Regulation of distribution connection charges in New Zealand

New Zealand Electricity Authority

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EXECUTIVE SUMMARY

CEPA has been engaged by the New Zealand Electricity Authority (NZEA or the Authority) to prepare a report on the regulation of electricity distribution connection charges. Distribution connection charges are one-off or upfront charges that are typically triggered by the creation of a new connection – or the upgrade of an existing connection – to a distribution network.

Connection charges are becoming an increasingly contentious issue in the NZ electricity distribution sector as there is increasing demand for new connections [1] and increasing reliance by some Electricity Distribution Businesses (EDBs) on upfront charges. There is a concern that problems in the current regulatory framework may lead to a lack of transparency, overcharging, or overservicing of new connections. This, it is feared, will deter new connection requests, slowing the process of electrification.

The Authority has developed a suite of policies to improve the regulation of distribution charges. Some of these policies are intended to be implemented in the short run (the "fast track" components) and some of these policies will be developed over a longer period (the "full reform" components). These reforms are designed to improve transparency and timeliness and to improve the position of users in connection negotiations, in order to facilitate the ongoing process of power system transformation.

This report assesses the policy proposals put forward by the Authority. Specifically, this report explores the problems that have emerged with the current regulatory framework, assesses the extent to which the Authority's proposals address those problems, and carries out a qualitative assessment of costs and benefits of those proposals. For the reasons set out below, we believe that the Authority's proposals will result in a material improvement in the regulation of connection charges in New Zealand.

The report has 4 substantive sections. The first section introduces some key concepts. The second section explores some of the problems that have arisen in the status quo. The third section assesses the policy proposals put forward by the Authority. The fourth section includes a qualitative assessment of the expected costs and benefits of the proposed reforms. The appendix summarises the regulation of connection charges in four different international jurisdictions (Australia, Great Britain, California, and Ontario).

Introduction to connection charges

Connection charges are one-off, upfront, payments that are triggered when a customer requests a new connection to the distribution network, or the upgrade of an existing connection. Connection charges comprise one component of the fixed charges of a distribution network – the other component being the ongoing fixed charges. The full set of charges of an EDB (that is, the connection charges, the ongoing fixed charges, and the ongoing variable charges) must collectively raise sufficient revenue to cover the total costs of the EDB.

In recent years different EDBs have chosen different approaches to the split between one-off upfront and ongoing charges. While some EDBs recover a very high proportion of the costs of connection services in connection charges, others recover none at all, instead recovering the full costs of the network, including any costs associated with new connections, through ongoing fixed and variable charges.

The connection of new customers will often (but not always) require investment by the EDB to extend or augment the existing distribution network. For example, the connection of a new customer might require the construction of a new spur line to the location of the customer or the subdivision, and/or the upgrade of the existing shared network to accommodate the higher loads associated with the new customer. Similarly, the connection of a new group of customers (such as a new subdivision) may require the construction of new distribution lines, or the

[1] The demand for new connections is due to electrification of transport and process heat and ongoing urban housing development.

upgrade of assets in the "core" network. Network assets which are dedicated to the provision of services to a single customer or group of customers are loosely known as "connection assets".

Conventional regulatory pricing principles require that the additional costs associated with serving new customers should be recovered in the revenue stream from those customers[2] -- either through upfront connection charges or ongoing fixed charges.[3]

In the regulatory framework for EDBs in NZ, the revenue from connection charges is treated as a "capital contribution" which is netted off the capital expenditure of the EDB. Under the price path incentives (as modified by the Incremental Rolling Incentive Scheme, IRIS), EDBs receive a financial reward when they reduce their net capex (that is, their actual capex less capital contributions) from the forecast level each regulatory period. This leads to a range of incentives which are discussed further below.

The current regulatory framework for EDBs in NZ does not directly regulate individual prices. EDBs are free to change their prices provided they comply with their overall revenue cap.[4] The Electricity Authority publishes distribution pricing principles which set out their expectations as to how EDBs should structure their prices. However, there are no individual price caps or controls on connection charges, or on the rate of rebalancing of tariffs.

Our concerns with the current regulatory framework

From our analysis of the current regulatory framework for connection charges in New Zealand, we have identified the following concerns:

- Changes in connection charges which are anticipated in the regulatory process do not result in the EDB earning excess returns (because any increase in forecast connection charges results in a lower forecast net capex)[5]. Nevertheless, changes in connection charges have consequences for the amount paid by newly-connecting customers relative to existing customers. An increase in connection charges, even if it is offset through a general[6] reduction in ongoing charges, could result in newly-connecting customers paying more for connection than existing customers for a long period of time, which may inefficiently deter new connections. At the same time, existing customers would receive a windfall gain.[7]
- Under the price path incentives (as modified by the IRIS mechanism) EDBs have an incentive to reduce their net connection capex ex post. They can do this by reducing the cost per connection, or by increasing the connection charges. EDBs may also have an incentive to resist or to encourage new connection requests, according to whether the connection charge is below or above the average cost of connection.
- In the case where connection charges are closely linked to connection costs, EDBs may have little incentive to economise on the costs involved in the provision of connection services.

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[2] This is the principle that the incremental revenue from a new service (or group of services) should cover the incremental cost of providing that service (or group of services).

[3] In either case, once assets are constructed, when the time comes for those assets to be renewed, it is not common to request an additional contribution from the customers for the renewal/replacement of those connection assets.

[4] This applies to non-exempt EDBs. Exempt EDBs (which are usually customer-owned) are not subject to a revenue cap.

[5] EDBs may still earn excess returns if the out-turn net connection capex is different from what was forecast. This is discussed in section 2.2.

[6] That is, a reduction in ongoing charges for all customers rather than a reduction in ongoing charges for newly connecting customers.

[7] The opposite occurs for a material reduction in connection charges.

- Since capital investments are usually "lumpy", it often makes economic sense for an EDB to deliberately over-build a connection asset in the short-run.[8] This raises the question of who should bear the risk that the anticipated future connections fail to materialise. If the EDB charges the full upgrade costs to the first customer ("first mover disadvantage") or to the customer whose connection triggers the need for the next capacity upgrade (the "final straw"), connecting customers face risks based on their position in the queue which may give rise to undesirable incentives to delay or bring forward connection requests.[9]
- Customers who are dissatisfied with the connection charges offered by their EDB have no means of redress under the current regulatory framework. In addition, the potential for customers to contract directly with a third-party to provide their connection assets (known as 'contestability') is patchy. Individual customers may therefore face a present value (PV) of connection charges which greatly exceeds the efficient connection cost, deterring new connections.

Given these concerns we consider there is a strong case for reforming the regulatory arrangements around connection charges in New Zealand.

The Authority's proposed solutions

The Authority has proposed several policies to address these problems. These policies can be divided into two groups: policies to be implemented in the short-run ("fast track"), and policies to be implemented in the longer run ("full reform").

The fast-track policies, which are the focus of this report, are as follows:

- **Connection charge reconciliation requirement:** EDBs will be required to report on the reconciliation between connection charges and the net incremental cost of a connection (i.e., incremental cost minus incremental revenue from serving the additional customer), using a standardised method.
- **Connection enhancement cost requirement**: A requirement on EDBs to offer and price a low-cost 'minimum scheme' connection solution. The parties can agree on a higher quality or higher capacity connection, with the associated costs allocated to the party requesting the enhancements.
- **Capacity costing requirement**: A requirement to calculate connection charges associated with network upgrades based on previously-published unit rates. A customer would be required to contribute to upgrade costs in proportion to the size of their connection, even if they are not immediately triggering a network upgrade, on the basis that their connection consumes the 'headroom' available in the network. This removes first-mover disadvantage and other 'position-in-queue' problems with respect to network upgrade works
- **Pioneer scheme requirement**: Due to lumpiness in investment, it is often efficient to build a connection asset to a larger capacity than is immediately required by a customer. If there are no other customers forecast to be connecting in the same location, the first connecting customer may be asked to pay the full cost of the connection asset. But, under a pioneer scheme, subsequent connecting parties at the same location would be required to contribute to the cost of the connection asset, and the EDB will use these contributions to offer a rebate to the first connecting customer.
- **Dispute resolution**: There are existing provisions in the Code governing dispute resolution in the context of connection of distributed generation. Under the Authority's proposals, these provisions would be extended to cover all connections, to strengthen the enforcement of connection rules.

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[8] In some cases, such as where there is a minimum feasible size of a connection asset, overbuilding to service a customer may be inevitable.

[9] In addition, EDBs can pass on uncertainties in construction costs, such as uncertainty about ground conditions. This reduces transparency about prices, increases uncertainty for customers and may act as a deterrent to new connections or upgrades.

- **Capital contribution reliance limit**: The Authority proposes to implement limits on the proportion of connections plus system growth capex that is funded through capital contributions. Specifically the ratio of capital contributions to the connections-plus-system-growth capex is proposed to be capped at 47 per cent (the average of this ratio across all EDBs over the last few years). In the case of EDBs for whom (in 2024) capital contributions accounted for a share larger than 47 per cent, these EDBs will be capped at their 2024 level.

We have analysed these proposals and have formed the view that they will materially improve the regulatory regime for connection charges in New Zealand.

Our assessment of the proposed reforms

We have carried out a qualitative assessment of the expected costs and benefits of these proposals and consider that the main benefits of the reform are:

- The improved alignment between the (upfront and ongoing) charges and the costs attributable to the connecting parties, promoting **more efficient connection decisions** (including timing) by access seekers. The reforms also support efficiency by reducing transaction costs, and by improving the incentives that EDBs face in relation to connection expenditure.
- Materially **improving the customer protections in relation to connection charges**. Customers will have greater transparency over what charges they should expect to pay and will have recourse to dispute resolution in the event they consider that the prices they are offered are unreasonable.

The costs of the reform are primarily related to its initial implementation, and the ongoing administration of connection charging methodologies and enforcement of the charging arrangements.

We consider that the benefits of the reform are likely to exceed the costs, particularly in the light of increasing demand for new and upgraded connections, including for price-sensitive fuel switching decisions (e.g., linked with the electrification of transport and process heat) and ongoing urban housing development. Further, the reforms are expected to facilitate the ongoing process of power system transformation.

In the longer run, the Electricity Authority is considering placing limits on the level of connection charges, based on a form of the net incremental cost methodology (i.e., setting connection charges based on the difference between incremental connection costs and incremental revenue plus a contribution to the common or shared costs of the network). We consider that this is a sensible direction for further reform, as discussed further below.

1. INTRODUCTION

The New Zealand Electricity Authority (NZEA or Authority) is considering whether to amend the Electricity Industry Participation Code (Code) to introduce new controls on connection pricing methodologies used by electricity distribution businesses. CEPA has been engaged by the NZEA to provide an independent view of whether regulatory intervention is justified and an assessment of potential changes to the regulatory framework which might assist in promoting the Authority's statutory objectives of reliability, efficiency and competition in the electricity industry for the long-term benefits of consumers, as well as protecting domestic and small business customers.

1.1. WHAT ARE CONNECTION CHARGES?

Electricity Distribution Businesses (EDBs) transport electricity (a) in both directions between the point of interconnection with the transmission grid and the location of commercial and residential electricity customers; and (b) transport electricity between individual commercial and residential customers.

To provide these services, EDBs create and maintain electricity distribution networks. The majority of the costs of providing distribution services are fixed (that is, independent of throughput in kWh)[10]. EDBs receive revenue from two main sources:

(a) Ongoing charges, known collectively as distribution use of system (DUoS) charges, which may comprise several components including:
    i. Fixed charges (e.g., $/day)
    ii. Usage charges (e.g., c/kWh) – which may vary by time of day or by season.
    iii. Peak demand charges (e.g., c/kW)

(b) Charges for *one-off connection* to the distribution network. These charges may be triggered by either the establishment of a new connection (e.g., to a new commercial site or subdivision) and/or an upgrade to an existing connection. These charges may be further divided into two categories:
    i. Charges related to the cost of construction or upgrade of new assets which connect the location of a customer to the core, shared distribution network (sometimes known as "dedicated assets" or "sole-use assets").
    ii. Charges related to any consequential upgrades within the core, shared distribution network itself, also known as "deep connection charges".[11]

Collectively, the one-off or upfront connection charges and the ongoing fixed use-of-system charges represent the *fixed charges* associated with connection to an electricity distribution network.

As just noted, to provide distribution services to a customer the EDB may need to make an investment in either assets which are dedicated to the provision of service to that customer, or upgrades to the shared network.

In some circumstances, when connecting a customer, the EDB will allow a third-party to construct new dedicated assets or to upgrade the network, paid for by the customer. Where a third-party constructs assets which connect to the distribution network, the ownership of the asset (and responsibility for its maintenance) is transferred to the EDB at the time of connection. These are known as "vested asset transfers". From the perspective of the connecting

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[10] Some costs (such as losses and, potentially, transformer maintenance schedules) are related to throughput in kWh, but these account for a relatively small proportion of the total cost of an electricity distribution business.

[11] Although a new connection *may* involve both expenditure on connection assets as well as upgrades to the core network this relationship is not direct or mechanical. A new connection may not require new connection assets or core network upgrades, especially if the connection uses the network at off-peak times when there is spare capacity. Conversely, upgrades to the core network may be required even in the absence of new connections, for example in the case where shifting demand patterns increase the co-incident peak (i.e., reduce the benefits of diversity of consumption patterns).

customer, this is equivalent to the EDB requiring an upfront payment equal to the cost of the dedicated assets (less any contribution from the EDB recovered through ongoing charges).

Different EDB customers can have quite different costs to serve. Some customers may be located close to the shared part of the distribution network (and have a consumption profile which does not contribute to the local system peak) and therefore may be connected with minimal expense. Others may be located further away (or may contribute materially to the local system peak and so force an upgrade of the shared network). These latter customers may require substantial expenditure to connect.

A key regulatory principle is that each connecting customer (or group of customers) should contribute a stream of new revenue greater than or equal to the incremental costs of connecting. Since the incremental costs of connecting may vary widely across customers, it follows that the amount charged by the EDB to different customers must also vary. A key challenge in the regulation of EDBs is reflecting these differences in the cost to serve in the prices charged – either upfront connection charges or ongoing charges.

While some standardised connection charges can be established in advance, given the wide range of potential customer sizes and locations, it is usually infeasible for a regulator to set individual prices for all potentially connecting parties *in advance*.[12] Instead, such prices are typically regulated *ex post*, on an as needed basis. That is, the distribution business estimates the required expenditure on a bespoke basis following a connection request. Typically, in other jurisdictions, in the event of a dispute on the level of these charges, the connecting party is allowed to seek dispute resolution on the bespoke or customised charges. The nature and extent of the regulation of these upfront charges is the focus of this report.

In most cases, all or almost all the variation in cost to serve across customers is reflected in variation in the upfront charges, leaving the ongoing charges to be undifferentiated across large customer groups or locations.

1.2. THE CURRENT REGULATORY FRAMEWORK FOR CONNECTION CHARGES

Under the existing regulatory framework in New Zealand, connections and connection charges are not directly regulated. We understand there is currently no obligation on EDBs to provide a connection when requested to do so.[13] We understand that the introduction of a formal obligation for EDBs to connect new load is the subject of ongoing consultation and is outside the scope of this report.

Similarly, at present, distribution connection charges are not directly regulated in New Zealand. Non-exempt[14] EDBs are free to decide how to set their connection charges and the balance between upfront and ongoing charges. EDBs are, however, required to publish their policy in the form of a *Capital Contribution Policy*. These obligations are set out in the Electricity Distribution Information Disclosure 2012 rules, as follows:

> *"2.4.6 Every EDB must at all times publicly disclose—*
>
> *(1) A description of its current policy or methodology for determining capital contributions, including—*
>
> *(a) the circumstances (or how to determine the circumstances) under which the EDB may require a capital contribution;*

[12] Although, as we will see, it is usually possible to set standardized *rates* for establishing connection charges (that is, a rate $/kW of capacity or $/km for the length of a connection).

[13] Arguably, a refusal to provide service may trigger a government response and EDBs may be anticipating this reaction by voluntarily meeting connection requests. We understand that, in contrast, there is an obligation to connect distributed generation.

[14] In the regulatory framework in New Zealand, customer-owned EDBs are classified as exempt from price-quality regulation. In this report, when discussing EDBs we will be focusing on the non-exempt EDBs.

(b) how the amount payable of any capital contribution is determined. Disclosure must include a description of how the costs of any assets (if applicable), including any shared assets and any sole use assets that are included in the amount of the capital contribution, are calculated;

(c) the extent to which any policy or methodology applied is consistent with the relevant pricing principles;

(2) A statement of whether a person can use an independent contractor to undertake some or all of the work covered by the capital contribution sought by the EDB;

(3) If the EDB has a standard schedule of capital contribution charges, the current version of that standard schedule."

EDBs must forecast the revenue they expect to receive from capital contributions at the start of each regulatory period. This forecast revenue is subtracted from the total capex forecast for the regulatory period. In addition, at the end of each regulatory period any capital contributions received during the period are offset from the actual capital expenditure when determining the closing Regulatory Asset Base (RAB).

At the start of a regulatory period, EDBs forecast their capex programs for the period, including forecast expenditure on connections and system growth. This capex program is reviewed by the Commerce Commission as part of its *ex ante* assessment of capex forecasts.[15] However, the forecast expenditure on new connections is, inevitably, somewhat approximate and based on forecasts of the numbers of new connections and the average cost per connection. The detailed capex requirements for each individual customer are only able to be determined *ex post* once a connecting customer, and their individual needs, are assessed.

We understand that the Commission does not monitor or oversee the charges that are offered to connecting parties. Rule 2.4.7 of the information disclosure rules requires:

> *"When a consumer or other person from whom the EDB seeks a capital contribution, queries the capital contribution charge, (and when the charge is not covered in the standard schedule of capital contribution charges, or no such schedule exists) the EDB must, within 10 working days of receiving the request, provide reasonable explanation to any reasonable query from that consumer or other person of the components of that charge and how these were determined."*

However, this rule does not give the Commission (or any other party) the power to review, modify or amend the charges proposed by the EDB.[16, 17]

1.3. OUTCOMES UNDER THE CURRENT REGULATORY FRAMEWORK

As shown in the figures overleaf, capital contributions have increased both in nominal terms and as a percentage of total consumer connection expenditure over time. This appears to have been driven mainly by Vector Lines, which

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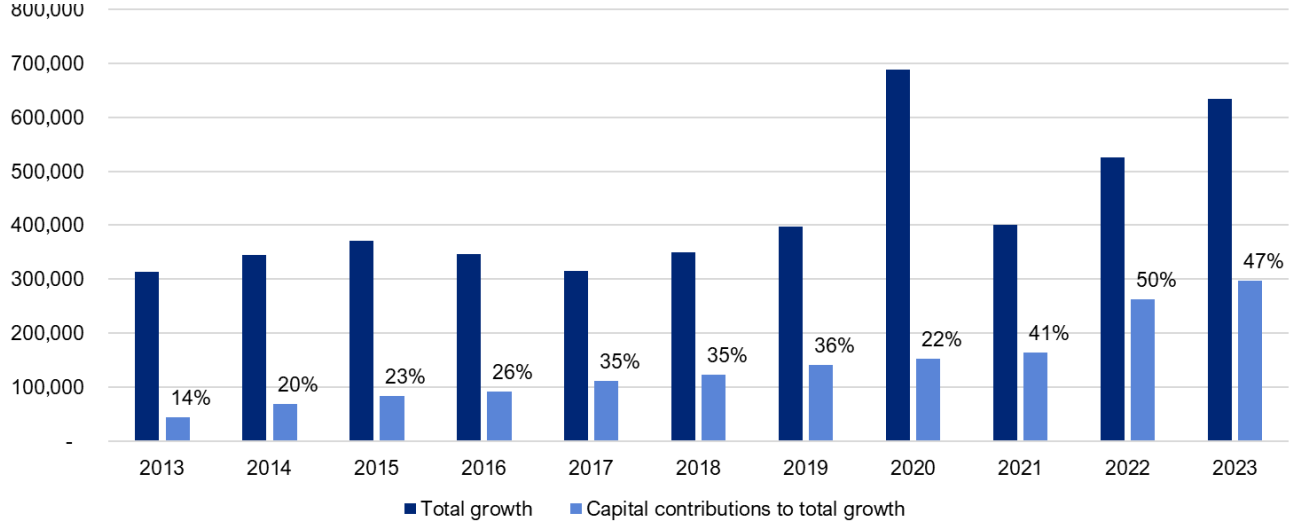
[15] The degree of ex ante scrutiny of capex forecasts differs between EDBs on "default price paths" and those on "customized price paths", but this distinction goes beyond the scope of this report.

[16] There is a dispute resolution body, Utilities Disputes Ltd, but it does not have the power to control EDB charges.

[17] One advantage of the current regulatory framework is that it overcomes a drawback that arises under a revenue cap. One of the drawbacks with a revenue cap regime is that, during the regulatory period, the regulated firm has little or no incentive to provide services that materially increase its costs. Since connecting new customers can imply material costs for an EDB, there is a risk that, if the revenue cap applied to all the revenue of the EDB, the EDB might seek to deny, delay or defer any new connections. This risk is mitigated under the status quo because the revenue from upfront connection charges is, in effect, outside the revenue cap. Provided the connection charge exceeds the average incremental cost of connecting each customer, the EDB retains an incentive to service new connections, as discussed in section 2.2.

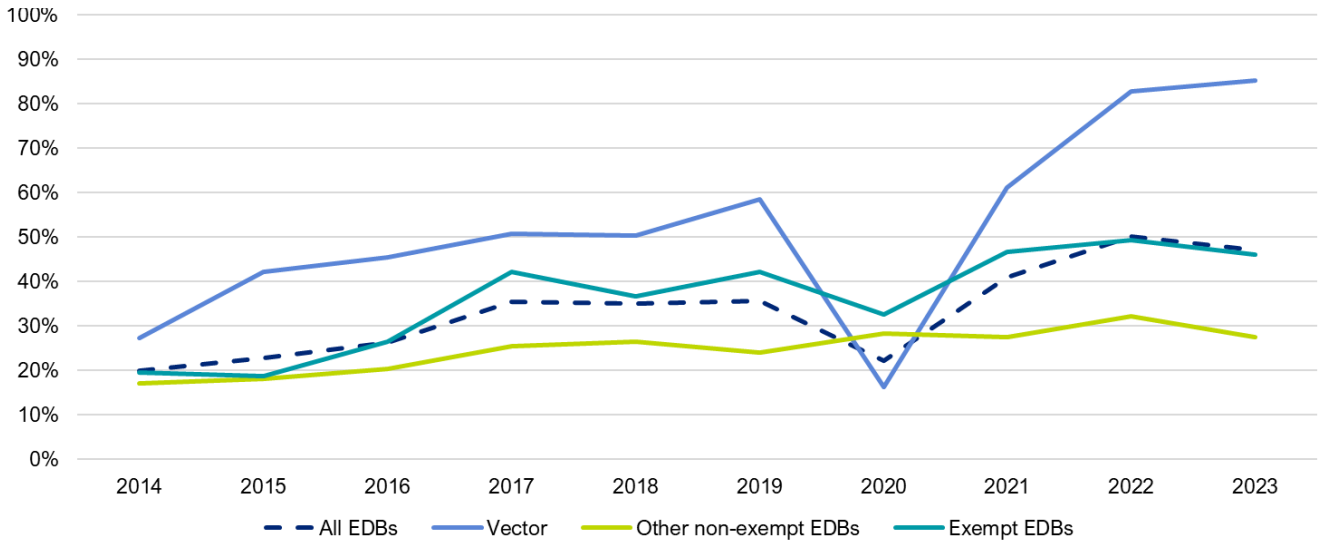
historically accounts for approximately 30% of consumer connection expenditure in NZ, as well as exempt EDBs[18], which historically on aggregate account for approximately 20% of consumer connection expenditure.

Figure 1.1: Consumer connections and system growth (nominal NZD '000s) and percentage of capital contributions



Source: CEPA analysis of EDB Information Disclosure (ID) data.

Figure 1.2: Capital contributions as a percentage of consumer connection and system growth expenditure

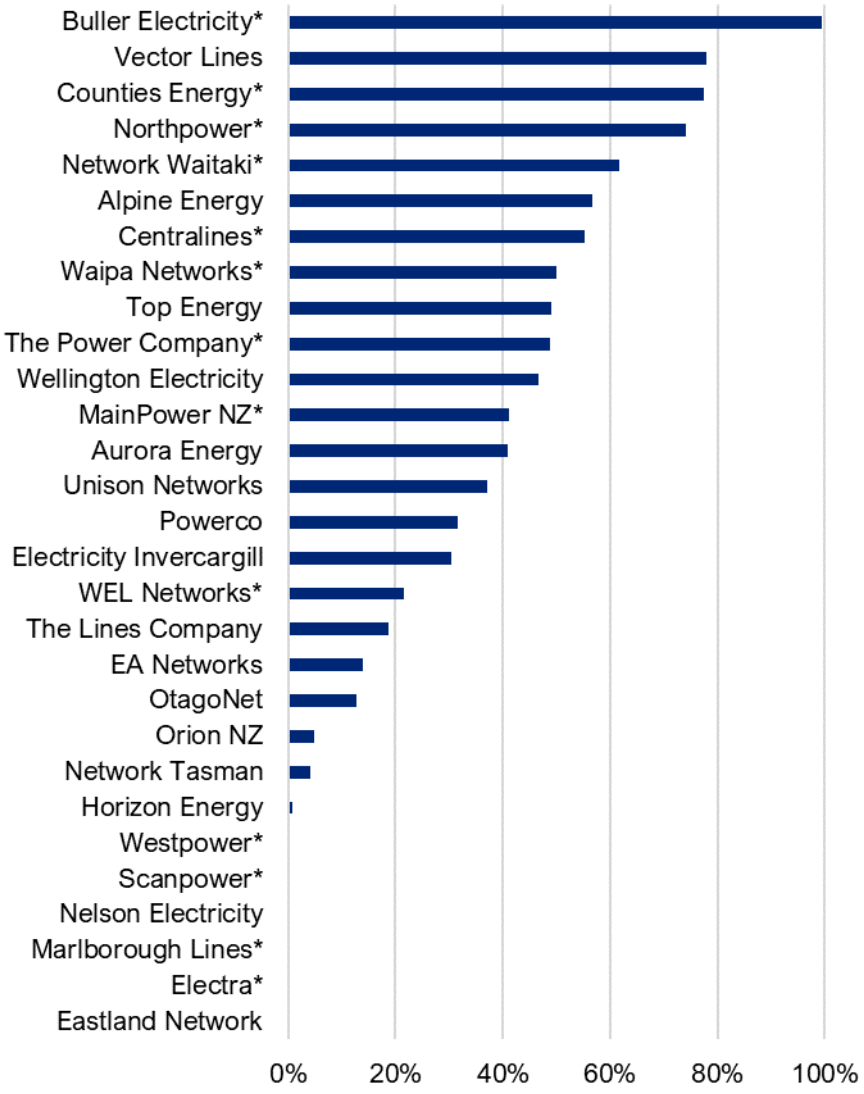


Source: CEPA analysis of ID data.

EDBs' practices vary widely in terms of the proportion of connection expenditure covered by capital contributions.

[18] In the regulatory framework for EDBs in New Zealand, exempt EDBs are customer-owned and are exempt from the price-quality regulation.

Figure 1.3: Percentage of consumer connection and system growth expenditure covered by capital contributions over disclosure years 2021-2023.



*Source: CEPA analysis of ID data. The symbol * denotes exempt EDBs.*

1.4. THE AUTHORITY'S PROPOSED REFORM PACKAGE

The NZEA has highlighted the following concerns with the current arrangements:

- **Changes in the level of connection charges.** For practical reasons, EDBs have a limited degree of differentiation of ongoing charges across electricity customers (particularly small mass-market customers).[19] In practice a newly connected customer will typically face the same ongoing charges as an existing customer. This potentially creates an issue when an EDB decides to change the level of connection charges. In the event, for example, that an EDB that increases connection charges, higher connection charges result in newly connecting parties facing a higher total cost (in present value terms) than existing customers. High total cost may deter connection activity.

[19] We understand that a degree of tailored pricing exists for large customers, but tariff differentiation is otherwise impractical for the bulk of smaller customers.

- **The level of connection charges.** The balance between upfront connection charges and ongoing charges allocates the "financing burden" associated with connections. To the extent that connections are charged upfront, the burden of obtaining financing lies with the customer. To the extent that costs are recovered instead via ongoing charges, it lies with the EDB. The NZEA notes that preferences for the level of connection charges may vary over time, between customers and EDBs, and even amongst EDBs.[20] However, extreme positions (both very low and very high connection charges, and correspondingly very high and very low ongoing charges) are seen as potentially problematic.
- **The structure of connection charges.** The current arrangements around connection charges are vulnerable to issues of coordination related to a connecting customer's 'position in the queue' (such as 'first mover disadvantage' or 'last straw') and potentially to the over-provision of connections (i.e., connections are provided, and charged, at a higher standard than requested).
- **Diversity of approaches.** Excessive diversity of approaches amongst EDBs raises transaction costs for access seekers, professional services, and suppliers (e.g., equipment and builders).

To address these issues, the NZEA is proposing the following reform package, to be implemented in successive stages.

Figure 1.4: Illustration of reform process

Specifically, the NZEA is proposing the following set of 'fast-track' reforms to be reflected in the Code and implemented in the short term, indicatively by early 2026:

- **Connection charge reconciliation requirement**: EDBs will be required to report on the reconciliation between connection charges and the net incremental cost of a connection (i.e., incremental cost minus incremental revenue from serving the additional customer), using a standardised method. In the short run, this is intended to enhance transparency of connection pricing, as well as serving as a stepping stone towards full reform, where EDBs will be required to price connections based on the net incremental cost methodology.
- **Connection enhancement cost requirement**: A requirement for EDBs to offer (and price) a least-cost connection service, with the costs of any 'enhancements' borne by the party requesting them. This least-cost scheme is specific to each connecting customer and may include a degree of "non-firmness" – such as the obligation to be curtailed in the event that the load of other connecting customers nears the network

[20] Depending, for example, on interest rate cycles, capex cycles, and regulatory settings (e.g., in relation to the cost of capital).

limit.[21] EDBs may elect to design an enhanced connection but must charge based on the lower cost solution between the minimum and enhanced scheme. Customers too can seek a higher capacity/quality service and bear the cost of the requested enhancements. This is to ensure that the EDB does not seek to "over-service" the newly connecting customer, while retaining flexibility for connections above the minimum standard.

- **Capacity costing requirement**: A requirement to calculate connection charges associated with network upgrades[22] based on published unit rates (e.g., $/kW or $/kVA) by network tier, [23] that reflect the average incremental cost of adding capacity at that tier. This ensures that customers contribute to upgrade costs in proportion to the size of their connection, even if they are not immediately triggering a network upgrade, on the basis that their connection consumes the 'headroom' available in the network. This enhances transparency and predictability about the level of connection charges, and promotes the consistency of charges from one customer to the next, regardless of the timing of their connection (i.e., their 'position in the queue').[24]
- **Pioneer scheme requirement**: It may be the case that due to lumpiness in investment, it is efficient to build a connection asset to a larger capacity than is immediately required by a customer. If there are no other customers expected to connect at the same location, then the first connecting party may be required to pay the full cost of the connection asset. However, under a pioneer scheme, if subsequently customers seek connection at the same location, those later customers may be required to share the cost of the connection asset, which is passed back as a rebate to the first connecting party. This reduces the magnitude of the first-moved disadvantage problem.
- **Dispute resolution**: There are existing provisions in the Code governing dispute resolution in regard to the connection pricing of distributed generation. The NZEA proposes that these provisions should be extended to cover all connections, to improve the enforcement and effectiveness of the other arrangements.[25]
- **Reliance limit:** An upper limit on the share of the total growth capex which may be recovered through connection charges. This is intended to manage the risk of distributors increasing their reliance on capacity contributions in the near term. This limit is expressed as the larger of the following two thresholds: (a) the average ratio of capital contributions to the sum of connections and system growth capex across all EDBs over the four years to 31 March 2024 (equal to 47 per cent); and (b) the same ratio for each individual EDB for the 2024 year.

The fast-track reforms will be accompanied by safeguards. These include restrictions on the ability of EDBs to increase capital contributions, and a process for deferring implementation.

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[21] This may require specific controls on the customer's load. The least-cost scheme may also (if the customer agrees) involve a lower level of reliability (such as reduced redundancy on the network serving the customer).

[22] Upgrades are defined as work required to increase the capacity of the shared network, as opposed to extending the network from the existing infrastructure to the connecting customer's premises and/or attaching the customer's premises to the network.

[23] Network tiers may include: sub-transmission line, zone substation, high voltage feeder, distribution substation, and low voltage mains.

[24] We understand that the NZEA is considering excluding very large connections from this rule, as in such cases the concept of average incremental cost of the new connection may be less applicable.

[25] These provisions apply to disputes arising, e.g., from allegations that regulated terms have been breached, conditions specified by a distributor are not reasonably required, or a party has not attempted to negotiate in good faith. Provisions that apply include the ability to appoint an investigator who 'must endeavour to effect an informal resolution (a settlement) of every matter under investigation, by agreement between the parties to the investigation'. If a settlement is reached, it must be approved by the Authority and is then binding on the parties. Failing settlement, the matter can be referred to the Ruling Panel. The Authority considers that these provisions could be readily extended to all connections as part of the fast-track reform, with the potential for further refinement in the timeframes for the full reform.

The ‘full reform’ will be implemented in the longer term (the exact timing will be considered as the full reform package is developed further over 2025). At this stage, it is envisaged that the full reform will include the implementation of a consistent methodology and terminology across EDBs, a requirement to price connections based on the net incremental cost approach (which EDBs will already be required to report against as part of the fast-track elements listed above), practice guidance, and additional arrangements around governance and the treatment of non-standard customers (such as large customers and developers).

This report focuses on the fast-track elements of the reform, as the elements that have been defined in more detail to date.

2. OUR ASSESSMENT OF THE ISSUES

This section sets out the issues we have identified that arise in the status quo.

2.1. WITHOUT RING-FENCING, A CHANGE TO CHARGE STRUCTURE LEADS TO WINDFALL GAINS AND LOSSES ACROSS CUSTOMERS OVER THE MEDIUM TERM

We identify that under the current arrangements, if an EDB decides to change the level of connection charges, this can lead to windfall gains and losses across customers over the medium term. This consideration is reflected in the first of the concerns highlighted by the NZEA, as set out in section 1.4 above. Here, we explore this issue more formally using a simple economic model, illustrated in Figure 2 below.

Let's imagine that an EDB is in a steady-state growth equilibrium with no upfront charges (no capital contributions). Let's assume that all customers are identical, so that there is no differentiation between customers in the ongoing charges. Each period new customers are added, resulting in new capital expenditure of $1000 on connection assets. This capex is added to the RAB. The connection assets are assumed to have a finite life of, say, 20 years. In the long-run steady state, the RAB per customer approaches the level of half the connection cost (reflecting the fact that each connection asset is, on average depreciated by half) – in this case $500.[26]

Now let's suppose that after some time has elapsed the EDB changes its capital contributions policy so that the upfront cost of each connecting customer is recovered entirely through a one-off upfront connection charge (equal to $1000, occurring in year 26 in this example). In this world, since the capital contributions exactly match the new connections capex, the net new capex reduces to zero. The RAB per customer will initially decline. In the long-run, if the growth continues at a constant number of customers per period, eventually the newly connecting customers will become a smaller and smaller proportion of the total RAB, and the RAB per customer will return to the previous long-run level ($500).

The problem lies in the transition between these long-run equilibrium states. In the absence of any differentiation between customers of the ongoing charges, a change in the capital contributions policy will increase the upfront charge for the next connecting customer but will only have a small (averaged) impact on the ongoing charges for all customers, including existing customers. This newly-connecting customer therefore faces *both* the full upfront charge and nearly all the ongoing charges. This customer faces a present value of upfront and ongoing charges which exceeds (potentially by a large margin) that customer's actual cost of connection. This has a deterrent effect on the taking up of new connections.

The newly connecting customers can in principle avoid the high charges (in present value) by delaying or deferring connection until all of the existing connection assets have been depreciated out of the RAB – but this could take several decades. The delay or deterrence in taking up new connections is a real economic harm.[27]

The previously-connected customers face a small reduction in their ongoing charges so they are better off (they experience a windfall gain), but their connection decision is sunk so there is no welfare gain.

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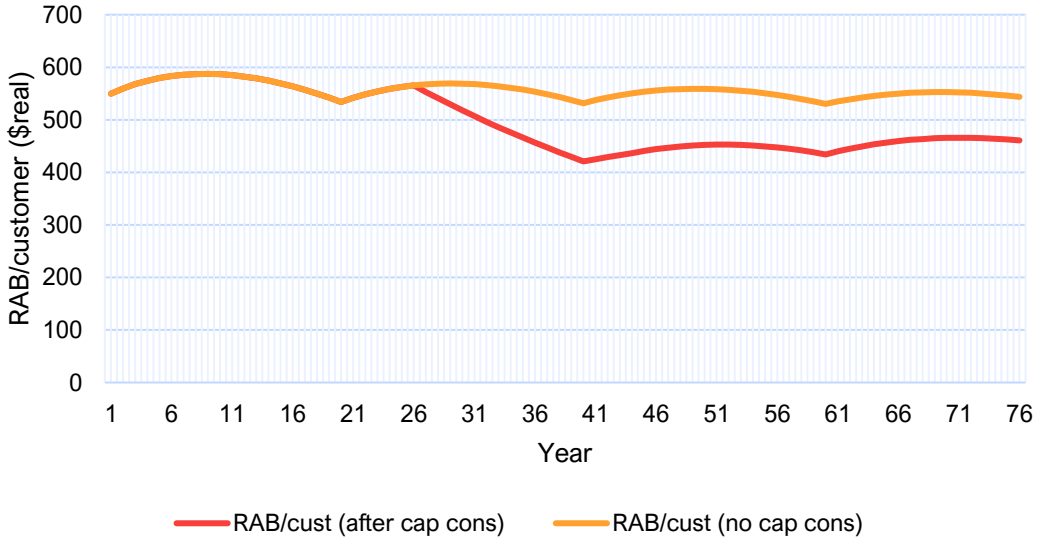
[26] All values are expressed in real terms.

[27] A similar effect can also happen in reverse. Let's suppose that an EDB starts with a high upfront charge and no ongoing charges. It then decides to swap to a low upfront charge and high ongoing charges. In the absence of any differentiation in the ongoing charges, this raises the ongoing charges, but only by a small amount (since the annualised cost for the newly connecting customer can be spread over all the customers). The newly-connecting customer faces a cost of connection which is much less than its true cost. This customer therefore has "too much" incentive to connect (which may lead the customer to "rush" its connection application). At the same time the previously-connected customers face unexpectedly higher ongoing charges. The threat that this restructuring of tariffs might occur may have a deterrent effect on making the connection in the first place.

Figure 2.1: Illustration of the effect of a shift from no upfront charges to high upfront charges (in year 25 a switch to high connection charges lowers the RAB for a period of 20 years; during this period the newly connecting customers pay more (in present value of charges) than the cost of connecting)



In summary, in the absence of differentiation of ongoing charges (that is, without "ring fencing" tariff restructuring) changes in capital contributions policy (specifically, an increase in upfront connection charges) will have harmful effects on the incentive for customers to connect. This occurs even though the changes in connection charges are fully anticipated and reflected in the forecast capital contributions.

2.2. EDBs FACE A MIX OF INCENTIVES, NOT ALL OF WHICH ARE CLEARLY DESIRABLE

In addition to the concerns identified by the NZEA in relation to changes in the level of connection charges, we note that EDBs face a mix of incentives, not all of which are clearly desirable.

Under the status quo any revenue from connection charges is treated as a "capital contribution" and offset against capital expenditure. The "net connection capex" is therefore equal to the connection capex less connection revenue (i.e., capital contributions). Each regulatory period, the net connection capex is forecast and used as an input to the building block model, which determines the revenue allowance during the period, as well as the forecast closing value of the RAB. When the out-turn net connection capex differs from the forecast net connection capex, EDBs receive a financial reward or penalty (as modified through the IRIS scheme).

Many EDBs have other concerns which affect their willingness and ability to respond to financial incentives.[28] Nevertheless, it is worthwhile to explore the implications of these financial incentives.

The net connection capex can be written as follows:

$$NCC = (AIC - CC) \times CR$$

Here:

AIC is the average incremental cost associated with each connection.

CC is the up-front connection charge.

CR is the number of connection requests.

[28] For example, profit-maximisation might not be a primary driver for some consumer-owned EDBs.

The EDB is rewarded for reducing the net connection capex relative to the forecast level. It follows that – other things equal – EDBs likely receive a financial reward for taking the following actions:

(a) A reduction in the average incremental cost (AIC) of each connection (provided this does not also reduce the connection charge).

(b) An increase in the upfront connection charge (CC) of each connection

(c) Delaying or resisting connections in the case where the connection charge is smaller than incremental cost ($AIC > CC$) and

(d) Encouraging or speeding up connections when the connection charge is larger than the incremental cost ($AIC < CC$).

Let's assume for the moment that the connection charge is not directly linked to the incremental cost of connection.

For example, suppose that average incremental cost of a new connection is $8,000, and the EDB charges $10,000 per connection. Let's suppose that 200 new connections are forecast per annum, so the forecast net connection capex is (8000-10000)x200=-$400,000. If the EDB can (perhaps through efficiencies) reduce the cost of a new connection to $7,000, the net connection capex reduces to (7000-10000)x200=-$600,000, and the EDB receives a financial reward. This is a socially-beneficial incentive.

Continuing this example, if the EDB can increase the number of connections from 200 per year to 250 per year, the net connection capex reduces to (8000-10000)x250 = -$500,000 and the EDB receives a financial reward. The EDB may not have much control over the number of connection requests, but at a minimum we can observe that the EDB has an incentive to process connection requests efficiently, which could be viewed as socially beneficial.

Similarly, continuing this example, if the EDB increases the connection charges from $10,000 to, say, $12,000, this reduces the net connection capex to (8000-12000)x200=-$800,000 and again the EDB is rewarded. It is not clear that this is a socially-beneficial incentive.

2.3. WHERE CONNECTION CHARGES ARE CLOSELY LINKED TO CONNECTION COSTS EDBS LACK INCENTIVES TO ENSURE EFFICIENT INVESTMENT IN CONNECTION ASSETS

Some EDBs seek to recover all the idiosyncratic costs of connection through upfront connection charges. This implies that any increase in the connection cost AIC is reflected in an increase in the connection charge CC (and vice versa for a reduction in the connection cost). An implication is that such EDBs face little or no incentive to economise on the costs of providing connections.

We understand that the capital expenditure associated with connection assets is not subject to detailed scrutiny or oversight by the NZ Commerce Commission.[29] As a result, it is not clear that (in this case where connection charges are closely linked to connection costs) there are incentives to efficiently optimise the connection investment.

In fact, some EDBs may have an incentive to *over-provide* connection assets. This would be the case, in particular, where the allowed regulatory cost of capital exceeds the true cost of capital, so that EDBs benefit from inflating their RAB. [30] We understand that, in proposing a minimum scheme as part of the reform package, the NZEA is precisely seeking to strengthen the incentive on EDBs to not over-service connecting customers.

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[29] As noted above, there is some ex ante assessment of proposed connection expenditure by the Commerce Commission, but no ex post verification that the connection expenditure in any given case is efficient.

[30] The practical significance of this incentive relative to the other incentives above is an empirical matter. The Commerce Commission believes that EDBs will generally follow the incentives to minimise expenditure and the regulatory-allowed return provides an incentive to invest to the necessary level. Further, due to the presence of the IRIS mechanism, the regulatory cost of capital may have to exceed the true cost of capital by a material margin before there is an incentive to inflate the RAB by over-investing in capex.

2.4. CONNECTION CHARGES MAY DEPEND ON "POSITION IN THE QUEUE"

In practice, there may be a minimum feasible size at which a connection can be provided, or a minimum practical size of an upgrade. As a result, it is not always feasible or desirable to size a connection asset to just meet the requirements of the connecting customer. Instead, it is often efficient for connection assets to be over-sized, especially where there is anticipation of future connections. But if a connection asset is over-sized in anticipation of future connections, who should bear the risk that those future connections fail to show up?

Under the status quo, an EDB could simply charge each connecting customer their full costs of upgrading the network even if that involves the addition of more capacity than the customer requires, regardless of the expected number of past or future connecting customers. This can give rise to a situation in which the first connecting customer, or some subsequent connecting customer (such as the "last straw customer") is charged the full cost of an upgrade while the intermediate connecting customers are charged little.

This has two disadvantages. Firstly, it results in price uncertainty to connecting parties who are unable to make connection plans without some certainty over the price they are likely to be charged. In addition, where charges depend on the "position in the queue" (as in this example) parties have an incentive to manipulate their position in the queue by delaying or rushing their connection applications.[31] This results in inefficient outcomes.

Similar coordination issues arise in relation to connecting customers that require a network extension to link the existing network infrastructure to their premises. Under current arrangements, the connecting customer may be saddled with the entire cost of the extension, even if the same extension line may be later used to service other customers who subsequently connect in an adjacent location. In this case, the first customer faces a potentially significant first mover disadvantage, which again could give rise to inefficient delays to connection decisions.

The NZEA is seeking to address these concerns through the unitised rates and pioneer scheme elements of the reform, respectively. Under the pioneer scheme proposal, the first connecting customer is charged the full cost of the upgrade, but receives a rebate from any subsequent connecting customers which share the same assets. This reduces the first-mover disadvantage but still exposes the first connecting customer to some risk (the risk that subsequent connecting parties will not show up). An alternative approach is to charge each connecting customer just the average incremental cost of connection (reflected in 'unitised rates'). Under this approach the risk that subsequent connecting parties will not show up is socialised to all customers.

These issues were recently addressed by the NZEA in its review of the Transmission Pricing Methodology (TPM). Amongst other things, the revised TPM seeks to eliminate the "first mover disadvantage" that arises because the charges for connection assets were disproportionately charged to the first connecting customer in a region. This is explained by the NZEA as follows:

> *"The new TPM addresses potential barriers to investments that will be required in the transition to a low-emissions future, which is premised on the connection of new renewable generation and the electrification of process heat. For example, the TPM has provisions that smooth the path for investment in new renewable generation and electrification by addressing the 'first mover disadvantage.' Under the new TPM the party who first funds the capital cost of a connection asset (first mover) only pays for what they need but:*
>
> - *not disproportionately more than a second mover who connects later (subsequent movers rebate a share of connection costs to the first mover)*
> - *not for any extra capacity that Transpower considers it is prudent to build in anticipation of (uncertain) future requirements (which is instead funded by a wider group of customers until subsequent movers connect)."*[32]

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[31] For example, connecting customers may jostle to avoid being the first to connect.

[32] Transmission Pricing Methodology 2022, Decision Paper, paragraph 2.10 and 2.11.

These issues are also being addressed in the Authority's Network Connections Project which is focused on non-price barriers to improving the efficiency of connecting to the distribution network and upgrading existing connections under Part 6 of the Code.[33]

2.5. Lack of a mechanism for effective enforcement of rules regarding connection charges or services

Under the current regulatory framework we understand that there are relatively few rules governing the level of connection charges.[34] But even if there were such rules, there are limited options for customers for enforcing such rules.[35] In the absence of protections, a customer could in principle be asked to pay substantially more than the efficient cost of connection (in PV terms). This could act as a substantial deterrent to investment by customers in devices (such as EV chargers) which rely on access to the distribution network and which increase the value of services to customers.

The NZEA's proposed reform includes a dispute resolution element intended to promote effective enforcement of rules for connection charges. Specifically, the Authority is proposing to adapt the existing dispute resolution provisions in the Code (relating to disputes between distributors and distributed generators) to apply to disputes between distributors and load customers.

Clause 6.8 of the Code lists the circumstances under which a (distributed generation) customer can seek dispute resolution. This includes allegations that regulated terms have been breached, conditions specified by a distributor are not reasonably required, or a party had not attempted to negotiate in good faith. The Authority has the power to appoint an investigator who 'must endeavor to effect an informal resolution (a settlement) of every matter under investigation, by agreement between the parties to the investigation'. In the event that a resolution is not reached, the matter can be referred to the Rulings Panel who must apply the principles in part 6 of the Code.

We agree that this mechanism could be adapted to apply to disputes between EDBs and connecting parties. This would give connecting parties a relatively low-cost mechanism to enforce the obligations in the Code, including the new obligations set out above.

2.6. Comments on other issues raised by the NZEA

The level of connection charges

In principle, upfront connection charges could cover very little of the connection costs (with the rest recovered through ongoing charges). At the other extreme, connection charges could cover not just the directly attributable costs, but also a contribution to the costs of upgrades deeper into the shared network ("shallow" versus "deep" connection charges).

We note that the Authority has indicated a preference that connection charges be neither very low, nor very high (that is including deep connection costs). We broadly support this position for the following reasons:

(a) Where connection charges are very low relative to ongoing charges, it is likely to be difficult to reflect the full variation in connection cost in the ongoing charges (since ongoing charges are not usually geographically differentiated). As a result, some customers will likely not face the full costs of their connection decisions while others will be somewhat overcharged.

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[33] Network connections | Our projects | Electricity Authority (ea.govt.nz)

[34] As noted earlier EDBs are required to publish a capital contributions policy, but each EDB's capital contributions policy can be changed at any time.

[35] There is a limited right to seek dispute resolution through Utilities Disputes Ltd (UDL). UDL deals with disputes over services provided (or not provided) and the rights of landholders, but does not deal with pricing disputes.

In addition, low upfront charges increase the financing burden on EDBs which (depending on the financing constraints on the EDB and/or the level of the regulated cost of capital) may limit the willingness or ability of the EDB to service new connections.

(b) Where connection charges are very high (including deep upgrade costs) it can be difficult to keep track of how much different generations of connecting parties have paid to the costs of the shared network. Where the number of connecting parties is higher or lower than originally forecast, this approach can lead to over or under-recovery of total network costs.

This approach also places considerable risk on the connecting party (regarding the longevity of the connection). A connecting party may not know in advance how many years it will require electricity service at its location. But when the connection charges are very high (and include deep upgrade costs) in effect the connecting party is asked to incur the full cost of long-lived assets, even if the deep upgrade costs can be subsequently shared with other subsequent connecting parties.

Transaction costs

The Authority has also expressed concern that different EDBs have chosen different approaches to connection charges. The diversity of approaches raises the transactions costs of customers which must seek connections with multiple EDBs, as well as potentially other parties who undertake connection-related work in multiple EDBs' service areas (professional services, suppliers).

We agree that some harmonisation of approaches, provided that it is not too disruptive for EDBs, is likely to reduce the transactions costs of parties who are seeking, or otherwise involved in, a large number of new connections.

3. OUR ASSESSMENT OF THE NZEA PROPOSALS

Having set out the problems with the status quo, let's now turn to a discussion of the solutions proposed by the Authority. Our assessment of these proposals, with associated commentary, is set out below.

3.1. LINKING CONNECTION CHARGES TO NET INCREMENTAL COST

As part of the fast-track reform package the Authority is considering introducing a new requirement for EDBs to report on the reconciliation between connection charges and net incremental cost. The proposed policy is only to require *disclosure* of the relationship between connection charges and net incremental cost; EDBs may still charge more or less. However, it is expected that this transparency will assist in identifying when connection charges are excessive. This will also serve as a stepping stone towards mandating, in the longer term, that connection charges are based directly on a net incremental cost methodology.

We agree with this policy on the following grounds:

- It introduces transparency the level of connection charges. This gives connecting parties some certainty as to what they can expect to pay.
- It will likely impose some limits on the EDB's discretion to change the level of connection charges, which in turn ameliorates the issue of windfall gains and losses associated with such changes.

An approach based on net incremental cost has precedent in other jurisdictions internationally, including in Australia, California, and Ontario, as detailed in the Appendix.[36]

The NZEA is proposing that the incremental costs of connection include both "shallow" connection upgrade costs and deeper costs of upgrading the core network. As set out in the Appendix, the "depth" of connection charges varies across jurisdictions, and within jurisdictions depending on the connection's characteristics. In general, customers bear the cost of dedicated assets and line extensions (subject to rebates under a pioneer scheme),[37] whereas the cost of network upgrades is charged only to larger connections (e.g., in Australia, GB, and Ontario).[38]

3.2. PREVENTING EDBS FROM OVER-SERVICING NEW CONNECTIONS

The Authority is considering introducing a minimum scheme, i.e., a requirement to offer (and price) a least-cost connection service, with the potential for the customer to seek a higher-quality service if required. This is to ensure that the EDB does not seek to "over-service" the newly connecting customer.

We agree with this proposal, as it ensures that connecting customers are not forced to pay for connection services that they do not need or require.

As discussed in the Appendix, there is a similar obligation in Australia, where EDBs are required to determine the charges for each component in a fair and reasonable manner, based on the *least cost technically accessible*

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[36] Great Britain follows a somewhat different approach, where EDBs levy connection charges based on an allocation of costs between EDBs and customers (as detailed below), and the regulated revenue requirement for connections is set with reference to forecast connection costs not covered by these connection charges. However, the arrangements in Great Britain are also underpinned by a common charging methodology, which ensures a consistent approach to connection charges across EDBs.

[37] Ontario is an exception, in that residential customers are not required to pay connection charges for dedicated assets up to a certain standard.

[38] In Australia, the threshold refers to the capacity of the connection (and is set at a modest level, capturing all but the smaller connections), whereas in GB it refers to the cost of the upgrades. In Ontario, EDBs can choose to charge upgrade costs to all customers based on a net incremental cost approach, but in practice some EDBs choose not to apply this methodology to residential connections. California is an exception, where customers are not required to contribute connection charges for upgrades to the shared network.

standard necessary for the connection service. This protects against gold-plating of the network, as only when a connection applicant requests a connection service to be performed to a higher standard, and pays the additional cost is the network built to a higher standard. Similar provisions exist in the other jurisdictions we reviewed, highlighting broad support for this type of policy.

3.3. PREVENTING DISCRIMINATION BETWEEN CUSTOMERS ON THE BASIS OF THE TIME OF CONNECTION

The Authority is considering a requirement to charge for network upgrades associated with connections using standardised unit rates reflecting the average incremental cost of providing additional capacity at each network tier. This is to enhance transparency and to reduce the risk of over-charging for connection services.

We agree that the proposal is likely to be valuable. This requirement ensures that similarly-situated connecting parties will face similar charges, eliminating the risk of discrimination between customers on the basis of the timing of their connection, addressing the "first mover" or "last straw" problems as they relate to network upgrades, and enhancing transparency on the costs of connection.

Further, unitised rates can support transparency and predictability of connection charges, and is consistent with international practices, such as the obligation on British EDBs to publish charging statements to "*be presented in such form and with such detail as would enable any person to make a reasonable estimate of the charges for which he would become liable in respect of […] connections to the licensee's Distribution System"*.[39] In practice, this translates to EDBs publishing the ranges of charges that would normally apply to particular activities, such as the construction of extension and reinforcement.[40]

3.4. REDUCING THE RISK OF FIRST-MOVER DISADVANTAGE

The Authority is considering a requirement that an initial connecting party which pays for a network extension is granted a partial rebate in the event that subsequent connecting parties are able to share, and contribute to, the cost of that extension. This is known as a "Pioneer scheme".

We agree that where there is subsequent demand for connection at that location, so that any spare capacity on the connection assets is utilized, the original customer who paid for the upgrade should be compensated from the connection charges of the newly-connecting customer. We support the establishment of a pioneer scheme whereby customers who are forced to pay for extensions larger than they require receive a share of subsequent connection revenue from sharing that asset.

As set out in the Appendix, there are pioneer schemes in all the international jurisdictions we reviewed, showing broad support for this type of policy. For example, in Australia, EDBs are required to apply a pioneer scheme to network connections that have been fully funded by a connection applicant. When subsequent customers connect and use assets within seven years of installation, the DNSP collects a pioneer scheme charge which is then passed back to the original customer. The refunded amount is based on the depreciated value of the asset and the proportion of its capacity used by a new customer.

In the case of GB, where, in order to provide a new connection, the DNO uses existing assets that were installed to provide a connection to another customer, and that existing customer has paid a connection charge for those assets, the new customer may be required to make a payment that will go towards reimbursing the existing customer. Reimbursements are required from all new connections made within 10 years of the existing customer's connection.

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[39] Ofgem (2024), Standard conditions of the Electricity Distribution Licence, 9 April, p. 89.

[40] See for example National Grid Electricity Distribution, East Midlands connection charging methodology, p. 131.

However, we observe that, although a pioneer scheme reduces the risk of being the first connecting party, it does not eliminate that risk entirely. If the subsequent connecting parties do not show up, the first connecting party will be left with the full costs. For this reason, we consider it preferable, where future connections are reasonably foreseeable, for the EDB to charge each connecting party their average incremental cost, through the unitised rates approach noted above. This approach, in effect, socialises the risk of stranded assets among all customers.

3.5. A MECHANISM FOR RESOLVING DISPUTES

The Authority is considering extending the existing provisions in the Code that relate to the connection of distributed generation, to cover load connections.

We agree and support this proposal. The provisions set out above need some mechanism to ensure that the EDB complies. Since it is not possible to establish all the connection charges in advance, if a customer is to be protected from the market power of the EDB, there must be a mechanism for enforcing the principles above, which the customer can invoke *ex post*, for *all* the services the customer requires, not just export services.

We observe that this dispute resolution mechanism should be able to tailor its efforts to the value of the issues in dispute. In the case of smaller households, the dispute resolution mechanism should be able to reach a decision quickly and with a minimum of effort. The decision might not involve setting a price directly, but, instead, mandating some form of contestability and/or confirming the unitised rates. In the case of larger customers, the dispute resolution mechanism should be able to seek review of, say, the planning decisions of the EDB and to form views on the efficient sharing of costs.

In Australia, rules regarding dispute resolution between EDBs and their customers are set out in Part G of chapter 5A of the National Electricity Rules. In this case the AER acts as the dispute resolution authority. An extract of this part of the Rules is as follows:

> "Clause 5A.G.1 Relevant disputes
>
> (a) In this Part:
> *customer* means: (1) a retail customer; or (2) a real estate developer.
>
> *relevant dispute* means: (1) a dispute between a Distribution Network Service Provider and a customer about: (i) the terms and conditions on which a basic connection service or a standard connection service is to be provided; or (ii) the proposed or actual terms and conditions of a negotiated connection contract; or (2) a dispute between a Distribution Network Service Provider and a customer about connection charges. …
>
> Clause 5A.G.2 Determination of dispute
>
> (a) In determining a relevant dispute, the AER must (so far as applicable) give effect to: (1) the relevant connection policy; and (2) a relevant model standing offer to provide a basic or standard connection service; and (3) this Chapter and any other applicable regulatory instrument.
>
> (b) In determining a relevant dispute, the AER may also: (1) have regard to other matters the AER considers relevant; and (2) hear evidence or receive submissions from the Distribution Network Service Provider and the customer; and (3) if the dispute relates to a negotiated connection contract – have regard to the negotiation framework set out in clause 5A.C.3."

3.6. LIMITS ON CAPITAL CONTRIBUTIONS

The Authority is considering placing a ceiling on the level of capital contributions that EDBs can receive as a proportion of their total connections and system growth capex. These are referred to as "reliance limits".

We agree that it makes sense to place limits on the ability of EDBs to raise connection charges. As we have noted, in the absence of ring-fencing (that is, in the absence of an offsetting reduction in the ongoing charges), an

increase in the connection charges leaves newly-connecting parties worse off than existing customers. We agree that limits are required on the ability of EDBs to shift towards higher connection charges (in the absence of ring-fencing).

Furthermore, we note that placing limits on connection charges does not necessarily (and should not) shift costs on to existing customers ny requiring an increase in charges to existing customers. Provided the present value of additional revenue from charges (upfront or ongoing) exceeds the present value of connecting and serving new customers, those new customers will yield sufficient revenue to cover their costs. There is no need to change the charges to existing customers, even in EDBs experiencing high growth in connections.

We also agree that EDBs should not seek to recover *all* of their connections-plus-system-growth capex through capital contributions. The reason is that the "system growth" category of capex is driven in part through organic growth of *existing* customers (e.g., changing patterns of consumption leading to an increase in the co-incident peak). This component of costs cannot be attributed to newly-connecting customers. Recovering this capex through connection charges would result in an inappropriate cross-subsidy from new customers to existing customers.

The reliance limits proposed by the Authority will likely not be binding for many EDBs. Currently three price-quality regulated distributors are forecast to exceed their proposed reliance limits for the period from 2026/27 to 2029/30. Specifically, Alpine Energy and Unison Networks are forecast to exceed the sector average limit of 47% in the years ending 2028 and 2029 and Vector is forecast to exceed its individual reliance limit of 82% in each of the remaining four years of the regulatory period (from 2026/27 to 2029/30). Again we note that this limit on the level of capital contributions on Vector should not result in a need to increase charges for existing customers.[41]

The Authority does not propose to place limits on the ratio of capital contributions to connections-plus-system-growth capex for EDBs for which this ratio remains below the sector average of 47%. The Authority would like to discourage very low reliance on capital contributions for the following reason: Where customers have a different cost to serve and the ongoing charges are undifferentiated, in the absence of a connection charge all customers face the same overall charge (in present value terms) for connecting. But this implies that low-cost-to-connect customers are, in effect, cross-subsidising high-cost-to-connect customers. The Authority would like to avoid this by allowing EDBs to increase their capital contribution in a way that reflects the full variation in the cost of connection of different customers.

We agree that it is desirable to avoid cross-subsidisation between different groups of customers. Doing so could overly deter connection for some customers, while not providing the correct price signal for other customers. We have not studied the degree of variation in connection costs across customers and how this varies across EDBs. It is theoretically possible that some EDBs may serve relatively homogeneous customers in a small geographic area with a relatively similar cost of connection. In this case, it would be possible to have a relatively low capital contribution and to recover the majority of the connection cost through undifferentiated ongoing charges. On the other hand, it is theoretically possible that an EDB may have very large variation in the cost of connecting customers, in which case nearly all of that variation in the connection cost would have to be reflected in variation in connection charges (as long as we retain undifferentiated ongoing charges).

In the absence of further information we agree with the Authority that it makes sense to allow EDBs with a ratio of capital contribution to connection-plus-system-growth capex less than the sector average to raise their capital contribution, so that the geographic variation in cost-to-connect can be reflected in variation in the capital contribution. In the longer term it makes sense to put in place rules which ensure that (a) the incremental revenue from each connecting customer exceeds the incremental cost of connecting that customer (so that there is no cross-subsidy between high-cost-to-connect and low-cost-to-connect customers); and (b) amongst customers with a similar cost to serve, the connection charge does not increase materially over time (so that subsequent

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[41] This assumes that the upfront and ongoing charges are such that the present value of the additional revenue from these customers exceeds the incremental cost.

connecting customers do not face charges materially higher than their connection costs and are not materially deterred from connecting)

3.7. OTHER REFORMS

Another policy that could be considered is a strengthening of the obligation to provide contestability – that is allowing for third-party provision of the connection assets. Allowing for contestability further protects the customer against over-charging for connection assets.

This is consistent with the policy adopted in international jurisdictions, as detailed in the appendix. For example, in GB, under the Competition in Connections (CIC) framework, the DNO can provide a complete connection service, but the customer may also ask an Independent Connection Provider (ICP)[42] to undertake a broad range of contestable works, including design, site preparation, construction, and connection to the LV network. Non-contestable work includes: design approval, connection to the HV network, and reinforcement of the existing network.

EDBs will need to retain control over their networks, for safety and security reasons. It will not be practical to open all services to contestability. The precise list of services open to contestability would be partly specified in the regulatory regime and partly open to decision by the EDBs, subject to ex post dispute resolution. We recognise that, where EDBs recover a portion of connection costs through ongoing fixed charges, it may not be possible to achieve effective contestability for the provision of connection assets without some form of contribution from the EDB. This is an issue which could be worked through in future policy development processes.

[42] ICPs are registered companies who can build electricity networks to agreed standards.

4. QUALITATIVE ASSESSMENT OF COSTS AND BENEFITS

Having reviewed the issues with the current arrangements governing connection charges in NZ and how the Authority's proposals seek to address these issues, we now turn to a qualitative assessment of the benefits and costs of the proposed reforms against the counterfactual of 'no reform' (i.e., maintaining the status quo). We focus primarily on the fast-track elements of the reform, which have been defined in greater detail at this stage.

4.1. ASSESSMENT OF THE FAST-TRACK REFORMS

We assess the expected benefits of the reforms against the statutory objectives of the Authority, as defined in Section 15 of the Electricity Industry Act 2010:

> *"(1) The main objective of the Authority is to promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers.*
>
> *(2) The additional objective of the Authority is to protect the interests of domestic consumers and small business consumers in relation to the supply of electricity to those consumers.*
>
> *(3) The additional objective applies only to the Authority's activities in relation to the dealings of industry participants with domestic consumers and small business consumers."*

Our assessment is set out in the table below.

Figure 4.1: expected benefits of the fast-track reforms

Reform element	Expected benefits
Connection charge reconciliation requirement	• **Efficiency:** The proposed reform will improve transparency of connection charges and will likely move connection charges towards the net incremental cost of providing connections. This promotes cost-reflectivity in the pricing of electricity distribution services and addresses the issue of windfall losses and gains to EDB customers that arise under current arrangements when EDBs change the level of connection charges. As charges will better reflect the cost that a new customer imposes on the distribution system, this can be expected to lead to more efficient connection decisions. • **Protecting the interests of domestic and small business consumers** – The reform supports this objective by introducing a clear point of reference for the level of connection charges. This gives connecting customers greater certainty as to what they can expect to pay.
Connection enhancement cost requirement	• **Efficiency** – This reform will help ensure that efficiently sized/scoped connections are undertaken, by ensuring that the party that seeks a connection above the minimum (i.e., the customer) is also the party that pays for the associated costs • **Protecting the interests of domestic and small business consumers** – The reform supports this by ensuring that connecting parties are not over-serviced and do not pay for enhancements that they have not requested (and do not value greater than the cost of their provision).
Network capacity costing requirement	• **Efficiency** – The reform would ameliorate the current coordination issue that arises when connecting parties strategically try to avoid upgrade costs by inefficiently rushing or delaying connections in an attempt to alter their position in the queue, with deleterious impacts on efficiency compared to optimally timed connections. • **Competition** – Unit rates can enhance transparency and consistency in connection charges from the same EDB (and potentially, to some extent,

Reform element	Expected benefits
	across EDBs). This can be expected to facilitate contestability of connection services. • **Protecting the interests of domestic and small business consumers** – The reform improves transparency and predictability of connection costs, as well as consistency (the cost doesn't depend on the position in the queue).
Pioneer scheme requirement	• **Efficiency** – The reform would ameliorate the current first mover disadvantage issue related to network extensions, facilitating efficient connection decisions by "pioneers", who could request and pay for an extension with the prospect of receiving a rebate if they can share the extension assets with newcomers. • **Protecting the interests of domestic and small business consumers** – The reform supports this by ensuring that customers who require an extension (including, for example, farmers and customers in rural locations) are able to share the cost of those extensions.
Reliance limits	• **Efficiency:** The proposed reform will prevent further increases in capital contributions (where it is binding) ensuring that newly-connecting customers are not overcharged in present value terms. This ensures that the charges will better reflect the cost that a new customer imposes on the distribution system, this can be expected to lead to more efficient connection decisions. • **Protecting the interests of domestic and small business consumers** – The reform contributes to ensuring that domestic and small business customers are not overcharged (where it is binding) for connections or upgrades, protecting their interests.
Dispute resolution	• **Protecting the interests of domestic and small business consumers** – The reform allows more effective enforcement of the connection pricing rules at the request of customers, including residential and small business customers, than under current arrangements.

In addition to the points set out above, the reforms can be expected to support efficiency the electricity industry by supporting greater harmonisation of charging approaches across EDBs and making charges more predictable and cost-reflective, which in turn would **lower transaction costs and facilitate planning decisions** for access seekers, including those who request connections across multiple EDBs' service areas (e.g., developers, commercial customers).

To summarise, the main benefits of the reform are:

- The improved alignment between connection charges and the costs attributable to the connecting parties, promoting **more efficient connection decisions** (including timing) by access seekers. The reforms also support efficiency by reducing transaction costs, and by improving the incentives that EDBs face in relation to connection expenditure (and possibly timing).
- Numerous improvements in the **protection of domestic and small business customers' interests**.

The reform also provides additional advantages, possibly of a more limited magnitude, in terms of competition for contestable connection services and downstream services.

In assessing the benefits of the reforms we have not taken into account issues related to "financeability" (that is, the ability of regulated businesses to obtain financing given their regulated cashflow stream). CEPA's view is that provided the cost of capital is set reasonably, businesses which are regulated using a building block model, are

almost always[43] able to obtain financing to balance their cashflow issues and that therefore financeability is not an important additional consideration.

The costs of the reform are primarily related to its initial implementation, and the ongoing administration of connection charging methodologies and enforcement of the charging arrangements.

Figure 4.2: expected costs of the fast-track reforms

Timeframes	Expected costs

One-off implementation costs	• **For the Authority:** implementing the reform (Code amendment).
	• **For EDBs:**
	  ○ Amending existing connection pricing methodologies to comply with new rules (e.g., developing unitised rates and net incremental costs methodologies).
	  ○ Considering the implications of changes to connection charges for their business plans, and engaging with customers, investors, and the NZCC on changes to revenue, pricing, and financing settings.
	  ○ Potentially the need to re-open the Default Price Path (or to revise a Customised Price Path) – that is, the costs associated with engaging with the Commission and the Authority on revisions to their revenue allowance.
	• **For access seekers:** developing an understanding of the new arrangements.

Ongoing costs	• **For the Authority:** providing guidance, monitoring, dispute resolution, and enforcement.
	• **For EDBs:**
	  ○ Ongoing analysis and reporting in relation to supporting connection pricing (e.g., net incremental cost and unitised rates calculations, administration of a pioneer scheme).
	  ○ Need to design and cost a minimum scheme for each new connection request.
	  ○ For EDBs that see a reduction in the level of connection charges as a result of the reform, the need to manage uncertainty around connection capex.
	  ○ Costs associated with dispute resolution
	• **For access seekers:** costs associated with dispute resolution.

We consider that the one-off initial implementation costs are likely to be minor relative to the lasting ongoing efficiency gains that the reform is expected to generate in terms of more efficient connection decisions and network expenditure. In the medium term, the cost for access seekers of familiarising with the new arrangements is likely to be more than offset by the reduced transaction costs linked with greater degree of pricing certainty and consistency, and the harmonisation of connection charging approaches across EDBs.

We acknowledge that the reform also entails some ongoing costs, however it is worth noting that the cost for EDBs of any ongoing analysis to support the pricing of connections under the proposed reforms is relevant only to the extent that it exceeds the cost of current connection pricing activities. Presumably, EDBs already have methodologies in place to price connections, and there is a cost associated to implementing these. It is unclear that the new methodologies required by the proposed reforms would result in materially more complex and expensive analysis (particularly if the new methodologies are based on a straightforward and standardised approach).

[43] With some possible exceptions for customer-owned firms or government-owned firms with particular borrowing constraints.

These ongoing implementation costs too must be weighed against the ongoing efficiency gains that are the key expected benefit of the reform. These benefits may be substantial, in the context of projected increasing demand for new and upgraded connections, including for price-sensitive fuel switching decisions (e.g., linked with the electrification of transport and process heat) and ongoing urban housing development.

Similarly, the ongoing costs for enforcing the reform through the proposed dispute resolution mechanism must be weighed against the considerable improvement that the reform introduces, relative to the status quo, with respect to protecting the interests of residential and small business customers (who currently appear to have in practice very limited recourse in the area of connection charges).

4.2. ASSESSMENT OF THE "FULL REFORM"

We have not carried out a detailed analysis of the full reform package, which is yet to be defined in detail. However, we understand that the full reform package will include (amongst other things) further strengthening of the link between connection charges and net incremental cost. Specifically, we understand that the full reform will include a requirement that connection charges will be required to be set between:

- incremental cost less incremental revenue, known as the "neutral point"; and
- incremental cost less incremental revenue plus a contribution to common cost (equal to the average contribution to common cost for other customers in the same customer class), which is known as the "balance point".

In our view, this policy makes sense. It is common in regulatory theory to require that the charges recovered from a customer (or group of customers) lie between incremental cost and standalone cost. More precisely, the additional revenue from serving a customer (which takes the form of one-off connection charges and ongoing fixed charges) should lie between the incremental costs and the standalone costs of serving that customer (both expressed in PV terms). In other words, we can write:

$$IC \leq CC + IR \leq IC + (SAC - IC) = SAC$$

Here

IC is the present value of the additional costs associated with serving this customer;

CC is the one-off connection charge;

IR is the present value of the additional revenue received from ongoing fixed charges;

SAC is the present value of the stand-alone cost associated with serving this customer.

It follows that the connection charge should be set in the range:

$$IC - IR \leq CC \leq IC - IR + M$$

Here $M = SAC - IC$ is the difference between stand-alone cost and incremental cost. We observe that the lower bound here is the "neutral point" referred to by the NZEA.

For fairness and horizontal equity reasons it makes sense to treat similar customers similarly. Let's suppose that customers in a given class all make a contribution of m to the common costs, then it makes sense to set the connection charge for new connecting customers in this class at the level:

$$CC = IC - IR + m$$

This is referred to as the "balance point" by the NZEA.

We agree that further constraining the connection charges to lie between the neutral point and the balance point will help to ensure that connecting customers only pay (in PV) an efficient price for connection, while also improving transparency and predictability of connection charges. We believe this will help to facilitate connections and facilitate the energy sector transition.

Based on these qualitative considerations, we conclude that the benefits of the proposed reforms are likely to outweigh their cost.

Appendix A CASE STUDIES

A.1. AUSTRALIA

Questions	Case study information
Who decides the amount and structure of the charges? • Is there a regulated calculation methodology or other form of oversight by the regulators? • To what extent EDBs have latitude in defining the charges?	The regulatory framework for distribution connection charges in Australia is set out in the National Electricity Rules (NER) and overseen by the Australian Energy Regulator (AER). The NER requires distribution network service providers (DNSPs) to prepare a network connection policy which sets out the circumstances through which various connecting parties pay up-front connection charges for the provision of connection services. The policy is required to comply with guidelines developed by the AER, and the AER may not approve a proposed connection policy that does not comply with these requirements.[44]
What is the basis for calculating the amount of the charges? • Are the connection charges standardised and defined prior to the connection application, or are they highly bespoke and only defined at the time of the connection application? • Is there a linkage to incremental cost or other cost metrics? • Are the charges shallow or deep?	The up-front connection charge that a connecting applicant will pay is calculated using the following formula: [45] $$Connection\ charge = AS + CC + PS$$ Where: • AS – is the total charge payable for all relevant alternative control connection services. • CC – is the total capital contribution payable for all relevant standard control connection services.[46] • PS – is the total charge payable to account for any pioneer scheme applying to the assets to which the connection applicant connects. Alternative control services are typically those that are directly attributable to an individual customer's connection to the network and can be charged to specific connection applicant, while standard control services are typically recovered from all customers through general network charges. However, DNSPs may seek a capital contribution through the connection charge for standard control services where the *incremental cost* of the standard control connection services exceeds the estimated *incremental revenue* expected.[47] The standard control services incremental costs include both customer specific incremental costs (those that are incurred by the DNSP in providing connection services for the sole use of the connection applicant) and shared network incremental costs (those that are incurred by the DNSP in providing connection services not for the sole use of the

[44] AER (2023), *Connection charge guidelines for connection customers,* Final version 3.0, p. 1.

[45] AER (2023), *Connection charge guidelines for connection customers,* Final version 3.0, p. 6.

[46] Chapter 6.2 of the NER defines a standard control service as a direct control service that is subject to a control mechanism based on a DNSPs total revenue requirement. In contrast, an alternative control service is a direct control service that is not a standard control service. A direct control service is defined in section 2B of the National Electricity Law (NEL) as a service where the price or revenue must be regulated under a distribution determination.

[47] AER (2023), *Connection charge guidelines for connection customers,* Final version 3.0, p. 10.

Questions	Case study information
	connection applicant).[48,49] In this way, the incremental costs include both shallow and deep charges. The incremental revenues are calculated as the net present value of all distribution use of system (DUoS) charges likely to be recovered from the connection applicant. The assumed connection period over which the NPV is calculated differs by the type of customer, with residential customers assumed to connect for a 30 year period, and business customers assumed to connect for 15 years.[50] There are some circumstances where connecting customers will be exempt from paying for shared network augmentations. These include when the cost of augmentation to the shared network is below a pre-determined shared-network augmentation charge threshold (hereby referred to as 'threshold'). This threshold is a demand level above which customers may be required to contribute to the cost of augmenting the shared network. While DNSPs may propose different thresholds across different parts of the network, broadly thresholds should be set at a level that excludes augmentation charges for retail customers.[51] The guiding principles for setting the threshold considers that connecting services above and below the threshold should have identifiably different characteristics, and that threshold should not create undue cross subsidies between new connection applicants and existing network users. The threshold is fixed for the duration of the regulatory period. [52] A key principle of Australia's connection charges regime is that retail customers should not be required to pay for deep network augmentations from connecting. Where a retail customer is seeking a connection service that exceeds the threshold set by a DNSP, so long as the retail customer is seeking a basic connection service, they will not be required to make a contribution towards the cost of the deep network augmentation.[53] DNSPs are obligated to have a model standing offer to provide basic connection services to retail customers which is approved by the AER.[54] A basic connection service typically requires no or minimal augmentation of the network and is sought by a significant class of retail customer.[55] There are several terms and conditions that are required to be included in a model standing offer with the key features being:[56] • A description of the connection, including its maximum capacity; • The qualifications required to carry out the work, and the safety and technical requirements to be complied with;

[48] AER (2023), *Connection charge guidelines for connection customers,* Final version 3.0, p. 10.

[49] These shared network incremental costs are calculated as: unit rate (the average cost of augmentation per unit of added capacity) multiplied by demand estimate (an estimate of the maximum electrical energy flow that will be consumed by the connection applicant).

[50] AER (2023), *Connection charge guidelines for connection customers,* Final version 3.0, p. 13-14.

[51] AER (2023), *Connection charge guidelines for connection customers,* Final version 3.0, p. 4.

[52] AER (2023), *Connection charge guidelines for connection customers,* Final version 3.0, p. 4.

[53] AER (2023), *Connection charge guidelines for connection customers,* Final version 3.0, p. 1.

[54] NER, Chapter 5A Part B.

[55] NER, clause 5A.A.1

[56] NER, clause 5A.B.2

Questions	Case study information
	• Details of the connection charges, or the basis they will be calculated on, and how they will be paid. DNSPs can also choose to put in place model standing offers for standard connection services – being a connection services other than a basic connection service for a specific class of connection applicant – by going through the same process as for basic connection services.[57] All other connecting charges are negotiated between the DNSP and connecting applicant, with protections in place that specify how and under what conditions parties can reach agreement in the NER and arbitration rights.[58] In addition to the costs of connection, the DNSP can also charge the connecting applicant a fee to cover reasonable expenses that arise from assessing bespoke connection applications and making connection offers.
Are connections charged upfront or via ongoing charges?	Connection charges directly attributable to a specific customer, or required through a pioneer scheme are typically charged up front. Connection charges that are not directly attributable to a specific customer are typically recovered through ongoing charges – the DUoS charges. However, where the incremental cost exceeds the expected incremental revenue derived through ongoing charges (called the cost-revenue test) then the DNSPs may seek a capital contribution that covers the difference.[59]
To what extent customers can negotiate different elements: • E.g., the split between ongoing and upfront? • Whether to require a connection with features beyond the minimum scheme (if there is a concept of minimum scheme)?	We have not been able to identify whether customers can further negotiate the split between ongoing and upfront charges outside the cost-revenue test that determines whether a capital contribution should be made for incremental charges. Where a customer requests a connection service of a standard above the least cost technically acceptable standard necessary for the connection service, then the connection applicant pays the additional cost of providing the service to the standard requested.[60]
Are there any 'pioneer' schemes – i.e., rebates for customers who have been among the first to connect in one area and have funded network assets which will also benefit others who connect later in the same area.	Pioneer scheme charges form part of the connection charges calculation. DNSPs are required to apply a pioneer scheme to network connections that have been fully funded by a connection applicant. When subsequent customers connect and use assets within seven years of installation, the DNSP collects a pioneer scheme charge which is then passed back to the original customer. The refunded amount is based on the depreciated value of the asset and the proportion of its capacity used by a new customer, however if the total refund is less than $1,000 ($, real, 2012), then the pioneer scheme charges are not incurred or refunded.[61]
How does revenue from connection charges interact with the remainder of the revenue allowance?	DNSPs are unable to earn a regulated return on assets that are funded by customers.[62]

[57] NER, clause 5A.B.4

[58] NER, Chapter 5A Part C.

[59] AER (2023), *Connection charge guidelines for connection customers,* Final version 3.0, p. 10.

[60] AER (2023), *Connection charge guidelines for connection customers,* Final version 3.0, p. 6.

[61] AER (2023), *Connection charge guidelines for connection customers,* Final version 3.0, p. 2 & 17.

[62] AER (2023), *Connection charge guidelines for connection customers,* Final version 3.0, p. 28.

Questions	Case study information
Are there mechanisms in place to incentivise EDBs to minimise the cost of connecting customers?	DNSPs are required to determine the charges for each component in a fair and reasonable manner, based on the least cost technically accessible standard necessary for the connection service.[63] This protects against gold-plating of the network, as only when a connection applicant requests a connection service to be performed to a higher standard, and pays the additional cost is the network built to a higher standard. Where jurisdictional (i.e., state-by-state) regulations allow it, DNSPs must provide an option for connection services to be contestable and provided by a third party.[64] DNSPs cannot require connections performed on a contestable basis to be at a standard higher than the minimum standard, unless this is requested by the customer or the DNSP pays for the difference.[65]

A.2. Great Britain

Questions	Case study information
Who decides the amount and structure of the charges? • Is there a regulated calculation methodology or other form of oversight by the regulator? • To what extent EDBs have latitude in defining the charges?	The Distribution Connection and Use of System Agreement (DCUSA) is a multi-party contract between licensed electricity distributors, retailers and generators in GB concerned with the use of the electricity distribution system. It was introduced in 2006, replacing numerous bilateral contracts, giving a common and consistent approach to the relationships between these parties in the electricity industry.[66] Schedule 22 of the DCUSA document sets out the Common Connection Charging Methodology (CCCM) that every Distribution Network Operator (DNO) is required to incorporate in its own connection charging methodology (along with other matters that are outside the scope of the CCCM), to ensure a consistent approach to connection charges across GB.[67] Each DNO's connection charging methodology must be approved by the British energy regulator Ofgem. However, Ofgem does not approve the individual charges calculated as a result of the methodology.[68] DNOs are required to adopt a Quotation Accuracy Scheme (QAS) approved by Ofgem. Individual customers who have requested small LV connections can challenge the accuracy of the charges quoted by their DNO in a connection offer under the QAS if they believe that the DNO: • Is quoting a figure outside the indicative price ranges included in their published charging methodology without adequate justification, or • Is not providing enough information to make this comparison.

[63] AER (2023), *Connection charge guidelines for connection customers,* Final version 3.0, p. 6.

[64] AER (2023), *Connection charge guidelines for connection customers,* Final version 3.0, p. 12.

[65] AER (2023), *Connection charge guidelines for connection customers,* Final version 3.0, p. 7.

[66] DCUSA website, https://www.dcusa.co.uk/about-dcusa/, accessed July 2024.

[67] DCUSA, version 16.2 (current as of July 2024), p. 603.

[68] Ofgem, https://www.ofgem.gov.uk/sites/default/files/docs/2014/08/ofg538_web_how_to_leaflet_4_0.pdf, accessed July 2024.

Questions	Case study information
	If the DNO finds merit in the customer's complaint, they will provide a revised connection offer and make a penalty payment.[69]
What is the basis for calculating the amount of the charges? • Are the connection charges standardised and defined prior to the connection application, or are they highly bespoke and only defined at the time of the connection application? • Is there a linkage to incremental cost or other cost metrics? • Are the charges shallow or deep?	In general, the CCCM requires DNOs to calculate the Connection Charge based on the estimated cost of the "Minimum Scheme" – i.e., the option with the lowest overall capital cost (as estimated by the DNO), solely to provide the required capacity.[70] The CCCM includes a non-exhaustive list of factors to be taken into account in the calculation of charges, including: • the required connection capacity • the available capacity of the distribution system • the type of work required (e.g., underground vs overhead lines) • the length of line or cable and other required installations • costs associated with design and consents • any variations in respect of the actual costs that were reasonably incurred as specified in the connection offer.[71] The CCCM sets out the allocation of connection costs between the customer and the DNO. The CCCM distinguishes between **extension assets** (single-use assets, i.e., assets that are used to connect a single site) and **reinforcement assets** (i.e., assets that add capacity to the existing shared-use distribution system, at the same voltage level and one voltage level above the point of connection to the existing distribution system): • The customer bears the cost of extension assets.[72] • For reinforcement: a. A high-cost project threshold of £1,720/kVA applies to demand connections, above which the customer is required to pay reinforcement costs in full. Below the threshold, reinforcement costs are generally borne by the DNO. b. A high-cost project threshold of £200/kW applies to generation connections, above which the customer is required to pay reinforcement costs in full. Below the threshold, reinforcement costs at the voltage level above the point of connection are generally borne by the DNO, whereas reinforcement costs at the same voltage level are apportioned between the customer and the DNO. The apportionment factor is based on the ratio between the new connection's thermal capacity (or voltage, or fault level requirement, whichever drives the need for reinforcement) and that of the relevant section of the network following the reinforcement.[73] Energy storage is treated as generation for connection charging purposes.[74]

[69] National Grid Electricity Distribution, East Midlands connection charging methodology, available at https://connections.nationalgrid.co.uk/connections-charging-statements/, p. 133-134.

[70] Subject to, among other things, accepted industry standards; the status and configuration of the Relevant Section of Network (RSN); the type and size of equipment currently in use on the distribution system; and the DNO's ability to minimise regulatory penalties associated with the Interruptions Incentive Scheme and the Guaranteed Standards of Performance. DCUSA, p. 603.

[71] DCUSA, p. 604.

[72] DCUSA, p. 605.

[73] DCUSA, p. 608-609.

[74] See https://connections.nationalgrid.co.uk/significant-code-review/, accessed July 2024.

Questions	Case study information
	The CCCM sets out some exceptions to these general principles. In addition, the customer can avoid paying reinforcement costs by choosing a Curtailable Connection (but may be required to pay for reinforcement later, if they wish to convert this to a non-curtailable connection). [75] Apart from these high-level principles of cost allocation set out in the CCCM, actual connection costs are calculated by the DNO providing the connection. Connection charges are bespoke and depend on the specific characteristics of work required. However, the DNO charging methodology includes indicative cost ranges for various connection activities, used as part of the Quotation Accuracy Scheme (discussed further below).[76]
Are connections charged upfront or via ongoing charges?	The cost of extension assets and those portions of reinforcement assets included in connection charges as described above must be paid upfront.
To what extent customers can negotiate different elements: • E.g., the split between ongoing and upfront? • Whether to require a connection with features beyond the minimum scheme (if there is a concept of minimum scheme)?	Where a customer has requirements for additional security, or the characteristics of the load require assets in excess of the Minimum Scheme, costs in excess of the Minimum Scheme are borne by the customer.[77] This includes the cost of the future operation and maintenance of assets beyond the Minimum Scheme – normally levied as a one-off charge representing the NPV of these costs. In certain circumstances the DNO may decide to design an "Enhanced Scheme" including additional assets and/or assets of a larger capacity or different specification than required by the Minimum Scheme. In this case, the applicable connection charge is the lower between the cost of the Minimum Scheme and the cost of the Enhanced Scheme minus any additional assets not necessary for the provision of the customer's connection.[78]
Are there any 'pioneer' schemes – i.e., rebates for customers who have been among the first to connect in one area and have funded network assets which will also benefit others who connect later in the same area.	Where, in order to provide a new connection, the DNO uses existing assets that were installed to provide a connection to another customer, and that existing customer has paid a connection charge for those assets, the new customer may be required to make a payment that will go towards reimbursing the existing customer. [79] These reimbursements are regulated by the Electricity (Connection Charges) Regulations 2017 as amended in 2022 (the ECCR). Reimbursements are required from all new connections made within 10 years of the existing customer's connection. In the first instance, the reimbursement is directed at the person who originally paid for the first connection. When they cease to own or occupy the relevant premises, they are no longer eligible for reimbursement, and can assign the right to future reimbursements to either the new owner/occupier of the premises or to the owner of the distribution system. Those who made a reimbursement under the ECCR are in turn eligible to receive reimbursements from subsequent new connections. Finally, the owner of the distribution network is entitled to reimbursement payments in relation to reinforcement and enhanced schemes cost which, as per the

[75] DCUSA, p. 607.

[76] For example, see National Grid Electricity Distribution, East Midlands connection charging methodology, p. 148 and on.

[77] Where the customer requests a three-phase connection and/or a supply voltage that is not necessary to meet the Required Capacity, and the local Distribution System is not of the requested number of phases and/or voltage, the customer pays in full the cost of Reinforcement of the Distribution System to your specified number of phases and/or voltage

[78] DCUSA, p. 604.

[79] DCUSA, p. 609. See also DCUS p. 613.

Questions	Case study information
	CCCM, they did not recover from the customer requesting the original connection.[80] The ECCR require that the DNO calculates any reimbursement payment as an appropriate proportion of the original connection expenses which appears "to be reasonable having regard to all the circumstances, including in particular the maximum capacity required by the person obtaining the Second Connection". The key circumstances to be taken into account are normally: • the extent to which assets provided for the purpose of the First Connection, are to be used for the purpose of providing the Second Connection, and • the maximum capacity required by the person obtaining the Second Connection.[81] Reimbursements are calculated relative to the total amount of extension assets. Reinforcement costs, instead, can be reimbursed only to the extent that: A) they were borne in part by the existing customer (in other words, costs borne entirely by the customer, e.g., those above the high-cost threshold, cannot be reimbursed); and B) the second comer would also be liable for reinforcement costs had they been the first comer under the prevailing connection charging arrangements. If the DNO determines that the reimbursement payment from a new customer would be less than GBP 300, the reimbursement charge is waived. The ECCR does not apply to "investment ahead of need" – i.e., it is not possible for a DNO to recover costs for reinforcement work that have not been triggered by an initial connection request.[82]
How does revenue from upfront connection charges interact with the remainder of the revenue allowance?	Connection costs that are not allocated to customers via upfront charges are borne in the first instance by the DNO. DNOs recover these costs, to the extent that these costs are included in the revenue allowances set by Ofgem in the electricity distribution price control, through ongoing charges. Clearly, the number and type of new connections that will be required during the price control period is not known upfront, and the allowance that DNOs request and Ofgem ultimately approves must be based on forecasts. In the absence of appropriate mechanisms within the price control to account for this uncertainty, there may be a risk that the DNOs receive an ex-ante allowance that falls short of or exceeds the outturn cost of the connections that the DNO will need to bear. This issue became particularly significant at the time of Ofgem's price control determinations for electricity distribution networks in 2022. The allocation of connection costs between connecting customers and DNOs described in the previous sections of this case study reflects amendments to the CCCM pursuant to the 2022 Access and Forward-looking Charges Significant Code Review (Access SCR). The Access SCR reduced the scope of upfront connection charges. For connections requested before April 2023, when the Access SCR came into effect, customers were generally required to contribute to reinforcement costs at the voltage level of the connection point plus the level above – without the

[80] Energy Networks Association (ENA, 2024), Electricity (Connection Charges) Regulations 2022 Guidance Document, May, p. 10.

[81] Ibid., p. 15.

[82] Ibid., p. 17.

Questions	Case study information
	exemptions that now apply below the high-cost threshold.[83] In approving the Access SCR, Ofgem reasoned that the previous connection charging arrangements posed a risk of stifling connection requests, at a time when greater investment was needed in low carbon technologies (LCTs) across the energy system (e.g., electrification of heat and transport, and uptake of low carbon distributed generation).[84] In setting the RIIO-ED2 price control for Electricity Distribution networks for the period 2023-2028, Ofgem recognised that there would be an increase in DNOs' costs following the Access SCR, as more connection work will be funded through the price control that would otherwise have been borne by connection customers. Ofgem also noted that this introduced significant uncertainty in DNOs' forecasting of the investment needed in RIIO-ED2. Consequently, prior to its price control determination, Ofgem asked DNOs to submit their estimate of the additional costs related to the Access SCR. Eventually, Ofgem decided that due to the uncertainty associated with the impact of the Access SCR, providing ex ante funding that is broadly equivalent to the first two years of DNOs' forecast impact would be best for consumers. This would ensure that DNOs are funded in the immediate term, with an ability to request further allowances through the Load Related Expenses (LRE) price control re-openers in 2025 and 2027, whilst not committing consumers to higher costs than may be necessary.[85]
Are there mechanisms in place to incentivise EDBs to minimise the cost of connecting customers?	The DNO who receives a connection application from a customer must provide a quote of the connection charge with a breakdown of contestable and non-contestable work. Under the Competition in Connections (CIC) framework, the DNO can provide a complete connection service, but the customer may also ask an Independent Connection Provider (ICP)[86] to undertake a broad range of contestable works, including design, site preparation, construction, and connection to the LV network. Non-contestable work includes: design approval, connection to the HV network, and reinforcement of the existing network. In addition, when the new connection is built by an ICP, the customer can choose for the associated network assets to be transferred to an Independent Distribution Network Operator (IDNO),[87] rather than the incumbent DNO. In this case, the party requesting the connection becomes a customer of the IDNO, rather than the DNO, and the IDNO will be responsible for all future operation, maintenance and fault repairs on the network that they own.[88] IDNOs can also act as ICPs and build the connection they will later own, at the customer's request. Alternatively, the ICP-built connection is adopted by the DNO who becomes responsible for future operation, maintenance and replacement.

[83] See National Grid, https://connections.nationalgrid.co.uk/significant-code-review/ , accessed July 2024.

[84] Ofgem (2022), Access and Forward-Looking Charges Significant Code Review: Final Decision, p. 4-5. https://www.ofgem.gov.uk/sites/default/files/2022-05/Access%20SCR%20-%20Final%20Decision.pdf

[85] Ofgem (2022b), RIIO-ED2 Final Determinations Overview document, p. 84-85. https://www.ofgem.gov.uk/sites/default/files/2022-11/RIIO-ED2%20Final%20Determinations%20Overview%20document.pdf

[86] ICPs are registered companies who can build electricity networks to agreed standards.

[87] An IDNO is a company licensed by Ofgem to own and operate electricity networks.

[88] National Grid, https://connections.nationalgrid.co.uk/information-for-customers/, accessed July 2024.

A.3. CALIFORNIA

Questions	Case study information
Who decides the amount and structure of the charges? • Is there a regulated calculation methodology or other form of oversight by the regulator? • To what extent EDBs have latitude in defining the charges?	The electricity sector in California is dominated by three large investor-owned utilities (IOUs) – Pacific Gas & Electric, San Diego Gas & Electric, and Southern California Edison. These IOUs engage in electricity generation, transmission, distribution, and retail supply. Transmission operations and associated revenues are regulated by the Federal Energy Regulatory Commission (FERC). Generation, distribution, and retail supply operations and associated revenues are regulated by the California Public Utilities Commission (CPUC). There are also three smaller IOUs – Bear Valley, Liberty, and PacifiCorp. This case study focuses on distribution charging arrangements, and in particular connection charges, for Southern California Edison (but arrangements for other major IOUs appear to be similar). There are also close to 50 smaller municipal utilities and rural electric cooperatives which are not subject to the same regulatory regime. The allocation of responsibilities and costs for new connections in the IOUs' service area is set out in the Electric Tariff Rules 15 and 16 adopted by the IOUs and approved by CPUC. Unless otherwise stated, information included in this case study is drawn from these rules.
What is the basis for calculating the amount of the charges? • Are the connection charges standardised and defined prior to the connection application, or are they highly bespoke and only defined at the time of the connection application? • Is there a linkage to incremental cost or other cost metrics? • Are the charges shallow or deep?	Connection charges are intended to recover the costs associated with: • Distribution line extensions, regulated in Rule 15. These are extensions of the existing distribution lines[89] from the nearest permanent and available distribution facilities to residential neighbourhoods and commercial/industrial areas. Distribution line extensions generally serve two or more customers. [90] • Service line extensions, regulated in Rule 16. These comprise the facilities that extend from the distribution line to the meter, and service-related equipment required to provide electric service to the customer. Each service line extension generally serves only one customer.[91] The charges are calculated with reference to "total estimated installed costs", based on project-specific cost estimates developed by the IOU.
Are connections charged upfront or via ongoing charges?	Upfront charges are required only to the extent that connection costs are not recovered from the estimated ongoing charges that the IOU expects to recover from the customer. IOUs determine upfront connection charges to be paid by the connection applicant[92] based on the difference between: • the IOU's "total estimated installed costs", based on project-specific estimates by the IOU; and

[89] Defined as "overhead and underground facilities which are operated at distribution voltages, and which are designed to supply two (2) or more services". Southern California Edison (SCE), Rule 15, Distribution Line Extensions, p. 17. Available at: https://www.sce.com/sites/default/files/inline-files/Rule15.pdf, accessed July 2024.

[90] SCE, Rule 15. See also https://www.sce.com/sites/default/files/inlinefiles/gas_and_electric_service_extension_rules.pdf, accessed July 2024.

[91] SCE, Rule 16, Service Extensions, available at: https://www.sce.com/sites/default/files/inline-files/Rule16.pdf. Accessed July 2024.

[92] Note that in most cases, the applicant will be the developer who constructs the dwelling/commercial facility, not the customer who ultimately occupies the premises. https://docs.cpuc.ca.gov/published/Final_decision/70109-02.htm#P125_9107

Questions	Case study information
	• "allowances" based on the revenue the IOU expects to receive in relation to providing service to the applicant. This requires evidence of "permanent, bona-fide loads to be served by the extension, within a reasonable time frame as determined by the utility" – i.e., allowances will only be granted if the applicant can show: A) that construction will proceed promptly and financing is adequate and B) evidence of building permit(s) or fully-executed home purchase contract(s) or lease agreement(s) or equivalent evidence of occupancy or electric usage. The allowance is used to offset service extension costs first. If the allowance exceeds service extension costs, the remainder is used to offset line extension costs. Allowances are based on the formula: *Allowance = Net Revenue / Cost of Service Factor* Where: • Net revenue is the annual revenue expected to be received by the utility from serving the applicant. To simplify the calculation of allowances, each IOU uses a standard revenue figure for residential projects, calculated as the total residential distribution revenue divided by the total number of residential customers.[93] Allowances for non-residential projects are based on project-specific estimates.[94] • The Cost of Service Factor (which varies by IOU) represents the annual revenue required by the IOU to cover all the costs associated with a $1 investment in line extension (including return on capital, depreciation, operations and maintenance expenditure, other expenses and fees, tax, and replacement expenditure for 60 years). Intuitively, the principle behind these arrangements is that, if net revenue associated with serving a connection is equal to (or greater than) the revenue required by the IOU to cover all the costs associated with the connection, the allowance will equal the cost of the connection and the applicant will not be required to pay any upfront charge. If net revenue from the connection is lower than required by the IOU to cover the cost of the connection, the remainder will be met by the applicant with upfront charges. This is only a stylised example. In practice, certain service and distribution extension costs are borne by the applicant and cannot be offset by the allowance.[95] To the extent that service extension costs are not fully offset by allowances, the applicant must pay them to the IOU in the form of an upfront cash charge. To the extent that distribution extension costs are not fully offset by allowances, the applicant must meet the costs through a combination of cash, value of facilities deeded to the IOU, and value of work conducted by the applicant at its own expense.
To what extent customers can negotiate different elements:	Any special or added facilities the IOU agrees to install at the request of the applicant (in addition to the specifications in Rule 2, Description of Service) will be installed at the applicant's expense.

[93] See https://docs.cpuc.ca.gov/published/Final_decision/70109.htm#TopOfPage

[94] https://www.sce.com/sites/default/files/inline-files/gas_and_electric_service_extension_rules.pdf, accessed July 2024.

[95] E.g., pole risers, excavation, conduit, protective structures, and equipment within the applicant's premises.

Questions	Case study information
• E.g., the split between ongoing and upfront? • Whether to require a connection with features beyond the minimum scheme?	
Are there any 'pioneer' schemes – i.e., rebates for customers who have been among the first to connect in one area and have funded network assets which will also benefit others who connect later in the same area.	Some of the upfront charges for distribution line extension are refundable.[96] Refunds become available when new customers using the same distribution line extension request service from the IOU. Refunds are no longer made after a period of 10 years. Where there is a series of Distribution Line Extensions, commencing with a Distribution Line Extension having an outstanding amount subject to refund, and each Distribution Line Extension is dependent on the previous Distribution Line Extension as a direct source of supply, a series refund will be made as follows: • Additional connections supplied from a Distribution Line Extension on which there is a refundable amount will provide refunds first to the Distribution Line Extension to which they are connected. • When the amount subject to refund on a Distribution Line Extension in a series is fully refunded, the excess refundable amount will provide refunds to the Distribution Line Extension having the oldest outstanding amount subject to refund in the series. Instead of paying refundable upfront charges in full, the applicant has the option to contribute only 50% of the charges' amount on a non-refundable basis. The IOU can charge the applicant (except individual residential applicants) a monthly "ownership charge" of 0.40% on any portions of refundable upfront charges that have not been refunded within 12 months.
How does revenue from upfront connection charges interact with the remainder of the revenue allowance?	As discussed above, upfront connection charges are required only to the extent that the cost of the connection exceeds the revenue the IOU expects to earn from serving that connection, which in turn depends on the level and structure of ongoing distribution charges. Periodically (every three years), the IOUs apply to CPUC to allow variations in the rates charged to their consumers. These proceedings are known as General Rate Cases (GRC) and have two distinct phases. In the first, CPUC determines the IOU's overall revenue required to cover the IOU's efficient costs, including a return on the asset base. In the second, CPUC decides on the allocation of this requirement between customer classes and the structure of the IOUs' charges. GRCs resemble a judicial process, where CPUC commissioners act as the judges and the IOUs and other interested parties (e.g., consumer advocates) intervene and submit evidence.[97] It is worth noting that, through these rate cases, IOUs can request the inclusion in their regulated revenue requirement of, among other things, costs associated with forecast connections.[98] This suggests that the "allowance" that is deducted from the total estimated installed cost of the

[96] The value of excavations, conduits, and protective structures, which cannot be offset by allowances and is not refundable.

[97] CPUC, https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-rates. Accessed July 2024.

[98] E.g., for "installing electric infrastructure required to connect new customers" and "customer contact, design and engineering, job cost estimation, contract preparation, construction, inspection of third-party work, and facility mapping". See CPUC, Decision on Test Year 2023 General Rate Case for Pacific gas and Electric Company, p. 435-436, 438. https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M520/K896/520896345.pdf, accessed July 2024.

Questions	Case study information
	connection to determine upfront charges (in recognition of the revenue the IOU expects to recover from ongoing charges) reflects allowed revenues that have been granted on the base of forecast connection costs. This provides for at least some proportion of connection costs to be recovered via ongoing, rather than upfront charges. Historically, the three major IOUs recovered the majority of their costs from usage charges (i.e., ongoing $/kWh charges). In May 2024, however, CPUC approved a new billing structure mandated by the state legislature in Assembly Bill 205. This introduces a US$24.15/month 'flat' ongoing charge, with a corresponding reduction in variable usage charges of approximately 5-7 US$ cents/kWh.[99] Low-income customers and customers living in deed-restricted affordable housing are eligible for discounted flat rates of $6/month or $12/month. The change will take effect in late 2025/ early 2026. The declared intent of this charging reform is to encourage electrification and EV uptake. CPUC has also indicated that this aligns with billing practices adopted in the rest of the United States.
Are there mechanisms in place to incentivise EDBs to minimise the cost of connecting customers?	The regime allows for contestability of connections. By default, the IOU is responsible for installing: • installing poles, cables, switches, transformers, and other distribution facilities pertaining to the distribution line extension; and • certain assets as part of the service line extension – e.g., risers, conductors, transformers and metering equipment. The applicant is responsible for excavation, substructures, conduits, and protective structures, and certain equipment within their premises. However, where requested by the applicant, the IOU may perform work that would otherwise be the applicant's responsibility. Vice versa, the applicant could also elect to perform work that would normally be the responsibility of the IOU, in accordance with the IOU's specifications and using qualified contractors. In this case: • Upon completion and acceptance by the IOU, ownership of all such facilities will transfer to the IOU. • The applicant shall provide to the IOU its estimate for the cost of the works. The lower of the IOU's and the applicant's estimated costs are subject to the refund and allowance provisions discussed above.

A.4. ONTARIO

Questions	Case study information
Who decides the amount and structure of the charges? • Is there a regulated calculation methodology or other form of oversight by the regulator? • To what extent EDBs have latitude in defining the charges?	The recovery of distribution connection costs is regulated by the Ontario Energy Board (OEB) in the Distribution System Code. The Code sets out cost allocation principles and a methodology for the calculation of capital contributions in relation to connection-related network expansions, but leaves a certain degree of flexibility to distribution businesses on the application of these principles. Aside from setting these high-level charging principles, the Code does not regulate the actual amount of the connection charges.

[99] CPUC, https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M531/K291/531291847.PDF, accessed July 2024

Questions	Case study information
What is the basis for calculating the amount of the charges? • Are the connection charges standardised and defined prior to the connection application, or are they highly bespoke and only defined at the time of the connection application? • Is there a linkage to incremental cost or other cost metrics? • Are the charges shallow or deep?	The Code sets out different rules for the recovery of: • connection costs – i.e., the cost of assets used to connect a single customer to the shared distribution system; and • expansion costs – i.e., those costs incurred when a distributor must add new facilities to or increase the capacity of its shared distribution system to connect a specific customer or group of customers.[100] Distributors cannot charge capital contributions for enhancements (i.e., network expansions motivated by forecast load growth rather than actual connection requests).[101] **Connection costs**[102] The treatment of connection costs depends on the type of customer and, to some extent, on the distribution business's own policies: • For residential customers, the distributor must define a basic connection, which must include, at a minimum, the supply and installation of overhead distribution transformation capacity and up to 30 meters of overhead conductor.[103] The distributor must recover the cost of the basic connection as part of its revenue requirement – i.e., the cost is socialised across the customer base and recovered from general distribution rates, rather than charged specifically to the customer requesting the connection. • For non-residential customers, a distributor *may* define a basic connection by rate class and recover the cost of connection either as part of its revenue requirement, or through a basic (i.e., standardised) connection charge to the customer. This leaves three options to distribution businesses: 1) socialising the cost of the basic connection;[104] 2) recovering the cost directly from the customer by applying a standardised connection charge;[105] or 3) not defining a basic non-residential connection service at all, and charging all connection costs directly to the requesting customer on a project-specific basis.[106] • For micro-embedded generation facility customers (i.e., those connecting a generation facility of 10kW or less), a distributor must

[100] An expansion of the main distribution system includes: (a) building a new line to serve the connecting customer; (b) rebuilding a single-phase line to three-phase to serve the connecting customer; (c) rebuilding an existing line with a larger size conductor to serve the connecting customer; (d) rebuilding or overbuilding an existing line to provide an additional circuit to serve the connecting customer; (e) converting a lower voltage line to operate at higher voltage; (f) replacing a transformer to a larger MVA size; (g) upgrading a voltage regulating transformer or station to a larger MVA size; and (h) adding or upgrading capacitor banks to accommodate the connection of the connecting customer. OEB (2024), p. 68.

[101] OEB (2024), p. 68-69.

[102] OEB (2024), Distribution System Code, revised 27 May 2024 p. 52. Available at: https://www.oeb.ca/sites/default/files/uploads/documents/regulatorycodes/2024-05/OEB_Distribution-System-Code_DERCR_EVCCP_20240527.pdf

[103] The cost of an underground connection above and beyond that of an overhead connection to the same premises must be borne by the customer.

[104] See for example Hydro One Networks (2023), Conditions of Service, p. 24-25. Available at https://www.hydroone.com/abouthydroone/conditionsofservice_/Documents/Hydro_One_Conditions_of_Service_January_1_2023.pdf

[105] We have not found specific examples of businesses that adopt this policy, but the Code suggests that it is allowed.

[106] See for example Alectra, Conditions of Service, p. 108-111. Available at https://alectrautilities.com/sites/default/files/assets/pdf/Alectra-Utilities-Harmonized-Conditions-of-Service-06252020.pdf

Questions	Case study information
	define a basic connection and recover the cost of the basic connection through a charge to the customer. • Finally, all customer classes are subject to a variable (i.e., project-specific) connection charge, calculated as the costs of connection in excess of the basic connection. **Expansion costs** In the case of an expansion, the distributor can perform an initial economic evaluation of the expansion project to determine if the future revenue from the customer(s) requesting the extension will pay for the capital and ongoing maintenance costs of the project. For this evaluation, distribution businesses must apply a standardised methodology based on a Discounted Cash Flow (DCF) model with the following inputs: [107] • Forecast revenue from the customers requesting the extension, based on forecast demand and the applicable distribution network charges by customer class. This calculation includes load expected to connect within a period of up to five years. The forecast horizon is for a period of up to 25 years from construction of the expansion – but the distributor can choose to apply a shorter horizon, e.g., for customers with greater business risk.[108] • The capital costs of the expansion, including the capital cost of connection assets. • Incremental operating and maintenance expenditures. If there is a shortfall between the present value of the project's costs and revenue, the distribution business may propose to collect all or a portion of that amount from the customer triggering the expansion in the form of a capital contribution, in accordance with the distributor's documented policy on capital contributions by customer class.[109] The language in the Code suggests that the distributor is not required to perform this evaluation and charge a capital contribution for every connection that triggers an expansion. For example, some distributors do not charge capital contributions for connections requested by residential and smaller commercial customers, [110] and presumably seek to recover the associated expansion costs through general distribution rates. Different rules apply for the calculation of capital contributions required from generation customers seeking to connect to the distribution system. In this case, forecast revenue is assumed to be zero, unless otherwise determined by rates approved by the OEB. However, for renewable generation, the distributor bears costs up to a "renewable energy expansion cost cap", or in other circumstances approved by the OEB.[111] **Expansion deposits** For expansions that require a capital contribution, a distributor can require the customer to provide an expansion deposit for up to 100% of the present value of forecast revenues from the project, in the form of cash,

[107] OEB (2024), Appendix B.

[108] See for example Kingston Hydro (2020), Appendix A to Conditions of Service, p. 4. Available at https://www.kingstonhydro.com/Cms_Data/Contents/KingstonHydro/Media/documents/Kingston-Hydro-CofS-_Appendix-A-_EEM-CCP.pdf.

[109] OEB (2024), p. 57.

[110] Kingston Hydro (2020), p. 4.

[111] OEB (2024), p. 55-56.

Questions	Case study information
	letter of credit from a bank, or surety bond. For expansions that do not require a capital contribution, a distributor may require a deposit for up to 100% of the present value of project costs. Every year, the distributor shall return a percentage of the deposit in proportion to the actual connections (for residential developments) or actual demand (for commercial and industrial developments) that materialised in that year, relative to the total forecast for the project. If after five years forecast connections/ demand have not materialised, the distributor is allowed to retain the remaining portion of the deposit.[112]
Are connections charged upfront or via ongoing charges?	As discussed above, the distributor can, but does not necessarily have to, request upfront capital contributions to fund expansions. The Code does not specify whether the basic and variable charges (discussed in the section above on connection costs) should be levied upfront or on an ongoing basis. However, the Code states that, when a distributor makes an offer to connect, it must declare, among other things, whether any connection charges will be charged separately from capital contributions towards expansion. This suggests that it is possible for the distributor to levy connection charges upfront, at the same time as expansion contributions. As noted above, distributors recover part of their connection costs (at a minimum, those for basic connections of residential customers) from distribution rates rather than connection charges. It is worth noting that, since 2015, residential distribution rates in Ontario have evolved from being largely recovered on a usage basis (i.e., $/kWh consumed) to a fixed charge basis ($/month). The reform was implemented gradually over the years, and currently most customers in Ontario (with the exception of customers in low density areas) are charged by their distributors entirely on a fixed basis.[113] Although the reform did not affect each distributor's aggregate revenue requirement, some individual customers saw an impact on their bills – e.g., customers with high electricity usage saw their distribution charges reduced with the move away from usage charges. The OEB cited the following reasons for the reform: • Ensuring that net metered customers (i.e., those who own distributed generation resources, the output of which is netted off the customer's consumption) still contribute towards distribution system costs, even if they withdraw very little energy from the grid. Prior to the reform, the OEB had to place restrictions on net metering to prevent revenue adequacy issues for distributors, and this was seen as a factor slowing the uptake of distributed energy resources. • Harmonising charging structures across distributors in the state. • The OEB saw fixed charges as a clearer, fairer, and more cost-reflective way of recovering the cost of distribution services, which are mostly fixed. [114]

[112] OEB (2024), p. 63-64.

[113] See for example https://www.hydroone.com/rates-and-billing/rates-and-charges/fixed-distribution-rates, accessed July 2024.

[114] OEB (2015), A New Distribution Rate Design for Residential Electricity Customers, p. 5-10. Available at https://www.oeb.ca/oeb/_Documents/EB-2012-0410/OEB_Distribution_Rate_Design_Policy_20150402.pdf

Questions	Case study information
To what extent customers can negotiate different elements: • E.g., the split between ongoing and upfront? • Whether to require a connection with features beyond the minimum scheme (if there is a concept of minimum scheme)?	It is possible for a customer to obtain a connection with features that exceed those of a basic connection, but the customer bears the additional cost.
Are there any 'pioneer' schemes – i.e., rebates for customers who have been among the first to connect in one area and have funded network assets which will also benefit others who connect later in the same area.	If un-forecasted customers connect to the expansion during the five-year period, the initial contributors are entitled to a rebate funded by the un-forecasted customers. The rebate is determined by considering such factors as the relative nameplate capacity of generator customers, the relative non-coincident peak demand of the load customers, and the relative line length in proportion to the line length being shared by the customers, as applicable.[115]
How does revenue from upfront connection charges interact with the remainder of the revenue allowance?	Similar to California, the distributor can levy capital contributions for expansions only to the extent that the cost of the expansion exceeds the revenue that the distributor expects to earn from serving that connection, which in turn depends on the level of ongoing distribution charges and therefore, more broadly, on the distributor's revenue allowance. In the case of connection costs, costs above and beyond the basic connections are "ring-fenced" and recovered directly from the requesting customer through ad-hoc charges. The same applies to embedded generator connections. Basic connection costs for residential customers are socialised and cannot be recovered via direct connection charges. The only area where discretion is left to the distributor to set its own policies is the recovery of basic connection costs for non-residential customers – but we have not been able to determine from the documentation whether and how frequently distributors in Ontario are permitted to change their charging policy (e.g., from socialised to direct charges).
Are there mechanisms in place to incentivise EDBs to minimise the cost of connecting customers?	There is some scope for contestability in connections. When a distributor requires a capital contribution from a customer for an expansion project, it must also allow the customer to obtain and use "alternative bids" from qualified contractors for eligible work.[116] When the customer transfers the expansion facilities that were constructed under the alternative bid option to the distributor, and provided that the distributor has inspected and approved the constructed facilities, the distributor shall pay the customer a transfer price. The transfer price shall be the lower of the cost to the customer to construct the expansion facilities or the amount set out in the distributor's initial offer to do the work that is eligible for alternative bid. The transfer price is considered a cost to the distributor for the purposes of completing the

[115] OEB (2024), p. 65.

[116] OEB (2024), p. 60. Some expansion work is non-contestable – e.g., distribution system planning, the design of the expansion, and any work that requires physical contact with the existing distribution system, unless the distributor specifically allows it.

Questions	Case study information
	economic evaluation used to establish any capital contributions owed to the distributor. [117]

[117] OEB (2024), p. 63.


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