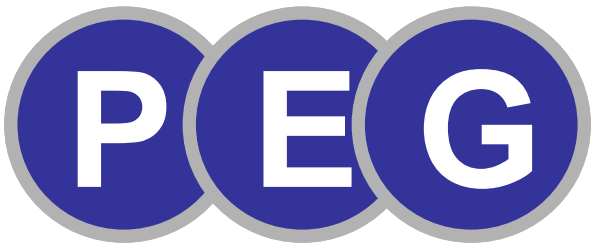
Comments on Meyrick and Associates Reports Prepared for the Commerce Commission's Inquiry into New Zealand Gas Transmission and Distribution Sectors



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June 2004

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This report will briefly comment on the two reports that Meyrick and Associates recently prepared for the Commerce Commission (*Comparative Benchmarking of Gas Networks in Australia and New Zealand*, and *Productivity Growth in New Zealand Gas Distribution Networks*). The primary purpose is to alert the Commission to qualifications and caveats that should be kept in mind when interpreting the results of these studies. Indeed, Meyrick freely acknowledge some of these caveats in their reports. The Commission should also understand the limitations of any benchmarking technique as it considers applying the results of a particular study to public policy decisions.

Comparative Benchmarking

Economies of Scale

One important limitation of the Meyrick benchmarking study is that it doesn't adequately control for economies of scale. This is primarily because the study uses a total factor productivity (TFP) level index to evaluate relative cost performance. TFP level indexes do not generally control as well as econometric techniques for differences in the scale of output(s) on expected cost.

By definition, if scale economies exist, then cost rises less rapidly than output. If a benchmarking technique fails to control for scale economies, then one firm can be judged as more efficient than another simply because it has greater output(s) and therefore lower unit cost. The scale of output is generally regarded as a business condition beyond managers' control, so it is not appropriate to conclude that one firm is more efficient than another simply because it provides more output.

It can be seen that TFP indexes do not entirely control for scale economies, since a firm's productivity is computed as an aggregate of its outputs divided by an aggregate of its inputs (relative to an established baseline, average firm). When there are scale economies, output rises more rapidly than cost. This is equivalent to output rising more rapidly than input, which is typically measured as cost deflated by an appropriate set of input price deflators. This relationship can apply to an individual firm over time or between firms at a given point in time. Therefore, any firm that enjoys greater scale economies than another firm will by definition have greater output relative to its inputs. This will be manifested as a larger TFP level index, but this higher ratio of outputs to inputs should not necessarily be interpreted as superior efficiency.

Properly controlling for scale economies is very important in New Zealand. NZ gas distributors are generally quite small by international and Australian standards. If this factor was properly controlled for, the NZ companies' performance relative to the Australian distributors would likely be improved.

Customer Density

The Meyrick study also doesn't control adequately for differences in customer density, or customers (N) per km of gas main (km). In fact, the TFP level indexes computed in Model 1 are highly influenced by a distributor's customer density. This is because both the numerator and denominator of the Model 1 TFP level index are dominated by the variables that enter into the

numerator and denominator, respectively, of the customer density measure. That is, the numerator of the TFP level index depends overwhelmingly on the number of customers served (it receives a weight of .86 while volumes receive a weight of 0.14); because the gas distribution industry is capital intensive, most of the value of the denominator will depend on the measure of capital, which in Model 1 is simply km of main. Therefore the ratio N/km figures directly into the calculation of the TFP level index, with each of the components of this ratio weighted quite highly relative to the remaining output and input, respectively. Because the customer density measure N/km is a business condition largely beyond managerial control, the fact that this ratio is directly affecting each firm's calculated TFP level index implies that this efficiency measure is distorted by external business conditions.

Model 2 uses ODV values for the capital stock. Because TFP level indexes computed with this model do not depend directly on the distributor's customer density, the Model 2 efficiency measures are superior to those generated in Model 1. However, Model 2 doesn't really *control* for differences in customer density. Recognizing that there are higher (unit) costs associated with less dense networks will raise the denominator of the TFP level index, all else equal, and thereby tend to reduce the spread of TFP indexes that are calculated. This is the result that Meyrick, in fact, obtained. But simply recognizing that costs depend on customer density isn't sufficient for analyzing the impact of different customer densities on a distributor's cost performance. This issue clearly

requires quantification of *how much* costs are expected to vary with differences in customer density, and this type of quantification is not reflected in Model 2.

The Meyrick report recognizes that Model 2 does not adequately control for customer density, and Model 3 is designed to rectify this problem. This model does so by "making an adjustment to (each distributor's) output and input data to place all distributors on a common density footing" (p. 41). This adjustment begins with model 1 and then scales each firm's customer numbers and volumes until each firm has a customer density and energy density (throughput per km) equal to that of AGLGN, which has approximately sample mean values for each of these densities. To reflect the fact that costs will rise when customer numbers and volumes rise, Meyrick multiplies each distributor's O&M costs by 0.86 * the number of customers added (to get to the AGLGN customer density) and 0.14* the throughput added (to get to the AGLGN energy density). The weights applied to customers and throughput come from an earlier PEG gas benchmarking study.

I understand and appreciate Meyrick's attempt to control for differences in density given the very limited amount of information available, but I have two concerns with this approach. First, it does not reflect an accurate application of PEG's work. One reason is the weights Meyrick uses apply to the relationship between outputs and total cost, not O&M cost. More fundamentally, the actual relationship between cost and either of these cost drivers is more complicated than what's reflected in the Meyrick application (multiplying changes in N and V

only by the "first order" coefficients on the respective variables). A full examination of the PEG model results shows that the relationship between costs and outputs is not linear, as in the Meyrick application, but also includes squared and interaction terms among variables.

Another concern with the Model 3 results is that they do not, by design, reflect the actual customer number or volume data for any of the companies "benchmarked" (except for AGLGN). The customer number and throughput values used to compute the Model 3 results are now purely hypothetical since they are intended to get each company to sample mean density levels and thereby lead to more appropriate comparative evaluations. However, any benchmarking evaluation that relies on hypothetical rather than actual cost and performance data is necessarily an artificial construct. I believe the Commission should be very reluctant to place much weight on benchmark measures that do not, in fact, reflect the actual data of the company being benchmarked.

Data Issues

Another concern with the Meyrick study is that it is based on a single year's worth of data. Any anomalies or "outlier" conditions that affect one company relative to the rest of the sample in that year can thereby influence that firm's computed benchmark measure. Such factors can include the impact of weather (e.g on throughput), changes in cost allocations, or the impact of excluded but relevant explanatory "cost driver" variables. Inferences on

efficiency based on a single year's data are generally not as robust as those based on multi-year models.

Finally, Meyrick states that the benchmarking exercise may be improved by using econometric techniques or broader samples of gas distributors, such as those from the US. I agree with Meyrick that econometrics was not feasible for ANZ gas distributors because of the small sample size, but these statements implicitly acknowledge that TFP level indexes are less powerful benchmarking tools than econometric methods. While data limitations may rule out the use of econometrics for ANZ-only gas distribution studies, I believe this highlights the importance of looking beyond ANZ when attempting to obtain the most robust benchmarking evaluations of NZ's gas distributors.

Productivity Growth

I also have some concerns with the Meyrick TFP growth study. Most importantly, the data limitations for TFP trend analysis are even more pronounced than those for TFP level analysis. Meyrick was only able to estimate TFP growth for NGC, which it says accounts for about 25% of the NZ industry in terms of customers served. Number of customers served is the main cost driver in the gas distribution industry, so Meyrick is only capturing about ¼ of the industry in terms of one of the main drivers of cost (and productivity) growth. I do not believe that this is sufficient to reflect the industry TFP trend, since a single company's TFP growth can be highly volatile from year to year and the

productivity trend associated with serving ¾ of the industry's customers is not accounted for.