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By online submission

Australian Energy Market Commission
PO Box A2449
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**Review into the use of Total Factor Productivity for the determination of prices and revenues—reference EMO0006**

Dear Sirs

Energy Safe Victoria (ESV) and the Victorian Department of Primary Industries (DPI) have each made submissions in response to the Commission's Draft Report on the use of total factor productivity (TFP) for the determination of prices and revenues. Jemena also made a submission on 22 December 2010. The ESV and DPI submissions highlight again:

- the significance of the TFP specification and in particular the definition of outputs in that specification
- the potential for price re-sets to affect measured TFP growth
- the question of how the average TFP growth for a period should be calculated.

In this supplementary submission, Jemena comments on those aspects of the ESV and DPI submissions.

## The PEG TFP specification—influence of weather-dependent output measures

The ESV and DPI both support the TFP specification developed by Pacific Economics Group (PEG) in the course of their work for the ESCV over a number of years. There are four output measures in that specification: the number of customers, power delivery volumes on-peak (in GWh), power delivery volumes off-peak (GWh), and non-coincident demands (GW). All except the number of customers are affected by weather.

In their submissions, the DPI[1] and ESV[2] acknowledge that year on year output variations in TFP growth can be attributed in part to weather variations. The ESV goes further and includes a graph in which the TFP growth values determined by PEG have been adjusted to control for weather-driven year-to-year variation in kWh deliveries.

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1 Department of Primary Industries, *Submission – Review of TFP Draft Report*, December 2010, p.3.

2 Energy Safe Victoria, Submission *to the AEMC review into the use of Total Factor Productivity for the determination of prices and revenues, Draft Report*, December 2010, pp 4-5.

The fact that ESV should contemplate smoothing PEG's raw values to control for weather variations suggests an acknowledgement by ESV that the PEG TFP values are an imperfect measure of industry productivity to the extent that they are influenced by weather variations. That is, the PEG specification is potentially flawed because it involves a significant weighting of weather-dependent output measures.

Looking at the graph in the ESV submission there is still a significant increase (+4.4 per cent) in TFP between 2005 and 2006 followed by a small reduction (-0.3 per cent) in the following year. The "unadjusted" changes for those years as reported by PEG, and which would presumably be the basis for any TFP calculation, are significantly greater at +5.3 per cent and -1.4 per cent respectively.

Even at 4.4 per cent, the adjusted year on year TFP growth in 2006 appears improbably high for established network businesses. Only during the post-privatisation "burst" of productivity gains in 1996 and 1997, has productivity growth been greater (5.9 per cent in 1996 and 6.5 per cent in 1997, both values unadjusted.)[3] Recall also that PEG's values are all average values for the 5 Victorian electricity distribution businesses so that the changes must have been greater for one or more of them.

Of the 5.3 per cent increase in 2006 as measured by PEG, 4.3 per cent was attributable to output growth. To the extent that the growth in output was attributable to weather variations, the businesses did nothing to achieve that growth. Conversely, if there was a year with very low throughput growth because of weather variations between years, the businesses would be powerless to increase output, and probably would not vary inputs, to maintain TFP growth.

By adjusting PEG's raw TFP values for weather-driven variations in outputs, the ESV apparently accepts that TFP growth should not be a function of short term weather-driven variations in throughput. Jemena supports that view. However, the ESV and DPI suggest that the weather-driven variation is part of normal measurement noise whereas, arguably, it reflects a flaw in PEG's TFP specification.

### What are the outputs of a network business?

In Jemena's view the principal outputs of a network business are connections and the capacity that it must install and maintain to:

- meet existing and forecast growth in connections and demand, and peak demand in particular, and
- achieve set standards of service quality and reliability.

It is these factors that drive the input requirements of the business. Input requirements are essentially unaffected by short term variations in throughput. In Jemena's view, a TFP specification that is heavily weighted towards weather-dependent output measures, such as the one promoted by PEG, cannot produce TFP growth estimates that are an accurate measure of the industry's true productivity performance.

[3] Pacific Economics Group, *TFP Research for Victoria's Power Distribution Industry: 2007 Update*, December 2008, Table 9.

It seems that there are really two concepts that need to be addressed in determining the productivity of a network business:

1. How efficiently is the business delivering the capacity that it actually has installed and the expansion of that capacity?

2. Is the level of installed capacity prudent given current and forecast growth in demand and the quality and reliability standards that the business must operate to?

The first question relates to productive efficiency and the second to dynamic efficiency. The PEG specification for TFP effectively conflates the two concepts by assuming implicitly that the prudent level of capacity in any year is the capacity required just to meet demand in that year. Clearly that is not a reasonable assumption.

On average there will always be spare capacity in a network. At the same time, there will be local bottlenecks as local demand increases to use the capacity installed at some earlier date to serve that locality. For an established network business, installed capacity changes only incrementally from year to year and certainly does not change in response to short term variations in demand due to weather variations between years.

If interruption and curtailment options are excluded, a network business has no ability to respond to or control short term variations in demand. Its only option is to ensure there is sufficient capacity to meet anticipated maximum demand. A TFP specification with a heavy weighting of weather-dependent output measures, such as the one promoted by PEG, cannot produce an accurate measure of the industry's true productivity performance. As noted above, the ESV and DPI appear to acknowledge that is the case.

PEG has argued that the theoretical basis for TFP measurement requires that only billable measures be included as outputs.[4] Of course network businesses in Australia derive much of their revenue from tariffs based on throughput measures reflecting practice that has developed historically in response to political and consumer preferences. As a consequence:

- network businesses are subject to an element of volume risk which would not be the case if all their revenue was derived from charges for connections and capacity, and

- the output side of PEG's specification is dominated by throughput measures so that the resultant values of TFP growth are a function of short term variations in demand due to weather variations and other external factors such as economic conditions which affect the utilisation of network capacity.

In Jemena's view the measured TFP growth should not be function of short term variations in throughput—this point is illustrated by the example in Attachment 1. If it is accepted that a network business's principal outputs are connections, capacity and reliability, then there is clearly an inconsistency between theory as propounded by PEG and reality. Logically, the problem must be with the theory, not the reality.

[4] Pacific Economics Group, *Submission to Australian Energy Market Commission: Design Discussion Paper*, October 2009, Appendix 1.

## The potential for "scheme induced" TFP variations

As we have noted in previous submissions[5], price re-sets can potentially produce "scheme induced" variations in TFP growth which will in turn flow on to prices and may or may not be sustainable.

In a previous submission[6], we observed that 2006 was the first year of a new regulatory period for the electricity distribution businesses in Victoria. It appears likely that the price reductions between 2005 and 2006 contributed to the sharp increase in TFP growth between 2005 and 2006 as measured by PEG.

The ESC determined $P_0$ values ranging from 3.1 per cent for AGLE (now Jemena Electricity Networks) to 16.4 per cent for Powercor. It follows that TFP growth for 2006 was affected to the extent that the businesses responded to those price reductions by:

a. reducing inputs

b. changing the revenue shares of their billable outputs.

As measured by PEG, there was a 1 per cent reduction in inputs between 2005 and 2006 whereas inputs have increased in every other year since 1998. If the changes in revenue shares were "abnormal" and/or the input reductions were greater than they would have been if the businesses had been left to respond normally to incentives, then measured TFP growth for 2006 was in effect modified, and probably increased, as an indirect consequence of the regulator's decisions.

Price re-sets as part of a TFP methodology have the same potential to cause "scheme induced" variations in TFP growth which will in turn flow on to prices. If a re-set results in a price reduction then it is more likely it will induce an increase rather than a reduction in productivity growth. This will in turn lead to an increase in X and further price reductions.

## Determining average TFP growth

The ESV's submission also draws attention to another point of difference between experts: whether "averaging" should be performed in the manner proposed by PEG, or by regression which would tend to smooth out the effects of any aberrant values.

The ESV and DPI both argue that year on year variations in TFP should be of little concern because the TFP index for price setting purpose will be calculated as an average over a number of years.[7] PEG calculates the average TFP growth for a period as the average annual growth in the TFP index between the first and last years of the averaging period. The result will be inaccurate to the extent that either of the end-point values is in error or biased. PEG acknowledge this in their 2007 update report:

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[5] Jemena Limited, *Jemena submission in response to AEMC Preliminary Findings on applicability of Total Factor Productivity regulation*, March 2010, p. 12.

[6] Jemena Limited, *Australian Energy Market Commission review into the use of Total Factor Productivity (TFP) for the determination of prices and revenues for regulated infrastructure businesses, Submission by Jemena Limited*, February 2009, p. 6.

[7] Energy Safe Victoria, *Submission to the AEMC review into the use of Total Factor Productivity for the determination of prices and revenues, Draft Report,* December 2010, p. 4, and Department of Primary Industries, *Submission – Review of TFP Draft Report*, December 2010, p.3.

> It is generally accepted that TFP growth rates will not be representative of longer-term trends if either the start or end dates of the sample period are distorted by unusual conditions, such as unusually slow output growth.[8]

Assuming an 8 year averaging period, the average TFP trend for the periods ending 2005, 2006 and 2007 using the PEG TFP index and averaging methodology would be 1.2 per cent, 1.6 per cent and 1.1 per cent respectively. Importantly, there will also be a corresponding sharp reduction in growth between 2013 and 2014 when 2006 becomes the first year of the averaging period. If regression was used instead to calculate the TFP trends for the periods ending 2005, 2006 and 2007 the values would be 1.1 per cent, 1.2 per cent and 1.1 per cent respectively.

If you wish to discuss this supplementary submission, please contact me on 02 9455 1551 or warwick.tudehope@jemena.com.au.

Yours sincerely

Warwick Tudehope
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[8] Pacific Economics Group, *TFP Research for Victoria's Power Distribution Industry: 2007 Update*, December 2008, p. 31.

**Attachment 1 – Example**

Consider two network businesses A and B where the only difference between the two is the load characteristics of the markets they serve:

- the networks are physically identical in every respect
- the capital and operating costs of the two networks are identical in every respect and unchanging from year to year
- the capacities of the two networks are the same and such that they can just meet the peak demand of the markets they serve without interruption i.e. there is no spare peak capacity in either network
- the load served by network A is such that peak demand and load factor are the same from year to year i.e. network utilisation is constant from year to year
- the load served by network B has the same maximum peak demand as that served by network A but peak demand does not reach the maximum every year and load factor varies from year to year i.e. network utilisation is variable from year to year
- there is no underlying growth in demand for either network
- both networks have the same weighted average price cap and a range of similarly structured charges per connection and tariffs based variously on throughput, booked capacity and actual peak consumption.

In Jemena's view the productivity of the two networks should be the same. The two different markets each require the same physical assets to serve them, and the two businesses utilise identical inputs to deliver those assets. However, it is clear that under the PEG TFP specification, where outputs are heavily weighted towards throughput measures, network B's TFP growth would vary from year to year but network A's would not.