be separated out of an FTR, this would dramatically complicate the FTR product and add an unnecessary barrier to market participation. Smartwin noted that including both losses and constraints in the funding is necessary to provide a higher degree of certainty and confidence in the market for participants Meridian and Genesis raised concerns around how LCE is currently used to fund the market, noting their opposition to financial intermediaries, not exposed to LPR, extracting LCE from the market. They suggested it would be more efficient that a greater share of the funding should come from auction revenue, returning more LCE to physical participants in the market. Acropolis suggested that the market should be funded by auction revenue only.	Although many participants who replied supported the use of LCE to settle the market, some firms raised concerns questioning the current use of LCE, and participation by non-physical participants in the market. As noted in the Authority's reply to question 7, a review of overseas markets indicates that using LCE and auction revenue to fund the market may be detrimental to consumers. Initial evidence suggests that LCE funding alone to fund the market, with auction revenue being passed back to grid customers may result in better outcomes for consumers. Further analysis is required around funding and market design options before any decision can be taken to change the current structure. Further analysis is required of what the net impact would be on consumers of any such changes. This will require further detailed market options analysis and consultation with market participants.
Observation 7: Many parties (particularly direct connect consumers and independent retailers) who are subject to LPR are not using the FTR market.	10. Why do you think organisations that are exposed to LPR are not participating in the FTR market (directly or indirectly)?	There was a varied reply to this question. As in question 8, some participants noted the different firm/business strategies and skill sets explained the difference in participation, as there is in any market, and that this is simply a reflection of normal competitive market operation. Complexity, informational and prudential requirements, transparency were raised as issues by a number of participants. A number of participants noted that even if a firm wasn't directly participating in the market, that it was still benefiting from the market indirectly, as FTRs lowered the overall operating costs and increased competition in the wholesale and retail market for all participants (whether participants participated directly in the market or not). Bold noted that the fact that some market participants do not use FTRs should not be a concern for the EA, noting that the focus should be to give every participant the equal right/opportunity to access the market; whether participants utilise this right is up to each individual firm.	From participants' replies it is clear there is scope to reduce barriers to entering the market. This should drive increased participation, which will help improve liquidity and should also further enhance price discovery. The benefit of indirect gains is a significant benefit from the FTR market. Even if firms are not participating in the market, they are benefiting indirectly from the lower operating costs and increased competition in the electricity market derived from the FTR market activity. The Authority recognises it needs to address the points raised by participants of possible barriers for new entrants and look to encourage increased activity in the market for existing participants. The Authority can look at ways to address potential barriers in market complexity, prudential requirements, market transparency, and education. The Authority will work with EMS on ways to increase education for participants in the market. In addition, the Authority will provide access to the forward price curve to market participants, helping increase transparency and competition in the market.

	11. What do you think can be done to maximise the efficient use of LCE for the benefit of consumers?	There was a similar breakdown by participants into opposing views of LCE use as in question 7. Genesis and Meridian see non-physical participants/financial intermediaries extracting LCE and value from the market to the detriment of physical participants managing LPR, increasing costs to consumers. They suggested limiting the ability/capacity of financial intermediaries to extract LCE from the market. Mercury supports the current use of LCE to help firm the market and provide settlement certainty. While independent retailers supported the use of LCE to fund the market, they noted that increased participation would lead to less reliance on LCE funding. Nodal noted that better alignment with the futures market would improve LPR and increase participation. emhTrade noted that the way revenue (in)adequacy levels are managed by the FTR market should be revisited as part of a structured market review.	The suggestion by some participants to limiting financial intermediaries' participation in the FTR market has the potential to cause serious harm to the market: this could lead to reduced competition, lower participation, and less efficient price discovery. The Authority disagrees with this suggestion to limit the participation of financial intermediaries. The Authority's view is that further analysis is required around funding and market design options before any decision can be taken to change the current structure. Further analysis is required of what the net impact would be on consumers of any such changes. This will require further detailed market options analysis and consultation with market participants. A number of participants identified the need for better alignment of FTRs with futures products, review of revenue adequacy settings, and the need to increase market participation. The Authority will continue to engage with EMS as part of its normal review process for how the market is operating, particularly around the question of the revenue adequacy and capacity settings.
	12. Do you consider LPR to be an impediment to effective retail and generation competition?	All gentailers and retailers indicated that LPR is a market risk for participants that needs to be addressed to further enhance competition.	As indicated by some participants' replies to earlier questions, although LPR is an impediment to competition, and the FTR market provides participants with a mechanism to address this risk, issues have been raised around how efficiently the market is doing this. The Authority will continue to undertake periodic reviews of the FTR to ensure that it is performing as intended.
	13. How does the FTR market allow you to manage LPR? What non-FTR market tools do you use to manage LPR?	Participants noted they also use ASX futures, OTC, retail pricing and portfolio and investment strategies to manage LPR. The specific options participants use differs from firm to firm, depending on firm strategy and their internal skill sets. Participants have the ability to contract in these services. Bold noted that there was limited activity in secondary markets that needed time to develop further. Another issue noted by participants is the complexity/ information requirements that can be a limiting factor for new entrants and for smaller participants with less specialist resources.	Participants have a growing list of instruments they can use to manage LPR, with FTRs, ASX futures, and OTC contracts. The degree to which participants can use these instruments depends on the internal skills and investment/business strategy of each firm, in addition to the inherent properties of the financial instruments themselves. The Authority recognizes the lack of activity in the secondary market is an issue, as this reduces the ability of firms to trade when they wish and slows development in the market. Increasing the ability of firms to open and close their positions through a secondary market, can be expected to lead to greater confidence in the market and enhanced price discovery. Firms are able to purchase the services from financial intermediaries to participate in the FTR market. Complexity does not need to be a barrier to entry.

	14. Are changes required to the FTR market for the long-term benefit of consumers?	Almost all participants who commented noted that changes were required to improve outcomes for consumers. Again, there were wide and varied replies on what sort of changes were necessary to improve the market. The participation and impact of financial intermediaries was raised by Meridian and Genesis, wanting to see these participants either excluded or reduced in their ability to transact in the market. This view is strongly opposed by many participants in the consultation, who see financial intermediaries increasing liquidity, improving price discovery and competition in the market. Participants made the following specific suggestions: Increasing the number of hubs [Mercury]; EA providing better information through forward price curve to the market [Nodal]; issue new products/cap products [Electric Kiwi+Haast]; cap FTR purchases based on firm's spot market purchases [Genesis]; better align the FTR to futures market [Flick]; reduce barriers to entry: prudential, complexity, education, information [MEUG].	The suggestion by some participants to limit/remove financial intermediaries from the FTR market has the potential to cause considerable harm to the market, through reduced liquidity, a reduction in competitive pressure and efficient pricing. The Authority is looking at how it can provide better information to participants by publishing a forward price curve (see section 7). Participants' suggestions on additional hubs, new products, possible caps, prudential requirements, and information provision will require further analysis and consultation with stakeholders and EMS.
Observation 8: FTRs tend to trade somewhat below 'fair-value.'	15. Do you agree with the view that FTRs are currently traded below 'fair-value'?	Participants' views are divided on this question. Meridian and Genesis again note the participation of financial intermediaries as an issue, extracting profits in a systemic way from the market given its funding structure. Contact notes it is difficult to determine whether FTRs trade below fair-value, and that looking at FTR profitability in isolation neglects the impact of offsetting transactions made on the ASX or via a CFD. Mercury and many of the financial intermediaries see the market trading at fair-value at the time of each auction, with the ability of any participant to compete equally in the market, with outcomes based on a variety of factors as in any normal competitive market. A number of participants note that the issue is more acute in the last three years where market expectation of the future price has consistently been below the actual price in the future. This is seen as a matter of market dynamics particular to this specific period that could change, and a period of losses rather than profits emerge at some point in the future.	The "fair-value" question is one of the four key issues to come out of the FTR consultation and is connected to market funding and design issues raised earlier. The Authority's analysis indicates that FTRs are fair-value at time of auction (see Section 5). The evidence for this is stronger for shorter dated products (ie. <1year); there is a degree of price variation for the longer dated two-year product, with the ASX market showing higher variation about the trend. The fair-value finding however does not indicate whether this is the most efficient use of LCE. Changing the market settings will see a different fair-value price settled, but the fair value outcome does not indicate that the use of LCE is the most efficient in terms of consumer outcomes; it only indicates that for the given initial market settings, that the settled price is fair value given these initial starting conditions in the market.

	16. Should FTRs be traded at/closer to 'fair-value?	There was a varied reply, but of those participants who responded, most agreed that FTRs do trade at (or close) to fair-value. Meridian and Genesis again noted that they felt that participation of financial intermediaries distorted the fair-value price.	As noted in question 15, the Authority's analysis indicates that FTRs are traded at fair-value at time of auction.
Observation 9: Some features of the FTR market appear unintended and have no direct link to consumer benefit.	17. Are there other features of the FTR market that appear unintended (or to have no clear consumer benefit)?	Most participants did not reply to this question. A number of participants who did noted that the FTR market has actually had additional, positive, unintended benefits. The two most common reasons noted are that FTRs provide an energy hedge (emhTrade, Electric Kiwi+Haast, Acropolis), and increase liquidity in the futures market (Contact, emhTrade), to the benefit of consumers.	The Authority has identified a number of co-benefits arising from the current settings and structure of the FTR market[48] The fact that participants are using FTRs as an energy hedge, and activity in the FTR market is leading to increased liquidity in the ASX futures market to cover FTR positions are both unintended benefits from the original market design. The co-benefits are related to the current market structure and source of funding. Any changes to the current market design, such as removing auction revenue to settle the market, may reduce the impact of the co-benefit; however this needs to be weighed against the gain to consumers through reducing the transfer of LCE to non-physical participants. Further analysis would be required to test this.
	18. Does the feature of the FTR market identified by the Authority negatively impact consumers?	There were a variety of replies, with no single common theme: The market is not operating to the benefit of consumers; wealth is being extracted by non-physical participants who not exposed to LPR [Genesis]; trading of FTRs outside of the auction process is very limited. [Meridian]; increase participation and increase education for market participants [Nodal]; reverse-flow options provide a useful price discovery and liquidity service to the market [Smartwin]; the scale of the LCE problem is small (LCE of $5.3m/mth), and LCE may not be passed on by EDBs to end consumers under current market structure [Alpine].	The Authority agrees with the need to identify further ways to increase participation in the FTR market, given the benefits this is expected to bring to participants and consumers. The Authority's view is that although initial findings suggest benefits to consumers from amending market funding (removing auction revenue), further analysis is required around funding and market design options before any decision can be taken to change the current structure. Further analysis is required of what the net impact that any such change would have on the outcomes for consumers. This will require further detailed market options analysis and consultation with market participants. This issue will be reviewed in future review of the market. The review has identified education and information options to enhance transparency and competition in the market. The Authority with engage with EMS on education options EMS can offer to market participants. In addition, the Authority will make available a forward price curve on the FTR market to market participants.

[48] A range of co-benefits are described in section 6 of the paper.

			The Authority will engage with EMS around governance issues and review of the revenue adequacy settings.
Observation 10: The Financial Markets Authority does not regulate trading conduct in the FTR market.	19. Do you think there is a requirement for enhanced oversight of the FTR market?	There was an even split in the number of participants who thought there should be further regulation of the market (although it should be noted only half of participants provided a reply). Participants who agreed that further regulatory oversight could have positive impacts for firms and consumers noted however that further analysis was required, and the need for coordination with FMA on any changes in regulation of the market. [Genesis, Nodal, Smartwin] A number of participants raised concerns that further regulation of the market could cause adverse outcomes, creating greater barriers to entry affecting participation and increase costs to participants. [Meridian, EMS, Alpine]	The Authority has identified there may be a regulatory gap in the FTR market. Further work is being undertaken to determine possible responses. A regulatory response to the gap is being considered and stakeholders will be consulted on in mid-2023. Increased regulatory oversight, if carefully targeted to ensure net benefits to participants and consumers, will contribute to increased transparency, lower barriers to participation, and lead to a more efficient market.
Observation 11: Revenue adequacy settings of the FTR market contribute to the profitability of FTR.	20. What are your views on speculators benefiting from the design of the FTR market?	A number of participants raised concerns regarding the participation of financial intermediaries in the market. This issue split into two clearly opposed positions: The first, and smaller of the two groups, representing a quarter of respondents, see financial intermediaries as a negative impact on the market to the detriment of physical participants and consumers [Meridian and Genesis]. This view was strongly contested by the second group of participants (representing three quarters of submitters in the consultation process). [Mercury, the financial intermediaries, and independent retailers]. This second group contend that financial intermediaries, far from being detrimental to physical participants and consumers, are critical to both in providing benefits through enhanced price discovery, increased market liquidity, product innovation, and increased competition. These submitters note that excluding financial intermediaries would lead to a less robust market, less efficient pricing, weaker competition, and reduced benefits to consumers.	Financial intermediaries are not unique in their ability to be able to derive benefit/profit from the FTR market. There is an equality of access/opportunity to trade in the market if a firm chooses to do so. The benefits/profit outcomes depend on the internal firm capabilities and trading strategies of any firm. The Authority disagrees with the view expressed by some participants that financial intermediaries participation in the market is increasing costs and reducing consumer benefit, and that their ability to participate should be limited or capped. This would likely reduce activity and liquidity in the market, have a negative impact on price discovery, and reduce competition. The impact of such changes would likely be a reduction in benefits to consumers in the long term.
	21. What benefit does speculation provide to the FTR market, and what link does this provide to	There are two clear opposing views about the presence of financial intermediaries in the FTR market. In the first group, there is a view that financial intermediaries extract value from the FTR market through LCE that is then no longer available to be reinvested by physical participants, to the detriment of consumers. [Genesis, Meridian, Nova,	Financial intermediaries, through the specialist experience and skills, provide services some market participants would otherwise find difficult to replicate. Limiting financial intermediaries' activity or presence could lead to lower levels of competition and a lower level of benefits to consumers. The Authority therefore disagrees with the view expressed by some participants to limit financial intermediaries'

	consumer benefit?	ENA].Meridian noted that as the FTR market is auction based with limited volumes available, financial intermediaries provide no additional liquidity to the market. Instead, speculators reduce the number of FTRs available for physical participants to use to manage their LPR and increase costs. The second group disagree with this position. These participants see financial intermediaries as a critical part of the market, providing enhanced priced discovery, increased liquidity (in the futures market), greater levels of competition, increased participation, a more efficient market, and real benefits to consumers. [Mercury, the financial intermediaries, independent retailers, EMS].	participation in the market due to the risk of reduction in benefits to consumers this is likely to cause.
Additional: FTR market governance issues Adding more hubs		Non-physical participants with no LPR currently outnumber FTR participants with LPR, they have the ability to approve additional hubs that benefit speculators rather than parties seeking to manage LPR. [Genesis] Introduce a proportionate voting system using the methodology for adding or removing FTR hubs. Increase in the number of FTR hubs will benefit consumers in the long term. [Mercury]; adding more hubs and extending FTRs to same period as ASX futures. [Nodal].	The Authority will engage with EMS on the governance issues that have been raised. The suggestion to increase the number of hubs will require further analysis and close consultation with EMS and market participants if this were to proceed. Changing the duration of FTS to match the ASX futures is a significant change that would require significant consultation with stakeholders if it was to be considered in the future.

Appendix C Fair-value analysis

Initial analysis undertaken by the Authority in 2019[49] involved a comparison of Benmore to Otahuhu (BEN_OTA) obligation FTRs against the BEN_OTA ASX[50] exchange traded baseload electricity futures differential averaged out across time.[51] The BEN_OTA obligation FTRs were selected for comparison because futures are traded only at two nodes, Benmore and Otahuhu, and are predominantly baseload obligation contracts.

Benmore to Otahuhu fair value

The purpose of the new analysis following the May 2022 Issues paper, was to examine the BEN_OTA obligation FTRs and the equivalent BEN_OTA futures differential at the time of auction. A BEN_OTA obligation FTR has the equivalent settlement to an OTA 'buy' futures contract held with a BEN 'sell' futures contract. It was expected that the residuals would be reasonably small because any large residuals would be arbitraged away by trading between the two markets and over time residuals would converge as auctions neared the contract start date.

Daily settlement prices obtained from exchange traded futures contribute to the formation of the forward curve. Assuming there is adequate allocative, operational and informational efficiency in the futures market, the forward curve reflects the market's expectation of electricity prices at a future point in time. This forward curve is the most appropriate benchmark for perceived fair-value.

In the data collection phase, it was identified that there were discrepancies that needed to be addressed:

FTR auction months are not always structured in a way that aligns with the equivalent ASX futures (which are traded quarterly and as individual months).

FTRs are monthly products auctioned two years out whereas exchange traded futures are available as quarterly products four years out and monthly products six months out – an approximation is required to combine three corresponding FTRs to an exchange traded quarterly

The initial analysis focused on the FTR primary auctions that correspond to equivalent futures quarterlies two years out from expiry, and FTR variation auctions that correspond to equivalent futures monthlies three, two and one month out from expiry. These auctions were identified to be in the best alignment with exchange futures. (ie. product time coverage was equivalent, and price data reflected same moment in time).

In addition, BEN_OTA option FTRs are more commonly transacted than BEN_OTA obligation FTRs, whereas futures are mainly obligations – a solution is required to account for this otherwise there will be fewer data points to compare. Two solutions were proposed and approved to be valid by Resource Innovation, the supplier of the FTR modelling software:

the inference of an obligation price from the difference between the directional option prices

- $OBL_{BEN \rightarrow OTA} = OPT_{BEN \rightarrow OTA} - OPT_{OTA \rightarrow BEN}$

the inference of an obligation price from the addition of obligation prices for paths in between BEN_OTA (this was not required due to the availability of auction shadow prices)

- $OBL_{BEN \rightarrow OTA} = OBL_{BEN \rightarrow HAY} + OBL_{HAY \rightarrow WKM} + OBL_{WKM \rightarrow OTA}$

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49 Post implementation review 2019 https://www.ea.govt.nz/monitoring/enquiries-reviews-and- investigations/2019-2020/post-implementation-review-of-the-ftr-market/

50 Australian Securities Exchange

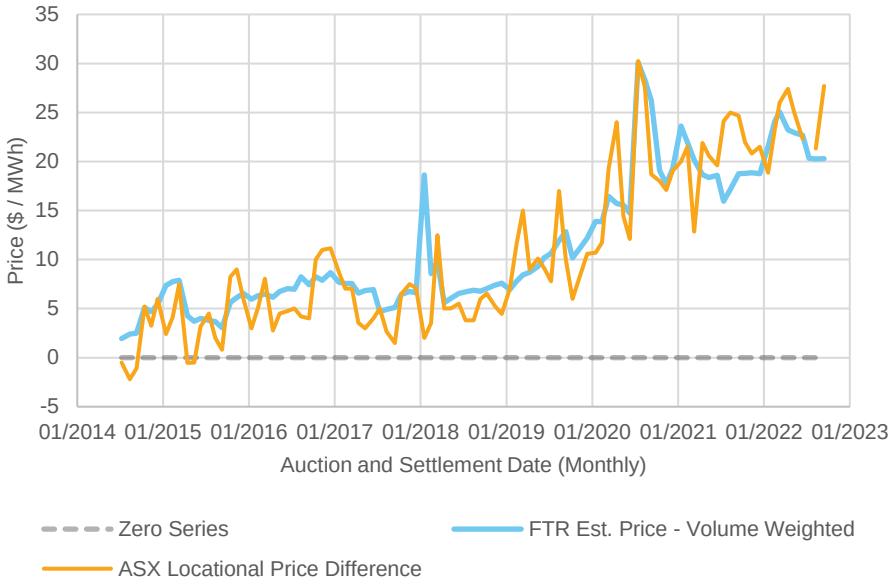
51 This analysis follows on from analysis conducted in November 2019[51] which used the average of several BEN_OTA obligation FTR and BEN_OTA futures data points for comparison. The November 2019 analysis provided a useful indication of the residuals between the two smoothed data sets. This latest analysis will focus on price action at the time of auction, when similar information is available to market participants of both the FTR market and the futures market.

For the comparison to futures quarterlies 2-years out from expiry, FTR auctions between June 2013 and June 2014 were excluded because FTRs were in the process of ramping up to a 2-year horizon. Hence, the analysis was completed for between June 2014 and October 2022.

Figure 1 provides a comparison between a volume weighted BEN_OTA obligation FTR estimated price for the relevant quarter, compared to the corresponding futures quarterly locational price difference for Benmore and Otahuhu. The auction dates used for comparison are observing prices for FTR products two years out from expiry. ie, FTR auctions in July, August and September 2014 are for July, August, and September 2016 FTRs which correspond to Q3 2016 futures.

A total of 99 auctions were analysed with 60 auctions where the FTR estimated price exceeded the futures locational price difference, and 39 auctions where the futures locational price difference exceeded the FTR estimated price.

Figure 1: FTR vs futures quarterly price equivalent for a 2-year horizon



For the comparisons to futures monthlies three, two and one month out from expiry, FTR auctions between June 2013 and August 2013 were excluded because FTRs were in the process of ramping up to a three-month horizon. The period between September 2013 and March 2014 was also excluded due to the poor availability of exchange data. Hence, the analysis was completed for between April 2014 and October 2022.

Figure 2 (below) provides a comparison between the BEN_OTA obligation FTR estimated price for the relevant month (three months out), compared to the corresponding futures monthly locational price difference for Benmore and Otahuhu. The auction dates used for comparison are observing prices for FTR products three months out from expiry.

A total of 102 auctions were analysed with 48 auctions where the FTR estimated price exceeded the futures locational price difference, and 54 auctions where the futures locational price difference exceeded the FTR estimated price.

Figure 2: FTR vs futures monthly price equivalent for a three-month horizon

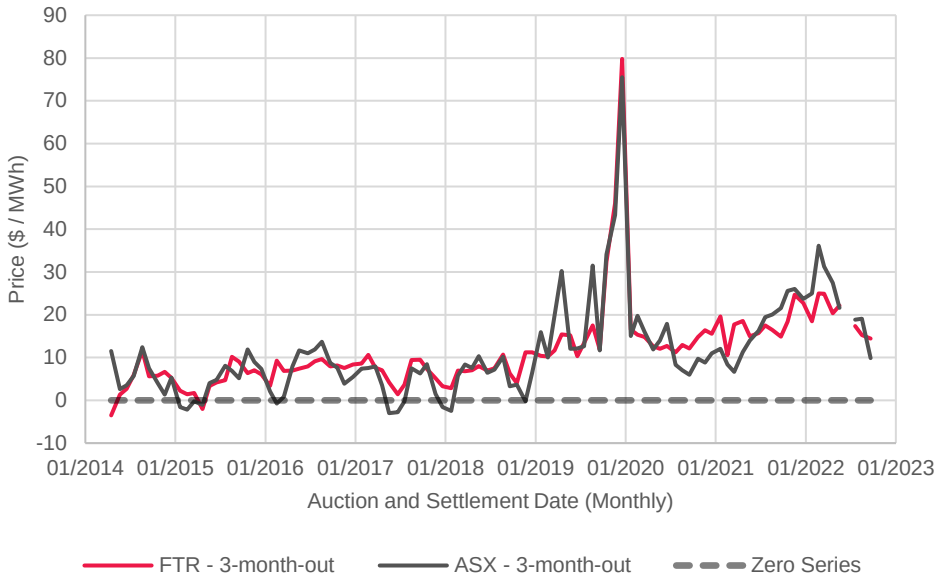


Figure 3 provides a comparison between the BEN_OTA obligation FTR estimated price for the relevant month (two months out), compared to the corresponding futures monthly locational price difference for Benmore and Otahuhu. The auction dates used for comparison are observing prices for FTR products two months out from expiry.

A total of 102 auctions were analysed with 51 auctions where the FTR estimated price exceeded the futures locational price difference, and 51 auctions where the futures locational price difference exceeded the FTR estimated price.

An outlier was observed for the November 2018 auction, where there was a buy of 0.9 MW for the BEN-OTA option and no other buys/sells on the BEN-OTA path. Buys/sells were present on other paths.

Figure 3: FTR vs futures monthly price equivalent for a two-month horizon

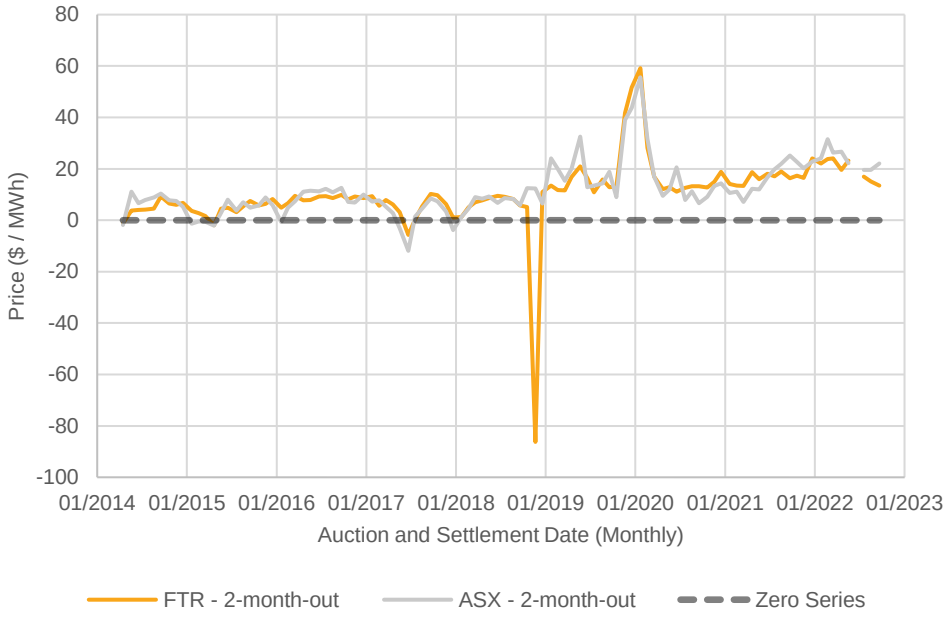


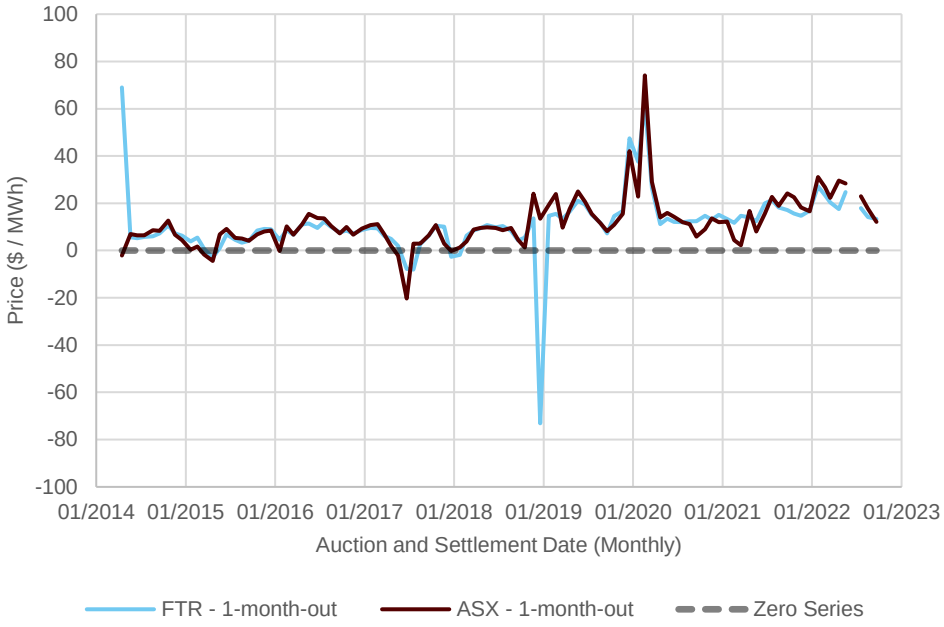
Figure 4 (below) provides a comparison between the FTR estimated price for the relevant month (one month out), compared to the corresponding futures monthly locational price difference for Benmore and Otahuhu. The auction dates used for comparison are observing prices for FTR products one month out from expiry.

A total of 101 auctions were analysed with 54 auctions where the FTR estimated price exceeded the futures locational price difference, and 47 auctions where the futures locational price difference exceeded the FTR estimated price.

An outlier was observed for the April 2014 auction, where there were no buys/sells on the BEN-OTA path and no buys/sells on other paths.

An outlier was also observed for the December 2018 auction, where there was a sell of 0.3 MW for the BEN-OTA option, sell of 9.1 MW for the OTA-BEN option, and no other buys/sells on the BEN-OTA path. Buys/sells were present on other paths.

Figure 4: FTR vs futures monthly price equivalent for a one-month horizon



Benmore to Otahuhu alternative pathways

It is only possible to directly compare FTR prices with ASX prices for the BEN-OTA route. To assess the fairness of FTR prices for other routes (such as Otahuhu to Haywards) a different approach was used.

This makes use of the fact that a participant could construct an equivalent FTR product to the BEN-OTA product via an intermediary hub. For example, an OTA to HAY obligation, paired with a HAY to BEN obligation would provide the same cover as a direct OTA to BEN obligation. A similar indirect route could be constructed using any of the (currently) six intermediate hubs.

If the main OTA to BEN route is fairly valued (relative to ASX prices), then these “intermediary hub routes” allow us to investigate whether the other pathways are also fairly valued.

This analysis used the same dataset as the initial analysis, and only considered FTR auctions with products that correspond to complete quarterly periods. While this does not consider all possible FTR auctions, the dataset includes 200 FTR auctions covering the period from 2014 to 2022, and 921 intermediate route/auction pairs in these auctions. This is expected to be sufficient to test the operation of intermediary node routes.

The first step in this alternative pathway analysis is the same as for the original Benmore to Otahuhu analysis. Obligation contracts were traded infrequently across all routes, hence the price for option products in both directions to derive an obligation price.[52] This was performed for all routes between BEN or OTA with one intermediary hub.

[52] These prices were shadow prices computed by the settlement software if no auction price was published because FTR volume was awarded.

Then, for each auction analysed, all the possible “intermediary hub routes” were compared with the direct route price. Of the 921 auction/route combinations for which data existed, only three had price differences of more than 1%. All three used the Redclyffe node in the Hawke’s Bay as the intermediary node and occurred within a few months after Redclyffe became an FTR hub in mid 2018.

In each of these instances, the price difference occurs because of a zero price for the Benmore to Redclyffe leg of the intermediate route; there was no “quantity awarded” across the leg, indicating that the price is a “shadow price” derived from the FTR software, rather than a cleared price. It is not certain whether this zero price is accurate, or if it arises because of data quality issues. Zero prices in data can often be erroneously represented “null” values (null values being an indicator of missing, invalid or otherwise non-existent data), and perhaps this is what has occurred in this situation. Given the limited extent of these data anomalies, it has negligible impact on the conclusions of this analysis.

Notwithstanding these three results, FTR prices for indirect routes between OTA and BEN aligned very closely with those for the direct route. While this result is not unexpected based on the intent of the FTR auction software, it is reassuring that the theoretical outcome is reflected in empirical data. It also suggests that pricing efficiency for FTRs on routes other than OTA_BEN route does not differ systematically from that on the OTA_BEN route.