April 2022

Distribution Pricing: Practice Note

Second Edition v 2.1, 2022

ELECTRICITY AUTHORITY
TE MANA HIKO

Contents

Wider information relevant to this Practice Note

The following relevant documents are available on the Electricity Authority's website's distribution pricing pages:

- The 2019 distribution pricing principles
- Distribution Pricing Scorecard - Interpretation Guide
- 2021 scorecards and the covering reports.

The *Distribution Pricing: Practice Note 2019* remains relevant and valid.[1] For ease of reference the 2019 guidance is included in this document as Appendix B.

This April 2022 version 2.1 of the second edition is a minor update to the December 2021 2nd edition. The update provides additional guidance relating only to locational pricing, which can be found at (new) paragraphs 89, 90 and 91. Numbering for the paragraphs that follow has therefore been updated.

[1] The 2019 Practice note remains valid with the exception of 2019's Figure 1, which is updated by Figure 1 in this 2021 2nd edition v2.1.

Part 1: Purpose

This Part lays out the purpose of the updated Practice Note and its expected future updates.

Purpose and overarching principles

1. The purpose of this 2nd edition Practice Note is to provide further guidance to assist distributors with applying the 2019 Distribution Pricing Principles.
2. The 2019 Distribution Practice Note remains relevant and valid and so is appended to this 2021 2nd Edition.[2] The guidance has been refreshed to now also provide:
    a. further guidance on the application of the pricing principles
    b. additional guidance and illustrations on the future course expected for distribution pricing
    c. timeframes expected for reform of distribution pricing
    d. more detail on what the Authority considers 'good looks like': outcomes driven by pricing reform from different stakeholders' perspectives.

Future updates

3. As reform of distribution pricing evolves, we expect to review and update this Practice Note again. This guidance is intended to be a 'living document' for the industry to reference in implementing efficient distribution pricing. This means that this 2021 2nd edition contains parts which may be superseded in the future as pricing reforms and conditions develop.

Forward engagement focus

4. Stakeholder feedback on the draft version of this 2nd edition Practice Note has highlighted key matters on which the sector seeks ongoing engagement and further clarification:
    a. expectations of pricing reform opportunities and progress during the phase out of the Low Fixed Charge regime
    b. customer impacts in regards of locational pricing and rate of transition to new pricing
    c. the merits (or not) of pass-through of price signalling for both transmission and distribution pricing.
5. The Authority considers that these matters are best progressed through broad engagement with stakeholders over 2022 and 2023. The intention will be to build on combined industry knowledge expertise and experiences to produce a shared understanding and agreement, rather than being specified through this 2nd edition of the Practice Note.
6. Outcomes of engagement and discussion on the above matters are likely to inform the next edition of this Practice Note.
7. Stakeholders have also highlighted data access for low voltage network congestion analysis to inform price setting is a concern. Consideration of this matter lies within the Authority's parallel workstream '*Updating the regulatory settings for the distribution sector*'. Concerns raised have been shared within the Authority and given the importance to pricing reform, the workstreams are collaborating.

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2 The 2019 Practice note remains valid with the exception of Figure 1, which is updated by Figure 1 in this 2021 2nd edition v2.1.

The 2019 Distribution pricing principles

a. Prices are to signal the economic costs of service provision, including by:

   i. being subsidy free (equal to or greater than avoidable costs, and less than or equal to standalone costs);
   ii. reflecting the impacts of network use on economic costs;
   iii. reflecting differences in network service provided to (or by) consumers; and
   iv. encouraging efficient network alternatives.

b. Where prices that signal economic costs would under-recover target revenues, the shortfall should be made up by prices that least distort network use.

c. Prices should be responsive to the requirements and circumstances of end users by allowing negotiation to:

   i. reflect the economic value of services; and
   ii. enable price/quality trade-offs.

d. Development of prices should be transparent and have regard to transaction costs, consumer impacts, and uptake incentives.

Part 2: Expectations on the application of the distribution pricing principles

This Part sets out the Authority's expectations for how the principles work to send appropriate pricing signals, how they work with asset management practices, capital contribution policies and lead to efficient pricing outcomes that benefit customers.

8. The primary role of efficient pricing is to correctly signal the most efficient use of the existing network and, where appropriate, to reflect the cost of future network investments or the application of non-network investments – the latter either by the distributor[3], its end-users, or other participants. By encouraging more efficient use of and investment in electricity networks, efficient distribution pricing leads to relatively lower prices for electricity consumers in the long-term. Promoting efficient electricity infrastructure investment will be particularly important as New Zealand electrifies its transport fleet and industrial processes over the next 30 years to support its transition to a low-emissions economy.
9. The *Distribution Pricing: Practice Note August 2019* signalled that efficient pricing requires a different approach to price-setting. Traditional price-setting allocated target revenue to consumer groups then developed prices for each group.
10. Efficient pricing over the longer term for a distribution network involves a process to develop cost-reflective allocations and using price as a signalling mechanism (where needed), and then (given the target revenue to recover) allocating residual costs in a least distortionary manner.
11. Figure 1 below illustrates the components of efficient distribution pricing. This graphic supersedes the version in the *Distribution Pricing: Practice Note August 2019* as we believe this version better illustrates the cost allocation, price signalling and final price setting approach.
12. Since April 2020 all distributors under Default Price-Quality Path and Customised Price-Quality Path regulation have had their revenue set via a revenue cap rather than a price cap. This approach removes the uncertainty associated with demand fluctuations interfering with calculating target revenue, and so provides more latitude for how distributors set prices and progress their reforms towards efficient distribution pricing.
13. The Commerce Commission noted in its Reasons Paper supporting the latest Default Price-Quality Path setting, *"[i]mplementing a revenue cap (as opposed to the previous price cap) will give distributors the flexibility to price in ways that offer more choice to consumers and that enhance incentives for energy efficiency and demand-side management."*[4] Distributors can now undertake more active price signalling to consumers to both encourage usage in times of low network congestion or demand, and to discourage usage during times of network constraint. This also applies to signals to suppliers of energy (via localised generation activity or distributed energy resources) where prices can signal when and where it is efficient for the network to receive energy, and when it is not.

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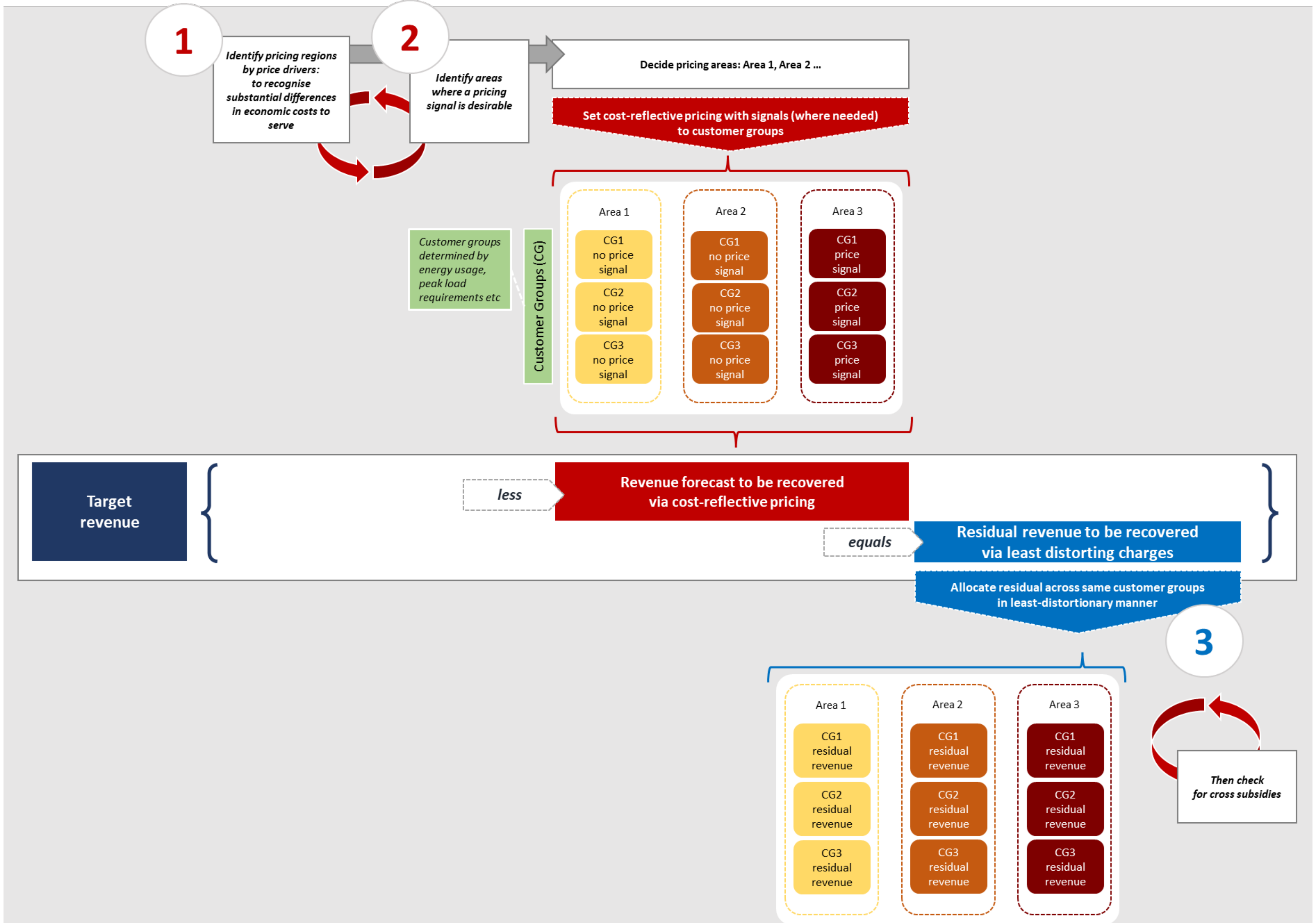
[3] Distributor investments in non-network alternatives is being considered as part of the *Updating the Regulatory Settings for Distribution Networks* consultation (August 2021).

[4] *Default price-quality paths for electricity distribution businesses from 1 April 2020 – Final decision*, Commerce Commission, 27 November 2019

Figure 1: Steps to setting efficient distribution pricing: 1) cost drivers and 2) any price signalling and 3) least distortionary residual allocation



What is expected of cost-reflective pricing with price signalling?

Cost reflective pricing

14. Setting prices to recover the economic cost of delivering electricity to a group of customers is the traditional definition of 'cost reflective'. That is, cost allocations should reflect the underlying drivers (causes) of cost and should recover the cost of sunk or already invested infrastructure, can include a price signal, and should be free of cross-subsidies. The price signalling element can also reflect the cost of providing new network capacity to customers, and, within the constraints set by the distributor's maximum allowable revenue, may at times be an even stronger signal (see paragraph 33 below).
15. The 2019 Distribution Pricing Practice Note's section 3.2 contains for more detailed guidance on considerations for allocating costs according to known cost drivers (The 2019 note is at Appendix B of this 2021 2nd Edition).

Why use a price signal?

16. A price signal is intuitively understood as the most visible input to the question *'am I willing to consume now at this given price?'*. Common price signals that people often deal with are hotel prices and airline tickets. With low supply and high demand we expect a higher relative price, and *vice versa*. A price signal creates a situation where choice can (usually) be exercised - do I consume now, do I change my consumption pattern, or do I find an alternative? It incentivises (rather than instructs) consumers, retailers, and flexibility traders to determine their willingness to be active in shifting demand.
17. A well-designed price signal provides a cost-reflective measure of the impact that an additional marginal unit of energy has on the network and can signal the opportunity cost of future necessary investments to accommodate increasing demand. Across a system or network the various price signals work to balance supply and demand – now and in the future. There is a continuum of people exercising their choices of how they value their marginal energy: as price rises, fewer people will keep consuming. These decisions are invisible to the distributor and often intuitively made by the consumer, or on their behalf, according to a multitude of individual preferences. As technology evolves demand shifting may become more invisible to the end consumer. Why someone values the energy they use is not necessary for a distributor to understand in order to provide efficient price signals.
18. Price signalling must reflect the state of the network and will therefore range from sending no signal, to a signal that incentivises a particular action. Its core aim is to signal physical loading on the network relative to capacity. When there is no (actual or anticipated) congestion the price signal should not be influencing how consumers use the network.[5] A peak signal could create a distortion that is inefficient and harms customers (eg, if it incentivises people to turn down, or off, heating) if there's actually no congestion.
19. Instead, efficient pricing for a network with a flat or falling demand and no constraints could be a fixed charge that simply recovers the invested capital without influencing network use. If recovery via a

> Illustration: For a feeder that is congested every weekday evening, the distributor sets higher prices during that time. If this doesn't ration demand the distributor could:
>
> - keep sharpening the signal
> - work to remove any barriers that are causing the signal to not 'get through', including considering if the cause is lack of pass-through or other response from retailers, in which case the distributor could seek to agree a solution with those retailers or flexibility traders
> - consider if the customers are simply not responsive to price. In the long term, if consumers' willingness to pay for a network upgrade exceeds the cost of the upgrade, then it would be efficient to upgrade the network.

[5] Network congestion means that network capacity is not adequate to meet demand at a particular network location at a particular time. It does not mean the same thing as peak demand on the network.

fixed charge is not available, a second-best option may be a completely flat tariff structure that does not vary by time or amount of energy consumed. By contrast, a network with congestion could address this by increasing prices during constrained periods. The increase (the signal) needs to be enough to:

a. incentivise enough demand reduction to remove the congestion, or

b. to signal that further investment in infrastructure or generation will be needed to accommodate increasing demand.[6]

20. Getting the right outcome for all customers (including those choosing to increase their electricity consumption), distributors, and other participants requires that those who stand to benefit from network (or network alternative) investments should shoulder the bulk of the cost, and those that are most able and willing to adjust their demand in response to price changes have an opportunity to monetise their choice by changing their consumption.

21. There is an interplay or circularity to allocating costs reflecting underlying cost drivers then setting a price signal - as indicated by the circular arrows in Figure 1. These arrows illustrate the aim to achieve pricing principles a) i) to iv) for cost allocations (including signalling) that applies to a customer group[7]:

being subsidy free (equal to or greater than avoidable costs, and less than or equal to standalone costs)

reflecting the impacts of network use on economic costs

reflecting differences in network service provided to (or by) consumers, and

encouraging efficient network alternatives.

22. To assess against these principles, it is necessary to complete (per figure 1) the first segmentation step then apply any desired price signal then allocate the share of the residual - *then* check whether there is over or under-recovery meaning the price signals might not align with pricing principle a) i) – that prices should be subsidy free.

23. By using prices to balance network usage, a distributor can ensure its network design is appropriate for customers' needs and avoid or delay investment in new capacity until necessary. Price signalling, within the constraint created by maximum allowable revenue, is a key component of good asset management.

24. The focus of this Practice Note is on reforming distribution prices for residential and small commercial customers.[8] Residential customers comprise 85% of total national ICPs[9] and this accounts for the bulk of the length and density of distribution networks.

Price signalling operates differently in the short and long term

25. Appropriate price signals will better manage usage of the network across the short and long term. Pricing can help ensure networks make the right investments at the right time in network and network alternatives, leading to lower overall costs to consumers in the long run: a clear consumer benefit.

26. Efficient short-term price signalling means charges could rise to ensure consumption reduces until congestion is no longer an issue on that part of the network, in the short term. An example of this is where a feeder is becoming congested for a short period each year, eg, for a few nights during the coldest part of winter, for a few hours per night. Prices are not the only method of signalling - a distributor could instead (or also) offer a 'first off' option or a demand

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[6] The Authority recognises that some consumers are not responsive to price and so price signalling can exacerbate affordability issues. The pricing principles include considering impacts on consumers. The Authority also supports MBIE's work on energy poverty.

[7] For further guidance on these principles see section 3.2 of the *Distribution Pricing: Practice Note August 2019*

[8] Sometimes referred to as 'mass market' customers

[9] Electricity Authority, EMI data

response option to help it manage network congestion, usually in return for a payment or a discount to charges.

27. It is efficient for a distributor to use such price signals to delay the necessity of investments, until the cost of a network upgrade (or alternative solution) becomes economically justifiable - ie, the value to consumers exceeds the cost. In this way, price signals lead to efficiency in the long-term. Once an investment is made to accommodate increasing demand and relieve congestion, pricing signals designed to limit use on that part of the network would likely be removed. The cost of a recent investment could be allocated across the whole network; however a more efficient pricing approach could mean a more granular cost-reflective approach that allocates long-term costs of a new part of the network to the customers connected to it (per step (1) in figure 1).[10]

28. Many distributors are pricing according to these concepts – so managing short- and long-term pricing and investment decisions via their asset management planning systems and tools which assess project investment viability. Our concern is that for some distributors price signals may need to become stronger to be confident that long-term decisions are in the best interests of customers.

The window of opportunity concept for designing effective prices as we electrify

29. Through the consultation on this Practice Note we were provided with a concept – the 'window of opportunity' that we believe assists in understanding the time element involved in efficient pricing. The 'window' describes a time dimension of anticipated congestion that is created by the interplay of increasing demand and cost reflective pricing and price signalling, and investments by distributors, customers and flexibility traders.

30. The window is determined by both a distributor's ability to respond with new investment (considering the lead time required to design, procure and build new infrastructure) and the timing of any customer investment.

31. Understanding the timing of these decisions by both distributors and customers creates a 'window of opportunity' where customers' responses to price signals can be used to efficiently defer or avoid network investment.

32. The strength of the price signal should reflect how far into the future the network constraint is expected. Sending a strong price signal too early may provide an inefficient incentive for customers' investment in distributed energy resources (DER). Conversely, sending a signal too late may not leave enough time for customers to respond before the network becomes constrained and the only practical option becomes network investment.

33. Applying the concept of a 'window of opportunity' leads to three potential pricing scenarios:

Scenario 1: Immediate Response Required

If demand is expected to create a network constraint before new infrastructure can be built, it is likely that a customer response and/or flexibility services will be required to help manage demand until such time as new infrastructure can be constructed. A strong price signal could manage demand to create the necessary response, as well as to support the entry of flexibility services.

Scenario 2: Cost-reflective price signal required

In situations where the network is expected to become constrained within the 'window of opportunity', a cost-reflective price that signals the future cost of network investment or the cost of demand-side investment (if that is lower) can influence

[10] This could be recovered as a fixed charge that is not intended to influence use of electricity, comparable to a benefit-based charge (in the transmission pricing context).

consumers to make choices about their consumption behaviour and investment in DER.

Scenario 3: No price signal required

If demand is not expected to create a network constraint within the 'window of opportunity' then no immediate price signal is required.

34. The specific timing of a window of opportunity will be determined by each network's characteristics and asset management framework.

35. It is important to also note at this stage that sending a price signal is not necessarily designed to ensure a demand response. Rather, a price signal is designed to ensure customers *consider* whether they want to adapt their demand, or not.

36. Sending a strong price signal where no network need is identified would result in inefficient pricing (see section *Unnecessary signalling should be avoided*). In the other direction, some distributors may want to send a weaker price signal as a temporary step where they believe that it will assist with developing customer familiarity with different pricing structures and help manage the customer impact in the future when the stronger signal may be needed.

37. The timing and purpose of a price signal therefore should be aligned with the strength of the signal. This is apparent in following sections where there is discussion of the risks of over-signalling and also an acceptance that weaker signals can serve a 'familiarity' purpose.

Price signals will vary across a network and across customer groups

38. An efficient price signal may vary across the network's footprint, and across time (over a day, week, month, or season). Depending on who is connected where, efficient price signals may also vary across customer groups. In contrast, a network with no congestion may not need price signals to shift demand across a day.

39. Time-of-use (TOU) tariff structures can be effective in reducing congestion on a specific part of a network during times of peak load. But because consumers differ, a peak signal to some consumers might be very effective, and the same signal could have zero effect on other consumers. So, balancing a network in the short-term may mean a different price for different parts of the network at different times. A blunt TOU pricing structure applied across a whole network (including parts with no congestion) may not be a useful signal. It could incentivise inefficient demand reduction or encourage inefficient investment in DER.

40. Appropriate consumer groupings require judgment by each distributor - sufficiently granular to price-signal congestion to the right consumers, but not so many that it becomes overwhelming for the distributor, retailer, flexibility traders and the wider market to understand and implement. Future technology may enable individualised price structures, but that is some way off and going to that granular level may not actually be desirable in other ways.

41. Distributors must trade-off between finely targeting price signals and pricing structures that are implementable, both for the distributor and also for retailers passing on the price signal. Whether the balance is right can be measured by how effective the price signalling is at achieving its intended goal.

    a. At times it may be appropriate to send a price signal where no current congestion or network need is evident, but the distributor's network understanding and trend analysis suggests that it will be required in the coming years. As mentioned above, this advance signalling has the benefit of helping customers to get accustomed to responding to signals.

    b. These signals, sent in anticipation of a future need, must be implemented carefully and we expect them to be monitored closely and assessed for undesirable or distortionary outcomes.

42. We do not expect to see one size fits all ‘cookie-cutter’ price signals, but rather distributors working to deeply understand both network conditions and customer demand patterns – now and over time. This process, we acknowledge, can take many years, and so pricing reform will rely on a distributor’s willingness to take appropriate actions now while building its information base and understanding to inform future pricing.

43. A distributor should understand its assets, and which assets serve which consumers, if pricing is to avoid unintended cross-subsidies from one part of a network’s consumers to other consumers.

Unnecessary signalling should be avoided

44. We try in this Practice Note to identify and illustrate what ‘good looks like’ and so for completeness we can also describe unnecessary signalling. In the simplest terms, an unnecessary price signal is sending one when it is not required, the signal does not meet a determined need[11] or it’s the wrong signal.

45. Examples include, but are not limited to:

    a. using a high variable charge component when no congestion is evident

    b. using a price signal across parts of the network that are not congested and/or which applies at times when no congestion occurs

    c. leaving a pricing signal in place after network investment has been completed and congestion is no longer an issue.

The strength of signals, and avoiding over-signalling

46. Price signals should not normally exceed the forecasted cost-reflective level of the future network investment required to respond to current and forecast demand. A price signal up to this level can be an efficient means of avoiding or deferring that future investment. The efficient price might also be well below this level, for example a cost-reflective price could signal the cost of a demand-side investment and encourage consumers to make choices about investment in DER.[12]

47. Sending a strong price signal is necessary and acceptable for the time period that the price signal is required.

Complexity

48. The distribution of electricity is a largely unseen yet relied upon service for customers, and over time, an expectation appears to have been created that pricing should be simple.

49. However, as we transition to low emissions and the economy electrifies further, future technology and service offerings available to customers are likely to become more complex, some distributors may elect to design a ‘fit-for-purpose’ pricing response. Increased complexity to better meet customer preferences could be accommodated by technology and the potential rise of flexibility traders filling a gap between customer desires and supplier needs. We expect the level of complexity and range of applicable pricing structures will rise and fall over time.

50. We expect trade-offs when balancing complex pricing with other aims. For example, a theoretically most efficient price signal for a certain situation may create confusion due to its

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11 For the avoidance of doubt, any time in this paper we refer with approval to a peak charge or TOU pricing (or any other price signal), we are referring to such a price signal that is required due to actual / imminent network congestion.

12 A possible exception to the above guidance could be that an immediate strong price signal - such as a critical peak price – could be used to efficiently ration use of a network during periods of congestion. This tool may become more prevalent in time if retailers choose to offer more variation in pricing plans for some residential and small commercial customers.

complexity, and there may be circumstances where a theoretically imperfect pricing structure is the most effective way to generate a desired response.

51. To simplify outcomes and impacts on customers, distributors and retailers need to work together to provide clarity for customers, ensuring that any aversion to pricing complexity does not slow electrification. This is an area that is often encountered and responded to - constructively - after a price change impacts a customer who then complains. Extending this good work addressing ‘outliers’ with detailed explanations to a new norm of ex-ante explanations to customers is encouraged.

Pricing signals in summary

52. By way of summary, designing effective pricing signals needs to follow a process where distributors seek to understand the following:
    a. their network design: what assets do they have, and where?
    b. flows relative to capacity: where is demand changing and congestion occurring, or expected?
    c. who’s using the network and how: do assets support all or some customers, and which customers will benefit from new investments?
    d. whether a price signal is useful, to influence users, or if prices should simply seek to recover costs in a manner that does not influence network usage (eg, a fixed daily charge) and/or reflects who is benefiting from specific parts of the network: a least distortionary cost recovery exercise.

Why? Because efficiency in network investments will lower prices for customers in the long-term

53. The purpose of effective price signalling is to provide efficient outcomes. Efficiency is shorthand for what it produces: long-term benefits for customers.

54. The electricity sector is seeing rising prices across all facets of traditional generation, transmission, and distribution. As the backbone of the electricity industry the distribution sector has a large ongoing investment programme already, to maintain, grow and replace existing networks; many with creeping age profiles and pressures to remain within regulated reliability and quality of supply requirements. Investments add costs to consumers.

> The goal of efficient cost reflective prices is that over the longer-term consumers will obtain the greatest value from their consumption of electricity, new investments will be at the right time in the right places, and consumers will pay less than they would have if prices were not efficient.

55. The 2019 Electricity Price Review found that there was no reason now to target distributors to fundamentally reduce their costs or review their prudent operation. However, if distributors overlook the pricing part of their toolkits, they risk over-investing in capital to lift capacity. Effective price-signalling can help delay or avoid additional investment.[13] This keeps prices relatively lower for consumers in the long-term.

56. Right-sizing of investments for efficient network performance is a hallmark of the sector’s engineering objectives, and most distributors are keenly aware of and anticipating the expected forthcoming ‘new energy future’ that will see their networks utilised more fully and by a wider range of participants than currently seen. This was a key component of the ENA’s 2017 *Guidance on Pricing Reform*.

57. Efficient pricing supports innovation. If pricing is cost reflective this also allows distributors to target traditional network and more innovative non-network solutions. It allows for other

[13] The Authority recognises that this is a balance: if consumers’ willingness to pay for a network upgrade exceeds the cost of the upgrade, then it is more efficient for the network upgrade to proceed.

participants, such as flexibility traders, to be involved and help to deliver a low emissions future. It leads to better use and investment decisions by consumers, including in distributed energy resources. In the context of technological changes and the substantial role that electrification is set to play in the very near term of New Zealand's low emissions future, distribution pricing reform is now critically urgent in shaping the success of achieving these goals.

Efficient pricing will lower prices in the long-term, for all

58. Efficient distribution pricing will not lower the price to every customer in the short-term. Managing the increases and decreases in network charges as they are re-balanced will require distributors to engage with customers. Retailers too will face concerns from customers affected by pricing reform, and we see that this will strengthen the partnership between distributors and retailers to deliver satisfactory outcomes to end customers. The Authority also has a role to assist distributors, retailers, and customers with this transition, and we expect that a collaborative approach will accelerate reform of distribution pricing.

59. Allocating the costs of the existing network will have different challenges to price signalling with respect to future investments. Changes to existing pricing structures may create a sense of unfairness by customers who face higher charges due to signals, location, economic costs of the part of the network they are on, and for some the fact that prices have changed when they have a history of expecting price stability.[14] There are options available to distributors to mitigate this impact. The target in any case is not necessarily to remove all cross-subsidisation,[15] but rather to provide customers with the ability to respond to price signals in their most valued manner.

60. Allocating future investment will also be critically important. Estimates of the capacity needed to deliver New Zealand's low emissions future means we can expect substantial investments over the next decades. It is imperative that efficiency is at the core of future investment decisions. We expect that those who are expected to benefit directly by a network enabling increased electrification will be allocated the related costs accordingly. By pricing efficiently distribution networks will help to position New Zealand for a lower cost transition to a low-emissions future by ensuring the best use of existing and future infrastructure.

Considering the impact of price changes on customers

61. Bill shock and impacts on customers are strong motivators to customers' acceptance of change, and the Authority therefore does not wish to create a rapid move to efficient prices that attempts to remedy decades of inaction within an unreasonably short time period.

62. The 2019 Distribution pricing principles addresses this:

> *(d) Development of prices should be transparent and have regard to transaction costs, consumer impacts, and uptake incentives.*

63. The 2019 Practice Note provides additional guidance on the application of this principle (see Appendix B).

64. To reiterate, the reason that efficient cost-reflective pricing is important to all customers is because the counterfactual - of unrestrained inefficient network investment - would increase the total costs of the system, and those inflated costs could potentially fall on parties who do not use or benefit from the investment.

65. We do not expect that providing welfare support to customers is the primary role of distributors and retailers, although we acknowledge this is often done by both. Energy hardship is a growing concern and cost reflective pricing and good price signalling will assist with keeping

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14 Although these prices are mediated by retailers so some customers may not see these changes.

15 The Authority recognises that where a very strong price signal is desirable, the subsidy-free principle may not always be attainable.

prices as low as they can be, overall and in the long-term, by ensuring that the right investments are made at the right time.[16] It will also provide greater visibility to allow better targeted support from Government agencies managing welfare outcomes.

66. Price shocks are not a desired outcome of pricing reform, and the Authority is cognisant of the need for prices to evolve on a journey towards efficient outcomes, rather than rush to an endpoint. We will have some patience with price reform once it is clearly underway, to allow customers to adjust, technology to assist, and distributors and retailers to manage good customer engagement and to learn and evolve towards what is best for their networks and customers.

67. The Authority expects to see steady progress to smooth customer bill changes over progressive years to move closer to an acceptable level of cost-reflectivity. Part 5 of this Practice Note outlines the Authority's expectations for the timing of price reform.

Pricing is part of a distributor's Asset Management toolkit

68. Good price signalling is expected to be a well-used tool in the distributor's toolkit for managing its network. It should form a part of, utilise and feed into, the Asset Management Planning process. In a strong Asset Management framework customer choices and ability to influence future investment are key parts of understanding the context of the network. Consultation on network developments and choices for alternative investments (network and non-network) have a clear pricing component and we expect they are part of discussions both internally and externally for efficiently and prudently managing investments.

69. We expect to see that options analysis of future investment include alternative pricing structures to delay or avoid investment. Given the long lead time of many network investments, there is ample opportunity for pricing to be more localised and trials and consultation undertaken with affected communities to inform the choices that distributors make. Currently this practice appears to be very infrequent.

Capital contribution policies need to align

70. How expansion or upgrade of networks is funded is often the nexus of asset planning and pricing, as expansion and upgrade investments indicate that customer needs of the network are currently not being met. Capital Contribution[17] policies are a disclosure requirement under Commerce Commission regulation.[18]

71. Currently there is no regulatory oversight of the content, design or intent of these policies which has led to distributors having a wide range of approaches. Without a single overarching goal of contribution policies – such as to recover the proportion of costs directly related to the beneficiary - there is the scope for significant cross-subsidisation and inefficient investment.

72. The role of contribution policies is another relevant question connected to the Authority's distribution pricing reform work. We expect to see all distributors bringing their contribution policies within the scope of their pricing structures and aligning with the Pricing Principles.

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16 That is, networks invest in the extra capacity at the point at which consumers are willing to pay for it, compared with poorly targeted or early upgrades that result in relatively low benefits for the consumers that ultimately pay for them.

17 Otherwise known as a Customer Contribution, Customer Connection policies

18 Section 2.4.6 of *Electricity Distribution Information Disclosure Determination 2012,* Commerce Commission

Part 3: Expectations on pricing structures

This Part sets out the Authority's expectations for how distributors segment their networks for pricing purposes – in location and time and how different approaches to pricing structures can apply.

Trade-offs abound in the journey to reform distribution prices

73. Due to the differences between networks now, and the paths each will take in the years ahead as the country responds to the challenge of the low emissions future, as well as different evolutions of customer demands and consumption patterns, it is not possible to establish a single blueprint for efficient pricing for all networks.
74. In recognising that every network is different the Authority accepts that trade-offs will impact networks differently and be managed differently, in accordance with how each distributor plans its pricing reform.
75. In setting broad expectations below, the Authority also recognises that some distributors may, at times, adopt pricing that appears contrary to a fully efficient price signal. This may be for example to manage customer impacts or to allow customers time to acclimatise to and understand new price signals – during a transition time period. We expect that each distributor understands the trade-offs they are making and is transparent about the underlying rationale for decisions made.
76. In a similar vein, there will always exist a tension between what we're advising each distributor to be cognisant of, and distributors applying their own judgement on what is best for them and their customers. For example, on decisions between pricing structures that are highly efficient and complex (so maybe difficult for retailers and customers to understand and quickly respond to) compared to a less efficient set of pricing structure that is more easily implementable, and understandable, and so more likely to achieve the intended customer response.
77. As signalled, the Authority plans to engage more closely and regularly with the sector, through formal and informal channels, and so we believe that uncertainties created by trade-offs will be able to be dealt with over time.

The optimal level of pricing granularity will change over time

78. The level of granularity with which a distributor chooses to segment its network by time (temporal), geography (spatial) and customer grouping will require an evolution of pricing structures that keeps pace with technology, trade-offs between efficiency and customer acceptance,[19] and the responsiveness of customers.
79. The need to improve granularity now is clear – price changes currently happen annually (albeit they could be changed more frequently, and in time this may become desirable) and so delaying segmentation and trialling or implementing new pricing structures costs time. The pace of change in technology and demand pattern changes is accelerating, and time is not something that distributors may have the luxury of.
80. We expect to see distributors undertake 'no regrets' work now - from understanding the flows on their networks, and the context of current prices on their networks, to trialling the efficacy of reformed price structures. We acknowledge that for distributors that do not face congestion

19 While customer acceptance is not part of the Authority's mandate, we acknowledge that it plays a role in distributor and retailer pricing decisions.

now (and don't expect it soon), reform may simply mean moving to higher fixed charges and reducing variable charges, once LFC regulations allow.[20]

81. For other distributors, increasing the granularity of network segmentation is an important first step to ensure that price signals become better directed. As noted in MIT's *Utility of the Future* paper *"Granularity matters. The prices and regulated charges for electricity services vary significantly at different times and in different locations in electricity networks. Progressively improving the temporal and locational granularity of prices and charges can deliver increased social welfare; however, these benefits must be balanced against the costs, complexity, and potential equity concerns of implementation."* [21]

82. Economic cost-price signalling takes a degree of judgement - to segment the network based on an evidence and data-driven assessment of what is practical and implementable, and then to implement pricing signals appropriate to each group. Access to relevant and accurate data to identify both congestion and consumption patterns can be difficult, but we are observing distributors retailers and meter owners making headway in reaching agreements[22]. We expect this challenge to decrease over time as access to information improves.

83. In reforming distribution pricing there is a necessary feedback loop that the Authority expects to observe as it is a necessary part of continual pricing reform: analysis, understanding, trialling, implementation, observation, and adjustment.

Locational pricing?

84. Geographical segmentation ranges from viewing the network as a whole through to considering individual ICPs. It is well understood that the cost-to-serve of each ICP is different, and the most granular, theoretically efficient cost-reflective pricing would allocate to that level (ie, real-time locational marginal pricing).[23] However, it is currently impractical and might ultimately be undesirable (in terms of overhead efficiencies and consumer impacts) to attempt such precision. Some form of segmentation is therefore required.

85. Many distributors have established geographical pricing regions reflecting significant differences in cost to serve in the long run. These are sometimes a result of historical acquisitions (a distributor buying networks in other regions), reflect an historical engineering view of the network, reflect a group around a GXP or a zone's substations, or reflect network density (ie, a rural area and an urban area). Practical segmentation of a network for efficient price signals is likely to be achievable at a zone substation level, recognising that sub-networks are interconnected Usually these may not be too different from existing pricing regions, but for some distributors zone-substation-regions may be more granular than presently used. If distributors have systems and data to segment to a deeper level, and if this seems useful for an efficient cost-reflective price signal, this should be done.

86. Distributors are expected to be able to sum the invested capital in each segment, along with recording the ongoing maintenance of it. This financial cost view of the network then sits alongside network performance standards and usage patterns to produce an economic cost of each segment's energy use.

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[20] The impact of the LFC regulations is understood to be a significant block to some distributors in their work to accelerate reform. In terms of efficiency outcomes for price signals, as measured through the Authority's annual scorecards, it is difficult for a distributor to score at the top end of the range in this category with the LFC regulations in place. Understanding specifically how LFC restricts implementing better price signals is individual to each network and we expect that distributors are clear with the Authority where these limitations occur and how they expect to respond as the LFC regulations are phased out.

[21] *Utility of the Future*, MIT, 2016, https://energy.mit.edu/research/utility-future-study/

[22] This area is being considered as part of the *Updating the Regulatory Settings for Distribution Networks* consultation (August 2021).

[23] Distribution network level locational marginal pricing has been investigated globally and some research has been undertaken in New Zealand to understand its potential reach and efficacy, especially in the widespread penetration of decentralised DER. The role of distribution locational marginal pricing is not a current consideration for the Authority.

87. We understand that currently there is a wide range of abilities across distributors (and sometimes within a distributor's network) to understand footprint granularity. Reform towards cost-reflective pricing requires this understanding to improve for many. How far segmentation should go will vary but should be to a point where the materiality of differences in price signalling or cost-reflectivity between segments is small enough to warrant no further segmenting. Footprint granularity is not a one-off exercise, as usage patterns evolve material differences could open up between previously similar segments, warranting further fine-tuning of pricing.

88. Building a segmented economic cost view of energy use and utilisation on their network is expected to be a foundational piece of progress that distributors should be demonstrating in their pricing roadmaps.

89. Distributors may wish to consider the merits of differences in locations cost drivers from at least two angles:

    e. Spatial (congestion), where costs differ across a network due to differences in congestion

    f. Spatial (geographic), where costs differ across a network due to differences in customer density, geography or topology.

90. Before engaging in locationally differentiated pricing, the distributor should have regard to the consumer impact of this change and balance this against the efficiency gains of this approach. Avoiding bill shock using an appropriate transition period if the difference is likely to be significant would also be appropriate.

91. If distributors decide not to engage in locational differentiation, they should be transparent about the degree of any cross-subsidisation that is occurring between different locales. Consideration of the appropriateness of locational pricing should be shown in their pricing roadmaps.

A time dimension to pricing?

92. Distribution networks have traditionally been built to largely allow ongoing consumption during peak periods: aiming to deliver all the energy customers want, when they want it. Whilst ripple control does dampen peak consumption down a little, during a few cold winter evenings per year, for most of the year large parts of New Zealand's 150,000 km of distribution network are unconstrained.

93. As energy consuming devices have changed and demand for energy has evolved, the peaks have tended to rise to match the habitual patterns of peoples' daily lives. As demand increases and technology such as EVs become more widespread, we could see more congestion peaks. Higher peaks may drive distributors to build more capacity for a network that for the bulk of the time is underutilised. This could be inefficient – if customers must pay for something that they mostly do not use. Or it could be efficient if customers' value for the extra energy is high.

94. Where congestion exists, correctly timing price signals to reflect the cost to the network and incentivise people to value their usage will reduce costs for everyone and lift welfare. Two of the most striking examples of habitual consumption that have been proved to be readily influenced are:

    a. load control of hot water heating: New Zealand has a long history of 'ripple control' to allow distributors to control hot water heating to reduce evening peaks. A discounted price paid by the customer for giving occasional control to the distributor benefits both, with a barely noticeable life change from the customer, and potentially large investments by the distributor avoided

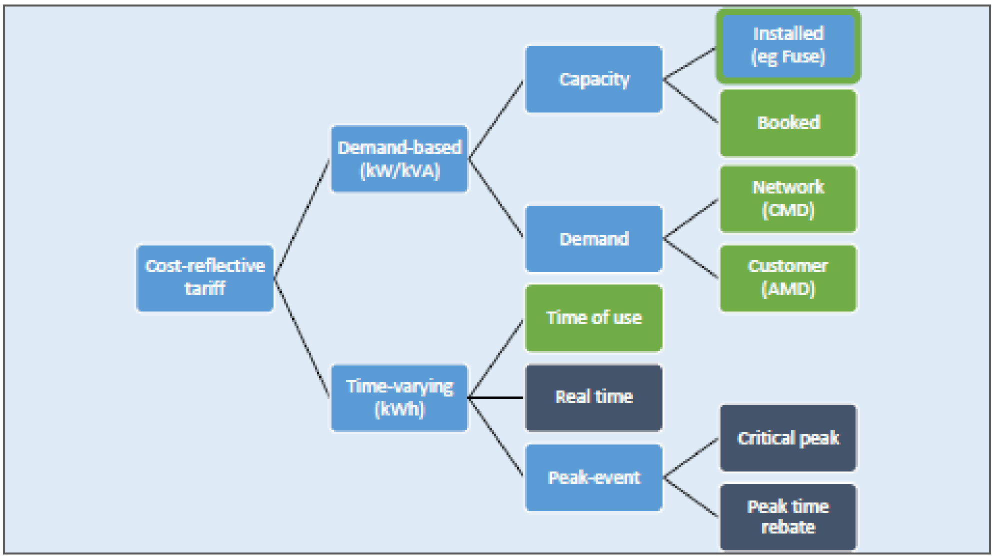
    b. home charging of EVs: This market is growing quickly and government policies to encourage further take up will exacerbate the potential for people to plug in when they return home. Domestic chargers (not necessarily fast chargers) will add to the evening peak, meaning new capacity is built (or network alternatives introduced), when instead a simple price signal could achieve a shift in charging that avoids the need for new investment.

95. Effectively pricing the time of use of energy to signal when (and where) congestion exists lifts efficiency of network use. However, assigning a time of use price signal to time periods when no congestion is present for example, could send the wrong signal and create a worse outcome than a flat charge. One caveat here is that good price signalling by a distributor takes account of trends that could see congestion arising, and so pre-emptively signalling to customers to become accustomed to a future price structure is prudent and encouraged by the Authority if the future congestion is sufficiently proximate.

96. Without a link between congestion and price signals (current or forecasted), a distributor risks reducing the welfare of customers, encouraging actions (defection, reduced consumption) that it does not desire, distorting behaviour unnecessarily and causing harm to all parties.

97. The ENA's *Guidance on Pricing Reform* helpfully lays out a view of pricing structures in the figure below. It focussed attention on the types of cost-reflective pricing highlighted in green. We have focussed attention on the Time of Use and Peak Event tariffs as these are the most likely structures to be useful in the New Zealand context. This is not to say that they are the only ones, nor that they should be applied without considerable thought to their intricacies, nuances, applicability and actionability.

Figure 2: Price structure options



Source: Electricity Networks Association, Guidance on Pricing Reform 2017 [24]

Time of Use

98. Time-of-Use (TOU) pricing has been the first stepping-stone for many distributors' pricing reforms. The key to using TOU effectively is to understand and signal when in a period – an hour, day, week, month, or season – network congestion is occurring (or expected) and so when the costs to deliver energy are highest, and to lift prices in those periods appropriately. Distributors should consider using TOU pricing where they can demonstrate that there is a

[24] *Guidance on Pricing Reform, ENA, August 2017,* https://www.ena.org.nz/news-and-events/news/final-pricing-guidance-report-published/document/151

need for it, for example a rapidly growing penetration of EVs in a particular area of the network, resulting in actual or imminent congestion.

99. TOU may not necessarily be the end point. Our assessment is that many distributors have implemented TOU as a means to start the journey of pricing reform, but that the next step for them is not clear. Our concern is that TOU can be a blunt and may be an inefficient method of cost reflectivity especially if not matched to actual or impending congestion, and that after implementing TOU, distributors may reduce their focus on pricing reform.

100. We expect distributors to assess the effectiveness of their TOU pricing to determine if there has been a resulting change in retailer and customer behaviour, noting whether:

    a. there has been a load shift of consequence, and

    b. the load shift has met the desired need.

101. We accept that TOU has the advantage of being easily understood by customers and so may be a useful step in changing habits or focussing attention. When customers can respond well to TOU structures it allows for existing network capacity to be better utilised and delay or avoid additional capacity investment. However, if the congestion problem that TOU is trying to solve is not well targeted then TOU risks being a change for the sake of making change. This is detrimental to customers' acceptance and risks creating a backlash to reform that distributors will have to bear later when they better target price signals.

102. We are also cognisant that TOU can have an undesirable effect of simply shifting the congestion out, if customers or automatic controls ramp up as the peak period finishes. Determining if this occurs, and if it is important to managing congestion, is a learning experience that would warrant further action.

103. We expect distributors, over the coming year, to understand whether their TOU implementation has reduced network congestion and therefore had the effect of 'cooling' heat maps of utilisation and congestion, and whether this effect can be tied to an Asset Management Plan change that has delayed or avoided future network investment.

Peak event pricing

104. A further evolution of TOU pricing may be to factor in peak events on a network, sub-network or feeder and overlay an additional charge during these times. This will amplify a price signal of an existing TOU structure, and for some networks just a 'critical peak price' may be sufficient to manage time-bound congestion, eg, the coldest winter night in a season, or rural coastal areas with a high density of holiday homes over the December/January holiday season.

105. Research has shown that using critical peak pricing is highly effective in reducing peaks, especially when paired with technologies that automate the management of usage in these times. The size of the peak signal is clearly a significant factor in managing peak reduction, and the infrequency of the number of peaks allows customers to make an 'extraordinary' decision rather than change a 'sticky' consumption habit.

106. Ensuring any peak signal is communicated a reasonable period in advance is considered the most effective way to allow customers to respond and engage with the signal, but there are limitations. Firstly, distributors do not always have access to customer contact data so cannot communicate directly and would be relying on 'links in the chain' to communicate the signal. Secondly, to be effective customers need to be engaged in managing their consumption or have automation in place that allows a response. For a network that sees critical peaks, this form of pricing is a useful method for limiting the near-term impact of demand, and so can delay investment and therefore a critical peak pricing structure may be effective, albeit not wholly cost-reflective.

Controlled load

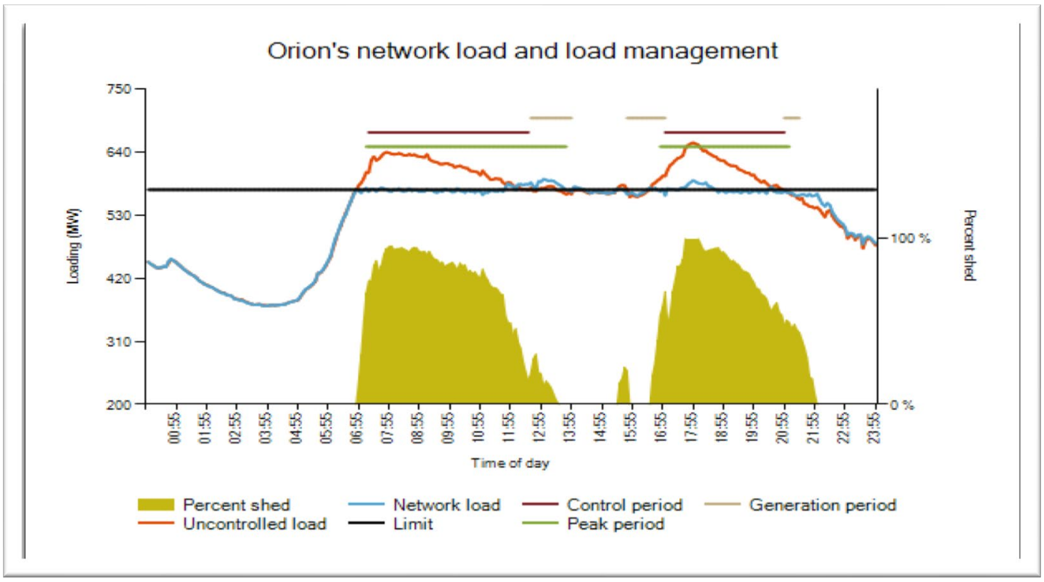
107. New Zealand distributors are advanced compared to overseas networks in managing the timing of their discretionary network load, mostly through the aforementioned ripple control. Distributors are practiced in managing these devices to reduce peaks, leaving themselves and customers better off, with little impact on their daily lives. The effect of good load management is illustrated by Orion's use of load control in the figure below.

108. Load control for hot water heating is the common application at present and has proven to be effective for managing congestion. Envisioning a future of more widespread EVs, PV and other controllable DER means that there are opportunities for greater use of demand response. Further, flexibility in the load side – including control of hot water and EV charging - will play a key role in future in balancing fluctuations in supply of energy from intermittent renewable generation around the grid.

109. Technology is likely to assist in the load control of EV charger installation, and as it has a similar load profile to hot water, this is an area where we anticipate rapid development and for distributors to actively encourage uptake, either directly or via pricing structures and signals that support other control devices.

110. We understand that the penetration of traditional ripple control for hot water at new ICPs is reducing in some parts of the country and in the short term this may hamper efforts to control hot water load more broadly. Whether this an economic decision (related to real or perceived value from the installation that could be addressed by more cost-reflective pricing) or there is some other barrier to more widespread uptake is not clear. In time, other communication and dispatch technologies may provide viable alternatives to ripple control.

Figure 3: Load control at Orion



Source: Electricity Networks Association, Guidance on Pricing Reform 2017 [25]

111. We expect to see distributors, retailers, and flexibility traders active in providing the ability to increase options for customers to manage these 'heavy' loads in return for a discounted pricing structure and/or paying a third party for this control. The Authority envisages a future where

[25] *ibid*

distribution congestion might be managed, to an extent, by demand flexibility, utilising emerging technology and business models.[26]

Transmission charges

112. Distributors will need to pay attention to the impact of the proposed changes in Transmission Pricing Methodology, and within the bounds of regulation (ie LFC), the Authority expects that for residential and small commercial customers:

    a. fixed transmission charges, which are not intended to influence customers' network use decisions, should be passed through as fixed (daily) distribution charges[27]

    b. transmission charges that are intended to send price signals that influence network use should be passed through as distribution charges that send the same price signal (and influence network use in the same way) as the transmission charge.[28]

113. The current LFC regulation may not allow the above expectations to be met immediately, however we expect distributors to be forward looking in how their treatment of transmission charges are passed through as regulation change allows.

Recovering the residual

114. As depicted in Figure 1, the final step (step 3) in the price setting process is to ensure that the revenue a distributor collects will match its allowed revenue (ie, the residual revenue). It is rare that the revenue collected from the price signalling step will match the revenue a distributor is allowed to earn. Most of the time the revenue collected from the price signalling part of the process will be less than the allowed revenue, but sometimes it could be more than the allowed revenue (especially if the distributor has a very strong price signal it needs to send to one group).

115. The difference between the revenue earned from the price signalling step of the process and the distributor's maximum allowed revenue is called, for the purpose of this guidance, 'the residual'. A share of this residual is allocated to each customer group. The price signal, plus the share of the residual, makes up a customer's distribution charge.

116. Because this residual amount has no need to send a price signal to any one group (because all the price signalling work is done in the first step) this residual recovery process should be done in a way that means a customer has no reason to change their electricity consumption use or pattern. This is what is meant by 'non-distorting'. To be non-distorting, the residual should be unavoidable, meaning that customers should not be able to take an action that means they avoid paying all or part of the charge (other than disconnecting from the network).

117. There are many ways that a distributor could allocate the residual across customers within a customer group, ranging from a simple per-ICP basis, to proportionately allocating the residual referencing a metric that reflects the size of that customer, and so it's overall effect on the network. For example, an allocation based on maximum demand could reflect the relative size of each customer's maximum usage of the network. Any metric referencing size or use would ideally be a historical reading of the metric, as this would create fewer possibilities for avoidance, making it a less distortionary allocator. As is the case for the other aspects of price setting, there is no one-size-fits-all solution, as differing methods can produce different outcomes that may be best applied by one distributor, but different for another.

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[26] We acknowledge the work of the Innovation and Participation Advisory Group in the area of efficient demand response: https://www.ea.govt.nz/assets/dms-assets/28/Transpower-DR-programme-review-draft-memo.pdf

[27] This would include the proposed benefit-based charges and residual charges, which are intended to be largely a fixed charge.

[28] An example could be a transitional congestion charge (TCC). The current proposed TPM does not include a TCC; however, the TPM guidelines provide for a TCC in certain circumstances, and Transpower might propose to introduce one in future.

118. In the 2020 Transmission Pricing Methodology guidelines the Authority decided that the residual portion of the transmission charge should be allocated using a customers' historical anytime maximum demand. Historical data is used because this is less distortionary than using more recent data, and the anytime maximum demand is a simple way of most likely reflecting a customer's size (as a proxy for their ability to pay). (However, residual cost allocation should never be updated regularly based on a customer's anytime maximum demand *in each period*. That would create a strong inefficient price signal and seriously distort consumer demand.)

119. In determining which is the least distortionary method for each distributor, we expect that distributors will balance the desire for simplicity with the outcomes produced by the different allocation methods. If the financial impact on customers from two methods is insignificant, then we expect that the simplest calculation method will be selected; however, we acknowledge that other methodologies fulfil other objectives, such as representing the relative use of the network and this may be appropriate. As with all pricing changes, considering impacts on consumers will be important.

Part 4: What a good pricing evolution will look like

This Part aims to provide guidance on how pricing responds to the changing needs of a network, the pricing response options that align and why they are needed.

120. We have considered stylised hypothetical networks that illustrate the way that we believe good pricing reform should be conceived and implemented.
121. These stylised hypothetical networks are conceived of in a world where the LFC regime does not exist, and the Authority acknowledges that they are aspirational at this stage; however they provide a good guide for distributors developing plans for an end target following steady reform over the years ahead.
122. The networks derived are based on two defining characteristics:
    a. density – urban and rural
    b. geography – remote and non-remote (applies more commonly to the Rural network examples).
123. In considering these networks we are focussed on residential and small commercial ICPs only. This simplifying assumption is reasonable as:
    a. Residential ICPs comprise 85% of total national ICPs which predominantly affects the length and density of distribution networks
    b. Commercial and Industrial ICPs are typically subject to non-standard individual contract negotiation that already, as we understand it, largely aligns with cost-reflective pricing principles
    c. Medium sized commercial ICPs are typically subject to load/demand pricing.
124. We have proposed simplified examples of the types of networks, the changes they face in growth, demand for energy, and access to the network, and the resulting 'best practice' pricing structures.
125. In some situations we have offered a near-term view as well as a longer-term view on best practice.
126. We have used a shorthand for describing the state of congestion on the network, *Design* compared with *Demand:*
    a. where a network is currently meeting the requirements of customers at their peak demand we describe it as Design = Demand. Such a network, in whatever configuration as it currently is in, is supplying connected customers with their electricity needs and faces no congestion
    b. where a network faces congestion at times we describe it as Design < Demand. Such a network is currently insufficient to meet customers' demands at times of peak demand
    c. where a network has significant spare capacity at times of peak demand, we describe it as Design > Demand.
127. The key distinction with this shorthand is that it describes the time of the day, week, or year where a network faces its peak demand, rather than an assessment of the all-year around demand requirements. It does not reference reliability or resilience standards, as these factors

are part of a distributor's asset management planning that are considered as part of the Commerce Commission's Part 4 regulation.[29]

128. The examples start with the 'What it looks like now' and then builds future scenarios from that base. This approach illustrates the way we believe that pricing should respond dynamically to changes in the network's use and demand and reflects the iterative way that we believe good pricing practice evolves.

129. The pricing structure in the starting position of 'What it looks like now' is currently an aspiration for many distributors as it has a 100% fixed daily charge. This is a strong indication from the Authority of an efficient pricing signal, albeit one in which no network with a LFC customer grouping can currently achieve, but we expect that distributors who match these network conditions will reform towards as regulation allows.

How Capital Contribution policies apply

An important element in the forward view of a network's expansion from the growth of ICPs and new load/demand is how a distributor's Capital Contribution policy (otherwise known as Customer Contribution, Customer Connection etc) applies.

This is important as growth within the existing network and expansion of the networks is funded by both new customers and the existing customers (ie via the distributor's revenue recovery). The amounts that distributors invest are recovered by way of pricing (line revenue) in accordance with the size of the capital they have invested (RAB as defined in the Commerce Commission IMs). Amounts funded by customers/new connections are outside RAB, and no revenue applies to them, ie, they should have no bearing on pricing to the wider network.

While substantial differences exist between distributors' approaches to their policies and methodologies, and the amounts they require from customer-initiated works **they mostly attempt to charge new connections in a manner that does not impose additional costs on existing customers that do not benefit from the new connection.**

It is not within the scope of this Practice Note to consider the efficacy of the contribution policies and methodologies, but it is clearly signalled that some consideration should be undertaken to ensure that the economic costs of the connection/load growth are adequately and efficiently recovered and do not burden the wider customer base.

Urban network

What it hypothetically looks like now

130. Design matches or exceeds Demand, with no indicators of congestion. Prices for services assist with Design = Demand such as load control (hot water ripple control) and 'first off' pricing options, and these are currently used in the congestion management of the network.

131. Network investment is predominantly historical, with renewal and growth expenditures within current and Asset Management Plan expenditure allowances.

[29] Investment undertaken to improve reliability, resilience or growth would be form part of the total revenue a distributor can recover, and so would form part of the allocation of costs exercise, but for this set of simplified examples they are separate to the price signalling discussion

132. Future investment is predominantly replacement capex, with any increased functionality planned to be uniformly installed. Where future service offerings do eventually differ, the allocation methodology would apportion costs appropriately.

133. **Pricing rationale:** No requirement to signal a change in customer behaviour, so pricing should recover the invested capital and ongoing maintenance of the existing network. With no capacity issues there is no reason to signal a price that influences consumption, therefore there is no rationale for a variable charge.

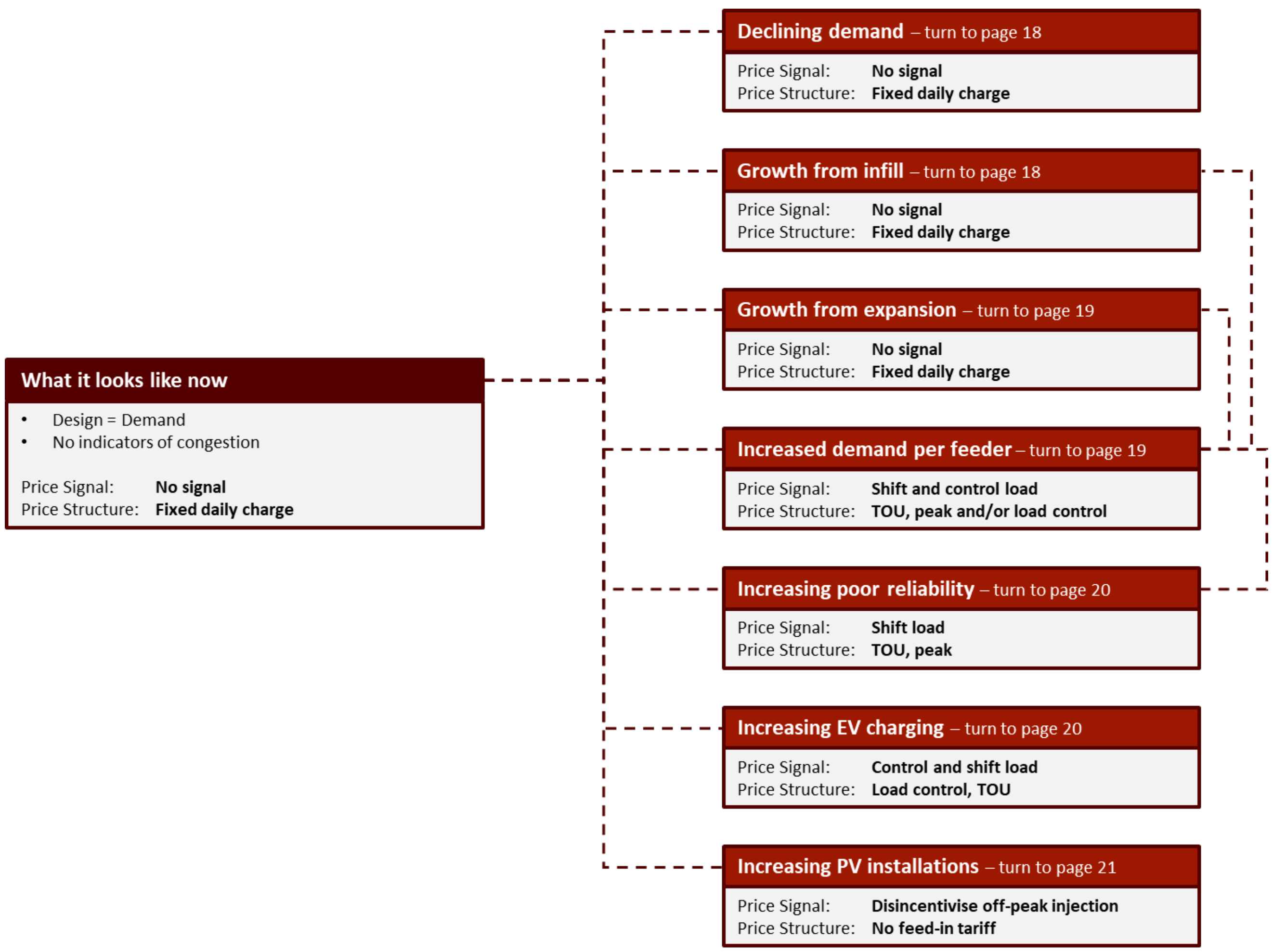
134. Controlled load manages congestion and avoids further investment, so can be zero-rated (ie $0) for distribution pricing at peak, which should also aid customer uptake.

135. **Pricing:** Fixed daily charge

Network change scenarios

136. Using the above conditions for our hypothetical network as the starting point, we consider seven factors that may impact use of the network, and how we see pricing respond. Each scenario is expanded upon over the following pages. [30]

Figure 4: Urban network scenarios map



30 References to a peak charge or TOU pricing mean such a price signal that is required due to imminent network congestion.

Declining demand

137. The network is not constrained, spare capacity is increasing, therefore Design > Demand.
138. Opex & maintenance costs fixed with total line revenue unchanged (ie, derived from existing and replacement capex).

139. **Pricing rationale:** Design exceeds Demand. There is no capacity constraint signal needed, nor any need to change total usage or time shift usage.
140. **Pricing signal:** No change - Fixed daily charge

Growth from infill

141. Identified by an increased ICP count on feeder leading to increased total network demand.
142. Design <= Demand – ie, congestion may become evident or predicted on impacted feeders and there may be a short-term incentive to reduce the peak.
143. Longer term, where an investment upgrade may be necessary, the network's Capital Contribution policy should apply to reflect the incremental impact on network costs.
144. Depending on the specifics of the contribution policy relating to new connections there may be costs associated with increased investment on the feeder to be shared.

145. **Pricing rationale:** Upgrades to a feeder may be fully recovered by the contribution policy, to balance Design = Demand. Where this occurs there is no need to signal a change in consumer behaviour across the network/feeder.
146. **Pricing signal:** No change – Fixed Daily Charge.
147. **Near-term pricing rationale:** Before an upgrade to a feeder can be completed, or if the upgrade investment is not sufficiently recovered through the contribution policy, there is an incentive to signal congestion to shift load in order to balance Design = Demand and delay or avoid investment.
148. **Pricing signal:** See 'Increased demand per feeder'.

Growth from expansion of the network

149. Identified by a new feeder or extension of an existing feeder.
150. The contribution policy recovers some or all of the network investment for the new development.
151. Upgrades before new expansion are not always recovered.

152. **Pricing rationale:** Additions to the network may be fully recovered by the contribution policy, to balance Design = Demand. Additional capex is (theoretically) recovered by the addition of new billing volumes. Where this occurs there is no need to signal a change in consumer behaviour across the network/feeder, pricing should merely recover the invested capital.
153. **Pricing signal:** No change – Fixed daily charge.
154. **Near-term pricing rationale:** Before an extension of a feeder can be completed, or if the upgrade investment is not sufficiently recovered through the contribution policy, there is an incentive to signal congestion to shift load in order to balance Design = Demand.
155. **Pricing signal:** See 'Increased demand per feeder'.

Increased demand per feeder/GXP

156. Increased demand could be for many reasons across different feeders, due to the source of the increased load, such as:

    a. Changing household energy use. This could include EV connections (see also section below on EVs).

    b. Historical infill or expansion of a feeder occurred but did not trigger an upgrade at the time.

157. Land use changes can also alter demand on a feeder - for example, a fringe rural area that has seen increased density to become more urban in density – ie, urban sprawl.
158. Feeder level heat maps (or a similar alternative) should be the reference for identifying the areas needing attention and for determining the target of sharper price signals and measuring the success of them.
159. Smart meter data may be required to better identify source, location, and timing of increased demand.
160. Monitoring of the load and changes will be required to determine whether the pricing response has been appropriate, and also if it is continuing to trend up and requires more action.

161. **Pricing rationale:** Design < Demand. Load shifting should be incentivised to avoid/delay capex. This comes in addition to existing load control measures. If demand holds up then it indicates capex may be appropriate.
162. Capex invested should be recovered from the affected feeder with the forward view of the investment and its price impact being part of customer engagement to provide fully informed decisions.
163. **Pricing signal (1):** Where congestion is regularly peaking one or two times a day – TOU. Vigilance will be required to ensure load shifting has not simply extended peak periods.
164. **Pricing signal (2):** Where congestion is peaking to critical levels during a season (such as over winter evening peaks), an enhanced seasonal component may be necessary to amplify the impact, ie TOU + Seasonal peak charge. This may involve a reduced off-season structure to stress the impact of the peak season pricing.
165. **Pricing signal (3):** Load control pricing may be strengthened to further incentivise controllability of load, ie EVs and hot water. This should be utilised in conjunction with TOU signals.
166. **Longer-term pricing signal:** TOU is a useful initial step for customers to get used to signals. Where congestion is managed as part of a short period within a year (say a few cold winter nights) transition to a further enhanced peak signal, either stand-alone or as part of a TOU structure.

Increasing poor reliability/security of supply

167. Worst performing feeders are identified through a distributor's asset management planning process. The focus here is on feeders that are not seeing an increase in per-ICP demand, but rather diminishing performance with a stable load.
168. Opex may be the least cost remedy for some time and the only option for a period if capex is a multi-year exercise. Pricing can assist in relieving pressure on the assets for a time.

169. **Pricing rationale:** A pricing response is appropriate to assist managing load to temporarily assist reliability (within the scope of the regular pricing adjustment timeframes). The pricing rationale is likely to be similar to the above scenario, but for a shorter period and potentially more

targeted and involve specific customer engagement to address and improve the pricing signal's impact.

170. **Pricing signal (1):** Where congestion is peaking during one or two times a day – TOU. Vigilance will be required to ensure load shifting has not simply extended peak periods

171. **Pricing signal (2):** Where congestion is peaking to critical levels during a season (such as over winter evening peaks), an enhanced seasonal component may be necessary to amplify the impact, ie TOU + Seasonal peak charge. This may involve a reduced off-season structure to stress the impact of the peak season pricing.

Increasing EV charging

172. Installation of EV chargers can be at any point of a network, and experience thus far suggests it is not an urban-only phenomenon.

173. Increasing load during peaks is the main concern for all distributors, but as EVs are still a fairly new technology there is an opportunity to tune customer expectations early with an appropriate signal.

174. Unless a distributor has systems in place to 'mark' new installations of standard or fast chargers that then necessitate customer line upgrades, and can match it to the ICP for metering, there is no visibility of the load that links it to a charger.

175. Controlling the load has marked benefits for distributors to manage existing networks and avoid increased investment.

176. Whether the load is controlled or not, having a signal that shifts the loads is desirable.

177. **Pricing rationale:** EV charging is sudden and burdensome and experience thus far shows it typically coincides with existing peaks. It is however, a very controllable load and as technology evolves, it will be increasingly 'shiftable'. Controlling the load in a manner similar to hot water heating is feasible and desirable at this stage.

178. **Pricing signal (1):** Load controlled, possibly with a distributor, retailer or flexibility trader provided smart charger if the cost can be justified to avoid other network upgrade costs.

179. **Pricing signal (2):** TOU where congestion trends suggest demand can be shifted to low demand times – vigilance will be required to ensure load shifting has not simply extended peak periods.

180. **Pricing signal (3):** Where a feeder upgrade is necessary, costs should be allocated to the feeder through an increase in fixed daily charges.

PV installation

181. PV installations on uncongested daytime networks provide no benefit to the distributor.

182. Where network prices using a significant portion on a variable charge PV can distort economic signals by reducing consumption (and therefore cost recovery) but does not reduce the ICP's reliance on the existing network.

183. **Pricing rationale:** With no daytime congestion evident, there should be no reward provided to PV installations for feeding into the distribution network.

184. **Pricing signal:** No feed-in tariff to reduce distribution charges – rely on fixed charges to send the appropriate network use signal.

PV installation with storage/other DER

185. If an installation is willing to inject when the distribution network requires it, then it is reasonable that a discount/feed-in tariff can be provided.

186. Having control of the injection is not currently common and so setting the price efficiently is difficult. This may change in the coming years, and distributors will need to be aware of developments to support this.

187. **Pricing rationale:** Distributors should err on the side of caution with DER pricing, and be sure that location aspects are well understood before setting prices. It is more likely that DER pricing will need more frequent updating than the current annual process, and this uncertainty is important to sending the correct efficient price signal.

188. **Pricing signal:** Distributors should exercise caution with sending pricing signals in the near-term to ensure they understand the impact on their network costs.

Rural networks

What it looks like now

189. Rural residential and small commercial connections often have slightly different usage patterns than similar urban customers but are largely the same in how they interact with the network.

190. More likely to have reliability or resilience issues – mostly related to weather and asset-lifecycle issues.

191. Network investment is predominantly historical, but land use changes need to be watched for as changes often lead to different energy usage and demand patterns. This can lead to pockets of congestion.

192. Future investment is often replacement and resilience capex, with increased functionality a lesser priority than building in improved reliability.

193. For a network that also has a denser urban centre, there should be customer grouping in place that reflects that rural cost of supply/losses are greater than an urban network.

194. Cost of supply modelling for a rural network is likely needing to be more segmented than with an urban network to understand differences in costs and energy losses. This factor tends to make rural networks strong candidates for many non-network energy alternatives. Therefore, a distributor must be more conscious of the cross-subsidisation decisions they make in order to not disrupt technology competition.

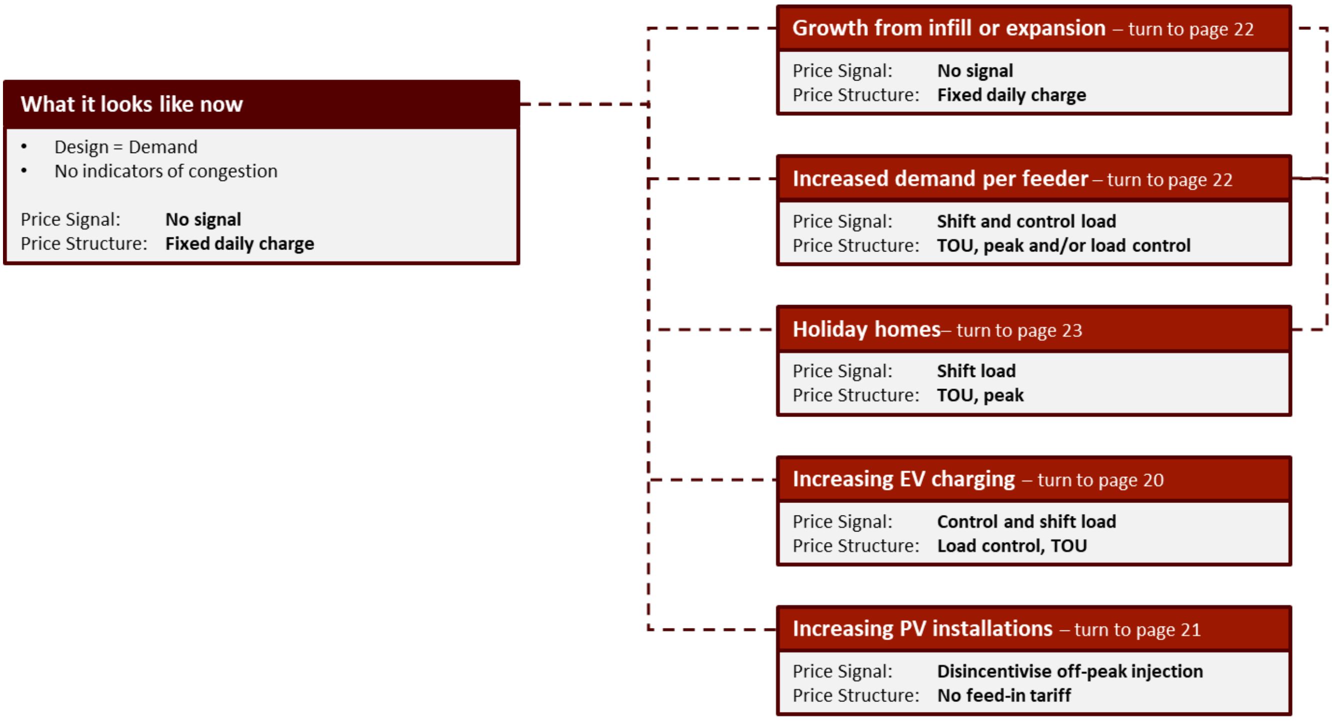
195. **Pricing rationale:** Rural residential and small commercial connections often have slightly different usage patterns than similar urban customers but are largely the same in how they interact with the network.

196. **Pricing:** Fixed daily charge. Rate should reflect the true cost of supply and therefore expose engineering design to good options analysis for non-network alternatives.

Network change scenarios

197. Rural networks have some features that set them apart from urban networks for pricing purposes and the signals that may need to be sent, and we have depicted them in the following pages. The influence of EVs and PV however, are the same as above.

Figure 5: Rural network scenarios map



Growth from infill or expansion of network

198. Largely the same as an urban network, with some distinctive features that may affect pricing.

199. Often infill growth is slower than on urban networks and therefore less likely that the incremental ICP growth will stress the existing network design (assuming it is currently matched).

200. Extensions of rural networks are typically not fully recovered from the beneficiary/exacerbator as the economic costs are significant.

201. Increasing density of rural networks is likely to reduce costs to serve, and so benefit the existing customer base, and this may affect the cost of supply modelling.

202. **Pricing rationale:** Pricing signal is the same as for an urban network.

Increased Demand per feeder/GXP

203. Land use changes are the dominant reason for substantial changes in energy demand and it is this which makes the most likely response in a rural network different from an urban network.

204. It is usual that there is even less visibility of the LV network in rural areas than in urban networks, but there is often a greater ability to ‘eyeball’ the reasons for changes in capacity and demand, so a distributor can usually fairly accurately target the capacity change costs to the source.

205. **Pricing rationale:** Design < Demand. Load shifting should be incentivised to avoid/delay capex. This comes in addition to existing load control measures. If demand holds up then it indicates capex may be appropriate. A move to capacity charging may best align with the cause of the increased demand, and better send the needed cost-reflective price signal.

206. **Pricing signal (1):** Where congestion is peaking one or two times a day – TOU.

207. **Pricing signal (2):** Where congestion is peaking to critical levels during a season (such as over winter evening peaks), an enhanced seasonal component may be necessary to amplify the impact, ie TOU + Seasonal peak charge. This may involve a reduced off-season structure to stress the impact of the peak season pricing.

208. **Pricing signal (3):** Load control pricing may be strengthened to further incentivise controllability of load, ie EVs and hot water. This should be utilised in conjunction with TOU signals.

209. **Longer-term pricing signal:** TOU is a useful initial step for customers to get used to signals. Where congestion is managed apart from a short period within a year (say a few cold winter nights) transition to a further enhanced peak signal, either stand-alone or as part of a TOU structure.

210. For some networks it may be appropriate for a move to a full demand charge. A demand charge structure would, based on experience, be most useful if the occasional peaks can be predicted and communicated to customers.

Increasing poor reliability/security of supply – holiday parts of the network

211. Peaks on networks may occur for only a few days in a year, with little elasticity of demand – eg long weekends and holiday periods in certain parts of the country.

212. Because the increase in demand in these areas is for such a short period it often doesn’t meet the upgrade standards for many distributors (usually based on normally resident population, economic activity, quality of supply measures etc).

213. The costs to upgrade these areas come under scrutiny in certain times of the year, and often have a vocal customer base for a short period. A distributor’s decision is always about where to apply its resources best.

214. Upgrade costs related to these parts of networks should be borne by these areas.

215. **Pricing rationale:** Design < demand – often only for a short period. The economic costs to lift supply security cannot be recovered through variable charges, given the often small volumes delivered.

216. **Pricing signal (1a):** Peaks are usually easily predicted but customers tend to have limited discretion/desire to manage load. A Network Peak Demand would best reflect the costs and usage but will likely create a very large spike to monthly billing.

217. **Pricing signal (1b):** Increase in Fixed Daily Charge.

Part 5: Expectations on the timing of reform

This Part aims to make clear what the Authority expects of distributors in the coming years, as they accelerate the reform of pricing.

The next two years, to 2023

218. The Roadmaps developed by distributors have been valuable for us to understand progress being planned by each distributor, and useful as a tool for distributors to hold themselves to account to customers, Boards, and regulators. The first steps for all distributors was to develop deeper understanding of what the pricing principles meant and how they should be applied. **We expect that this work is comprehensive and complete, then updated annually.**

219. The most recent steps that many distributors have taken has been to apply the principles to understand their own network needs for aligning prices to a cost-reflective structure. This should have included building knowledge of the varying economic costs across the network and understanding locations, timing, and sources of congestion. Discovering the nature of the congestion and how price signals can address it should be well under way. **We expect that after the past three years that enough of this work has been done to take substantive action now.**

220. Examination of pricing reform options revealed that under the LFC regime there was, at least across some pricing dimensions, limited ability for distributors to have a proportionate outcome change from the work required to implement pricing changes. However, reform in the interim is still possible, and LFC does not create a barrier to actioning critical preparatory steps such as better understanding network flows relative to capacity. The Government's announcement of a five-year phase out of LFCs allows distributors to accelerate their implementation of reforms. Our understanding is that the modelling and trials work undertaken now would allow distributors to 'press the button' as LFC is being phased out. We would be disappointed if distributors decided to delay further progressing their reform work until after the LFC is fully removed, as this could waste up to five years in their reform process. **We therefore expect to see distributors have clarity on their optimal process and at a minimum undertake the first steps from the April 2022 pricing year, with this to be reflected in progress up the scorecards.**

221. Changes to pricing methodologies may appear to be slow, when undertaken annually, but ongoing customer engagement work and trials and modelling to finely tune the next steps in development can, and should, continue throughout the year.

222. We acknowledge that even in trials undertaken now LFC may have an influence, but we do not see this as an impediment to proceeding with them.

As the LFC is being phased out from 2022-2027

223. During the LFC's phase-out we expect the first major tranches of pricing reforms to have been progressed. This will involve increasing the effectiveness of pricing signals and where appropriate will see improved cost allocation outcomes, increasing fixed charges as a proportion of pricing structures, and/or review of the responsiveness and customer engagement from the initial steps of pricing signals being used to address congestion. **More detailed expectations will be developed within the engagement framework referred to in Part 1: Forward engagement focus**

224. We expect a robust feedback loop to aid continued advancement of reforms, in a manner that directly informs ongoing changes. This will include continued updating of network understanding and aligning pricing with network requirements, as well as increased customer engagement that helps distributors to align their pricing intentions with realised outcomes.

225. We note that the Government has agreed that there should be a review on the progress of the LFC phase out in late 2023, and this will provide the Authority, industry and wider stakeholders an opportunity to assess pricing reform progress and customer impacts.

226. We would like to see distributors have a link between the scorecards and their roadmaps. We would like to see distributors have their own expectations on how the work they do in delivering their roadmaps and pricing reform will change their future scorecard ratings, as a way for distributors to hold themselves to account for their commitments and roadmap plans.

Appendix A Glossary

Authority means the Electricity Authority, being the Crown entity established under section 12 of the Electricity Industry Act 2010 to promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers

Avoidable costs are those costs that can be avoided by not serving a customer or customer group. Examples of avoidable costs include billing and customer service costs, connection costs specific to the customer or customer group, and additional maintenance costs

Consumer groups means for pricing purposes, consumers grouped to have similar characteristics, similar network costs, and similar consumption profiles. Consumers within a group are typically subject to the same pricing plan

Customer means a person who has entered into a contract with a retailer for the supply of electricity, other than for resupply, and/or the provision of distribution services, where the electricity supplied to the customer's premises is used fully or partly for domestic uses

DER means distributed energy resources and refers to resources on the network that do not connect to the transmission grid, such as solar PV, energy storage systems and demand response

Distribution services mean the conveyance of electricity on lines, as defined in the Electricity Industry Act 2010, by a distributor

Distributor has the meaning given to it in section 5 of the Electricity Industry Act 2010.

Economic costs are costs of providing the service, and any additional costs (externalities) borne by others (but not the producer)

ENA means the Electricity Networks Association

ERANZ means the Electricity Retailers Association of New Zealand

EV means an electric vehicle, both hybrid and fully electric, and has a battery which has the ability to be recharged from the distributor's network

Fixed costs are invariant to the level of output, eg costs that are invariant to the amount of electricity sent down a network

ICP Installation control point – a point of connection at which the electrical installation for a retailer's customer is connected to a network

Locational marginal pricing is pricing at different locations in the network, reflecting local demand and capacity, and the cost of getting electricity to a particular location

Low Fixed Charge means the Electricity (Low Fixed Charge Tariff Options for Domestic Consumers) Regulations 2004 (LFC regulations)

Marginal cost is the additional cost of producing one extra unit. In the context of distribution, typically the additional cost of serving one additional customer to the network, or the additional cost of increasing network capacity

Non-network alternatives are alternatives to investments in transmission and distribution, often to manage capacity constraints. Examples include demand management, interruptible demand, distributed generation, batteries, etc.

Non-distorting is an action or price is non-distortionary if it does not change the behaviour of consumers or producers

PV means Photo voltaic, or solar panels

Residual revenue / residual cost is revenue that augments the revenue obtained from cost reflective pricing to ensure that fixed costs can be covered, so that firms do not make a loss. (Residual costs for consumers = residual revenue recovered by distributors.)

Retailer has the meaning given to it in section 5 of the Electricity Industry Act 2010

Revenue targets are the levels of revenue that distributors aim or are permitted to obtain, eg as determined by price-quality paths set by the Commerce Commission (where applicable)

Ripple control is demand management of consumer power consumption based on remote control of hot water cylinders

Standalone costs are the costs needed to replicate or bypass a network entirely. If electricity prices are greater than a consumer's standalone cost then the consumer is better off by disconnecting from the electricity network and, for example, generating their own electricity or sourcing it elsewhere

Subsidy-free prices are subsidy-free if they fall below standalone cost but are above incremental cost. A consumer paying a subsidy-free price makes some contribution to a distributor's fixed cost

Appendix B Distribution Pricing: Practice Note August 2019

This refreshed 2021 Distribution Pricing: Practice Note (draft for consultation) itself appends the *Distribution Pricing: Practice Note August 2019* – because the 2019 document's substantive advice on interpreting the distribution pricing principles remains relevant.

The one place where this 2nd edition Practice Note overwrites the 2019 edition is Figure 1, included at page 5 of this document. We believe this updated diagram better portrays the methodology than the figure in the 2019 edition.