7 February 2011

Mr John Pierce
Chairman
Australian Energy Market Commission
PO Box A2449
SYDNEY SOUTH NSW 1235

Dear Mr Pierce

**REVIEW INTO THE USE OF TOTAL FACTOR PRODUCTIVITY (TFP) FOR THE
DETERMINATION OF PRICES AND REVENUES – DRAFT REPORT**

Energy Safe Victoria (ESV) is pleased to present this supplementary submission to
the Australian Energy Market Commission (AEMC) which briefly responds to the 14
January 2011 submission from Jemena Ltd regarding the Review into the use of TFP
for the determination of prices and revenues.

Yours sincerely

Paul Fearon
DIRECTOR OF ENERGY SAFETY

Energy Safe Victoria   Level 3 Building 2   PO Box 262   **Phone** (03) 9203 9700
ABN 27 462 247 657   4 Riverside Quay   Collins Street West   **Fax** (03) 9686 2197
                        Southbank Victoria 3006   Victoria 8007   **Web** www.esv.vic.gov.au

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SUPPLEMENTARY SUBMISSION TO THE AEMC REVIEW INTO THE USE OF TOTAL FACTOR PRODUCTIVITY FOR THE DETERMINATION OF PRICES AND REVENUES

DRAFT REPORT

FEBRUARY 2011

This submission briefly responds to the 14 January 2011 submission from Jemena Ltd regarding the use of Total Factor Productivity (TFP) for determining prices and revenues. The Jemena document references the most recent submission from Energy Safe Victoria (ESV), but it misinterprets both the purpose and substance of ESV's most recent submission. One reason is that Jemena does not recognise what TFP is or what it is designed to measure. This fundamental misunderstanding, in turn, leads to erroneous speculation on the appropriate TFP specification and unfounded claims that the TFP specification of Pacific Economics Group (PEG) is "flawed." Jemena's most recent submission therefore provides an opportunity not only to correct the record regarding ESV's most recent submission, but also to address fundamental issues regarding TFP measurement that have unfortunately persisted during this Review.

Weather-Driven kWh Fluctuations and the Output Specification

Jemena's submission notes that ESV's most recent submission includes a graph which shows that most of the annual fluctuation in PEG's measured TFP trends for Victorian electricity distribution businesses (DBs) is due to annual changes in the DBs' kWh deliveries. Jemena then says that '(t)he 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 flawed because it involves a significant weighting of weather-dependent output measures." There is nothing in the ESV submission to support Jemena's conclusion that ESV is contemplating smoothing PEG's TFP studies to control for weather variations, or that we believe weather-driven fluctuations of kWh deliveries represent a "flaw" of any kind. On the contrary, ESV says the following:

> it should be recognised that some year-to-year TFP volatility is inherent for energy networks simply because of weather-driven year-to-year changes in throughput. PEG's results *reflect this reality* (emphasis added), as would any TFP estimates developed for the AER, since the *Draft Report* has said that for, at least for the medium term, TFP estimates will be developed using the same output specification that PEG used in Victoria. This output specification uses revenue-share weighted billing determinants for output quantities. Since a large share of most distributors' revenues are collected from kWh deliveries, and these deliveries fluctuate from year to year because of weather, this implies that the volatility reflected in PEG's TFP estimates will also be evident in any alternate TFP specification used by the AER.

Far from being a flaw, this quote makes it clear that annual changes in kWh are a reality that is inherent in the electricity distribution business. The changes in kWh that are delivered to, consumed, and purchased by the DBs' customers therefore *should* be reflected in the changes in the output provided by DBs from year to year. A flawed output measure would be one that does not reflect this fundamental reality, not the one that does.

ESV continues to be surprised by the misunderstanding surrounding this fundamental point, and we believe it can be clarified by a simple example.

- Revenue is equal to output price multiplied by output quantity or, with a multi-product firm, an index of output prices multiplied by an index of output quantities. This is an identity *i.e.* it is true by definition, so it must be true at all times.

- Since revenue is equal to output price multiplied by output quantity, it follows that the percentage change in revenue between two periods (*e.g.* between two years) is

equal to the percentage change in output prices plus the percentage change in output quantities.

- It is indisputable that the change in DB revenues fluctuates from year to year in large part because of the weather. The change in DB prices is constrained by a price indexing formula, which is fixed in advance and entirely independent of weather. Since the only other potential contributor to annual fluctuation in revenues is changes in output, it *must* be true that fluctuations in revenue are overwhelmingly due to the annual fluctuation in outputs that the DBs have provided to their customers.

- Measured DB output must therefore reflect annual output fluctuations due to weather. Jemena somehow believes this to be a flaw but, in fact, it is endemic to the industry. Moreover, this is not "theory" but fundamental accounting reality and identities that must be satisfied for any regulatory TFP specification to be sensible. The fact that PEG's TFP specification reflects this reality, and does not attempt to mask it, is a strength and evidence of its veracity, not a flaw.

In addition, as ESV stated in its last submission, using the 'volatility' issue to discredit the PEG TFP specification is unfounded in any case. The AEMCs *Draft Report* has said that, for the medium term, DBs' output will be measured by revenue-weighted billing determinants. *This is the PEG output specification.* The AEMC has therefore accepted the usefulness of PEG's output specification, which means "the volatility reflected in PEG's TFP estimates will also be evident in **any** alternate TFP specification used by the AER" (bold added).

In sum, ESV presented the graph in our earlier submission not in an attempt to control for volatility but simply to explain why measured TFP has been volatile. This is not "normal measurement noise" or a flaw, but something fundamental to the industry. PEG's output specification is the correct one, it has been accepted as the basis for the TFP specification to be pursued, and this entire issue is a red herring.

The Nature and Measurement of TFP Growth

A significant part of Jemena's confusion regarding PEG's TFP specification is that it does not have a proper understanding of what TFP really is. Jemena appears to believe that TFP is equivalent to *efficiency*, so that measured changes in TFP should only reflect changes that utility managers undertake and, relatedly, inputs that they have managed. This attitude is evident in this passage in the Jemena submission:

> 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* (italics added).

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?

Clearly, Jemena is focusing on the relationship between "input requirements," "how efficiently" firms are providing capacity, and the prudence of installed capacity as being the relevant "concepts that need to be addressed in determining the productivity of a network business." Productivity is equated in Jemena's vies with how efficiently a network is managing its inputs. Measured TFP growth must therefore reflect changes in how efficiently companies are managing inputs to provide the services customers are demanding.

This view is somewhat prevalent, but it is simply untrue. Moreover, this is an area where PEG and Economic Insights agree. In several documents, PEG personnel have presented a decomposition a TFP growth into various components. EI personnel have reviewed this decomposition and concluded that it is "well grounded in economic theory." This decomposition was presented most recently in the April 2010 submission by Dr. Larry Kaufmann, and it is replicated below:

$$
\begin{aligned}
T\dot{F}P &= \dot{Y} - \left(\dot{C} - \dot{W} \right) \\
&= \dot{Y} - \left[\left(\sum_i \varepsilon_{Y_i} \cdot \dot{Y}_i + \sum_n \varepsilon_{Z_n} \cdot \dot{Z}_n + W^* + \dot{g} + \dot{\eta} \right) - \dot{W} \right] \\
&= \dot{Y} - \left\{ \left[\left(1 - \frac{1}{\sum \varepsilon_{Y_i}} \right) \cdot \sum \varepsilon_{Y_i} \cdot \dot{Y}_i + \sum_i \frac{\varepsilon_{Y_i}}{\sum \varepsilon_{Y_i}} \cdot \dot{Y}_i \right] + \sum_n \varepsilon_{\dot{Z}_n} \cdot \dot{Z}_n + W^* + \dot{g} + \dot{\eta} \right\} - \dot{W} \right] \\
&= \dot{Y} - \left\{ \left[\left(\frac{1}{\sum \varepsilon_{Y_i}} - 1 \right) \cdot \sum \varepsilon_{Y_i} \cdot \dot{Y}_i + \dot{Y}^\varepsilon + \sum_n \varepsilon_{\dot{Z}_n} \cdot \dot{Z}_n + W^* + \dot{g} + \dot{\eta} \right] - \dot{W} \right\} \\
&= \left(1 - \sum \varepsilon_{Y_i} \right) \cdot \dot{Y}_i + \left(\dot{Y} - \dot{Y}^\varepsilon \right) - \left(W^* - \dot{W} \right) - \sum_n \varepsilon_{\dot{Z}_n} \cdot \dot{Z}_n - \dot{g} - \dot{\eta}
\end{aligned}
$$

It can be seen that there are six, separate components that contribute to the growth in measured TFP. Of these, only the last is due to changes in the efficiency of company management *per se*. The other contributors are: 1) the scale economy effect; 2) the non-marginal cost pricing effect; 3) the cost share effect; 4) the Z variable effect; and 5) technological change. It follows that a significant – indeed, perhaps the dominant – source of TFP gains result from factors that are not entirely under the control of utility management, yet will be (and should be) reflected in an industry's measured TFP trend. Weather-related changes in kWh sales are one example of such an effect and, using the decomposition above, would be reflected in the scale economy and non-marginal cost pricing effects. Jemena's attempt to identify a list of outputs consistent with "true productivity performance" – *i.e.* management efficiency - is therefore misguided since it focuses on only a subset of TFP gains.

"Scheme Induced" TFP Variations

Jemena also claims that there is a potential for "scheme induced" changes in TFP with the PEG specification. They support this assertion with the fact that there was a significant increase in the DBs' TFP in 2006, which was the year following a price reset that led to price reductions for the DBs. Jemena says that "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."

This claim is unfounded. Changes in revenue *shares*, as opposed to overall DB revenues, were miniscule between 2005 and 2006. Moreover, any changes in revenue shares would have had no impact on changes in the DBs' measured inputs, since the input quantity index is constructed using cost shares, not revenue shares.

Jemena also seems to be suggesting that a tighter price control can "induce" greater input quantity reductions and, if so, this effect should for some reason not be reflected in a measured TFP trend. This is a curious position. If Jemena is correct, and tighter price controls force DBs to pursue efficiencies more aggressively, this effect would in fact be an ongoing, regular part of the DB industry. Every five years, there would be an expected TFP acceleration after a price review. Because this acceleration would happen at periodic (and even known) intervals, there is no reason it should not be reflected in the industry's TFP trend since it would represent a regular, episodic source of TFP growth. This differs from, say, the 'burst' of TFP gains that followed the DBs' privatisation, since this was clearly a one-time event that would not be repeated.

ESV suspects, however, that if there was any impact from the price review on the DBs' TFP growth, the reasons are very different from those suggested by Jemena. In any event, the input quantity reductions in 2006 resulted directly from the reporting and financial incentives inherent in the cost-based, building block model and do not represent a flaw in either the TFP methodology or PEG's TFP specification.

Determining Average TFP Growth

Finally, Jemena claims that PEG acknowledges that measured TFP trends "will be inaccurate to the extent that either of the end-point values is in error or biased." They then quote from PEG's 2007 TFP update report which says, in full, "(i)t 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."

ESV notes that the quoted PEG statement says nothing whatsoever about "errors" or "biases" in the underlying TFP trend. It simply says that the measured TFP growth between two different periods should be representative of longer-term TFP trends, and the endpoints that are used to the basis for computing the trend should therefore not characterised by unusual conditions which are necessarily not representative of long-term trends. This is a common sense and uncontroversial position.

Energy Safe Victoria
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