9 September 2020

Claire Preston
Australian Energy Regulator
email: Claire.Preston@aer.gov.au

Dear Claire

RE: Preliminary Economic Insights benchmarking report

CitiPower, Powercor and United Energy welcome the opportunity to provide comments of the preliminary benchmarking results in the draft Economic Insights report and underlying data files. Our businesses remain strong advocates of benchmarking and are supportive of the AER continuing to explore and refine its techniques.

Economic Insights has made a number of revisions to the total factor productivity (**TFP**) model. The most material of which is the revision to the output weights. While we agree with correcting identified errors as part of continuous improvement, we note that many of the more substantive issues with the TFP model identified by NERA Economic Consulting (**NERA**) and Frontier Economics (**Frontier**) have not been addressed. Refer to appendix A.1 for a summary of these issues.

In our view, the significant change in the output weights undermines the purpose and the value of the TFP model and provides further evidence of the instability of the model, in particular:

1. **the new weights do not reflect the cost drivers of an electricity distribution network**

   The new output weights place materially more weight on ratcheted demand and line length and significantly less weight on customer numbers. This is counterintuitive as in our experience operating three electricity networks of different scales, topology and operating environments, the size of the customer base is the most significant cost driver of operating and capital expenditure and most closely represents the scale of the network.

   Conversely, ratcheted aggregate peak demand has a more limited bearing on operating costs and only spatial demand is relevant to our capital expenditure. While line length is relevant to maintenance and capital costs, it is also largely fixed in time and reflects a network's geographical reach rather than explaining variation in expenditure over time.

   From an economic and engineering perspective we would expect customer numbers to have the highest weighting followed by line length and peak demand. As previously advised, and well accepted across the industry, energy throughput has no bearing on the operating or capital expenditure and in our view should not be included in any benchmarking models especially in a world with increasing penetration of distributed energy resources. Therefore the new weightings have even less relevance to cost drivers of an electricity distribution network than the previous weights.

2. **instability in the benchmarking outcomes undermines the competitive objectives of benchmarking**

   One of the greatest benefits benchmarking brings to the regulatory framework is a strong competitive incentive for networks to use benchmarking results for internal purposes to drive down costs and compare their efficiency over time and with peers. Our businesses have delivered some of the most significant efficiency gains since benchmarking was introduced by the AER. Further, benchmarking conducted by the AER has proven extremely important to potential and current debt and equity holders in the businesses and is routinely taken into consideration in making decisions to invest in our businesses.

However, to provide this incentive, the benchmarking results must be intuitive and stable over time. Instability in benchmarking outcomes resulting from material revisions to the benchmarking models erodes this incentive as the outcomes cannot be predicted and do not follow logic. It also begins to undermine faith in the rigour of the analysis creating a potential crisis of confidence amongst investors. It was for this reason that the New Zealand Government moved to prohibit comparative benchmarking of electricity networks. It is noted the concern was particularly focused on the changing outcomes of the TFP results in terms of network rankings.

We have previously raised concerns with the level of emphasis Economic Insights places on the TFP model. The TFP model relies on a Leontief cost function for deriving the TFP output weights and we have previously presented reports by expert econometricians, Frontier and NERA, demonstrating numerous statistical and logical flaws in the Leontief cost function and TFP methodology. A summary of NERA and Frontiers concerns is provided in appendix A.1.

While we understand Economic Insights has addressed one of the many issues identified by Frontier and NERA, this is insufficient to improve the credibility of the modelling used to derive the TFP output weights. We also question the value of correcting this one error alone when the resulting output growth weights do not follow economic or engineering logic and materiality of the change in benchmarking results risks undermining the overall credibility of benchmarking.

We are now engaging experts to review the 2020 Economic Insight preliminary report and will provide further commentary once available. The scope of the engagement is to:

- assess the statistical robustness of the Leontief cost function used to derive the output weights, including the many statistical challenges Economic Insights tries to overcome to derive the output weights with such a small sample size – raising the question of why not simply rely on the output weights from the statistically robust SFA econometric model
- assess whether the output weights are consistent with economic theory and engineering logic
- using the econometric model outcomes, prepare the same analysis Economic Insights currently provides for the TFP model, including the trends over time and the analysis of the key drivers – we understand this information provides valuable insights
- identify any other concerns with the TFP model.

Given the above concerns regarding the TFP model, we strongly encourage the AER to either remove the TFP model or reduce the emphasise placed on the TFP models when preparing the 2020 benchmarking reports and to exclude the TFP model from the output weights used for determining the output growth component of the operating expenditure rate of change in regulatory revenue determinations.

Instead we would encourage greater use of parametric techniques, such as the SFA econometric model, which provide the same, if not greater explanatory power, but also can be subject to statistical testing providing greater confidence to all users of benchmarking analysis.

We have not identified any errors in the underlying data files for our three networks.

Please feel free to contact [redacted] if you have any questions regarding this submission.

Yours sincerely

Brent Cleeve
Head of Regulation
CitiPower, Powercor Australia and United Energy

A.1 Expert reviews of TFP model

NERA findings[1]

The MPFP model weights are unlikely to reflect the drivers of cost of an efficient operator, and that the model is therefore inconsistent with the NER.

- **The MPFP weights are estimated with very little data, suggesting the weights are estimated imprecisely:** EI estimates a separate regression for each company, so each has only 12 data points. This is unlikely to be enough data to calibrate the relationship between costs and drivers accurately.
- **The weights in the MPFP model are artificially constrained to be positive, masking possible misspecification of the model:** After an attempt to estimate weights resulted in negative coefficients, EI adopted an approach of using squared coefficients, which guaranteed that EI would end up with a positive relationship between costs and outputs in the MPFP model, even where no relationship exists.
- **The process for deriving weights from the MPFP modelling has been opaque**: The output weights that EI uses are treated as an input into the efficiency benchmarking process. There is little documentation on how the weights themselves have been derived. We have gleaned some components of the AER's methodology from another similar study done by EI in New Zealand as well as through reading EI's modelling code, but this may not satisfy standards of transparency set out in the NER.
- **The drivers included in the MPFP modelling were chosen based on tariff structure, not by assessing their effect on DNSPs' costs:** EI chose drivers to include in the MPFP model on the basis that they were drivers of revenue and hence reflected the design of regulated tariffs. While the AER has an objective to ensure cost reflectivity of tariffs, tariffs may not be designed in such a way that they are cost reflective; the ongoing process of tariff reform in Australia and elsewhere to address structural changes in the electricity sector suggests that they are not.

Frontier findings: [2]

The AER should discontinue its reliance on the Leontief model in the setting of opex allowances.

We agree with NERA that the AER should discontinue its reliance on the Leontief model in the setting of opex allowances. We base our conclusion on the fact that there very serious statistical problems associated with the Leontief models estimated by EI. Of the 52 Leontief cost functions EI estimated for the AER's 2018 Annual Benchmarking Report, more than half of the estimated cost functions do not have a single coefficient that is statistically significant at the commonly used 5% level of significance. Even at the less strict 10% level of significance, 46% of the 52 equations do not have a single statistically significant coefficient. Further, for 25 of the 52 equations, the estimated rate of technical change is so large as to lack any credibility.

The situation is exacerbated by the extreme multicollinearity between the customer numbers, circuit length and the time trend in the estimating equations. For all 13 DNSPs, the correlation between customer numbers and the time trend is 0.96 or higher, and for 11 DNSPs it is 0.99. The correlations between circuit length and the time trend, and between circuit length and customer numbers are also extremely high for 11 of the 13 DNSPs.

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1 PAL ATT012: NERA, R*eview of the AER's Proposed Output Weightings Prepared for CitiPower, Powercor, United Energy and SA Power Networks*, December 2018, p. ii.

2 PAL ATT052: Frontier*, Review Of Econometric Models Used By The AER To Estimate Output Growth A Report Prepared For CitiPower, Powercor and United Energy*, December 2019, p. 1-2.

EI has stated that to minimise the risks associated with the limited degrees of freedom per regression and the fixed propositions nature of the Leontief cost function, we then take a weighted average of the derived output cost shares across all the Australian DNSP observations, where the weights are the DNSPs' opex shares in total distribution industry opex.

However, in our view, the statistical problems with the estimated equations are so severe that they cannot be overcome by taking weighted averages. It is hard to overstate how poor the statistical properties of the estimated Leontief functions are. In our view, it is not possible to derive credible estimates of the relative contributions to opex of different outputs from such poorly estimated models.

Since the same output weights are used in the construction of the Multilateral Total Factor Productivity (MTFP) and MPFP productivity indices, the same conclusion applies to those indices.