

[VECTOR LOGO]

**Submission to Commerce Commission on
Productivity Measurement**

31 July 2009

CONTENTS

INTRODUCTION..... 3

EXECUTIVE SUMMARY 3

RATES OF CHANGE..... 5

INTRODUCTION

1. Vector welcomes the opportunity to provide this submission to the Commerce Commission on the measurement of productivity for the setting of X-factors in default path resets.
2. Vector has viewed the report from Pacific Economics Group ("PEG") submitted by the ENA, which provides an alternative basis for measuring the productivity performance of the electricity distribution businesses ("EDBs") relative to the rest of the economy. In our view, the PEG report provides useful evidence to the Commission on the productivity performance of the New Zealand EDBs and should be given appropriate weight in setting an X-factor in the coming reset.
3. In this submission we set out our views on the approach to determining an X-factor. This submission largely reproduces views from Vector's submission of 17 July 2009 on the Default Price Path Discussion Paper, but we thought it would aid the Commission's submission review process to provide this submission separately.

EXECUTIVE SUMMARY

4. Vector's key points in relation to the Commission's proposals for rates of change are:
 - (a) **Vector has strong concerns regarding the specification of the input-output function proposed to measure changes in productivity.** The Commission's approach treats physical inputs (e.g., MVA-kms) as an output and proposes to compound this error by multiplying MVA-kms by transformer capacity. The use of these physical inputs as outputs would result in directionally illogical movements in productivity and should not be used in this manner.
 - (b) **Vector supports the use of the "B-factor" framework to set the rates of change in price-quality paths.** At this point in time, Vector does not express any views on the proposed *methodological* refinements to the TFP framework previously used.
 - (c) **The proposed sense check of Economic Insights' analysis is supported.** Making an assessment of the productivity potential of lines businesses will in the end require judgement that needs to recognise a number of contextual considerations relevant to Electricity Distribution Businesses ("EDBs"). It is important that the Commission recognise that

the technical complexity set out in the Economic Insights papers does not equate to empirical precision. Vector submits that Economic Insights should present its approach to the industry to allow for more informed comment and understanding of the proposed approach. The ultimate test of any particular empirical approach is whether it generates sensible outcomes given the stable nature of the industry and the technology it uses. Vector endorses the Commission's recognition that it will need to examine international productivity data as a sense check on the results of Economic Insights' analysis. The report from PEG submitted by the ENA appears to have a reasonably sound methodological basis and generates plausible results. The Commission should give it appropriate weight in assessing the results.

- (d) **A cautious approach to setting X-factors is required:** In the present economic environment and in the context of an industry with significant sunk costs, the scope for productivity improvements becomes more limited. Vector urges the Commission to adopt a cautious approach to setting X-factors. The consequences of setting an X too low, would simply result in delayed sharing of efficiency gains with consumers until the next reset. Setting an X-factor that is too high, relative to EDBs' productivity potential, risks creating disincentives for investment and/or lead to a significant number of CPP proposals, which the Commission may not be in a position to progress, given that the Commission is not required to address more than four CPPs in any one year.

RATES OF CHANGE

Commission's proposals

The Commission has proposed that rates of change are to be based on a modified version of the B-factor used under the Part 4A regime. The Commission proposes:

- (a) To use international data as a check on the results of TFP analysis on New Zealand data;
- (b) To use an amended TFP formula proposed by Economic Insights;
- (c) To use indexed historic cost data as the basis for determining unit capital costs (although this is likely to have marginal impacts on accuracy);
- (d) To include transformer capacity as an output measure; and
- (e) To derive an input price differential from the TFP approach.

Vector's response

5. Vector supports the use of the "B-factor" framework to set the rates of change in price-quality paths. At this point in time, Vector does not express any views on the proposed *methodological* refinements to the TFP approach previously used. The Economic Insights paper includes some 346 technical equations to justify the new approach, which we have not had the time to comprehend, let alone test. From a process point of view, we suggest that the Commission makes personnel available from Economic Insights to present and take questions on the new approach to enable the industry to understand it.

6. In general, we are extremely supportive of methodological rigour being used to underpin empirical analysis (for example, we support the statistical rigour demonstrated in the Statistical Research Associates report supplied by ENA on setting and assessing quality performance). However, with respect to the Economic Insights analysis it is not apparent to us how the approach being suggested relates to real world data and any necessary assumptions that may be required to apply the methodology in practice.

7. The ultimate test of any approach is its ability to generate meaningful and plausible results, without resorting to simplifying assumptions or approximations that distort the underlying methodology. It is clear that all aspects of productivity

measurement are unsettled, including the methodological approach, parametric specification of the input-output function and data quality/interpretation, so caution must be applied.¹

8. The nature of the service provided by lines business is inherently stable, in terms of the technology that applies to delivering distribution services. If anything, because network use is a derived demand resulting from consumers' choices of appliances and equipment, productivity improvements are increasingly hard to come by. From a supply-side perspective, the industry has already reaped many of the benefits of improved communications technologies and network automation, but from a demand-side perspective, consumers have growing (and sometimes unrealistic) expectations of the services they receive, including reliability of the service, increasingly peaky demands, and in future years increasing substitutes to electricity. Intuitively, we expect that the trend rate of productivity growth for lines businesses will tend to be low and given the long-lived nature of the capital equipment, to be below the economy-wide average. In addition, given the sunk nature of networks in coming years we expect capacity-utilisation measures, which are a key component of productivity growth, to deteriorate given the decline in economic conditions.²

9. Making an assessment of the productivity potential of lines businesses will therefore ultimately require judgement that needs to balance these contextual considerations. It is important that the Commission recognises that technical complexity does not equate to empirical precision. Vector endorses the Commission's recognition that it will need to examine international productivity data as a sense check on the results of Economic Insights analysis. The approach taken by PEG appears to us to provide a reasonable methodological basis for measuring productivity performance and provides a plausible range of results given the stable nature of the industry and New Zealand circumstances.

¹ The experience of productivity measurement to date, where the 2004 results of the MTFP analysis changed dramatically in 2008, when there was a "technical refinement" has illustrated significant methodological, data and specification difficulties.

² We do recognise that at some point in the future, EDBs are likely to experience a productivity revolution as technological advances in appliances catch up to the capabilities of smart meters. This should enable EDBs to improve capacity-utilisation, by being able to signal dynamically constraints on networks. This revolution, however, is more likely to be in the five to ten year bracket, rather than affecting EDBs in this regulatory period and may well raise new industry challenges in terms of being able to recover costs when customers are able to substitute to cost effective energy substitutes (e.g., photo-voltaics).

Input-output specifications for productivity measurement

10. A critical element of the measurement of TFP is the selection of the input-output specification. This is challenging in a network industry, however, we believe that the proposed specification incorrectly treats inputs as outputs. The proposed inclusion of transformer capacity as an output variable compounds this problem. We propose (below) a simple test which illustrates the inappropriateness of the proposed specification.

11. The Commission proposes a refinement of the TFP measurement by multiplying the MVA-km output measure by transformer capacity to, in its view, better reflect the service delivered by EDBs. The Commission contends that an increase in transformer capacity relative to the growth in inputs represents a productivity increase. This is counter-intuitive: such an increase would reflect a *decline* in industry productivity: it now takes proportionately more transformer capacity to meet consumers' demands per MVA-km.

12. In Vector's view, the Commission and Economic Insights have misconceptualised the nature of the sector's production function. The industry exists to serve customers (i.e., ICPs), their peak demand requirements (kVA), at their chosen locations (distance). Productivity improvements arise where EDBs can improve capacity utilisation (more kWh delivered for an existing level of capacity). This can be achieved through effective price signalling to encourage consumers to flatten their load profiles (i.e., **requiring less not more transformer capacity**) and, where possible, improving network design to reduce the growth in length of the (meshed) network to serve customers. The problem with the Commission's previous output/input specification and the proposed refined version is that it does not capture this capacity utilisation concept in the design.

13. Incorrectly, the proposal includes MVA-km (a factor of production) to measure the output of the sector. A more correct specification of the output of the network would be measures such as peak demand and kilometres of network (ideally it would measure some aggregate of customers' distances from GXPs, but this would be impractical to measure, so network length would be a reasonable proxy) and compare this to the MVA-kms and transformer capacity to serve customers' demands at their locations.

14. A means of testing the appropriateness of the specification of the input-output function is to design possible specifications and test each element individually by asking the question: "what would happen to productivity if I double the variable?" If each variable test generates a sensible movement in productivity,

then it should be considered a suitable candidate for inclusion in the productivity measure.

15. Under the Commission's proposed refinement, as we understand it, a doubling of transformer capacity would lead to an increase in the "output of the network" by $2 \times \text{MVA-km} \times \alpha$, where α is the share of the output in the output specification. Inputs would increase by $2 \times \beta$, where β is the share (i.e., less than one) of transformer capacity in the input function. Hence, an overall doubling of transformer capacity would lead to an alleged productivity improvement. Notably, this input-output specification would not measure any correlation between the increase in transformer capacity and change in consumers' peak demand requirements, so consumers may not have changed their demands at all, yet productivity would have increased! On this test, inclusion of transformer capacity in the output specification fails to generate a sensible directional movement in productivity.

16. Compare this with a specification that included peak demand as an output variable and transformer capacity as an input variable. Under this scenario, doubling transformer capacity would lead to an increase of $\beta \times 2$ in the input function. The extent to which consumers increase their peak demand relative to the increase in transformer capacity would indicate whether a productivity improvement has been achieved. Intuitively, this kind of input/output specification would provide a superior measure of productive capacity of the network.

17. This thought experiment clearly demonstrates that the proposed refinement of treating transformer capacity as an output would be inappropriate and erroneously suggest that EDBs could improve their productivity by increasing transformer capacity regardless of consumers' needs for such additional capacity.

18. Vector submits that the Commission needs to put further work into designing an appropriate input-output specification that avoids treating physical capital inputs as output variables. We suggest that the Commission designs a number of possible specifications and consults with the industry on their viability.

User cost of capital

19. In the time available, Vector is unable to provide meaningful comment on the analysis that leads to the (weak) conclusion that indexed historic cost measures should be used in computing TFP estimates.

20. In relation, however, to some of the points made in the Discussion Paper, we note the following:

- (a) Given the methodological, parametric and data quality issues / uncertainties relating to TFP measurement, the conclusion that IHC approaches are methodologically better is likely to be relatively unimportant in the estimation of long-run productivity trends; and
- (b) The conclusion that the 2004 ODVs provide accurate information for deriving asset specific input cost shares (para 338) is unsubstantiated. EDBs held a number of concerns with the accuracy of the ODVs and it has been recognised that the ODVs were developed for comparative purposes, rather than for controls.

21. Accordingly, it would seem that the requirements for TFP analysis are not material to the choice of asset valuation approach for broader regulatory purposes and vice versa.

Input price differentials

22. In the time allowed for submissions we have not yet been able to assess the claims made in respect of the use of the TFP approach for deriving input price inflation trends. Again we would caution that it is important for the Commission to adopt a cautious stance in interpreting the results of previously unused models. Sense checking against EDBs actual experiences should be undertaken.

23. In regard to input price inflation trends facing the sector, we observe that Vector continues to face significant input price inflation above the CPI. There remain significant pressures on infrastructure development, particularly in an environment where fiscal stimulus is coming through infrastructure projects.

24. Vector submits that the Commission should work with the industry to develop a tool to measure key elements of input price inflation for use in future resets.