

The treatment of non-system assets, intangibles and easements in the New Zealand electricity lines optimised deprival valuation handbook

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An opinion by Geoffrey Horton

Experience and qualifications

I am Geoffrey Robert Horton, an independent consultant specialising in advice on economic regulation to regulatory bodies and regulated companies. I hold an MA degree in Philosophy, Politics, and Economics from Oxford University and an MSc in the Economics of Public Policy from London University.

I have worked as an economist or regulator for more than thirty years. The first half of my career was spent mainly as a macroeconomist at the United Kingdom Treasury, in consultancy or as a university lecturer but, for the last sixteen years, I have been involved in economic regulation, particularly in the electricity industry.

As Senior Economic Adviser in the UK Department of Energy from 1988-90, I was responsible for all economic advice on electricity, coal, and the environment and played a leading role in the redesign and reorganisation of the electricity industry before the new companies were vested and subsequently floated.

From 1990 to 1995, as Director of Regulation and Business Affairs at the British Office of Electricity Regulation, I was responsible to Professor Littlechild for all aspects of the price controls, issues of price discrimination, and advice on economics and accounting. In that role I conducted reviews of the price control licence conditions for the National Grid Company, the public electricity supply businesses, and the public electricity supplier distribution businesses.

From 1992 to 1995, I was simultaneously Director General of Electricity Supply for Northern Ireland. This is an independent statutory appointment, entirely separate from the Office of Electricity Regulation in Great Britain, with responsibility for the regulation of the electricity industry in Northern Ireland.

From 1995 to 1998 I was Director of Consumer Affairs at the UK Office of Fair Trading, responsible for the half of the office discharging the Director General's consumer protection responsibilities. Since 1998, as a regulatory consultant, I have worked on many topics, including matters relating to price control or asset valuation in electricity, railways, gas, banking, postal services, water, bus transport and pharmaceuticals.

I have advised electricity regulators or regulated companies in England & Wales, Scotland, Northern Ireland, the Republic of Ireland, Turkey, Russia, Singapore, Thailand, Ukraine, Australia and, through UK Trade and Investment, China, Taiwan, Saudi Arabia and Abu Dhabi.

1 Summary

I have been asked to consider whether the revised Handbook for Optimised Deprival Valuation (ODV) of System Fixed Assets of Electricity Lines Businesses, a draft of which was published on 23 December 2003 by the New Zealand Commerce Commission, should be amended so as to include intangible assets and easement rights.

In considering this question I assume that the principles to be applied are primarily those of economic efficiency:

- Efficiency in production - so that goods and services are produced at least cost; and
- Efficiency in allocation - so that the goods and services that are produced are those whose consumption will maximise consumer welfare.

The former requires, inter alia, that producers are faced with incentives to minimise the overall cost. An investor should have the expectation of recovering the cost of capital on efficient investment, an expectation of “financial capital maintenance” (FCM). The use of ODV may not ensure FCM unless other measures are also taken. FCM will not occur if some assets that have been purchased are not included in the asset base.

Allocative efficiency requires consumers to face prices that reflect the full cost of providing the good or service so that they can make efficient choices. If there are no economies of scale this will mean that prices should be based on an assessment of the replacement costs of the lines business that is comprehensive.

If no current payment is made in respect of an asset which is necessary for the operation of the electricity lines business it should normally be included as part of the asset base when making efficiency judgements or when considering price levels that are appropriate either to secure allocative efficiency or to ensure financial capital maintenance. This applies to tangible assets such as depots, other property, and motor vehicles and to intangible assets such as easements that enable lines to pass over land.

There will be inefficiencies introduced by the use of an asset base value that omits easements or other assets to calculate productivity (as part of an assessment of whether an efficiency threshold has been breached), a rate of return (as part of an assessment of whether an excess profit threshold has been breached), or maximum price levels that might be imposed as part of a control as described below.

- The omission of values for easements (or other assets) or the inclusion of post-1993 easements at an historic cost rather than ODV will affect the weights to be assigned to the inputs and may affect the movement of each input over time. . It will therefore influence assessments of both TFP movements and relative productivity comparisons. Since the omission of these assets means that some input use is not taken into account in the efficiency estimate, the estimate will be inaccurate. The degree of inaccuracy may well vary between companies.
- If a judgement on whether a price is excessive or on the maximum level of price to be permitted is based on an asset valuation that omits non-system or intangible assets necessary for the operation of the lines business, it will be likely to lead to productive and allocative inefficiency.

- As regards productive efficiency, it will not maintain the principle of financial capital maintenance in respect of pre-1993 easements and other omitted assets¹ unless either no payment has been made for their purchase or an operating cost payment to another body is recognised for their use. Even as regards post-1993 easements that are valued at historic cost, there will not be full FCM since calculation of the appropriate return is different for assets valued at historic cost from that for assets valued at ODV.
- As regards allocative efficiency, it will underestimate the full resource cost of the provision of lines and, if there are no economies of scale, fail to set a price to the consumer that fully reflects the cost of consumption with a consequent detriment to efficiency.

I therefore consider that the asset base should include all assets necessary for the operation of the lines business including non-system assets, intangibles and easements, provided that they are not remunerated by current spending on operating costs.

2 Question addressed

I have been asked to consider whether the revised New Zealand Handbook for Optimised Deprival Valuation (ODV) of System Fixed Assets of Electricity Lines Businesses, a draft of which was published on 23 December 2003 by the New Zealand Commerce Commission, should be amended so as to include intangible assets and easement rights.

The present draft and the existing handbook include only “*fixed assets [that] are tangible in nature, have relatively long useful lives, and are used, or are intended to be used, for the conveyancing or supply of electricity*”. They specifically exclude a number of other tangible assets that might be used by an electricity lines business, such as depots, offices, and motor vehicles, and by implication exclude intangible assets. However appendix A also permits the inclusion of easements purchased after 1 January 1993 (or 1 January 1988 in the case of Transpower) provided that they have not already been expensed.

3 Principles to be applied

3.1 Economic efficiency

In considering this question I assume that the principles to be applied are primarily those of economic efficiency:

- Efficiency in production - so that goods and services are produced at least cost; and
- Efficiency in allocation - so that the goods and services that are produced are those whose consumption will maximise consumer welfare.

The former requires, inter alia, that producers are faced with incentives that reflect the true costs of the resources they use so that they can minimise the overall cost and the latter that consumers face prices that reflect the full cost of providing the good or service so that they can make efficient choices.

¹ I understand these to include depots, other property and vehicles.

3.2 Objectives of the Commission

The New Zealand 1986 Commerce Act suggests that the Commerce Commission has a similar objective.

Section 3A says, “*Where the Commission is required ... to determine ...a benefit to the public, the Commission will have regard to any efficiencies that ...will result...*”

The purpose of the provisions relating to electricity in that act is said to be “*to promote the efficient operation of markets directly related to electricity distribution and transmission services through targeted control for the long-term benefit of consumers by ensuring that suppliers-*

- (a) are limited in their ability to extract excessive profits; and*
- (b) face strong incentives to improve efficiency and provide services at a quality that reflects consumer demands; and*
- (c) share the benefits of efficiency gains with consumers, including through lower prices.”*

I assume that the criteria by which profits are deemed to be excessive are those of economic efficiency in that the relevant factors are whether consumers are faced with prices that do not accurately reflect the costs of provision and whether rewards to producers are not such as to promote efficiency in production.

Similarly, I assume that purposes (b) and (c) involve consideration of, on the one hand, the retention of some profits from efficiency gains to encourage productive efficiency and, on the other hand, passing the benefits to customers so that prices reflect costs and allocative efficiency is promoted.

3.3 Bonbright principles

These considerations also underlie the Bonbright principles², which are widely cited in United States regulation. These involve three primary criteria:

- Capital attraction, which takes the form of a reasonable return for private utility companies;
- Consumer rationing, under which rates are designed to discourage wasteful use and promote all use that is economically justified; and
- Fairness.

The last criterion relates to issues such as avoidance of arbitrariness and discrimination but the first two concern economic efficiency. The first reflects the need to provide a return that attracts producers to the right extent. The second involves charging customers an amount that prevents them using the product when costs exceed the benefit to them (as reflected in the price) but avoids deterring them when costs are below the benefit.

² These are described in *Principles of Public Utility Rates* (1988) James C Bonbright, Albert L Danielsen, and David R Kamerschen.

4 Consequences for prices

These principles have consequences for maximum price levels set by regulatory authorities for the output of regulated utilities. The Commerce Commission is not setting price levels but compiling a manual for asset valuation in relation to thresholds used to determine whether goods or services should be controlled. This distinction is discussed in section 5 below. However, for ease of exposition, the points here are made in the context of regulatory price setting.

4.1 Producer perspective – productive efficiency

To satisfy productive efficiency and capital attraction it is necessary that an investor should have the expectation of recovering the cost of capital on efficient investment. This requires a method of valuation that ensures an expectation of “financial capital maintenance”.

4.1.1 Financial capital maintenance

Under financial capital maintenance (FCM) the regulated firm (operating efficiently) will recover the financial capital invested in its assets; payments for return and depreciation (when discounted at the cost of capital) will equal the cost of the investment. It clearly will not apply if assets are excluded from an asset base but, provided they are included, it is a principle that is compatible with many systems of asset valuation and price setting. However, it will have implications for the method of application of each.

Probably the simplest method is when prices are set on a “building block” approach using, in respect of capital assets, the basis of straight line depreciation of the historical cost of the asset plus the nominal cost of capital as a return on the undepreciated portion³. However, this will tend to frontload charges relative to an assessment of prices based on marginal cost, particularly when inflation is high, and so will be likely to conflict with allocative efficiency.

An alternative is to index the asset value (and so also the depreciation charge) for inflation and to apply a return equal to the indexed asset value times a real cost of capital⁴ but this value too may differ from a modern equivalent asset or deprival value.

If the value used is MEA (or ODV) financial capital maintenance will require that the additional depreciation of the MEA value relative to the inflation indexed historical cost is also used as part of the depreciation total setting prices. However, this may lead to instability in pricing from year to year. To avoid this, yet still provide an ex ante expectation of FCM, it is possible to raise the return above the cost of capital ex ante by an amount equal to the expected excess annual percentage MEA depreciation⁵ rather than add the actual excess depreciation ex post.

³ The simplest form of the building block approach sets expected revenue equal to the rate of return times the average regulatory asset base (RAB) + depreciation of the RAB + operating costs (C_t), where the RAB at the end of the year is equal to the previous RAB less depreciation plus new investment (I_t).

⁴ The normal approach is to consider a regulatory period as a whole (in this case five years) and set a price control so that the net present value of expected revenue is equal to that of expected costs using an equation similar to that below, where all values are expressed in constant prices, ror is the rate of return and V is the revenue driver volume expected in each year. P_0 and X are the variables to be decided. It can be derived from the more simple form by transformation of the series.

$$0 = RAB_0 - RAB_5 / (1 + ror)^5 + \sum_{t=1}^5 ((1 / (1 + ror))^{(t-0.5)}). (C_t + I_t - P_0 \cdot (1 - X)^t \cdot V_t))$$

⁵ A factor sometimes referred to as “technical progress”.

Therefore the use of ODV may not ensure FCM unless other measures are also taken.

4.2 Customer perspective – allocative efficiency

From a consumer point of view, and to satisfy allocative efficiency, the need is to set a charge that reflects the marginal cost of provision. This is so that the customer will purchase whenever the benefit of consumption exceeds the cost (and so price) and will refrain from purchasing when the benefit is below the cost.

The cost valuation that is relevant for this perspective is that of an expansion or contraction of output, which would require purchase of inputs at the present cost and so, as regards capital assets, the purchase of a modern equivalent asset (MEA) or, if less expensive, the use of other means of achieving the same objective without the asset (ODV).

Therefore MEA/ODV is the theoretically appropriate method of valuation from this perspective. However, some commentators have considered that the theoretical advantages may be outweighed by the practical problems of its application.

Marginal cost should be calculated valuing assets valued at replacement cost (or ODV) but it may differ from an average cost calculated on that basis if there are economies of scale. There is a large literature about the reconciliation of the marginal cost principle with that of raising sufficient revenue to cover all costs (including a reasonable return) in circumstances when there are economies of scale and marginal cost is below average cost⁶. This is not discussed here as it lies outside the scope of this opinion, particularly since economies of scale have apparently not been found in New Zealand electricity lines businesses.

There are various studies that have investigated the existence of scale economies in electricity distribution. Some have concluded that they exist⁷ but others have concluded that only very small scale is a disadvantage⁸. For New Zealand Meyrick and Associates⁹ concluded that they are unimportant: *“Scale of operations also does not appear to be a major determinant of average [multilateral total factor productivity] MTFP levels with the smallest distributor in terms of throughput (Scanpower) appearing near the top of the list and the second smallest distributor (Buller Electricity) appearing near the bottom. The five largest distributors (United Networks, Vector, Orion, Powerco and Aurora Energy) are spread across the top, middle and bottom thirds of the sample.”*

If there are no economies of scale allocative efficiency will require that prices should be based on an assessment of replacement costs that is comprehensive.

⁶ For example in Laffont J. -J. & Tirole J. (2000), *Competition in Telecommunications*, MIT

⁷ *Productivity Improvements in Distribution Network Operators* Report to Ofgem by Cambridge Economic Policy Associates Ltd November 2003; *Scale and cost efficiency in the Swiss electricity distribution industry: evidence from a frontier cost approach*. Centre for Energy Policy and Economics Working Paper Number 8 Filippini, Massimo, Wild, Jörg, & Kuenzle, Michael (1999).

⁸ *Evidence on Scale Economies in Electric Utility Distribution and What it Implies: "Is Bigger Better?"* by John Kelly, Director of Economics & Research, American Public Power Association March 2001; *Electric Power Distribution Costs: Analysis and Implications for Restructuring*, John E. Kwoka, Jr., a report to the American Public Power Association, December 2000.

⁹ *Regulation of Electricity Lines Businesses, Analysis of Lines Business Performance – 1996–2003* Report prepared by Meyrick and Associates for Commerce Commission, Wellington, New Zealand December 2003

4.3 ODV: Relationship to “value to owner” and economic asset value

The ODV method estimates the replacement cost of the entire system by calculating the MEA cost of a notional optimised system that produces the services presently required. This is a component of a calculation of the value to the owner, which is standardly viewed as the minimum of replacement cost and economic value, where economic value is the maximum of the present value of its future earnings and its realisable value from sale¹⁰.

In most cases in utility regulation the economic value is likely to be the consequence of the actions of the regulatory authority rather than a useful input, since it depends on expected future profits. However, there may be circumstances where the economic value lies beneath replacement cost. In the United Kingdom, for example, pricing decisions on both water and railway services are based on values far below the estimated replacement cost and the sale value of water and railway companies and their assets is also much lower than replacement cost. This is justified mainly on the grounds of financial capital maintenance, because it focuses on the amount shareholders have invested, but partly also recognising the possibility that marginal cost in these industries may be lower than average cost and so prices based on full cost might cause allocative inefficiency.

5 Purpose of the asset valuation

The purpose of the asset valuation to which the ODV handbook applies has changed from what was originally intended in the 1986 Act. It appears now to be threefold:

- (i) To value inputs for use in total factor productivity and other productivity calculations as part of an assessment of whether an efficiency threshold has been breached and so whether control should be introduced;
- (ii) To value assets to calculate a rate of return as part of an assessment of whether an excess profit threshold has been breached and so whether control should be introduced; and
- (iii) To be used in calculations supporting maximum price levels that might be imposed as part of such control.

The third of these potential uses is essentially the same as for any regulatory price setting as described in section 4.

The second is similar to price setting calculations but differs in that, instead of using an estimate of efficient costs and a reasonable rate of return in order to set prices, it subtracts actual costs from prices to see if the rate of return on assets is excessive. The difference between a reasonable and excessive return is not the concern of this note but presumably an excessive return exceeds a reasonable one by an amount that is greater than is tolerable given the costs and inefficiencies of control and the uncertainties involved in the calculations.

The second difference between the profitability test and a price setting calculation, the use of actual costs rather than an estimate of efficient costs, is addressed by the first use or test, which assesses whether cost levels exceed an acceptable level of inefficiency.

¹⁰ See, for example, *The Economic Analysis of Accounting Profitability* by Jeremy Edwards, John Kay and Colin Mayer.

6 Intangible and other non-system assets

Given this background I now consider the treatment of intangible and other non-system assets as costs when making efficiency judgements, setting allocatively efficient prices and determining returns to capital that contribute to capital attraction and productive efficiency.

6.1 Expensing and capitalisation

There are differences between regulatory systems, and even between regulated companies within a single regulatory system, in the treatment of capitalisation. For instance, some systems may capitalise IT expenditure while others may treat it as an expensed item even when the regulated company capitalises it in its own accounts. Some companies may capitalise property or vehicles within the regulated business, others may lease them from other companies (sometimes other companies within the group) and so treat the expenditure as current.

In what follows I discuss the treatment of non-system assets on the assumption that payments for them are not included as current expenditure.

6.2 General treatment of non-system assets

If no current payment is made in respect of an asset which is necessary for the operation of the electricity lines business it should normally be included as part of the asset base when making efficiency judgements or when considering price levels that are appropriate either to secure allocative efficiency or to ensure financial capital maintenance. This applies to tangible assets such as depots, other property, and motor vehicles and to intangible assets such as easements (or wayleaves) that enable lines to pass over land.

The following sections discuss the three uses of the asset estimates concentrating on the particular case of easements which the draft handbook includes in the asset estimate only if purchased after 1 January 1993 (or 1 January 1988 in the case of Transpower) and valued at historic cost rather than ODV.

6.2.1 Efficiency judgements

I have not been able to study the TFP and MTFP reports and analyses prepared for the commission in great detail but it is my understanding that these assess factor inputs in five groups:

- operating costs per kilometre or customer deflated by a labour cost index;
- kilometres of overhead line;
- kilometres of underground line;
- KVA of installed transformers; and
- the ODV value of other system assets such as computers and control systems.

These are weighted by expenditure on operating costs for the first item and 12.5% of ODV value for the other four.

The omission of values for easements (or other assets) or the inclusion of post-1993 easements at an historic cost rather than ODV will affect the weights to be assigned to the inputs and may affect the movement of each input over time. It will therefore influence assessments of both TFP movements and relative productivity comparisons. Since the omission of these assets means that some input use is not

taken into account in the efficiency estimate, the estimate will be inaccurate. The degree of inaccuracy may well vary between companies.

6.2.2 Allocative efficiency

The handbook valuation of the replacement cost of electricity lines omits any expenditure that might be necessary to secure an easement right. The rights only feature in the asset value at historic cost and if purchased after 1993. Therefore, the extent to which easement costs are included in the asset ODV depends on whether construction of the actual, as opposed to the optimised, system has involved purchase of easements since 1993 and the extent to which easement values have changed between the time of purchase and the time of valuation.

If a judgement on whether a price is excessive or on the maximum price to be permitted is made on the basis of easement costs valued in this way, it will underestimate the full resource cost of the provision of lines¹¹ and, if there are no economies of scale, fail to set a price to the consumer that fully reflects the cost of consumption with a consequent detriment to allocative efficiency. This would be the case whether or not the electricity lines company had in fact paid for the asset in question or had acquired its use by other means such as by statutory right.

6.2.3 Financial capital maintenance

The treatment of easements in the handbook appears to have been influenced by considerations of FCM since post-1993 purchases are entered at historic cost. As regards pre-1993 easements, existing rights are said to be protected by the 1992 Electricity Act and original rights were acquired under previous legislation where “*the Crown and ESAs had virtually unlimited rights of access to land to build works.*”

However, even as regards the post-1993 purchases, there will not be full FCM. As described in section 4.1.1, calculation of the appropriate return is different for assets valued at historic cost from that for assets valued at ODV. Applying the same method to a composite estimate containing optimised deprival and historic cost valuations is likely to lead to error.

FCM will not apply to easements acquired before 1993 unless no payment has been made in respect of them. I do not know whether the previous legislation in New Zealand allowed access to land to build without compensation but, even if that was so, the transfer of those rights to private sector companies at the time of the sale of the businesses may have involved an implicit payment for them.¹²

7 Treatment in other jurisdictions

I have not conducted a survey of the regulatory treatment of these issues in other jurisdictions. Practices differ. However, intangible assets are widely recognised. In the United States there are many examples of decisions adjusting the rate base for easements and other intangibles¹³ and this is also done elsewhere.

¹¹ As will also be the case if it fails to take other non-system assets into account.

¹² I also do not know the reason for the different treatment of Transpower’s easements, which are only protected pre-1988 and can feature in the asset base from that date, but, if this was done because payments were known to have been made by Transpower in respect of 1988-92 easements, it would assist FCM and form an interesting precedent.

¹³ For example the New York Public Service Commission 2000 decision on adjustment of the New York Telephone Company’s rate for transfer of intangible assets including name and reputation.

The principle of financial capital maintenance is also normally an important feature. In United Kingdom regulation, for example, the initial regulatory asset base is normally determined by considering what was paid by shareholders to acquire it. Thus any value of access rights and other intangibles that was implicit in the sale would automatically be included.

This method of determination of the regulatory asset base cannot be applied to all sales and purchases of regulated businesses, and cannot be established ex ante, since it is circular. If the appropriate value to be assigned to assets is what was paid for them and subsequent prices can be set on that basis, any purchase price could be asked and paid provided that there was sufficient market power to levy the consequent charges. Nevertheless, unless there is reason to question the price paid, the implicit value assigned when a business was purchased is a reasonable guide to its value and should be taken into account when considering asset values.

8 Conclusion

I consider that the asset base should include all assets necessary for the operation of the lines business including non-system assets, intangibles and easements, provided that they are not remunerated by current spending on operating costs. This is necessary for the calculation of prices compatible with productive and allocative efficiency.

The question of the method of valuation that should be used is more complex and the principles of financial capital maintenance and marginal cost pricing (respectively supporting productive and allocative efficiency) may sometimes lead to different conclusions. However, the rate of return to be applied to the assets in question should be calculated so as to be consistent with the method of valuation.