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David Healy
Network Performance Branch
Commerce Commission
Wellington

by email: NPB@comcom.govt.nz

SUBMISSION ON ECONOMIC INSIGHTS PAPERS

- 1 Orion New Zealand Limited (**Orion**) welcomes the opportunity to comment on the two companion papers to the Commerce Commission's *Reset of Default Price – Quality Path for Electricity Distribution Businesses* discussion paper (the **DPP paper**) prepared by Economic Insights (**EI**) in June 2009. The two papers are:
 - 1.1 a technical report that purports to extend the theory of regulation by embedding the regulated firm in a small general equilibrium model of an open economy (the **technical report**); and
 - 1.2 a report on the use of asset valuation in productivity-based regulation, and particularly, the relative merits of the optimised deprival value (ODV) and historical cost-based methodologies (the **asset valuation report**).
- 2 We have prepared our submission in conjunction with our economic advisors NERA Economic Consulting.
- 3 The fundamental purpose of the two papers appears to be to extend the theory of productivity-based regulation by addressing perceived shortcomings that have existed hitherto – both in New Zealand and internationally. The resultant methodology supposedly represents a 'new and improved' way of estimating industry-wide total factor productivity (**TFP**). In arriving at its methodology in its asset valuation report EI also makes a number of more specific observations on the relative merits of different asset valuation methodologies. Our submission is therefore divided into three parts:

- 3.1 a summary of the substantial theoretical and practical shortcomings in the TFP methodology proposed by EI for determining the industry-wide X-factor for the default price-quality path;
 - 3.2 an overview of the mischaracterisations contained in the assessment of the merits of the different asset valuation approaches in the asset valuation report; and
 - 3.3 a critique of the EI papers by Dr Jeff Makholm, Senior Vice President of NERA Economic Consulting, which highlights the clear unsuitability of the proposed methodology for the determination of the X-factor and is attached as Appendix A.
- 4 Regrettably, we found there to be very little merit in any of the material prepared by EI. In short, we do not believe that the papers do anything to advance the implementation of the new regime – the antithesis is more likely. For the most part, the analysis appears to have been driven largely by abstract economic theory, with little apparent focus on the need to ensure that regulation is transparent, predictable and comprehensible to regulated businesses and other interested parties. Other aspects of the EI analysis – particularly aspects of its asset valuation report – represent what is, in our view, a rather unbalanced account of the issues in question. We set out the reasons for these views below.

TFP Methodology

- 5 Coming to grips with the revised TFP methodology proposed by EI and, most importantly, with its *potential implications*, is a significant challenge – so much so that serious questions must be asked about whether the Commission should place any weight on it at all. Put simply, if a key regulatory objective is indeed to promote transparency and understanding of the regulatory decision-making process – as the Commission acknowledges – then the methodology proposed by EI should by all rights be disregarded.
- 6 The technical report in particular is a dense, virtually impenetrable exposition of abstract economic theory that contains 347 algebraic equations. We struggle to see how it can be of any possible assistance to the Commission as it seeks to promote incentives to innovate and to invest, consistent with the objective of Part 4. Indeed, it is hard to imagine anyone not possessing an advanced degree in economics being able to *understand* the EI proposal. If businesses cannot understand how they are to be regulated, how can they possibly have appropriate incentives?

- 7 As we pointed out in our submission on the DPP paper, previous experience with similar untried theory-driven methodologies advanced by the same proponents under Part 4A should serve as a cautionary tale. As the Commission will be well aware, the application of the much-maligned and unique to New Zealand 'C1-factor' led to perverse outcomes and, ultimately, a statutory prohibition of comparative benchmarking on efficiency. Many of the assertions made by EI in its companion papers raise similar 'red flags', most notably:
- 7.1 that the sunk cost characteristic of network assets and the desirability of ensuring real financial capital maintenance have 'important implications' for how productivity analysis is used in network regulation; and
 - 7.2 that EI has in its new methodology developed a 'unifying theory' of network regulation using productivity analysis by addressing 'important gaps' that have existed hitherto.
- 8 Orion commissioned Dr Jeff Makhholm to review the papers prepared by EI. Dr Makhholm has extensive experience in the application of performance based regulation around the world. His 1986 Doctoral dissertation at the University of Wisconsin-Madison, entitled *Sources of Total Factor Productivity in the Electric Utility Industry*, investigated theoretical and empirical techniques that later become standard in the formulation of TFP offsets (ie, X-factors) for incentive regulatory plans worldwide. He is one of a select few people whom are well placed to comprehend and opine on the EI proposal.
- 9 Dr Makhholm's review is set out in Appendix A to this submission. He concludes that the two EI papers "ultimately give no assistance to the Commerce Commission in its job to set reasonable electricity prices that balance the often-competing interests of utility owners and utility customers". Consistent with Orion's assessment, Dr Makhholm observes that, from a purely practical perspective, the most obvious problem with the reports is the "utter incomprehensibility of EI's theoretical discussion for anyone outside of a small circle of academic and consulting economists already familiar with the complex subject areas of index number theory and productivity measurement".
- 10 Dr Makhholm then highlights that, in addition to the impenetrable nature of the analysis, the central premise of EI's analysis is in itself flawed. Specifically, the presence of sunk costs does *not* call into question the validity of the traditional methods of determining the X-factor, as EI so asserts. Finally, he points out that his more than 20-years experience performing productivity analyses for utility industries is sufficient for him to

conclude that “the empirical work called for in EI’s extended theory lies completely beyond the ability of the available data to make into an objective and usable method for controlling regulated prices”.

- 11 In summary then, the EI methodology purports to solve a problem that does not actually exist, is virtually incomprehensible to non-economists and so cannot possibly promote appropriate incentives, and is incapable of implementation in light of the obvious data limitations in any event. Ultimately, no EDB wants to see its industry being used once more as a testing ground for a new and unproven TFP theory. We therefore strongly encourage the Commission to disregard the EI proposal and to adopt a more pragmatic approach that businesses can actually understand, support and respond to appropriately.
- 12 In our view, a durable X-factor arguably should be informed by *multiple factors*, including the application of ‘common sense’. Indeed, there are limits on the extent to which studies of past TFP can robustly predict long-term trends, particularly in light of the acknowledged limitations with the New Zealand data, the period of profound regulatory and structural change to which the data relate, and the pressures facing all businesses in the economy at present. Above all, the X-factor should not be the idiosyncratic creation of a single analyst, as we highlighted in our submission on the DPP paper:¹

“[T]he Commission in assessing aggregate productivity should not mechanistically apply the results from any single analytical technique - particularly if that technique is complex, untested and comprises questionable data. Rather, it should use the results of any such analysis to inform its thinking, with those results given appropriate weight in light of other considerations”

- 13 Whatever measures are used, the overarching objectives must be to produce a reasonable estimate of long-run average productivity improvement, and to promote the long-term benefit of consumers, consistent with the s52A purpose statement. Ultimately, it is for the Commission to judge how much pressure reasonably to place on EDBs to achieve efficiency gains, rather than simply to assume that the mechanical application of an analytical technique will yield a “fair” rate of change. When exercising its judgment on the TFP estimates, we urge the Commission to adopt a conservative approach, on the principle of ‘first do no harm’.

¹ Orion New Zealand, *Submission on Reset of Default Price-Quality Path for Electricity Distribution Businesses*, 17 July 2009, para 40.

Assessment of ODV, DHC and IHC

- 14 The asset valuation report purports to evaluate the relative merits of ODV, depreciated historic cost (DHC) and indexed historic cost (IHC) methodologies for valuing regulatory assets. In particular, the thrust of the EI analysis appears to be to determine the asset valuation principle that, in the context of productivity-based regulation:²
- 14.1 best complies with ex ante financial capital maintenance (FCM) as a key regulatory principle;
 - 14.2 supports outcomes that are dynamically, productively and allocatively efficient; and
 - 14.3 adheres to various other practical considerations such as cost effectiveness, transparency and accuracy.
- 15 On this basis, EI concludes that the use of historic cost rather than replacement cost valuations should be favoured, and that IHC should be preferred to DHC. It also indicates that, where historic cost information does not exist, the earliest available comprehensive asset valuation (which it concedes will usually be a replacement cost valuation) can be 'locked in' as an opening asset value, and rolled forward using an IHC framework from that point. EI summarises its findings in the following table.

² EI contends that the assessment would be similar for building blocks regulation.

Principle	ODV	DHC	IHC	Comment
1. Supports economic efficiency	x	√	√√	IHC is superior when constant real prices are required for intertemporal efficiency or when front loading of capital charges is considered to be economically inefficient and conventional depreciation is adopted, making it difficult to make offsetting adjustments in defining allowable capital income.
2. Facilitates NPV=0	x	√√	√	DHC is superior if there is a significant divergence between actual and expected inflation. ODV is more likely to lead to windfalls gains and losses.
3. Cost effectiveness	x	√	√√	IHC is clearly superior if ready conversion from nominal to real magnitudes is required (principle 6). ODV requires expensive periodic valuations.
4. Consistency and accuracy	x	√√	√	DHC is superior if there is a significant divergence between actual and expected inflation. The need for extensive judgements to be made makes ODV less likely to be consistent and accurate.
5. Transparency	x	√	√√	DHC would be more difficult to be replicated than IHC because of the difficulty in converting from nominal to real magnitudes (principle 6). The need for extensive judgements to be made makes ODV less transparent and less replicable.
6. Conversion of nominal to real	√	x	√	DHC performs poorly on this principle which would be important for total factor productivity measurement if a constant price asset value is used as a proxy for the capital input quantity.

Notes: x = performs poorly. √ = performs well. √√ = performs very well.

- 16 Orion disagrees strongly with the conclusions reached by EI set out above, and with much of the analysis, which we consider contains a number of mischaracterisations regarding the relative merits of the three asset valuation approaches, and of the ODV methodology in particular. The purpose of this section is therefore briefly to highlight those flaws (indeed, as noted above, the EI reports should preferably be disregarded as irrelevant).
- 17 First, EI claims that ODV performs poorly in terms of economic efficiency in the context of the electricity lines industry (relative to historic cost-based asset valuation methodologies), because significant sunk costs mean that the market is not contestable and the benchmark of the hypothetical new entrant (HNE) upon which the ODV value is based is 'not relevant'. In short, it contends that the HNE standard is not applicable for such industries because *actual entry* is unlikely because an entrant will face a

higher entry cost than that initially faced by an incumbent. However, the fact that actual entry will not occur is beside the point.

- 18 Indeed, EI has misconstrued the essential, *notional* value of the HNE standard. As NERA (2008) explains, the HNE standard was never intended to form an *actual* competitive constraint in infrastructure markets with natural monopoly characteristics.³ Rather, it is the application of *regulation* using HNE principles that imposes the constraint by seeking to replicate the outcome of an effectively competitive market, despite the fact that actual competition is neither present nor likely. It is for this fundamental reason that the word ‘hypothetical’ features in the name of the principle.
- 19 In other words, the prospect of *actual* entry is immaterial to the applicability of HNE-based asset valuation techniques – either to establish the opening RAB, or to update that RAB periodically, moving forward. The ODV value as at a particular date represents the price that an HNE would be prepared to pay at that time to buy the incumbent’s assets as compared with the alternative of building a new network - recognising that by purchasing second-hand assets it will face the prospect of higher maintenance costs and earlier replacement.⁴ By definition, the methodology makes an HNE indifferent between these two alternatives.
- 20 In other words, the fundamental purpose of the ODV methodology is to establish regulatory asset values and prices that will place the HNE on an equal footing with the incumbent on a forward-looking basis, however unlikely the prospect of *actual* entry may be. The comparison that EI implicitly makes between the entry costs faced by the HNE and the original cost outlaid by the incumbent is irrelevant to this exercise, and has no bearing on the economic efficiency of the ODV methodology vis-à-vis alternative historic cost methodologies.
- 21 Rather, consistent with the promotion of economic efficiency, decisions on whether to control and/or how to set prices by reference to an HNE standard – and so an ODV valuation – are consistent with the opportunity cost of the resources that would be displaced at that point in time in providing services in the relevant market. For these reasons, we disagree with EI’s rather sweeping assertion that an ODV approach to setting the

³ NERA, *Revised Draft Decision for TSO Instrument: Submission on behalf of Orion New Zealand*, 10 June 2008.

⁴ In principle, the application of the ODV methodology results in the entrant facing exactly the same net present value of cash-flows from these two options, although the profile of those cash-flows will differ.

opening RAB and/or updating that RAB over time would not support economic efficiency.

- 22 Second, we do not agree that a weakness in the ODV methodology is that it is not based on 'black and white' information on past expenditure, that it risks giving rise to 'windfall gains and losses', and is less likely to comply with 'ex ante FCM'. It is important here to distinguish clearly between the decision about how to establish the opening RAB, and the decision about how to update that RAB over time. EI does not make this distinction in its report, which results in a rather confusing analysis.
- 23 There is simply no basis for concluding that establishing the *opening RAB* based on an ODV value will lead to 'windfall gains and losses' over the lifetime of infrastructure assets. For example, if opening RAB values for EDBs were based on an unadjusted 2010 ODV, there would be no sound basis for concluding that those values would exceed the opportunity cost of assets to the incumbent *at some previous date* (ie, some form of historical cost) giving rise to a 'windfall gain'. In fact, the 'residual value' may exceed significantly a 2010 ODV.
- 24 EI's analysis has perhaps been influenced by the recent strong period of growth in asset values. However, the recent period of growth may have been more than offset by an earlier period of low returns – there is simply no way of ruling out this possibility. To assess properly the quantum of 'windfall gains and losses' brought about by using a current ODV to set opening asset values, information would be needed on (amongst other things) the original costs outlaid, all new investments undertaken since that time, accumulated depreciation and outturn rates of return relative to a normal rate of return over the entire lives of the assets in question, including any shortfalls.⁵
- 25 However, such an analysis cannot be done, and so any conclusion that basing the opening RAB on an ODV methodology would lead to windfall gains amounts to little more than unsubstantiated contention.
- 26 Moreover, one of the reasons that the methodology is employed so regularly throughout the world to set opening RAB values is because there

⁵ Because a historical cost valuation represents the opportunity cost of the initial investment in an asset a component of that opportunity cost is any shortfalls in returns that arise during the early years of an asset's life. This phenomenon is commonplace in the return profiles of large sunk assets. For example, in the years immediately following its completion a gas distribution pipeline may have been under-utilised and it may not have delivered its target return to investors during that period. For this reason, in order to provide a return on the opportunity cost of the original investment the quantum of those shortfalls subsequently would have needed to be *added* to the asset value to 'make whole' the original investors.

often is no reliable 'black and white' information on historic costs. Indeed, as noted above, EI concedes that that opening RAB will often need to be a replacement cost valuation for this reason – and this is precisely what the Commission is seeking to do.

- 27 It is likewise not accurate to assert that, even where historical cost information is available, this will necessarily lead to a more objective assessment of asset values. As described further below, a departure from ODV will almost certainly see the Commission embracing ex-ante and/or ex-post prudence reviews of capital expenditure – at least in the context of a customised price path. As the Commission notes in its Input Methodologies paper, such assessments can be just as subjective as the optimisation processes implicit in the ODV methodology.⁶

'[T]hese types of efficiency review still expose suppliers to some degree of uncertainty and risk. They are also fairly information intensive and can be just as subjective as those that feature in the replacement cost-based approaches.'

- 28 There is likewise no reason to think that undertaking periodic ODV revaluations in order to *move that RAB forward over time* is likely to lead to windfall gains and losses. As noted above, there is simply no way of confirming the historic profile of returns pre-dating the opening ODV. As such, even if *no adjustments* were made to account for revaluation gains or losses between ODV estimations, this would not necessarily lead to 'windfall gains or losses' over the life of the assets and a 'violation of ex-ante FCM'. There is simply no way of knowing that.
- 29 Moreover, the regulatory regime could treat any revaluation gains as income for the purposes of setting forward-looking prices (ie, undertake a 'wash-up'), which would remove any perception that 'windfall gains' had arisen. In other words, the conclusion that the ODV methodology would lead to windfall gains and losses, and would not comply with ex-ante FCM is again little more than unsubstantiated contention. Indeed, as Orion has pointed out on myriad occasions – and EI itself acknowledges⁷ – the FCM concept can be applied consistently to *any* asset valuation methodology.⁸

- 30 Finally, although the ODV methodology requires a relatively complex periodic calculation, and has significant scope for the application of

⁶ Commerce Commission, Input Methodologies Discussion Paper, para 6.143.

⁷ Asset valuation paper, p23.

⁸ NERA and Mark Berry, *Review of Commerce Commission's Draft Gas Distribution Services Decisions Paper: A Report for Orion New Zealand Limited*, 30 November 2007, p19.

judgement, that is not to say that historical cost based asset valuation methodologies necessarily are more cost effective, more transparent, or obviate the need to exercise judgement. Indeed, as noted above, both IHC and DHC methodologies inevitably will involve the application of more extensive and intrusive assessments of the prudence of capital expenditure – potentially on both an ex-ante and ex-post basis. Such assessments will involve additional regulatory costs, will entail a degree of regulatory judgement and may sometimes lack transparency.

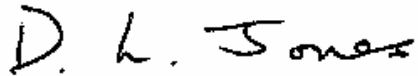
- 31 One therefore simply cannot assert without qualification that one methodology will better comply with the various practical considerations such as cost effectiveness, transparency and accuracy better than the others. The reality is that the ODV, IHC and DHC methodologies inevitably will *all* involve significant regulatory costs, the exercise of judgement and will not always be perfectly transparent. In our view, the various ‘ticks’ and ‘crosses’ contained in the summary table displayed should be replaced with question marks. In our view, the present assessment falls significantly short of an objective, considered analysis.
- 32 In summary, Economic Insights’ assessment of the relative merits of the three asset valuation methodologies is unbalanced and contains a number of misrepresentations. In particular, many of the alleged disadvantages of the ODV approach are either illusory or misrepresented, and several of the contended strengths of alternative asset valuation methodologies are overstated, or overlook potential weaknesses.

Concluding remarks

- 33 The EI reports do little, if anything, to assist in the implementation of the new regulatory regime. In our view, they are more likely to hinder that process.
- 34 The proposed TFP methodology – and the technical report in particular – is driven exclusively by abstract economic theory with no regard whatsoever to the need to ensure practical implementation and transparency. Moreover, as Dr. Makhholm sets out in his report in Appendix A, the methodology itself is fundamentally flawed.
- 35 Orion likewise takes issue with much of the analysis contained in the asset valuation report. In our view, the EI assessment leaves much to be desired and represents an unbalanced assessment of the various asset valuation methodologies. For these reasons we would strongly encourage the Commission to disregard both EI reports, and dedicate no more resources to either endeavour.

- 36 Thank you for the opportunity to make this submission. Orion does not consider that any part of this submission is confidential. If you have any questions please contact: Dennis Jones (Industry Developments Manager), DDI 03 363 9526, email dennis.jones@oriongroup.co.nz.

Yours sincerely

A handwritten signature in black ink that reads "D. L. Jones". The signature is written in a cursive style with a clear, legible font.

Dennis Jones
Industry Developments Manager

APPENDIX A

Note on the June 2009 Reports by Economic Insights pty ltd on the Theory of Network Regulation in the Presence of Sunk Costs

Jeff D. Makholm, Ph.D
Senior Vice President, NERA

31 July, 2009

A. Comments on the Economic Insights Papers

The June 2009 reports for the Commerce Commission from Economic Insights Pty Ltd (“EI”) on the theory of regulation make sweeping statements about defects in the way that *CPI-X* regulation has been applied around the world since its introduction into modern utility price regulation in the UK in the 1980s. As a response to those purported defects, EI submitted a “technical report” with a strictly theoretical presentation on an alternative method of *X-factor* estimation. EI holds that its alternative method has two features to recommend it: (1) it takes into account the nature of electricity distributors’ sunk costs, which previous methods have failed to do; and (2) it has the feature of taking into account the regulator’s role to “improve the welfare of households” within the context of a “small general equilibrium model of an open economy,”⁹ something that current regulatory methods fail to do as well.

⁹ EI Report, 8 June, 2009, p. 1

My overall reaction to the two EI papers is that they ultimately give no assistance to the Commerce Commission in its job to set reasonable electricity prices that balance the often-competing interests of utility owners and utility customers. From a purely practical perspective, the most obvious problem with the reports is the utter incomprehensibility of EI's theoretical discussion for anyone outside of the small circle of academic and consulting economists already familiar with the complex subject areas of index number theory and productivity measurement. To be sure, one of the reports' authors, Professor Erwin Diewert, is a distinguished economist who is well regarded by his peers as a theorist and econometrician.¹⁰ But utility regulators, whether in New Zealand or anywhere else, are not economic theorists. Being practical, politically-minded people, they want an objective and straightforward method of price and earnings control for regulated companies. They will use what is tested by experience rather than general theoretical reasoning. From this context alone, there is really nothing to be done with the EI papers, as they fail what is perhaps the most basic test for economists attempting to work in the real world: to demonstrate to non-economists that their work has practical relevance. With regard to productivity-based regulation, the theoretical EI papers offer nothing even remotely practical.

Turning to the merits of the papers on the subject of productivity-based regulation, they exhibit problems in three areas: conceptual/theoretical, empirical and institutional.

¹⁰ Professor Diewert was made a Distinguished Fellow by the American Economic Association in 2009 for his work in economic modeling and econometrics. Indeed, I made three references to Diewert's writings in my own 1986 Doctoral thesis and have always had a high regard for his contributions to establishing the mathematical/theoretical foundation for productivity investigations.

The conceptual/theoretical problems I perceive are of two sorts. The first has to do with the whole point of productivity measurement in *CPI-X* regulation. EI constructs an elaborate theoretical model to, in its words, extend the theory of regulation so that the *X-factor* can serve as the means by which regulators can improve the welfare of households in the economy. But such is not the goal of *CPI-X* regulation as it widely applied around the world. The much more modest—although still quite useful—goal of *CPI-X* regulation is to make cost-based regulation more streamlined and efficient by allowing prices to move according to a defined path during a set number of years. My understanding of Paragraph 53P of the Commerce Amendment Act is that it would appear to square with this more modest role for *CPI-X* regulation—and not with what EI styles as “a unified theory of network regulation using productivity analysis.”¹¹

In addition to pursuing a task that it would appear Paragraph 53P does not call for, EI uses *sunk costs* as a the jumping-off point to claim that the existing theory of *CPI-X* regulation is, as its says, a “piecemeal” affair. In its words, “the existence of sunk cost assets greatly complicates the regulator’s responsibilities and changes the nature of some of key regulatory theory findings.”¹² I think that EI is totally mistaken in this respect, proceeding from its own assumed distinction about utility sunk costs that does not carry over to the real world. That is, the issue of sunk costs is not as black and white for utilities, or so unique to utilities, as EI appears to assume. First, notwithstanding the sunk nature of many of a utility’s capital

¹¹ EI Report, 11 June 2009, p. ii.

¹² EI Report, 8 June 2009, p. 1.

costs, capital assets are continuously being added and retired, providing ample possibilities for substituting between new capital assets and other types of productive inputs. Second, a utility's other costs (e.g., labor) have important rigidities making them not nearly as discretionary and distinct from the cost of capital assets as EI assumes. Finally, the whole productive output of an electricity distributor is outside of its discretion anyway, being defined by the legal duty to satisfy the public's need for safe and adequate service. All of this is to say that sunk costs do not present electric distribution utilities or their regulators with awful or unique constraints in practice, and there is nothing inherently wrong with the way in which existing cost-based regulation, using *CPI-X* methods of price control, deals with the issue.

On the subject of productivity measurement leading to the *X-factor*, the EI papers are exclusively theoretical. Many times in both papers EI makes references to the difficulty of obtaining data to flesh out its theory. These statements notwithstanding, EI grossly understates the data problems that would accompany any practical attempt to validate or apply its theory without making annihilating simplifying assumptions. Obtaining stable and useful productivity measures is a difficult empirical exercise in the best of circumstances, even with the finest and most uniform data in the world. The types of measures that EI's theoretical extensions call for, even if those extensions were solidly grounded, are well outside of what could usefully or objectively be produced in a regulatory proceeding. As I said in the case of individual company *X-factors* in 2003 before the Commerce Commission, any attempt to measure such highly arcane measures as EI calls for with its new theory would "inevitably be an idiosyncratic creation of

an individual analyst”¹³—loaded with subjective and simplifying assumptions and impossible to replicate.¹⁴

Institutionally, the EI papers treat the price adjustment mechanism as the central focus of a “unified theory”¹⁵ of regulation, contrary to the real work of regulators, whose task centers (at least in common law countries like New Zealand) on the sanctity of private property put into public services, the adequacy and efficient provision of those services, and the administration of reasonably objective and orderly administration of methods of price control. That is to say, regulation in the real world is a collection of legal, accounting and administrative institutions that provide assurances of safety and adequacy of services to the public and confidence to investors that their capital will be repaid with a reasonable return—in other words, the “regulatory compact.” The economic relationships between consumers, businesses, regulators and investors in the provision of public utility services are complex—guided by people with particular motivations, desires and customs within a very longstanding legal and legislative framework. It is futile to treat these economic relationships as conforming to models that appear like so much physics, as EI’s elaborate theoretical presentation essentially does.

Ultimately, I disagree with EI’s central theme that the presence of sunk costs calls into question the validity of the traditional methods for finding the *X-factor*.

¹³ “Unacceptable Electricity Distribution Productivity Measures for Re-Setting the Price Path Threshold,” Prepared for Orion New Zealand Limited, Jeff D. Makholm, NERA, October 5, 2003, p. 6.

¹⁴ Those arcane measures include deviations of regulated prices from “opex marginal cost” and “deviations of the allowed amortisation amounts for sunk cost capital stock components from their corresponding marginal user benefits.” EI Report, 8 June 2009, p. 5.

¹⁵ EI Report, 11 June 2009, p. ii.

Furthermore, having performed productivity analyses for utility industries many times over more than 20 years, I conclude that the empirical work called for in EI's extended theory lies completely beyond the ability of the available data to make into an objective and usable method for controlling regulated prices.

B. Qualifications

Orion New Zealand, Ltd., asked me to perform a review of two reports presented by Economic Insights Pty Ltd ("EI"), dated 8 June 2009, entitled "The theory of network regulation in the presence of sunk costs" and 11 June, 2009, entitled "Asset valuation and productivity-based regulation taking account of sunk costs and financial capital maintenance." Those two EI reports investigate the consequences of what their authors hold to be a key theoretical oversight in the way that performance based regulation (called by various names, including *CPI-X* regulation in New Zealand) has been applied around the world since it first appeared in the UK in the mid 1980s.

I have extensive experience in the application of performance based regulation around the world. My 1986 Doctoral dissertation at the University of Wisconsin-Madison, entitled *Sources of Total Factor Productivity in the Electric Utility Industry*, investigated theoretical and empirical techniques that later became standard in the formulation of total factor productivity (TFP) offsets—that is, the *X-factor*—for incentive regulatory plans worldwide.¹⁶ Among my various reports, published papers, and testimonies over the years on the subject of incentive

¹⁶ For example, The *X-factor* report of Pacific Economics Group (whose lead author, Dr. Larry Kauffman, also comes from the University of Wisconsin-Madison and formerly worked for my former thesis advisor, Professor Laurits Christensen), employs productivity measurement methods that are largely the same as those in my 1986 thesis.

regulatory plans, I published two papers in 2007 on topics involving incentive regulation and controversies surrounding the source of the *X-factor* in such incentive regulatory plans.¹⁷

I also have longstanding experience in dealing with regulatory issues in New Zealand, dating back to 1993 when I assisted Natural Gas Corporation in the derivation of its pipeline transport charges. I outlined that experience in my October 2003 report on behalf of Orion to the Commerce Commission where I highlighted the deficiencies in both the concept and application of company-specific *X-factors* in resetting price paths for New Zealand's electricity distributors.¹⁸ I also appeared by video link in hearings before the Commerce Commission in that case early in 2004. It is my understanding that the Commerce Amendment Act of 2008, among other things, eliminated those company-specific *X-factors*.

In the preparation of this note, I have reviewed the materials related to my previous involvement in price path controversies (including my own report), the Commerce Amendment Act of 2008, and the two June 2009 EI reports.

¹⁷ See "Elusive Efficiency and the X-Factor in Incentive Regulation: The Törnqvist v. DEA/Malquist Dispute," in Voll, S.P., and King, M.K. (Eds.), *The Line in the Sand: The Shifting Boundaries Between Markets and Regulation in Network Industries*, National Economic Research Associates, White Plains, New York (2007), at 95-115; and "Theoretische Rechtfertigung des X-Faktors" ("Theoretical Justification for X-Factors"), *Energiewirtschaftliche Tagesfragen*, Vol. 47, No. 3 (March 2007), at 50-52.

¹⁸ "Unacceptable Electricity Distribution Productivity Measures for Re-Setting the Price Path Threshold," Prepared for Orion New Zealand Limited, Jeff D. Makholm, NERA, October 5, 2003.