Providing a D-Factor Mechanism under the DPP Framework

Report to Vector

April
2014

Acronyms and Abbreviations

the Act	The Commerce Act 1986
ACS(s)	Annual Compliance Statement(s)
AER	Australian Energy Regulator
Capex	Capital Expenditure
the Commission	Commerce Commission
CPP	Customised Price-quality Path
DM	Demand Management
DPP	Default Price-quality Path
EDB	Electricity Distribution Company
ENA	Electricity Networks Association
IMs	Input Methodologies
IPART, Tribunal	NSW's Independent Pricing and Regulatory Tribunal
kW, KWh	Kilowatt, kilowatt hour
MBIE	Ministry of Business, Innovation and Employment
MW	Megawatt, equal to one million joules per second, measures the rate of energy conversion or transfer
NSW	New South Wales
NPV	Net Present Value
Opex	Operating expenditure
WAPC	Weighted Average Price Cap
Working group	ENA Energy Efficiency Incentives Working Group

Table of Contents

Appendices

Tables

Boxes

Executive Summary

A working group set up by the Electricity Networks Association (ENA) identified a number of existing regulatory settings for Electricity Distribution Businesses (EDBs) in New Zealand that do not promote energy efficiency. Following this work, the Commerce Commission (the Commission) is seeking views as part of its consultation on the upcoming reset of the Default Price-quality Path (DPP), on how EDBs could be compensated for any financial impacts that arise from implementing energy efficiency initiatives.

The core problem addressed in this report is that the use of a weighted average price cap (WAPC) as the regulatory control applied to EDBs under the DPP means that EDBs will generally receive lower revenues by implementing energy efficiency options. This revenue loss occurs even for energy efficiency options that are in the long term interest of consumers—creating misalignment between the interests of EDBs and the interests of consumers.

Any solution to this core problem should reward EDBs appropriately and consistently for making good expenditure choices under the DPP. The solution should also take effect as part of the upcoming DPP reset to avoid worthwhile energy efficiency opportunities being unnecessarily postponed for a further five years. In effect, this means that a solution to this problem should not require changes to the input methodologies, which would not be possible until these are reviewed at a later date. Any changes to regulatory arrangements under the DPP should also aim to preserve the positive features of the current WAPC.

We find that these features limit a feasible solution to adjusting EDBs' regulatory price control to compensate EDBs for any revenue forgone by implementing energy efficiency measures. This type of adjustment has been used by economic regulators overseas, and is known in Australia as a "D-Factor". The research and analysis presented in this report indicates that a similar set of arrangements would not be difficult to put in place under the DPP, although a small number of design choices would be important to its effectiveness.

A D-Factor is currently used to adjust the WAPC that applies to electricity distributors in New South Wales (NSW), Australia. The simplest way forward for the Commission would therefore be to lift the D-Factor that applies in NSW and incorporate it into the DPP. However, the regulatory regimes applying in New Zealand and NSW have some important differences, which suggests that a more careful analysis of design features is warranted. This report considers what features of the D-Factor that applies in NSW could be easily transferred to the DPP regime in New Zealand, and what alternative design features would better meet the objectives of the regulatory regime in New Zealand under Part 4 of the Commerce Act.

The key design features that we recommend for the DPP D-Factor in New Zealand are summarised by answering the questions posed in Table ES1.1. These design features have been selected to be consistent with the low-cost philosophy of the DPP by minimising the need for costly audit, verification, and approval processes.

In summary, we recommend taking a broad view of the activities that could be included in an application of a D-Factor revenue adjustment (a "DPP D-Factor"). This will ensure that options are not unnecessarily limited.[1] However, EDBs would need to show that the initiative has the purpose and intent of reducing electricity volumes, and should be able to

[1] This approach is consistent with the definition of energy efficiency in the ENA Energy Efficiency Incentives Working Group's report, "Options and Incentives for Electricity Distribution Businesses to Improve Supply and Demand-Side Efficiency", 2014.

draw a credible link between the energy efficiency measure adopted and a consequent reduction in demand. The Commission should then have tools available to gain assurance of this link, including through director sign-offs, independent reviews, and requesting further information. However, reliance on these further assurances would need to be the exception, rather than the rule to fit with the low-cost rationale of the DPP. Otherwise, many EDBs would likely decide that it is not worth pursuing revenue recovery because the benefits would not justify the costs (even if verification costs are recoverable).

While we suggest applying a broad definition of energy efficiency, we recommend that the DPP D-Factor only allows EDBs to recover forgone revenue. Allowing EDBs to recover the costs of implementing the energy efficiency measure itself (as allowed in NSW) risks overcompensating EDBs.[2] Other positive incentives, such as allowing EDBs to recover greater costs when there are wider benefits to other parties or considering specific funding for upfront establishment costs to implementing efficiency options (such as R&D), should be considered at a later stage—but are not essential for the upcoming DPP reset.

Table ES1.1: Overview of Recommended Design Features for a DPP D-Factor

Question	Answer
What activities are covered by the D-Factor?	▪ Broadly defined as anything that may be considered energy efficiency or demand-side management ▪ Limited to where EDB can demonstrate an energy efficiency purpose and intent ▪ Focused on non-tariff measures initially, though the inclusion of tariff measures could be considered at a later date
What impacts are recoverable under the D-Factor?	▪ Forgone revenue only ▪ The DPP already incorporates allowances to recover efficient expenditure forecasts
How are energy efficiency activities linked to impacts?	▪ EDB submits a statement linking each activity to revenue forgone ▪ Statement identifies other factors that may have also contributed to reduced demand and their estimated impact on demand
How can the Commission gain additional confidence in the link between activities and impacts?	The Commission also has the ability to: ▪ Request further information or evidence from an EDB ▪ Require EDBs to commission an independent review of their statement linking energy efficiency activities to forgone revenue, and ▪ Obtaining director certificates and/or an audit statement declaring the accuracy and veracity of the information presented. Depending on the timing and mode of recovery, these certifications may already accompany the EDB's annual compliance statement (ACS)

[2] This is acknowledged by the NSW Independent Pricing and Regulation Tribunal (IPART) on page 94 of "NSW Electricity Distribution Pricing 2004/05 to 2008/09: Final Report." Available online at http://www.ipart.nsw.gov.au/Home/Industries/Electricity/Reviews/Network_Pricing/Review_of_Capital_Expenditure_and_Operating_Expenditure_of_NSW_DNSPs/10_Jun_2004_-_Final_Report/Final_Report_-_NSW_Electricity_Distribution_Pricing_200405_to_200809_-_June_2004

Question	Answer
When does the adjustment occur?	EDBs have the option of seeking the adjustment: ▪ Before energy efficiency activities are implemented: as long as a sufficient link can be drawn between proposed activities and forecast impacts, approval is obtained from the Commission, and actual forgone revenue is reported after implementation, ▪ Through ACSs: resulting in a two year lag between the implementation of energy efficiency measures and the adjustment, or ▪ Via the DPP reset process every five years. The financial impact of the adjustment will be the same regardless of when the EDB applies for the adjustment by allowing the rate of return on revenue forgone before the adjustment takes effect

1 Introduction and Background

The Commerce Commission (the Commission) has released a process and issues paper for the upcoming reset of the Default Price-quality Path (DPP) for electricity. One of the issues identified by the Commission is whether the DPP adequately promotes energy efficiency. This focus on energy efficiency is required by Section 54Q of the Commerce Act, which calls for the Commission to "promote incentives and avoid imposing disincentives for suppliers of electricity lines services to invest in energy efficiency and demand side management".

This section provides context to the issue addressed in this report and sets out our approach to fully defining, assessing and recommending a solution to the issue.

Aspects of the current regulatory environment discourage EDBs from promoting energy efficiency

The Electricity Networks' Association (ENA) formed the Energy Efficiency Incentives Working Group (the working group) to assess whether current regulatory and market settings support Electricity Distribution Businesses (EDBs) to play an effective role in promoting energy efficiency. The working group identified a number of issues with current settings that act as disincentives to EDBs investing in energy efficiency. The working group highlighted some of these issues in a letter to the Commission before the Commission released its process and issues paper,[3] which are described more fully in a subsequent report.[4]

Key issues and recommendations in the working group report include:

- **Volume-based pricing**: the Commission should incorporate a revenue-decoupling mechanism as part of the DPP reset; and the Ministry of Business, Innovation and Employment (MBIE) should consider increasing or removing/replacing the Low User Fixed Charge regulations
- **Depreciation on short-life assets**: the Commission should ensure depreciation equivalence for energy efficiency investments (for example, by using separate asset life assumptions)
- **"Looking through" the regulatory reset process**: the Commission should ensure a consistent treatment of expenditure over time, such as through an incremental rolling incentive scheme for operating expenditure (opex) and capital expenditure (capex).

This report focuses on the issue of forgone revenue from energy efficiency initiatives

The Commission's process and issues paper acknowledges ENA's letter on the working group's findings. The paper notes the Commission is interested in exploring ENA's recommendations and it seeks views on how to compensate EDBs for forgone revenue from energy efficiency and demand management (DM) initiatives.

This report responds to the Commission's invitation by investigating how the form of regulatory control applied to EDBs can create incentives to promote energy efficiency and

[3] Both ENA's letter to the Commission and the Commission's process and issues paper are available at: http://www.comcom.govt.nz/regulated-industries/electricity/electricity-default-price-quality-path/default-price-quality-path-from-2015/.

[4] ENA Energy Efficiency Incentives Working Group's report, "Options and Incentives for Electricity Distribution Businesses to Improve Supply and Demand-Side Efficiency", 2014.

DM ("efficiency options").[5] The DPP regime currently applies a WAPC, as set out in the Commission's input methodologies (IMs) and its most recent DPP determination.[6] A significant outcome of a WAPC control is that any fall in electricity volumes within a regulatory period reduces revenues.[7] As a result, EDB revenues would fall, even though reduced volumes may result from investments that are in the long term interests of consumers.

This report focuses on adjusting allowed revenues, rather than changing the regulatory control to a revenue cap

Economic regulators in Australia and the United States have put regulatory tools in place to adjust price controls for any revenue forgone from energy efficiency (often referred to as "lost revenue adjustments" in the United States). A similar mechanism in New Zealand would compensate EDBs for forgone revenue from reduced demand generated by efficiency options.

The example that is closest to home is the "D-Factor" implemented in New South Wales (NSW), Australia. A summary of the NSW D-Factor is provided in Box 1.1 below. Ideally, the NSW approach could simply be replicated in New Zealand. However, significant differences exist in how electricity distributors are regulated in NSW and New Zealand. Most notably, the regulatory control for each distributor in NSW is based on an individual assessment of efficient costs over the coming regulatory period. In contrast, the DPP in New Zealand tries to contain the costs of regulation by combining the analysis of 16 distributors' efficient costs into a single decision-making process. To respect these differences, we consider the applicability of the NSW D-Factor in Section 3 of this report when evaluating the specific design features of a DPP D-Factor in New Zealand.

Box 1.1: The New South Wales D-Factor

The D-Factor was implemented by NSW's Independent Pricing and Regulatory Tribunal (IPART) in 2004 to incentivise distributors to invest in demand management (DM) initiatives. These are defined as activities to meet customers' needs through altering the level or pattern of consumption, the source of energy, or the use of the distributor's network.

The D-Factor attempts to overcome the disincentive to pursue DM that is inherent under a WAPC. The D-Factor adjusts the WAPC to compensate distributors for forgone revenue and allow distributors to recover the implementation costs of DM activities. Recent reviews of the NSW D-Factor have found that it has generated peak demand reductions, with a small impact on prices.[8] In the first three years of

[5] In this note we refer to "efficiency options" which cover all possible demand and supply-side options efficiency measures, as defined in the ENA Energy Efficiency Incentives Working Group report.

[6] The Commerce Commission's most recent 2010 input methodologies are available at: http://www.comcom.govt.nz/regulated-industries/input-methodologies-2/electricity-distribution/input-methodologies-for-electricity-distribution-services/, while it most recent 2012 DPP determination is available at: http://www.comcom.govt.nz/regulated-industries/electricity/electricity-default-price-quality-path/2010-2015-default-price-quality-path/.

[7] We note that this effect could be addressed by a DPP reset which incorporates future demand forecasts. However, where such resets are predictable and potentially common, other options are worth considering (as discussed in this report).

[8] ISF, "Win, Win, Win: Regulating Electricity Distribution Networks for Reliability, Consumers and the Environment", 2008.

the D-Factor scheme, traditional capital investments had typically been deferred by one year.[9]

The Australian Energy Regulator (AER) assumed responsibility for regulating NSW distributors from 2009, and continued to apply the D-Factor to NSW distributors (although the D-Factor was not applied in any other Australian states or territories). The AER has proposed to discontinue the NSW D-Factor as it is considering moving to a revenue-cap for the 2014 regulatory period.[10] However, given the positive impacts of the scheme, the AER intends to retain aspects of a D-Factor (such as funding options for efficiency programmes) under a revenue cap.

Moving the regulatory control to a revenue cap would also remove the disincentive to EDBs implementing energy efficiency measures. Under a revenue cap, EDBs would have a greater assurance of revenue recovery following reductions in demand, and would therefore have greater incentive to carry out or promote demand-side management. International regulatory practice (including in Australia) appears to be moving towards greater reliance on revenue caps. However, shifting to a revenue cap under the electricity DPP would require changes to the IMs, so could not be implemented as part of the upcoming DPP reset. The impact of a revenue cap on the positive features of the WAPC (such as placing the responsibility of demand-risk management on EDBs) would also need to be evaluated.

Structure of this report

This report assesses the best approach for "decoupling" EDB revenues from demand and recommends a new regulatory tool to adjust the DPP to promote energy efficiency. The remainder of this report:

- Identifies how the current DPP regime provides a disincentive to EDBs pursuing efficiency options and outlines the desired characteristics of a solution (Section 2).
- Considers the design features of a suitable regulatory mechanism, including: which activities and impacts should be within its scope, how EDBs should demonstrate the impacts of energy efficiency and provide the Commission with additional assurances, and the timing and process for the recovery of forgone revenue. For each design feature, we describe its function and how overseas regulators have designed their regulatory tools (where relevant), before recommending the most desirable design to be implemented under the DPP (Section 3).
- Provides a summary of our analysis and a set of recommendations for the Commission to adopt in the 2014 DPP reset (Section 4).

Appendix A outlines the amendments to the WAPC required to implement both the forgone revenue recovery mechanism (the DPP D-Factor) recommended in this report and the NSW D-Factor (which also allows the recovery of efficiency options' implementation costs).

[9] IPART, "Demand management in the 2004 distribution review: progress to date", 2007.

[10] References to the Australian or NSW D-factor in this report refer to the existing mechanism before this change takes effect.

2 Problem Definition and What a Solution Needs to Achieve

The use of a WAPC in the DPP regime places the responsibility for managing demand risk on EDBs. This ensures that EDBs have incentives to connect new customers and maximise the utilisation of their assets, spreading fixed costs over a larger volume of consumption. However, by linking EDB revenues with volumes, the WAPC discourages EDBs from implementing measures that would reduce volumes, even when such initiatives would be in the long term interests of consumers.

This section summarises the incentives the current WAPC regulatory approach is designed to create. We then highlight why certain features of this regulatory control may not be in the long term interests of consumers. This helps to focus on the specific problems that a mechanism addressing energy efficiency incentives needs to resolve.

Conventional thinking on the allocation of demand risk with incentive regulation

Incentive-based regulation often allocates demand risk within the regulatory period to regulated suppliers. Regulated suppliers then have the incentive to provide customer service and market their services in ways that maximise asset utilisation. Under this conventional thinking, the ability to exceed demand forecasts and generate higher returns helps to offset the usual concern that regulated suppliers with guaranteed revenues are not sufficiently interested in providing services that their customers value. The upside of being able to earn additional returns from higher levels of demand has the symmetrical downside of earning lower returns if sales volumes fall below forecast.

A five-year regulatory period is usually considered to strike an appropriate balance between providing these incentives while updating demand forecasts to reflect the latest information. Under normal circumstances, variations between forecasts of electricity demand and actual demand over a five year period are likely to be sufficiently small to be able to be managed in a cost-effective way by regulated suppliers. This means that regulated suppliers do not require large increases in their asset *betas* to assume this risk. However, the risk is also considered sufficiently material to incentivise efficient conduct.

This conventional thinking underpins the choice of a WAPC to control EDBs' returns. EDBs manage distribution networks that require significant capital costs and economies of scale (the cost per unit of output generally decreases with volume because fixed costs are spread over more units of volume). EDBs also provide distribution services directly to a large number of end users. These characteristics mean that it may make sense to allocate demand risk to EDBs if the suppliers have levers to control demand on their networks.

This conventional thinking acts in some ways as a barrier to energy efficiency

A major drawback of the WAPC is that it undermines incentives for EDBs to invest in efficiency options. The volume incentive (sometimes referred to as a throughput incentive) means that a fall in electricity volumes within a regulatory period will reduce EDB revenues. This result acts as a disincentive to efficiency options that reduce volume because revenues fall and suppliers are unable to raise prices to remain financially neutral.

This disincentive applies regardless of the pricing methodology that an EDB chooses to apply. Most EDBs currently receive most of their revenues from consumption charges (usually expressed in $/kWh). However, a small number of EDBs have introduced demand charges (usually expressed in $/kW). In either case, capping prices means that EDBs face a revenue risk through reduced use of their network—either in terms of lower total electricity consumption or lower levels of peak demand.

The disincentive a WAPC creates for pursuing efficiency options is at times inconsistent with the purpose of Part 4 of the Commerce Act. In particular the Act supports creating

incentives for EDBs to pursue efficiency options that are in the long term interests of consumers (Section 52A(1)(b) of the Act).

Efficiency options can benefit consumers by reducing the EDBs' investments costs which are spread across users. With peak demand driving the need for EDBs to invest in capacity, efficiency options that reduce or manage these peaks have a value in terms of deferring or avoiding capex on traditional capacity expansions (which may be needed purely to meet peak demand and therefore have poor asset utilisation rates). In achieving this deferral, the total costs paid by consumers may be lower.[11] However, EDBs may be worse off due to reduced revenues creating a disincentive to pursue efficiency options.

Additional barriers to energy efficiency can include new types of costs, such as establishing processes to implement or monitor the efficiency initiatives. Efficiency options can also provide long term benefits to consumers through costs that are avoided in other parts of the electricity supply chain (such as transmission and generation). These effects mean that EDBs may not be sufficiently motivated to invest in energy efficiency options that are higher cost than traditional investments, despite the options potentially being in the long term interests of consumers.[12]

A solution should address disincentives, without compromising the beneficial features of a price cap

The disincentives to invest in energy efficiency options need to be addressed to achieve the aim of Section 54Q. While there are a number of barriers to energy efficiency, the forgone revenue resulting from lower demand is a crucial issue. A solution to remove the existing disincentive should remove or alter the link between EDBs' sales volumes and revenues, making EDBs financially better off (or at least neutral) when they pursue efficiency investments that reduce demand and deliver long term benefits to consumers.

However, any solution that creates incentives for energy efficiency should not come at an overall cost to consumers. Therefore, the solution should:

- Not undermine the positive incentives for EDBs to provide appropriate services to consumers. The WAPC approach currently allocates some demand risk to EDBs. The Commission has identified that this has desirable features in its review of Orion's Customised Price-quality Path (CPP) application.[13]
- Be sufficiently attractive to encourage EDBs to invest in energy efficiency, while ensuring benefits are shared with consumers. Although solutions that generate strong financial returns to EDBs will create stronger incentives for them to pursue energy efficiency, consumers should ultimately pay lower prices as a result of energy efficiency. The Commerce Act reinforces that efficiency gains must be shared with consumers (Section 52A(1)(c)).

A solution should be put in place as soon as practicable

A solution should also be implementable by the next DPP reset in order to encourage efficiency options that are beneficial to consumers as soon as possible. The solution therefore needs to be able to be developed during submissions and cross-submissions on the Commission's process and issues paper (due 30 April and 15 May respectively), so that the Commission can make a draft determination by 30 June 2014 that incorporates any

[11] See Section Four of ENA Energy Efficiency Incentives Working Group's report, "Options and Incentives for Electricity Distribution Businesses to Improve Supply and Demand-Side Efficiency", 2014.

[12] The working group recommended the Commission clarify the treatment of external revenue from such initiatives, suggesting that EDBs should be allowed to recover their avoided costs from such initiatives and also contract with other parties to share in the gains to them from avoided investment by way of unregulated revenues.

[13] Commerce Commission, "Setting the customised price-quality path for Orion New Zealand Limited", November 2013. Available online at http://www.comcom.govt.nz/regulated-industries/electricity/cpp/orion-cpp/.

change in approach. Parties will then have further opportunities to comment on that approach before a final determination is released on 28 November 2014.

This timeframe is likely to rule out mechanisms that require changes to input methodologies (as this would not be achievable as part of the 2014 DPP reset). Options such as altering the definition of a recoverable cost in IMs (for example, to include forgone revenue resulting from efficiency options) or moving to a revenue cap are therefore probably not feasible for this reset. Such alternatives can be considered as part of future reviews of the input methodologies.

3 Design Features of a DPP D-Factor

The regulatory tool known in Australia as a D-Factor overcomes the disincentive to energy efficiency that is inherent under a regulatory price cap. The D-Factor used in NSW allows electricity distributors to recover forgone revenue and the costs of implementing efficiency measures shown to be in the interests of consumers. Several design choices need to considered before applying a D-Factor as part of the DPP in New Zealand. These choices are not particularly complex or controversial, but should be made in a way that is consistent with the low cost intention of the DPP and the overall objectives of Part 4.

This section answers the following questions to arrive at a recommended set of features for the DPP D-Factor:

- **Scope of activities covered: What activities should be considered eligible?** The D-Factor could be defined to apply to a broad range of activities carried out by EDBs, or confined to a limited subset of prescribed activities.
- **Financial compensation received: What impacts should be compensated?** The D-Factor could focus on forgone revenue only, or could extend to compensate EDBs for any additional costs, or could incorporate additional incentives to actively promote energy efficiency.
- **Demonstrating the link with forgone revenues: How should EDBs be required to link the energy efficiency activities undertaken with the impacts observed on their network and the consequent forgone revenues?** The standard of proof for showing that energy efficiency has caused forgone revenue could be set at different levels.
- **Building greater confidence in the link: How should the Commission gain additional confidence in the link between activities and forgone revenues if required?** Depending on the standard of proof required to demonstrate the link between energy efficiency and forgone revenues, the Commission may feel that further evidence is required. A range of approaches to gaining greater confidence are possible.
- **Timing of the adjustment: How often should the regulatory control be adjusted to account for the impacts of energy efficiency?** There will be administrative costs involved in preparing or reporting on a D-Factor application, and reviewing the material submitted. On the other hand, more regular adjustments will reduce the lag between implementing an efficiency initiative and receiving compensation.

Answering these questions in a consistent way yields a D-Factor that can be implemented as part of the 2014 DPP reset.

3.1 Scope of Activities Covered

The purpose of a D-Factor is to provide greater incentives for EDBs to pursue energy efficiency activities. This immediately raises the question: what defines an energy efficiency activity that is eligible for recognition under the D-Factor?

We recommend that the Commission adopts a broad definition of the activities included under the DPP D-Factor. The ENA Working Group report highlights that a wide range of activities can be considered to have energy efficiency benefits, either by changing the behaviour of suppliers or consumers. That report groups energy efficiency activities into four categories: loss reduction, efficient/controllable equipment and systems, distributed generation/on-site supply/storage, and behavioural programmes. Activities in all of these categories should be eligible to apply for a D-Factor adjustment.

The NSW D-Factor does not allow forgone revenues that result from tariff-based initiatives to manage demand (such as through changing pricing signals during network peaks) to be recovered. We suggest taking the same approach, at least initially, by excluding tariff measures from the DPP D-Factor. Distributors will have opportunities to structure their tariffs to maintain revenues, given the flexibility that EDBs currently have over the prices set to different consumer groups. However, future reviews of the DPP D-Factor should identify if there are volume-based disincentives to tariff-based measures (such as losing revenue as part of the transition to a new tariff structure) that prevent consumers from accessing long term benefits. In this case, the Commission may consider widening the scope of the DPP D-Factor to include tariff-based measures.

To be eligible in NSW, projects must also be located in areas of network constraint. Instead of restricting eligible activities in this way, we recommend that EDBs be required to show an express purpose of achieving an energy efficiency outcome. This will focus the D-Factor on those activities that would not otherwise proceed without a D-Factor and are in the interests of consumers, rather than allowing EDBs to claim forgone revenues that are coincidental to activities that have no obvious energy efficiency rationale (or where investments are not cost-effective). For instance EDBs could pursue projects preventing a future network constraint in areas that do not currently suffer from constraints, as long as EDBs can show a link to reducing peak demand.

Our recommendation on covering a broad scope of activities is consistent with the recommendation for EDBs to provide evidence that their efficiency activities are linked to the revenue forgone (discussed in more detail in Section 3.3 below). This requirement prevents EDBs from claiming compensation from reductions in demand that are unrelated to efficiency initiatives implemented by EDBs. In practice, this may limit the eligibility of some activities carried out by EDBs, but these limitations should not prohibit a DPP D-Factor from addressing the volume disincentive prioritised in this report. We also consider that it is preferable to apply limitations by requiring evidence to be submitted by EDBs identifying the intent of their initiatives, rather than by restricting the scope of the D-Factor.

3.2 Financial Compensation Received

Energy efficiency initiatives can create different financial consequences for EDBs. In some cases, they will result in forgone revenue. In other cases, EDBs will incur additional implementation costs. Both of these effects can act as barriers to energy efficiency. This means that the D-Factor needs to be designed to answer the question: what financial impacts will be covered? Should EDBs be able to claim the costs of implementing energy efficiency initiatives, the revenues forgone due to lower demand, a share of the wider financial benefits generated from their activities, or all three types of impact?

We recommend that the DPP D-Factor initially be limited to the recovery of forgone revenue only. This can be accomplished by adjusting the WAPC formula as part of the DPP reset (as described in Appendix A). Compensating EDBs for forgone revenue directly addresses the volume disincentive summarised in Section 2. Future resets can consider implementing more generous incentives if the D-Factor is found to be insufficient to encourage EDBs to implement energy efficiency initiatives.

This recommended design is different from the D-Factor that applies in NSW—in this case the scope of financial recovery we recommend for New Zealand is more restrictive. Under NSW's D-Factor, EDBs are allowed to recover forgone revenue as well as the costs of implementing efficiency options. This goes beyond removing the clear disincentive to pursuing efficiency options, and potentially makes such investments more attractive than comparable traditional network expansions of capacity. IPART acknowledged that the D-Factor scheme was generous when it was put in place, and that the NSW D-Factor risks

overcompensating EDBs when their savings from avoiding traditional network investments are higher than the costs of an efficiency option.[14] IPART nevertheless considered that this type of positive incentive was appropriate.

Allowing EDBs to recover the costs of implementing energy efficiency options is more difficult to justify in New Zealand, where the Commerce Act places strong emphasis on efficient, least-cost investment. The DPP forecasts of opex and capex are considered to reflect efficient costs, which means that if efficiency options are least-cost then they should be implemented without the need for further incentives. Allowing specific cost recovery therefore risks double-recovery of such costs—which is why IPART envisaged cost recovery as a short-term incentive to catalyse the uptake of efficiency options.

More generous revenue adjustment schemes have also been justified elsewhere on the basis that more is needed to overcome additional (non-financial) barriers to energy efficiency. For instance, a number of US states use a revenue recovery mechanism and also set performance requirements for efficiency initiatives that allow EDBs to gain back part of a project's implementation costs or the net benefits realised by the project. The Commission could consider extending the DPP D-Factor in future—particularly if a forgone revenue recovery mechanism proves to be an inadequate incentive for EDBs to invest seriously in energy efficiency. However, we recommend that the D-Factor initially only allows the recovery of forgone revenues, thereby solving the core issue identified by the ENA working group and summarised in Section 2 of this report.

3.3 Demonstrating the Link with Forgone Revenues

A key element to the success of a DPP D-Factor is that there must be a link between activities carried out and the use of the EDB's network. This means that the design of the D-Factor needs to resolve the question: how should EDBs be required to show that their energy efficiency activities have led to the demand reduction observed on their network, and the consequent revenues forgone?

We recommend that EDBs be required to establish a clear basis for the link between activities they undertake and forgone revenues. When IPART first introduced the D-Factor in NSW, it noted that EDBs should be able to demonstrate such a link by using a "direct assessment approach".[15] We agree that such a link must be established (and will likely be estimated before undertaking energy efficiency activities anyway), so that EDBs are compensated for revenue forgone from energy efficiency as opposed to other factors.

There are a variety of ways to link efficiency measures to network impacts, and ultimately to forgone revenue. Box 3.1 outlines a number of potential sources of information that EDBs could use to establish a link between energy efficiency and forgone revenue (the most appropriate sources will depend on the activity).

Box 3.1: Sources of information to link efficiency to forgone revenue

KEMA's 2012 report "Review of Energy Efficiency Investments" (prepared for Vector) lists a number of potential ways to estimate or measure energy savings (or demand reduction). These methods could be used by EDBs when considering efficiency activities and establishing a link to forgone revenue.

[14] IPART discusses the generosity of the D-Factor regime on page 94 of "NSW Electricity Distribution Pricing 2004/05 to 2008/09: Final Report." Available online at http://www.ipart.nsw.gov.au/Home/Industries/Electricity/Reviews/Network_Pricing/Review_of_Capital_Expenditure_and_Operating_Expenditure_of_NSW_DNSPs/10_Jun_2004_-_Final_Report/Final_Report_-_NSW_Electricity_Distribution_Pricing_200405_to_200809_-_June_2004.

[15] See page 97 of "NSW Electricity Distribution Pricing 2004/05 to 2008/09: Final Report" or SKM, "Avoided distribution costs and congestion pricing for distribution networks in NSW", November 2003, p 80.

Source	Variables and outcomes
▪ Standard engineering equations[16] ▪ Data from programme vendors ▪ Results ▪ Interviews with customers ▪ Deemed savings ▪ Billing data ▪ Load data ▪ Customer surveys ▪ Vendor interviews ▪ Simulation models (large industrials) ▪ Inspections ▪ Metering	▪ Change in kW ▪ Annual hours of use ▪ Number of measures installed ▪ Energy savings per measure ▪ Measure life ▪ Length or programmes ▪ Incentive levels ▪ Results of energy and demand savings per customer

Source: KEMA 2012 "Review of Energy Efficiency Investments" (prepared for Vector)

We recommend that a set of high-level principles applies to the analysis required to establish the link between energy efficiency activities and forgone revenues. A principles-based approach is preferable to specifying precisely how forgone revenue must be calculated because the approach will depend on the activity itself. The nine principles that we recommend are listed in Table 3.1, and have been adapted from the principles used in the NSW D-Factor.[17]

Table 3.1: Principles for Estimating Forgone Revenue under the DPP

Principle 1	Forgone revenue (FR) occurs as a result of a change in quantities to which a value is attributed; the calculation should separately identify the forgone quantity estimate (FQ) and the price estimate (P). $\boldsymbol{FR = P * FQ}$[18]
Principle 2	The forgone quantities may include energy consumption, energy demand and/or capacity. In addition, the quantities may relate to a specific time-period such as peak, off peak, or shoulder. Estimates of forgone quantities provided should be consistent with the relevant tariff structure
Principle 3	The energy efficiency initiative should be aimed at a clearly identified target quantity reduction (such as energy demand). This may be different to the actual quantity reduction calculated after the initiative has been implemented. The target quantity reduction for the efficiency initiative should be identified as part of the EDBs' design of the measure. When calculating forgone revenue (*ex-post*), the actual quantities forgone should be compared with the targeted change in quantities

[16] Of which KEMA provide standard equations for measuring the kWh and kW saved for residential lighting, commercial chiller replacement, and commercial lighting measures. Further equations and information is available from: Common EM&V Methods and Savings Assumptions Project; Northeast Energy Efficiency Partnerships (NEEP); Prepared by KEMA, 2010

[17] See Network Demand Management Consultation Working Group "Guideline: Methodology for estimating forgone revenue," 2005.

[18] Both P and FQ are for year t-1 but the estimate of quantity can only been finalised after year t-1 when the actual forgone revenue can be calculated

Principle 4	The estimation process should identify whether other factors (such as weather or economic conditions) may explain part or all of the reduction in demand claimed. The application, or reporting, should state why the energy efficiency initiative provides a credible explanation for forgone revenue
Principle 5	Estimates of forgone quantities may be derived with reference to a representative sample, accompanied with an explanation of how it provides a reasonable estimate of actual aggregate effects of the initiative. The Commission may require independent confirmation of this as part of further information request steps to be detailed below. If the efficiency measure is implemented and managed through an energy performance contract or similar arrangement,[19] the measurement process under the contract may meet this requirement
Principle 6	Estimates of prices to be applied to forgone quantities should be based on the appropriate tariff applying at the time the quantity was forgone. In other words, if an EDB implements an efficiency initiative in year t-1 which results in lower quantities in year t-1, then the relevant price is that tariff that would have applied to the forgone quantity in year t-1
Principle 7	If the efficiency initiative is targeted at a specific customer or project, the actual tariff applying to that customer or project should be used to estimate the forgone revenue. The application of this tariff should be limited to the component related to the use of the distribution network (i.e. price components from generation, transmission and retail should be excluded)
Principle 8	If the efficiency initiative affects quantities associated with more than one tariff, the price can be estimated based on actual quantities or appropriate weightings. The basis for any weighting needs to be shown to be appropriate for an estimate of forgone revenue
Principle 9	The approaches used to estimate changes in quantities should be consistent with the prices used to determine forgone revenues. For example, the same approach and assumptions should be used for weighting quantities and prices

The Australian guidance for estimating forgone revenue from DM activities also provides worked examples of how these principles apply in practice.[20] Although the same approach to all D-Factor applications may be suitable in Australia, it is unlikely to be appropriate in New Zealand given the emphasis on the DPP being a low-cost regulatory tool. Instead, we suggest that the application of the principles should be fit for purpose depending on the level of forgone revenue recovery being sought by an EDB. While the adjustment should reflect the principles set out above, not all applications will require an in-depth analysis of the causes of foregone revenue. The DPP should avoid imposing unnecessary compliance burdens that might deter low cost efficiency options that would lead to forgone revenue.

[19] An energy performance contract is an agreement between an energy user and a third-party contractor, where the third-party contractor guarantees (via contract) to lower the amount of energy used by the customer by implementing energy efficiency upgrades.

[20] Worked examples are available on pp.9-14, "Guideline: Methodology for estimating forgone revenue."

This requires a flexible application of the principles to ensure the regulatory response is proportionate to the level of financial compensation sought by EDBs.

EDBs may also want some assurance that a proposed approach for linking efficiency activities to impacts is appropriate. Under the D-Factor in NSW, distributors are able to seek approval of their intended methodology for calculating forgone revenue before implementing an activity. This provides distributors with greater investment certainty rather than just relying on the retrospective assessment at the end of the regulatory period. However, this is only a preliminary assessment of the methodology to provide guidance to distributors. We recommend that EDBs should have the option to request the Commission's guidance on their methodologies under the DPP D-Factor.

3.4 Building Greater Confidence in the Link between Activities and Impacts

In the case that the forgone revenue sought for recovery is material, the Commission may need greater assurance than would be provided through an application of the principles set out above to be confident that a revenue adjustment is appropriate. The design of the DPP D-Factor should therefore consider whether the Commission should have the ability to seek additional information or assurance on the link between energy efficiency activities and forgone revenues, and if so, how?

We see three mechanisms that could be used to gain greater confidence, without violating the low-cost intent of the DPP:

- Requesting further information on the activities, representative samples or the calculations made to establish the link with forgone revenues
- Requesting an independent review of forgone revenue calculations or their basis
- Obtaining director certificates and/or an audit statement declaring the accuracy and veracity of the information presented. Depending on the timing and mode of recovery (options are discussed in Section 3.5), these certifications may already accompany the EDB's annual compliance statement (ACS).

It would be up to the Commission to determine when any of these further steps are justified, with the expectation that if a clear intuitive link is supported by appropriate calculations then these further steps would not be required. Such a confirmation process is not without cost, and we therefore propose that it be left to the Commission to limit further information or assurance requirements to those circumstances where they are appropriate. We would expect that the circumstances calling for additional information or assurance would be relatively rare. In such cases, EDBs should also be able to choose to withdraw the application for revenue recovery if the benefits of recovering the revenue are perceived not to justify the costs in providing the additional assurance.

This approach is preferred to requiring an independent verification of each calculation of forgone revenue, or requiring verification under certain circumstances depending on the type of activities or the basis of calculation. This approach is also consistent with the D-Factor in NSW. For instance, the AER can ask EDBs to confirm that samples used to establish the nature of any link to forgone revenues are appropriate.[21]

Where the Commission does seek independent verification or further information from EDBs, the Commission can either accept the statement, decline it, or adjust the amount the EDB is able to recover. This effectively incorporates the element of pricing approval that is used in NSW within the DPP regime, but only in relation to forgone revenue from

[21] "Guideline: Methodology for estimating forgone revenue."

efficiency options and only when the Commission has decided further assurances have been necessary.

If the Commission requires further processes to confirm the link between energy efficiency activities and forgone revenues, then any costs incurred by the EDB should be recoverable as part of the forgone revenue adjustment (as is the case in NSW).

3.5 Timing of the Adjustment

EDBs should not face an undue delay between implementing energy efficiency activities and having their revenue adjusted. On the other hand, many activities may be relatively small in scope and therefore might not justify the cost of a specific application. These factors suggest that the DPP D-Factor will need to decide how often the regulatory control be adjusted to account for the impacts of energy efficiency.

NSW distributors generally make annual submissions on their required adjustments to the WAPC based on their reports of DM costs, avoided distribution costs, and forgone revenue. These applications are made as part of the annual pricing approval process. The recovery mechanism imposes a two year time lag because distributors incur lost revenue, report it the following year and if approved recover the forgone revenue in the third year. If the D-Factor is less than 0.001, then distributors are allowed to defer adjustments to future periods in order to minimise administrative costs.

We recommend that EDBs be able to select from three options for applying for a revenue adjustment under the DPP:

- ***Ex ante* adjustment.** EDBs should be able to apply for an adjustment before energy efficiency activities are implemented in situations where a sufficient link can be drawn between proposed activities and forecast impacts. The forecast must be approved by the Commission, and EDBs should be required to report estimates of the actual forgone revenue after implementation (to allow the Commission to observe the accuracy of the *ex ante* adjustment). Although a wash-up mechanism could be applied, EDBs face both risks and rewards from their forgone revenue estimations. In keeping with the low-cost approach of the DPP regime, *ex ante* approval of the forecast and *ex post* reporting should be sufficient to prevent EDBs from excessively profiting from the process. The Commission could also consider incorporating an *ex-post* wash up mechanism if the reported difference from original estimates exceeds a particular materiality threshold.
- **Annual compliance statements.** The most appropriate avenue for EDBs to recover forgone revenue is likely to be through their annual compliance statements (ACSs). This approach would require EDBs to submit statements as part of their ACS on the energy efficiency activities they have carried out and the link to forgone revenues (set out their calculations described in Section 3.3). This approach has the benefit of providing the Commission with director sign-off of accuracy and also being subject to the audit of the ACS. The practical effect of this process would be the same as the D-Factor that applies in NSW—EDBs would receive the forgone revenue with a two year lag (and therefore would need to receive a time value of money adjustment for those two years to maintain financial neutrality).
- **DPP resets.** Given the costs involved in gathering evidence, conducting the required analysis, and confirming the results, EDBs may prefer to wait until the next DPP reset to apply for forgone revenue. Adjustments made through the DPP reset process would rely on forgone revenues reported in the ACS

immediately prior to the DPP reset, with the Commission expecting this recovery to occur as part of the DPP reset.

The NSW scheme also allows forgone revenue from efficiency options after a project has ended to be recovered up until the end of the regulatory period. The following regulatory period's demand forecasts will incorporate any further impact on consumption. We recommend that the same approach be adopted for the DPP where EDBs have sought the Commission's guidance of a proposed methodology or forgone revenues have been claimed for an activity/project in previous years (which would allow forgone revenue to be claimed in the first two years of the subsequent regulatory period). The impact in future regulatory periods will be incorporated into the volume forecasts as part of the following DPP reset. This should address the reduced incentive for efficiency projects toward the end of the regulatory period and would balance the appeal of energy efficiency investments with more traditional capacity expansion options.

4 Summary and Recommendations

We conclude that a forgone revenue recovery mechanism ("DPP D-Factor") should be incorporated into the weighted average price cap that applies to EDBs under the DPP. A revenue recovery mechanism provides incentives to EDBs to pursue efficiency options that are in the long term interests of consumers, and can be implemented as part of the upcoming DPP reset. This means that EDBs will have greater incentives to implement energy efficiency options in the period from 2015-2020 than they have had in the past.

The design of the DPP D-Factor should initially be limited to the recovery of EDBs' forgone revenue, but should include all non-tariff initiatives that have a clear energy efficiency or demand-side management rationale. These features ensure the current disincentive to invest in efficiency options is neutralised and benefits are shared with consumers. The future inclusion of tariff measures could be considered on review of the scheme.

The Commission should allow revenue recovery to be incorporated into existing reporting processes to minimise compliance costs

To implement a forgone revenue recovery mechanism, non-exempt EDBs will be required by the Commission to report their efficiency projects and the forgone revenue in their annual compliance statements. EDBs will need to show a clear link between their activities and forgone revenue. The actual calculation of forgone revenue should be consistent with the principles outlined in Table 3.1, with the level of supporting analysis reflecting the amount of revenue recovery sought by an EDB.

We suggest EDBs be able to opt for recovering forgone revenue by either pre-approval, reporting in their annual compliance statements, or as part of the following DPP reset. The Commission should retain the option of either accepting claimed amounts, or seeking further information or assurance on the link between energy efficiency activities and forgone revenues. However, where further assurances are sought, EDBs may consider the costs exceed the benefits of recovery and opt out (though should be allowed to recover their verification costs if they wish to proceed). The Commission should also have the option of spreading recoverable amounts over multiple years with the expectation that amounts claimed for multiple years will be recovered over the same time period.

Recommended actions for the Commerce Commission

We recommend the Commission:

- **Note** the appropriate features for a mechanism to address the volume-disincentive to efficiency options:
  - **Activities covered**: All non-tariff energy efficiency options pursued by EDBs that have the express purpose of reducing demand
  - **Impacts covered**: Forgone revenue only (adjusting for the time value of money and including the cost of any independent verification required by the Commission)
  - **Process**: EDBs to clearly establish link between energy efficiency activities and financial impacts (based on principles listed in Table 3.1). EDBs have the option of seeking the Commission's guidance of methodology for calculating forgone revenue
  - **Optional assurances for Commission**: Following the above process, the Commission can accept the statement, or seek further information or assurance from the EDB on the forgone revenue calculation (or its basis). If further information or assurance is sought, the Commission may then accept

the statement, reject it, or adjust the amount of forgone revenue the EDB is able to recover

- **Timing**: EDBs are able to claim forgone revenue:
  - Before carrying out an energy efficiency activity, as long as a credible link to forgone revenue can be supported and actual impacts are reported ex post
  - Annually through their annual compliance statements, which will result in a two year lag (forgoing the revenue in year t-1, reporting it in year t, and recovering it in year t+1), or
  - As part of the DPP reset, with recovery occurring over the next regulatory period as part of the DPP reset.

- **Agree** to include the above mechanism, amend the WAPC formula as suggested in Appendix A, and as necessary to achieve the above mechanism, expand the annual compliance statement requirements in its draft DPP determination on 30 June 2014
- **Consult** on the proposed mechanism prior to finalising a mechanism for inclusion in the Commission's final decision DPP determination on 28 November 2014.

Appendix A: Adjusting the Weighted Average Price Cap to Recover Forgone Revenue/Include a D-Factor

This section sets out the amendments that would be required to the WAPC formula during the DPP reset in order to either allow EDBs to recover their forgone revenue (as suggested in this paper) or implement a D-Factor such as that applied in NSW (also allowing for the recovering of costs). Principles for calculating the forgone revenue are provided in Table 3.1.

Amendments to allow EDBs to recover forgone revenue

We recommend that initially EDBs simply be able to recover their forgone revenue (and that other issues with current settings be addressed directly via other means). This can be achieved by amending the following formulae during the DPP reset (adding the highlighted components):

$$\frac{NR_t}{R_t} \leq 1$$

where:

NR_t is the notional revenue for the Assessment Period t, being equal to:

$$\sum_i P_{i,t} Q_{i,t-2} - K_t + AF\ Revenue_{t-2}$$

R_t is the allowable notional revenue for the Assessment Period t, other than the First Assessment Period, being equal to:

$$R_t = \left(\left(\sum_i P_{i,t-1} Q_{i,t-2} - K_{t-1} + AF\ Revenue_{t-2} \right) + (R_{t-1} - NR_{t-1}) \right) \times (1 + \Delta CPI_t)(1 - X)$$

where:

$AF\ Revenue_{t-2}$ is the amount of forgone revenue for recovery by the EDB in Year t-2

R_{t-1} is the allowed notional revenue during assessment period t-1

t denotes the year of the Assessment Date in the Assessment Period, for which compliance is being assessed

i denoted each Price relating to an Electricity Lines Service

$P_{i,t}$ is the i^{th} Price during any part of the Pricing Period t

$P_{i,t-1}$ is the i^{th} Price during any part of the Pricing Period t-1

$Q_{i,t-2}$ is the Quantity corresponding to the i^{th} Price during the Pricing Period t-2

K_t is the Sum of all Pass-Through Costs during the Assessment Period t

K_{t-1} is the Sum of all Pass-Through Costs during the Assessment Period t-1

R_{t-1} is the allowable notional revenue during the Assessment Period t-1

NR_{t-1} is the notional revenue for the Assessment Period t-1

X is the rate of change for the Non-exempt EDB

ΔCPI_t is the derived change in the CPI to be applied during the Assessment Period t, being equal to:

$$\frac{CPI_{Dec,t-3} + CPI_{Mar,t-2} + CPI_{Jun,t-2} + CPI_{Sept,t-2}}{CPI_{Dec,t-4} + CPI_{Mar,t-3} + CPI_{Jun,t-3} + CPI_{Sept,t-3}} - 1$$

where:

$CPI_{q,t}$ is the CPI for the quarter q of the year t

Amendments to allow implementation of a D-Factor such that EDBs can recover forgone revenue as well as the costs of efficiency options

A D-Factor like that used in NSW could be applied by amending the formula for the allowable notional revenue during assessment period t (R_t) in the Commission's DPP determination as part of the DPP reset to add the highlighted component below.[22]

$$R_t = \left(\left(\sum_i P_{i,t-1}Q_{i,t-2} - K_{t-1}\right) + (R_{t-1} - NR_{t-1})\right) \times (1 + \Delta CPI_t + X + D_t)$$

where:

$$D_t = \frac{DM\ Cost\ Pass\ Through\ Amount_t}{R_{t-1} - AF\ Revenue_{t-2}} - \frac{DM\ Cost\ Pass\ Through\ Amount_{t-1}}{R_{t-2} - AF\ Revenue_{t-3}}$$

D_t is the D-Factor to be included in the price control formula for Year t.

$AF\ Revenue_{t-2}$ is the amount of forgone revenue for recovery by the EDB in Year t-2

$AF\ Revenue_{t-3}$ is the amount of forgone revenue for recovery by the EDB in Year t-3

$DM\ Cost\ Pass\ Through\ Amount_t$ is the DM Cost pass through amount calculated for the EDB for the Year t – the sum of DM costs and forgone revenue incurred in year t.

$DM\ Cost\ Pass\ Through\ Amount_{t-1}$ is the DM Cost pass through amount calculated for the EDB for the Year t – the sum of demand management costs and forgone revenue incurred in year t-1

R_{t-1} is the allowed notional revenue during assessment period t-1

R_{t-2} is the allowed notional revenue during assessment period t-2

t denotes the year of the Assessment Date in the Assessment Period, for which compliance is being assessed

i denoted each Price relating to an Electricity Lines Service

$P_{i,t-1}$ is the i[th] Price during any part of the Pricing Period t-1

$Q_{i,t-2}$ is the Quantity corresponding to the i[th] Price during the Pricing Period t-2

K_{t-1} is the Sum of all Pass-Through Costs during the Assessment Period t-1

R_{t-1} is the allowable notional revenue during the Assessment Period t-1

NR_{t-1} is the notional revenue for the Assessment Period t-1, being equal to:

$$\sum_i P_{i,t-1}Q_{i,t-3} - K_{t-1}$$

X is the rate of change for the Non-exempt EDB (to be specified in the determination in-keeping with the new way of expression)

ΔCPI_t is the derived change in the CPI to be applied during the Assessment Period t, being equal to:

$$\frac{CPI_{Dec,t-3} + CPI_{Mar,t-2} + CPI_{Jun,t-2} + CPI_{Sept,t-2}}{CPI_{Dec,t-4} + CPI_{Mar,t-3} + CPI_{Jun,t-3} + CPI_{Sept,t-3}} - 1$$

[22] The way the X-factor is expressed has also been adjusted to the approach used in Australia. This is simply so that the D-Factor isn't automatically scaled by the X-factor.

where:

$CPI_{q,t}$ is the CPI for the quarter q of the year t

T: +1 (202) 466-6790
F: +1 (202) 466-6797
1747 Pennsylvania Avenue
NW 12th Floor
WASHINGTON DC 20006
United States of America

T: +61 (2) 9231 6862
F: +61 (2) 9231 3847
36 – 38 Young Street
SYDNEY NSW 2000
Australia

T: +64 (4) 913 2800
F: +64 (4) 913 2808
Level 2, 88 The Terrace
PO Box 10-225
WELLINGTON 6143
New Zealand

T: +33 (1) 45 27 24 55
F: +33 (1) 45 20 17 69
7 Rue Claude Chahu
PARIS 75116
France

---------- www.castalia-advisors.com