Memorandum

From: Denis Lawrence, Tim Coelli and John Kain **Date:** 4 March 2015

To: Mark McLeish

CC: Toby Holder, Kevin Cheung

Subject: HoustonKemp Review of TNSP Economic Benchmarking Report

We have been asked to review the HoustonKemp (HK) report titled 'Review of the AER transmission network benchmarking study & its application to setting TransGrid's opex rate of change' dated January 2015 and submitted by TransGrid as part of its revised regulatory proposal.

The HK report makes a number of criticisms of the Economic Insights (2014) report 'Economic Benchmarking Assessment of Operating Expenditure for NSW and Tasmanian Electricity TNSPs' dated 10 November 2015 and prepared for the Australian Energy Regulator. These criticisms cover four broad topics as follows:

- confidence intervals for output weights
- impact of changing the sample size
- impact of using alternative models, and
- application of forecast opex productivity growth rates to rate of change.

In this memo we briefly respond to each of these areas of criticism.

Confidence intervals for output weights

HK (2015, p.1) argues that 'the output weights derived by the model are highly uncertain'. Since there are only 40 observations available (5 TNSPs over 8 years each) for the estimation of functional output cost shares using an econometric cost function model, it is inevitable that the output weights will not be able to be estimated precisely. To estimate the output weights with a high degree of precision would require several times the number of observations currently available, including the additional of more cross–sectional observations to introduce greater variability into the database. However, despite this, the estimated coefficient remains the best point estimate and the 95 per cent confidence interval around it has the highest probability of containing the true value compared to a similar sized interval constructed around any other point. To put this another way, the confidence interval around the estimated coefficient itself merely shows the estimation uncertainties which, in this case, will likely be a result of the small sample size available. But the estimate itself is still the best available.

We also note that HK attempt to translate the standard error for the first order output coefficient into a standard error for the corresponding output share using a very crude and simplistic method, namely dividing the standard error for the output coefficient in question by the sum of all the first order output coefficients. In reality, the standard error for the output share would be a much more complex term which also took account of the standard errors of the other output coefficients.

HK (2015, p.10) states that ‘our finding does not challenge Economic Insights’ assumptions’. Given that the point estimates for the output weights derived from our translog cost function model provide the best estimate available, we see no reason to change our analysis or recommendations based on the HK criticism.

Impact of changing the sample size

HK (2015, p.1) argues that ‘the output weights are sensitive to changes in input data’. By ‘changes in input data’ HK appear to mainly mean changes in the sample size as they go on to present sensitivity analyses based on excluding AusNet Services data, excluding 2013 data and assuming that energy throughput decreased by 1 per cent annually from 2009 onwards rather than the actual outcomes. Since actual energy throughput data are available from 2009 to 2013, there seems little value in HK’s third option.

As noted above, the sample available for the estimation of functional output cost shares is already relatively small for this type of exercise with only 40 observations in total and only 5 cross–sectional units. Further reducing the sample size by excluding years and/or TNSPs would be expected to produce volatile results that could not be relied on as HK do indeed find. HK (2015, p.12) claim ‘this outcome can only be deemed nonsensical’. However, it is rather an illustration of the inadvisability of trying to estimate a model of this type with fewer than 40 observations.

We also note that rather than showing the resulting output growth rates (with different output weights) are not robust, HK go on to show the resulting opex PFP growth rates are sensitive. However, much of the sensitivity is due to opex changes from year to year rather than from output changes resulting from different output weights. In particular, we note a temporary increase in opex in 2012 appears to be the main cause of a lower opex PFP growth rate being obtained for the series excluding 2013.

HK go on to illustrate what they claim to be a lack of robustness in our estimated output weights by illustrating the change in output weights between the initial results and the draft determination results. However, this change was due to a revision of AusNet Services’ opex series in the intervening period. Instead of this change to AusNet Services’ opex series being relatively minor, it was an approximate halving of this series from one of the largest TNSPs due to AusNet Services having initially included the large Victorian Government easements tax in its reported opex. It is therefore not surprising that making a non–trivial change of this nature produces somewhat different estimated output weights. Including the corrected data was clearly appropriate. We again see no reason to change our analysis or recommendations based on the HK criticism.

Impact of using alternative models

HK (2015, p.14) state ‘there is no objective means of assessing the appropriateness of any different input/output specification, and so alternative specifications are equally valid’. We disagree with this. We set out the logic behind the range of output specifications examined and assessed them against the identified selection criteria in the AER's series of workshops in 2013, in the memo setting out the initial benchmarking results in August 2014 and in our November 2014 report. We noted the issues involved in choosing functional outputs for electricity networks and indicated there were advantages in using a specification broadly similar to that being used for DNSPs based on the model developed by Pacific Economics Group in Ontario.

HK (2015, pp14–15) look at three sensitivity analyses for Multilateral TFP results using our five output specification, one excluding connections, one excluding energy and one including our earlier system capacity measure. It is important to note that, while useful at the industry level, our earlier system capacity measure has disadvantages when benchmarking NSPs of widely differing sizes given its multiplicative nature which artificially advantages large NSPs relative to small NSPs (as illustrated in HK's figure 5).

We note the failure of HK's estimates for the model excluding energy to satisfy basic requirements as it has a negative estimated output weight. There is no logical reason for connections to be considered a negative output.

HK appear to set up a 'straw man' by using the results of their sensitivity analysis to caution against the use of MTFP results for TNSPs at this time. The need for this is unclear as Economic Insights (2014, p.14) clearly states:

> 'economic benchmarking of transmission activities is in its relative infancy compared to distribution. As a result, while we present an illustrative set of MTFP results using an output specification analogous to our preferred specification for DNSPs …, we caution against drawing strong inferences about TNSP efficiency levels from these results. More confidence can be placed in productivity growth rate results because they simply measure year–to–year changes without passing judgement on relative efficiency levels.'

HK's figure 5 is a good illustration of the point we make in this quote. Despite the different specifications producing somewhat different MTFP level results, the growth rates for the different specifications (the slopes of the plots of annual results for each TNSP) are all very similar across the four specifications reported.

Economic Insights (2014, p.16) reported the opex PFP growth rate results obtained from three different output specifications: the preferred five output specification including energy, ratcheted maximum demand, weighted entry and exit connections, line length and energy not supplied; a four output specification which is the same as this but which excludes line length; and, a three output specification which is the same but which excludes energy and line length. The average annual opex PFP growth rates for the three output and the four output specification are both higher than that for the preferred five output specification leading to our preferred specification producing a conservative opex PFP growth rate.

Based on our review of HK's arguments regarding alternative models we see no reason to change our analysis or recommendations.

Application of forecast opex productivity growth rates to rate of change

HK (2015, p.16) criticises the use of information from economic benchmarking to inform the AER's assessments of TNSP opex forecasts. However, only productivity growth rates are used and these are considerably less likely to vary with changes in output specification than are calculated productivity levels. As noted above, this is graphically illustrated in HK's own figure 5.

We also noted above that our preferred 5 output specification produced a somewhat more conservative opex PFP growth rate than the alternative specifications examined in Economic Insights (2014).

HK (2015, pp.19–20) also criticises our opex PFP growth rate calculations for not excluding step change impacts. By including step change impacts the opex PFP growth rate will be lower than it otherwise would be. We illustrate this in Economic Insights (2014, p.19) making use of the best information currently available on past identified and estimated step changes (given that step changes have not always been explicitly identified in previous TNSP determinations). Excluding the effect of previous step changes would have increased the calculated industry opex PFP average annual growth rate from 0.89 per cent to 1.43 per cent for the period 2006 to 2013. However, given that previous TNSP determinations have not always included explicit quantification of the step change component, we believe it is better use the series including step change effects at this time. It will therefore be the case that using this series including previous step changes (which ends to underestimate the true underlying opex PFP growth rate) will automatically compensate the TNSP for some degree of future step increase.

HK (2015, pp.20–21) attempt to update the RIN data to 2014. However, not all 2014 data are currently available as AusNet Services reports on a calendar rather than financial year basis. HK state 'not all of the necessary information was available from the 2014 RIN data set, and so *TransGrid has instructed us to make the following assumptions* …' (emphasis added). HK go on to list three assumptions that could be likely to produce lower opex PFP growth rates for AusNet Services than may eventuate. This appears to be supported by HK's table 8 which shows a sizable fall in AusNet Services' opex PFP growth rate being an important driver of a claimed reduction in the calculated industry growth rate to 2014. We are of the view that only a balanced panel of actual data should be used to base the forecast opex PFP growth rate to be used in the rate of change formula on. We therefore believe the HK estimated series to 2014 should not be used, particularly seeing that the missing data has been filled in using assumptions HK was instructed to use by TransGrid rather than on the basis of objective and impartial estimates.

In summary, we do not accept the three grounds on which HK criticises our forecast of TNSP opex PFP. Our estimates of opex PFP growth rates are relatively stable across different specifications as illustrated by HK's own figure 5. HK's choice of alternative sample periods and TNSP coverage are arbitrary with the result to 2012 being driven by a temporary opex increase in that year and the results to 2014 being driven in large part by assumptions included under instruction from TransGrid. And, our inclusion of step change impacts will underestimate the true underlying opex PFP growth rate which will automatically compensate the TNSP for some degree of future step increase in opex.

Other issues

We note that HK (2014, p.7) incorrectly states that 'Economic Insights has formulated the [MTFP] index using the Fisher ideal index'. It is clearly stated in Economic Insights (2014, p.5) that 'For this study the Fisher ideal index was … chosen as the preferred index formulation for the productivity time series analysis'. Not being transitive, the Fisher index cannot be used for multilateral comparisons in panel data. Rather, we use the Caves, Christensen and Diewert multilateral index for MTFP calculations as set out in Economic Insights (2014, appendix B).

In its revised regulatory proposal TransGrid (2015, p.28) states 'the AER has not adequately taken into account the exogenous factors that distinguish TNSPs in its benchmarking'. With regard to opex PFP growth rates, it should be noted that these growth rates are unlikely to be affected by whether operating environment factors are taken into account or not. This is because operating environment factors are relatively constant over time and affect productivity level comparisons more than productivity growth rate comparisons.

References

Economic Insights (2014), *Economic Benchmarking Assessment of Operating Expenditure for NSW and Tasmanian Electricity TNSPs*, Report prepared by Denis Lawrence, Tim Coelli and John Kain for the Australian Energy Regulator, Eden, 10 November.

HoustonKemp Economists (HK) (2015), *Review of the AER Transmission Network Benchmarking Study & its Application to Setting TransGrid's Opex Rate of Change,* Report prepared for TransGrid, Sydney, January.

TransGrid (2015), TransGrid Revised Revenue Proposal, 2014/15–2017/18, Sydney, January.