AEMC

REVIEW

Australian Energy Market Commission

FINAL REPORT

Review into the use of total factor productivity for the determination of prices and revenues

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About the AEMC

The Council of Australian Governments, through its Ministerial Council on Energy (MCE), established the Australian Energy Market Commission (AEMC) in July 2005. The AEMC has two principal functions. We make and amend the national electricity and gas rules, and we conduct independent reviews of the energy markets for the MCE.

Summary

The Australian Energy Market Commission (AEMC) has conducted a review into the use of a total factor productivity (TFP) methodology in determining regulated prices and revenues for electricity and gas service providers. The objective is to advise the Ministerial Council on Energy (MCE) on whether permitting the use of a TFP methodology would contribute to the national gas objective (NGO) and/or national electricity objective (NEO) and, if so, to provide draft Rules. This Final Report presents our analysis and recommendations.

We note that during the course of this Review, stakeholders have questioned the ability of the current network regulatory arrangements to deliver good regulatory outcomes for consumers. The AER has indicated that it is currently conducting a review of the current Rules for electricity network regulation with the view to submitting possible Rule changes to the AEMC later this year. The analysis conducted in this Review will therefore help stakeholders understanding of the issues and assist the current debate on network regulation. It will also assist any future work on the effectiveness of the current regulatory approach of building blocks and assessing possible reforms.

There are two possible applications of TFP in revenue regulation permitted under the national energy laws. TFP indices can be used to assist the Australian Energy Regulator (AER) in applying efficiency benchmarking to service providers' costs under the existing building blocks approach. Alternatively, a TFP methodology could be applied in a more mechanistic manner where TFP indices are used to set the allowed rate of change of allowed revenues over the regulatory period. This methodology would be applied as an alternative to the existing building block approach established in the Rules. This Review was initiated following a Rule change proposal from the Victorian Minister for Energy and Resources which was based upon concerns about the efficiency of current prices and performance of service providers under the building block approach.

We found that this use of a TFP methodology in setting the allowed revenue path has the potential to create stronger incentives for service providers to pursue cost efficiencies compared to the building block approach. This is because it could provide higher returns to the service provider when it makes investments and improves operating practices which deliver continuing productivity improvements. There would be more pressure on all service providers to out-perform, or at least maintain, the rate of industry group productivity growth.

Furthermore, a TFP methodology could reduce the scope for the service provider to boost returns by exploiting its information advantage over the regulator, and has the potential for lower regulatory costs. A TFP methodology would have more inbuilt incentives to undertake demand management compared to the building block approach because it includes an incentive to utilise assets well.

Service providers have raised concerns about the ability of a TFP methodology to set allowed revenue at a level which is sufficient to cover costs and also its ability to cope

with changes in circumstances. Our analysis, supported by detailed modeling, indicates that a TFP methodology can provide service providers with a reasonable opportunity to recover their prudently-incurred costs and maintain investment incentives. It can handle significant changes and adverse cost shocks affecting the industry as a whole relatively well provided there are regular price resets or equivalent safeguard mechanisms in place.

Accordingly implementing a TFP methodology as an alternative to the current building block approach could lead to increased productivity and lower prices for consumers in the long term. Therefore such a methodology could in principle contribute to the national energy objectives.

However, a number of conditions need to be satisfied for a TFP methodology to work properly and promote efficient regulatory decisions. We find that such conditions are not likely to be met at the present time. Crucially, the current lack of a sufficiently robust and consistent data-set means that it could be too problematic to reconstruct existing data for the purpose of a TFP methodology. Also the lack of data prevents proper testing of the other conditions needed for a TFP methodology. We advise that the initial focus should therefore be on establishing a better, more consistent data-set.

The use of TFP indices in setting efficient cost benchmarks for the building block approach is already allowed for under the Rules. However to date, the AER has made limited use of benchmarking in its determinations. A key reason behind this is the lack of consistent data needed to apply benchmarking techniques. Therefore our recommendation on establishing a better, more consistent data-set will facilitate greater use of benchmarking in future determinations.

Given these findings, we propose a two stage process for Rule changes. Firstly an initial Rule would be made which requires service providers to provide specified regulatory data which would then permit the AER to test for the conditions necessary for a TFP methodology and to undertake initial paper trials of the calculations. Drafting of the detailed design of the TFP methodology and making of the Rule – the second stage – should only occur once both a) the necessary conditions can be, or are likely to be, met and b) it is considered that introducing a TFP methodology would contribute to the national energy objectives given the status of the market at that time.

The regulatory data provided under the initial Rule would assist the AER in meeting its obligation to have regard to efficient benchmarks when making regulatory determinations and also in applying the service standards incentive schemes. In addition, the development of TFP indices for the energy sectors could be used to guide wider policy decisions by providing an accurate measure of productivity in the industry. We attached a draft Rule change proposal to implement this first stage.

Conducting the implementation of a TFP methodology in two stages is the most sensible approach. Focusing solely on developing the necessary data-set would also allow proper consideration of the impact of smart grids, measures arising from the Victorian Bushfires Royal Commission and climate change on the practicality of

applying a TFP methodology. It will give flexibility to adapt the design of the TFP methodology to the circumstances at that time.

One issue with introducing a TFP methodology as an alternative to building blocks regulation is that it could lead to having two alternative forms of regulation working in parallel. While this adds to the flexibility of the regulatory regime, it will add to transaction costs and creates possible gaming incentives. Further consideration of these effects plus the effectiveness of the building block regime at that time should occur before a TFP methodology is implemented.

Even if a TFP methodology is not ultimately applied, the collection of relevant, robust data using consistent definitions is an important part of cost effective economic regulation.

Collecting reliable and useful data will improve current regulatory practice in three ways:

1. through addressing the considerable information asymmetry problem that regulators face under the building block approach

2. facilitating greater use of benchmarking techniques

3. help measure the effectiveness of the current regime in delivering outcomes for consumers

This is consistent with improving regulatory practice, transparency and achieving the efficiency potential of incentive regulation. This will, in turn, provide both end-users of the regulated services and service providers with greater confidence that prices reflect efficient costs over the long term.

For these reasons the proposed reporting requirements should cover both distribution and transmission service providers, even though we have found that the conditions needed to support a TFP methodology are more likely to be met in the distribution sectors. We provide some initial thinking on how better regulatory data would assist in regulating the outputs of transmission service providers.

Such reporting requirements will lead to costs to both the regulator and service providers from these reporting requirements. The key factor in such costs would be the need to align reporting practices to develop consistent data across the industry service providers. However given that the nature of the data being requested such costs should be low.

We consider that the benefits would more than offset any such costs. The approximate cost of one complete cycle of revenue determinations using the current building blocks method is estimated to be $327m (which excludes the cost of any merit reviews). An incremental reduction in that cost due to the improved regulatory practice resulting from the reporting requirements would more than cover the additional costs.

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1 Introduction

The Australian Energy Market Commission (AEMC) has initiated a Review into the use of a total factor productivity (TFP) methodology to determine regulated prices and revenues for electricity and gas service providers. The objective is to advise the MCE on whether permitting the use of a TFP methodology would contribute to the national gas objective (NGO) and/or national electricity objective (NEO) , collectively referred to as the national energy objectives, and, if so, to provide draft Rules for the MCE consideration.

This Final Report sets out our recommendations to the MCE regarding the suitability of using a TFP methodology in network regulation. It explains the reasoning why a TFP methodology could have the potential to promote the national energy objectives but that such a methodology should not be applied today as the available data is not sufficiently robust or consistent. The Report then discusses what arrangements need to be made in order to facilitate the potential use of a TFP methodology in the future. A Draft Rule change request with proposed Rules for the MCE's consideration to facilitate data collection and testing is attached to this Final Report.

1.1 What is TFP?

TFP is a measurement of how businesses, industries or regions use all the inputs in their production processes to produce outputs that are valued by customers and can identify the component of the change in outputs that is not explained by changes in inputs. TFP indices provide a way of comparing how productive businesses or industries use their resources. An industry TFP growth index measures the rate at which the productivity of a group of businesses changes over time and can be used in determining the rate of change of allowed prices for regulated service providers.

The National Electricity Law (NEL) and National Gas Law (NGL) allow for a TFP methodology to be applied in two possible ways.[1] A TFP methodology could be used by the Australian Energy Regulator (AER) to set service providers' regulated prices or revenues. Under this application, an estimate of the historical industry TFP growth rate is used to determine the X factor, which is the allowed rate of change, in revenues (or prices) for service providers. Alternatively, TFP could be used to assist the AER in applying the current building block approach in making determinations. In this instance, TFP indices can provide a benchmark against which the AER could assess expenditure proposals or past performance.

Both the National Electricity Rules (NER) and National Gas Law (NGR) allow the AER to have regard to efficiency benchmarks when applying the current building block approach to regulated prices and revenues determinations. This leaves the AER with the option to consider the use of TFP benchmarks under the existing arrangements.

1 See NEL, schedule 1, clause 26J and NGL, schedule 1, clause 42(c). The NEL and NGL also allow for rules to be made for the use of a TFP methodology to assist in the resolution of access disputes. This should be permitted if a TFP methodology can be used in the original determination.

Therefore, it is whether amendments to the NER and NGR should be made to facilitate the use of TFP methodology - where historical TFP rate determines the allowed rate of change in service providers revenue -which is the focus of this Review.

1.2 Approach to the Review

The aim of this Review is to determine whether a TFP methodology to set service providers' prices or revenues should be permitted as an alternative to the current building block approach for electricity and gas service providers. The objective is to provide advice to the MCE on:

- whether there would be circumstances in which a permitted application of a TFP methodology would contribute to either the NEO or the NGO;
- the arrangements including information, reporting and data requirements that need to be put in place to facilitate its application; and
- where appropriate, develop and recommend for the MCE's consideration draft rules to allow a TFP methodology for any individual or group of service providers.

The need for this Review was identified following consideration of initial submissions on the Rule change proposal on a TFP methodology for electricity distribution network regulation lodged by the Victorian Minister for Energy and Resources in June 2008 (Victorian Proposal).[2]

To provide this advice, it is necessary to develop and assess the case that a TFP methodology can promote the NEO and NGO. We approached this by first addressing the economic efficiency properties of a TFP methodology. The assessment then moved to considering the practicalities of introducing a TFP methodology into the current arrangements and whether the conditions needed to support a TFP methodology exist, or would be likely to exist, in the energy markets. This was the purpose of the Preliminary Findings Paper published in December 2009, which set out and tested the efficiency properties and the practical application issues associated with a TFP methodology.

We have engaged actively with stakeholders to assess the benefits of a TFP methodology through a number of public consultations. This also included releasing various consultant expert reports for consideration and holding workshops on the TFP design example and conducting discussion with stakeholders on TFP design issues. Appendix A details the consultation stages to this Review and appendix B provides a summary of the consultant reports.

2 On 23 June 2008, the Victorian Minister for Energy and Resources submitted a proposal to amend the NER to allow the use of a TFP methodology as an alternative economic regulation methodology to be applied by the Australian Energy Regulator in approving or amending determinations for electricity distribution service providers.

We have sought to improve stakeholders understanding of TFP and to test the perceptions held by stakeholders as to both the merits and problems with applying a TFP methodology. We have also evaluated the extensive research done on the application of a TFP methodology to energy regulation in Australia.

In submissions to the Preliminary Findings Paper several service providers expressed reservations about the ability of a TFP methodology to cope with potentially large changes about to impact the distribution sectors, particularly those related to climate change and smart grids. We have subsequently undertaken extensive work on the economics behind a TFP methodology and commissioned the construction of a detailed model comparing TFP methodology and building block outcomes by Economic Insights released on 29 June 2010. This Final Report incorporates the results of that modeling.

1.2.1 Why it is important to evaluate a TFP methodology

A TFP methodology is an alternative form of applying incentive regulation to determining regulated prices or revenues for electricity network and gas pipeline service providers compared to the building block approach. The aims of incentive regulation are to provide service providers with incentives to improve their operating and investment efficiency, service performance, and to ensure that consumers benefit from the gains. This Review is looking at how best to achieve these aims in the national energy markets. This is important given the role electricity and gas service providers play in the efficient provision of services and because of the high proportion of customer bills which is accounted for by network and pipeline charges.

Under the existing NER and NGR, regulated prices for electricity networks and gas pipelines are determined using the building block approach. The regulator estimates the efficient level of prices by assessing information and forecasts specific to each individual service provider.

A TFP methodology operates in a different way. TFP indices provide a way of comparing how productive businesses or industries use their resources by measuring how inputs are used to produce outputs that are valued by customers. Instead of an assessment of business-specific costs, the regulator links the annual change in prices to estimates of the industry TFP growth index. Hence while the regulated price at the start of a regulatory period is likely to be the same under either approach, the future path of prices could be quite different under a TFP methodology.

There can be problems with applying the building block approach which a TFP methodology might help to address. Regulators do not have complete information about the costs and operational attributes of individual service providers and will have difficulty in estimating the true level of their efficient costs. The service provider may use this information advantage during the regulatory review process to try to increase its profits to the disadvantage of users. The outcome could be less effort by the service provider to keep costs down and prices set above the level of efficient costs.

The building block approach can often become information intensive. This can lead to significant administrative costs and make the process quite contentious as the regulator assesses the information provided by the service provider and attempts to determine forecasts of efficient costs over a number of years.

In the national energy markets, the application of the building block approach has been adapted and refined in response to such problems. However, stakeholders continue to raise concerns with the performance of service providers under this approach and the efficiency of the current level of prices. The Rule change proposal submitted by the Victorian Minister for Energy and Resources was based on such concerns and provided the impetus for this Review.

A TFP methodology could be characterised as attempting to expose regulated service providers to pressures more akin to a competitive market, where a failure to keep up with industry productivity growth would reduce profits. This could deliver stronger performance incentives. A TFP methodology could also lead to lower regulatory administrative costs and redress the information asymmetry issues faced by regulators by relying less on business-specific information when determining regulated prices.

This Review is an opportunity for a comprehensive assessment of the suitability of using a TFP methodology in the national energy markets at this time, both in terms of assessing the potential economic benefits and also addressing whether a TFP methodology could work in practice. This will determine whether permitting the use of a TFP methodology would address the concerns with the current arrangements and contribute to the promotion of economic efficiency in the national energy markets.

1.2.2 Developing the design of a TFP methodology

As a TFP methodology can take many forms, a factual model (TFP design example) was developed and refined in consultation with stakeholders to assist in the assessment. This TFP design example has been refined further to reflect stakeholder comments raised at workshops and in submissions.[3] In particular further work on the appropriate method to determine the initial price necessary for any TFP methodology has been done.[4]

Not all aspects of the design example as it currently stands could be considered complete. However, the design example has been specified to a sufficient degree to assist in the analysis for the AEMC to make recommendations on the use of TFP methodology. Further refinements and details of the TFP methodology are more appropriately left to an implementation stage in the future. This will provide for the detailed TFP methodology required for the relevant rules to reflect the most recent thinking on TFP issues. In addition, at this stage stakeholders will also be able to consider recent energy market developments that may impact on the design particulars of the TFP methodology.

3 See Preliminary Findings Paper (17 December 2009), Appendix B.

4 See TFP Review Draft Report (12 November 2010), Appendix C.

1.2.3 Assessment framework

In undertaking this Review, the AEMC must have regard to the NEO and NGO as well the Revenue and Pricing principles.[5] The national energy objectives are founded on the concept of economic efficiency, with explicit emphasis on the long term interests of consumers. This encompasses not only the price at which services are provided, but also the quality, reliability, safety and security of the network and pipeline systems. It also covers the principles of good regulatory design and practice in order to promote stability and predictability of the regulatory framework, minimise operational interventions in the market, and promote transparency.

Economic efficiency has three principal dimensions (referred to as productive, allocative and dynamic efficiency), and there is some potential for trade-offs to arise between them. Each dimension is captured by specific references in the national energy objectives.

The Issues Paper identified five criteria with which to assess whether a TFP methodology would contribute to the national energy objectives and would be consistent with the revenue and pricing principles.[6] These are:

- cost incentives – the strength of the incentives on the service provider to pursue cost efficiencies and the extent to which such cost efficiencies are shared with end-users;
- investment incentives – the ability of the framework to ensure efficient investment to promote long term innovation and technical progress for the benefit of the service provider and end-users;
- good regulatory practice – clarity, certainty and transparency of the regulatory framework and processes to reduce avoidable risks for service providers and users;
- cost of regulation – minimisation of the costs and risks of regulation to service providers and electricity and gas users; and
- transition and implementation issues – appropriate resolution of transition and implementation issues and costs.

The assessment of how a TFP methodology meets these criteria is against the counterfactual of the present building block approaches for gas and electricity.[7] During the course of the Review, stakeholders asked what exactly is the problem that a TFP methodology is meant to address. The question is whether maintaining the current arrangements would best promote the achievement of the national energy objectives.

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5 NEL, ss. 7-7A and NGL, ss. 23- 24.

6 AEMC 2008, *Review into the use of total factor productivity for the determination of prices and revenues: framework and issues paper*, 12 December 2008. (Issues Paper)

7 Taking into consideration how the application of the building block approach differs between the gas and electricity sectors.

This requires identifying the problems with the current arrangements and determining whether a TFP methodology would address these issues.

We note that there has been increasing scrutiny about the effectiveness of the current framework for regulating network service providers given the substantial increases in retail prices. The AER has indicated that it is currently conducting a review of the current Rules for electricity network determinations with the view to submitting possible Rule changes to the AEMC later this year. We have considered the relative advantages and disadvantages of the current application of the building block approach in the assessment of a TFP methodology. The analysis conducted in this Review will therefore help stakeholders understanding of the issues and assist the current debate on network regulation. It will also assist any future work on the effectiveness of building blocks and assessing possible reforms.

1.3 Outline of the Final Report

This Final Report has been structured as follows:

- Chapter 2 presents the key findings and recommendations for the Review into the use of a total factor productivity methodology to determine regulated prices and revenues for electricity and gas service providers;

- Chapter 3 provides the details and reasoning for the proposed Rules to establish a regulatory data disclosure obligation and also an annual TFP testing arrangements by the AER; and

- Chapter 4 discusses our recommendations regarding the process for deciding whether a TFP methodology should be implemented once the necessary conditions are, or are likely, to be satisfied.

The appendices provide further background information and supporting analysis. Appendix C provides our analysis on why a TFP based methodology would promote the national energy objectives by strengthening incentives for cost efficiency and innovation while retaining incentives to invest and potentially reducing the costs of regulation.

1.4 Victorian Minister Rule change proposal

On 18 June 2008, the Victorian Minister for Energy and Resources submitted a Rule change proposal to amend the National Electricity Rules to allow the use of a TFP-based methodology as an alternative option for pricing determinations. That proposal sought to permit the option of a TFP-based methodology for electricity distribution determinations and requested that the option be made available in time for the next Victorian revenue reset process. The Commission issued a section 95 of the NEL Notice on 24 July 2008 advising of its intention to commence the rule making process and initial consultation on the proposal. Following a review of the submissions to the Rule change proposal, especially the AER's comment that it would not be able to complete

all the tasks required for a TFP methodology to be operational in time for the 2011-2015 Victorian determination, the Commission decided to hold consideration of the Rule and initiate this wide ranging Review.

We intend to proceed to making a draft determination on this Rule change request following publication of this final report. In making a determination on this Rule change proposal, the Commission will have regard to the analysis set out in this report, and the process going forward supporting any implementation of a TFP-based methodology.

2 Recommendations

This chapter sets out the key findings and recommendations presented in this Final Report.

2.1 TFP-based methodology and the national energy objectives

- The national energy objectives are founded on the concept of economic efficiency, with explicit emphasis on the long term interests of consumers. This encompasses not only the price at which services are provided, but also the quality, reliability, safety and security of the energy network systems. It also covers the principles of good regulatory design and practice in order to promote stability and predictability of the regulatory framework, minimise operational interventions in the market, and promote transparency.

- In order to assess whether a TFP methodology would promote the national energy objectives the AEMC developed five key criteria for testing whether a TFP methodology would promote economic efficiency and would be consistent with the Revenue and Pricing Principles. These criteria cover cost incentives, investment incentives, good regulatory practice, the costs of regulation, and transition and implementation issues.

- A TFP methodology attempts to expose regulated service providers to competitive market like pressures by linking their prices and revenue to the recent productivity performance of the industry group as a whole instead of basing them on an assessment of forecast service provider-specific costs.

- There would be more pressure on all service providers to out-perform, or at least maintain, the rate of industry group productivity growth. A poor performing service provider would face more risks under a TFP methodology than it would under the building block approach as it would need to at least achieve the industry group average productivity growth to earn its benchmark rate of return. This need to match peer performance should drive productivity and innovation.

- A TFP methodology could have more inbuilt incentives to undertake demand management compared to the building block approach because it includes an incentive to utilise assets well. This has the effect of encouraging the service provider to undertake demand management activity prior to the construction of new assets

- A TFP methodology has the potential to deliver stronger performance incentives, lower regulatory administrative costs and redress the information asymmetry issues faced by regulators. As a result of these effects, a TFP methodology has the potential to increase benefits available to consumers by lowering prices in the long run.

- Although the current building block approaches seem to perform well in promoting investment, there are questions on whether the current arrangements adequately promote efficiency, whether they exacerbate information asymmetries facing the regulator, and whether administrative procedures are inappropriate and too costly. These could be leading to higher prices for customers.

- A key disadvantage of the current arrangements is the prospect of a service provider to use its information advantage strategically to exploit the regulatory process to increase its profits to the disadvantage of consumers. The inadequacy and inconsistency of the current regulatory reporting requirements seem to give further weight to this disadvantage.

- Under most circumstances, a TFP–based methodology would give service providers achieving industry group average productivity growth the opportunity to recover their revenue requirement. It thus provides service providers with a reasonable opportunity to recover their prudently-incurred costs and maintains investment incentives

- Based on its assessment against the five key criteria the AEMC is of the view that inclusion of a TFP-based methodology for setting price or revenue paths would contribute to achieving the NEO and NGO. It has the potential to improve economic efficiency and would be in the long term interests of consumers.

2.2 Approach to implementation

- A TFP methodology requires reliable and robust data from service providers. However, the existing data are not consistent, reliable nor robust. Therefore, for a TFP methodology to become available, a consistent regulatory data-set must be created to enable testing of the conditions needed for the methodology.

- The AEMC is proposing that a TFP-based methodology be implemented in two parts:

    - Firstly, an initial Rule be made which facilitates data collection for electricity and gas transmission and distribution service providers and assessing whether the conditions necessary for a TFP based methodology exist. This will enable a TFP-based methodology to be possibly applied at a later stage; and

    - Secondly, drafting of the detailed design of the TFP-based methodology once the necessary conditions can be, or are likely to be, met and it is considered that there is merit in allowing a TFP methodology to be used as an alternative to building blocks given the market and technology conditions and the regulatory framework applying at that time.

- It appears unlikely that it would be appropriate to implement a TFP methodology for the electricity and gas transmission sectors because of the small

number of service providers, the lumpiness of capital expenditure and difficulties in measuring outputs. It is, however, important to improve data collection within the electricity and gas transmission sectors to allow these issues to be tested more fully.

2.3 The proposed initial Rule

The proposed Rule for TFP data collection and testing:

- obliges all regulated distribution and transmission (electricity and gas) service providers to submit an annual disclosure of regulatory data to the AER (Regulatory Disclosure Data Report)
- specifies required financial, asset and network operational TFP reporting items in schedules to the NER and NGR
- obliges the AER to develop supporting guidelines on the detailed coverage and specification of the required data in conjunction with a working group(s) of industry and end-user representatives
- provides for Regulatory Disclosure Data to be audited (financial data only) and to be made publicly available (subject to substantial and approved commercial confidentiality)
- provides for data to be provided under certification of the CEO and the Company Secretary or a Director

The proposed Rule requires the AER to publish an Annual TFP Report by 1 March each year which:

- complies with the specified principles for calculating TFP
- uses the Regulatory Disclosure Data and only alters it in specified circumstances
- provides an assessment of the possible use of TFP-based methods in regulatory determinations
- presents TFP index results for all included service providers, for the industry as a whole and for relevant groups of service providers identified by the AER as facing similar operating environment conditions
- includes all data used in calculating the TFP index results

The proposed Rule lists the following assessment factors for consideration in testing whether a Total Factor Productivity-based methodology could be used for the determination of prices and revenues:

1. Regulatory Disclosure Data of sufficient length to establish reliable TFP trends are available, robust and consistent both through time and across service providers

2. calculation of Total Factor Productivity indexes that represent an accurate measure of productivity growth for individual, as well as grouped, providers is possible

3. sufficient service providers are included in each group for calculating Total Factor Productivity indexes for distribution determinations so that the Total Factor Productivity index cannot be manipulated by an individual provider or a collective of related providers with common ownership

4. calculation of Total Factor Productivity index growth rates using historic data represent a fair and reasonable estimate of future productivity growth potential for providers in that grouping

The proposed Rule states that the AER must comply with the following principles when calculating TFP:

- must use the index number approach - econometric approaches are not permitted;
- must be designed to avoid systematic bias in the TFP growth estimate;
- must use output quantities that accurately reflect standard control services supplied by providers;
- capital user costs are to be set exogenously, are to be consistent with the service provider's regulatory asset base (RAB) and are to be consistent with the property of financial capital maintenance (FCM); and
- measures of capital input quantities are to accurately reflect the physical service potential of assets employed in the provision of standard control services by providers.

2.4 Decision procedure for possible future implementation

- Service providers are to submit their annual Regulatory Disclosure Data Report to the AER no later than 1 November each year. The AER is then required to calculate TFP indexes for each included service provider, for the industry as a whole and for groupings of service providers based on similarity of operating environments and, therefore, TFP growth potential. The AER then assesses whether the specified conditions necessary for a TFP methodology are met for each industry grouping having regard to the principles of TFP and the assessment factors.
- By 1 March each year the AER is to publish its Annual TFP Report setting out its TFP calculations and its assessment of whether the conditions are met. If the assessment is that the specified conditions are not met then no further action is taken that year and the process is repeated the following year.

- If the AER's assessment is that the conditions are met then the AER notifies stakeholders and the MCE considers whether the implementation of a TFP-based methodology should be initiated. Key factors this decision would be based on include prevailing market conditions at the time, potential energy policy developments, the performance of the regulatory framework at the time and the effectiveness of building blocks regulation.

- If the MCE decides that conditions at the time do not warrant initiation of the implementation process then no further action is taken that year and the process is repeated the following year.

- If the MCE decides that initiation of the implementation process is warranted then the AEMC is to then prepare a Rule change proposal for MCE consideration. The Rule change proposal would include details of the TFP index specification and formula and the design of the TFP-based methodology.

- The MCE would need to weigh up the potential instability caused by likely market and technological changes and the relative ability of TFP-based and building block methodologies to cope with these against the benefits of the stronger incentives associated with a TFP-based methodology.

3 Proposed Rule for TFP data collection and testing

In the Draft Report, we established that a TFP-based methodology could contribute to the promotion of the national energy objectives but also found that data collection and further testing of the conditions were needed to determine how the methodology should be applied. Appendix C summarises how a TFP-based methodology could promote the national energy objectives by strengthening incentives for cost efficiency and innovation while retaining incentives to invest and potentially reducing the costs of regulation.

The Draft Report went on to argue that the current focus should be on facilitating the collection of the data needed for a TFP-based methodology to enable testing of the conditions needed for the methodology. It proposed that a TFP-based methodology be implemented in two parts:

- Firstly, an initial Rule is made which facilitates data collection and testing. This would enable a TFP-based methodology to be possibly applied at a later stage; and

- Secondly, drafting of the detailed design of the TFP-based methodology once the necessary conditions can be, or are likely to be, met and it is considered that there is merit in allowing a TFP methodology to be used as an alternative to building blocks given the market conditions and regulatory framework applying at that time.

Submissions on the Draft Report generally supported this two-stage approach and are briefly summarised in the following section. We then set out the broad details of the proposed Rule to facilitate data collection and testing. Subsequent steps for the possible future implementation of a TFP-based methodology are then discussed in chapter 4.

3.1 Submissions on the Draft Report

Service provider submissions generally recognised the importance of having consistent data available and supported initiatives to concentrate on data collection and testing initially. For instance, ActewAGL noted that establishing a robust and consistent data set was a critical requirement and that the development of the AER's annual reporting process appeared to have stalled.[8] Energex noted that the availability of consistent, comparable and reliable data was critical to the credibility of a TFP-based methodology.[9]

Service provider submissions generally argued that the AEMC had underestimated the potential cost of establishing consistent data collection and reporting mechanisms. For example, EnergyAustralia argued the costs involved in the collection of a long term,

8 ActewAGL submission, December 2010, pp.1-2

9 Energex submission, December 2010, p.2

robust and reliable data set are significant.[10] Most argued against the AER being allowed to backcast data. For example, Ergon Energy argued that significant work will need to be done on reporting systems to enable the collection of accurate data and it therefore disagreed with the use of earlier historical data as it was likely to be derived differently across service providers which would contribute to inconsistencies in information.[11] Similarly, EnergyAustralia noted that the inappropriateness of currently available data was 'well established and beyond doubt' and backcasting was therefore inappropriate.[12]

All service providers supported the deferral of drafting of Rules for a TFP-based methodology for determining prices and revenues until the necessary conditions are met. They considered that this would allow further testing of a TFP methodology once data starts to be collected and enable:

- appropriate consideration of the impacts of climate change policy and smart grids;
- further experience to be gained of the current building blocks arrangements; and
- further work on the theory and application of TFP regulation to be undertaken.

Most service provider submissions argued that the AER's current data gathering powers were adequate to accommodate data collection for TFP purposes. For example, Jemena argued that the consultation, guidelines, confidentiality, auditing and level of sign-off features of the proposed Rule were adequately covered in the laws defining existing powers.[13] The Energy Networks Association (ENA) considered that the proposed Rule change had the potential effect of bypassing procedural protections built into the existing regulatory framework.[14]

The Victorian DPI argued for a jurisdiction by jurisdiction approach to the introduction of a TFP-based methodology for determining prices and revenues. It argued that Victoria was the most mature state in this regard and the AER should consider introducing a TFP-based option for Victoria using existing 'legacy' data while a consistent national database and methodology are being developed. DPI argued for the Rule design phase to be brought forward to ensure it is completed by 2013 in time for the next Victorian electricity price determination.[15] Jurisdictional implementation issues are addressed in section 4.2.

10 EnergyAustralia submission, January 2011, p.3

11 Ergon Energy submission, December 2010, p.8

12 EnergyAustralia submission, January 2011, p.9

13 Jemena submission, December 2010, p.9

14 ENA submission, December 2010, p.6

15 Victorian DPI submission, December 2010, pp.2-3

3.2 Reasons for the initial focus on data collection and testing

It is necessary to establish a robust, consistent data base to enable TFP to be calculated. Also this Review has established that it is necessary to have such a database in order to test for the conditions necessary to ensure that a TFP methodology can be applied consistent with the national energy objectives.

For example, the ability of the TFP growth index to be a good estimate of future productivity growth for the service providers within the industry group would be met in a steady and mature market. However, there is some doubt that the condition can be met in the foreseeable future as there are a range of external factors that may impact on what service providers are required to deliver. Although we note that there are design features that can be included in the TFP methodology to protect service providers, we recommend that the predictability and stability of the TFP growth rate be tested once the TFP specification is established and data are collected.

An important condition for a TFP methodology is that service providers within an industry group face comparable productivity growth prospects if they are managed efficiently. The preliminary indications based on a limited sample are that operating conditions (such as customer density, geographic location and spread) may not significantly influence TFP growth rates and hence differences in operating conditions would be captured by the setting of each service provider's initial price level. However we recommend that empirical testing on this be undertaken as the TFP data set is being developed.

Splitting the process of making the TFP methodology into two stages permits the drafting of the Rules on how the TFP methodology will be applied to be deferred until the conditions are met. This allows flexibility to adapt the design of the TFP methodology in accordance with the operating conditions at that time and avoids the need for drafting of detailed Rules at an early stage. It will allow proper consideration of the impact of smart grids and climate change plus any new measures relating to bushfires on the practicality of applying a TFP methodology.

Even if the detailed drafting stage is not triggered, the data collection and testing will deliver other significant benefits which will offset the costs involved. This includes the possible use of TFP as a benchmarking technique in building blocks or other similar benchmarking techniques. We consider there to be a net economic benefit to consumers of energy from proceeding on this basis. The collection of relevant, robust data using consistent definitions is also an important part of cost effective economic regulation.

Reliable and consistent data will go some way to addressing the information asymmetry problem that regulators face under the building block approach. This is consistent with improving regulatory practice, transparency and achieving the efficiency potential of incentive regulation. This will, in turn, provide both end-users of the regulated services and service providers with greater confidence that prices reflect efficient costs over the long term.

It is important that the data collected support greater use of benchmarking techniques by the AER in its building blocks determinations. This includes not only the use of TFP indexes as efficient benchmarks but other methods such as data envelopment analysis and stochastic frontier analysis. We consider that a core set of physical and financial data will support the range of possible benchmarking techniques.

We do recognise that there will be costs to both the regulator and service providers from these reporting requirements. Such costs should be low given that the data required should be readily available for the service providers and the list of data is comparable to the information requests that the AER issues for building block determinations. We have had regard to the potential cost in developing the proposed Rule through ensuring that only necessary data will be required to be provided.

There may be some need for service providers to change their reporting practices and IT systems in order to provide the data in a consistent manner as required for a TFP methodology. However, we consider that the benefits would more than offset these costs. In section 3.5 of the Draft Report, we reported that based upon information provided the cost of one complete cycle of revenue determinations using the current building blocks method was around $327m (which excludes the cost of any merit reviews). The expected reduction in the cost of determinations due to improved regulatory practice resulting from the reporting requirements will more than cover the additional data collection costs.

3.3 The proposed initial Rule

The initial Rule to facilitate the possible implementation of the TFP methodology covers the following four areas:

- Submission of Regulatory Disclosure Data Reports;
- Requirement on the AER to publish Regulatory Disclosure Data reports and an annual TFP report;
- Conditions needed to be met before a TFP methodology could be applied; and
- Principles for calculating TFP.

These aspects of the proposed Rule are discussed in the next sections. The proposed Rule change request is attached to this Final Report. If the MCE accepts our recommendations then changes to the Rules will then be considered through a standard Rule change process.

We note that the AER has indicated that it is currently conducting a review of the current Rules for electricity network regulation with the view to submitting possible Rule changes to the AEMC later this year.[16] The changes proposed in this report are

16 AER, Media Release, Response to Professor Garnaut's Climate Change Review Update, 29 March 2011

not expected to limit developments from the AER's review of current building blocks arrangements.

3.3.1 Collection of Regulatory Disclosure Data

The proposed Rule:

- *obliges all regulated distribution and transmission (electricity and gas) service providers to submit an annual disclosure of regulatory data to the AER*
- *specifies required financial, asset and network operational reporting items in schedules to the NER and NGR*
- *obliges the AER to develop supporting guidelines on the detailed coverage and specification of the required data in conjunction with a working group(s) of industry and end-user representatives*
- *provides for Regulatory Disclosure Data Reports to be audited (financial data only) and to be made publicly available (subject to commercial confidentiality)*
- *provides for data to be provided under certification of the CEO and the Company Secretary or a Director*
- *provides for the AER to request additional data as may be required for it to fulfill its functions.*

As a reliable and robust data-set is a key component in having a workable TFP methodology, it is important to identify and specify a core set of Regulatory Disclosure Data and to ensure that data are consistent across service providers and over time. The collection of robust and relevant data has benefits other than allowing the commencement of a TFP methodology in the future. These are:

- a better understanding for the regulator and users of the differences and similarities of the service providers' operating environments, conduct and performance;
- providing relevant information to assist in the management of the service providers' businesses; and
- data that can be used to undertake benchmarking and comparative analysis between service providers (and over time) within the building block approach.

That is, even if a TFP methodology is not ultimately included in the NER or NGR or, if the methodology is not selected by service providers, the collection of relevant, robust data using consistent definitions is an important part of cost effective economic regulation. Reliable and useful data will go some way to addressing the information asymmetry problem that regulators face under the building block approach. This is consistent with improving regulatory practice and achieving the efficiency potential of incentive regulation. This will, in turn, provide both end-users of the regulated services

and service providers with greater confidence that prices reflect efficient costs over the long term. It will also facilitate the potential adoption of improvements to existing arrangements such as the use of output incentives in transmission regulation as discussed in Appendix E.

For these reasons, we advise that the reporting requirements also apply to transmission service providers as well as distribution service providers. Although we found in the Draft Report that it is unlikely to be appropriate to implement a TFP methodology in the transmission sectors, the issues with the building block approach identified during this Review apply equally to both transmission and distribution. Therefore, the development of robust and transparent regulatory data sets for transmission will potentially improve the application of economic regulation in these sectors as well.

Regulatory reporting is also a cost to service providers, the regulator and users. It will take some resources to establish a reporting regime as well as ongoing costs for all regulated service providers in compliance and costs for ongoing improvements. Ultimately, these costs will be recovered through regulated prices. Nevertheless, the costs are not so significant as to render accurate, consistent and relevant regulatory reporting infeasible.

There are also significant costs under the building block approach. The regulator has to expend considerable time and effort to understand what data submitted by a service provider actually are (that is, to establish the facts), before it is in a position to analyse and interpret the data presented. The full cost of this task in terms of more time consuming, more intrusive and less well informed regulatory decision making also needs to be recognised.

There were differing views expressed by stakeholders in submissions on whether the AER has sufficient powers to collect TFP data, with most arguing that the current powers are adequate. However, we consider that, in recommending a new function for the AER with respect to the TFP methodology, placing an obligation in the Rules on the service providers to provide the necessary data (in a clearly defined and consistent format) would:

- add clarity and regulatory certainty;
- provide support to the tasks given to the AER; and
- ensure that the AER can start its work without unnecessary delay or argument.

The proposed requirement will be separate to the existing provisions in the National Electricity and Gas Laws. Therefore this proposed Rule will not prevent the AER's use of its existing information gathering powers under the NEL and NGL to obtain any other information that it requires. The benefits of having this separate rule is that it will remove uncertainty on what information is to be provided for revenue decision making processes, and prevent service providers from delaying revenue determinations and information gathering processes by questioning of or seeking justification for data requests from the AER.

Also, the current arrangements may not be fully supporting the collection of the regulatory data necessary for good regulation. Data collection is carried out on a case by case basis, on a five year cycle as part of revenue determination decisions. As a result, some uncertainty exists for both service providers and the AER on what data are to be provided and, because each review is largely forward looking, the data are not necessarily collected on a consistent basis.

The proposed Rules detail the financial, asset and network operational data reporting items required to be submitted by distribution and transmission service providers as part of their Regulatory Disclosure Data Reports. The required items are presented in the schedules in the draft Rules and Appendix F. At this stage, we consider that the Regulatory Disclosure Data returns should be required to be submitted within three months of the end of the relevant reporting year. The Rule change process will permit further consideration as to whether this gives the service provider sufficient time.

Financial data contained in the Regulatory Disclosure Data returns must be audited and all data is to be provided under the certification of the Chief Executive Officer and the Company Secretary or a Director. Requiring financial data to be supplied on an audited basis would not increase the costs of supplying data unduly while providing a higher degree of confidence in the accuracy of the data.

The proposed Rules specify that the AER may only use the Regulatory Disclosure Data for the purposes of informing decision-making for future regulatory determinations, monitoring compliance with existing regulatory determinations, informing assessments of the potential suitability of Total Factor Productivity-based methods for determining allowed revenues, performance monitoring and preparation of the Annual TFP Report.

The AER is to establish a Regulatory Disclosure Data Working Group for each of the four sectors (gas and electricity distribution and transmission) which will be tasked with developing detailed guidelines and templates for reporting. The guidelines are to include detailed definitions of all required items. The Working Groups will be chaired by the AER and comprise representatives from the regulated service providers and end users. The collaborative approach to forming the data specifications will have the benefit of addressing some of the key regulatory principles such as communication, consultation, and transparency.

The Working Groups will help the AER ensure that the same services can be reported on over time and across service providers and that definitions and collection mechanisms remain unchanged for a sufficiently long period to create a robust database. For example, the flexibility service providers currently have in choosing cost allocation methods may lead to cost data being supplied that are not sufficiently consistent for TFP, benchmarking or other analytical purposes. One way of addressing this might be to require service providers to supply cost data both with and without overheads included. This would provide scope to adopt a common cost allocation method across all service providers for TFP purposes.

One of the potential benefits of a TFP methodology is that it is more transparent than current building block arrangements. This should reduce the extent of disputation as well as providing a higher level of confidence and certainty to all stakeholders. However, to ensure this potential is realised it is important that all relevant data – both that supplied by the service providers and that used by the regulator - are available in the public domain. This not only allows all stakeholders to conduct their own analysis if they so choose but leads to service providers having ownership of the data used and to appropriate levels of accountability for the regulator.

As the data proposed to be included in the Regulatory Disclosure Data relate to the service providers' key outputs and inputs and are historic rather than forecast, it is unlikely that the relevant data would be of a genuinely commercial-in-confidence nature. Consequently, to ensure the benefits of a TFP methodology are realised and all stakeholders are as fully informed as possible, the bar for any data remaining commercial-in-confidence should be set at an exceptional circumstances basis.

Service providers' TFP information disclosures would be published annually on the AER's website and the AER would be required to publish an Annual Regulatory Disclosure Data Report. The AEMC presumption is that all data contained in the Regulatory Disclosure Data should be published. If the AER approves the confidentiality claim for any part of a TFP data-set by a network operator, the AEMC understands that it will be required to use all reasonable measures to protect confidential information from unauthorised use or disclosure, consistent with the obligation on it under Section 18 of the NEL (which in return refers to Section 44AAF of the Trade Practices Act 1974, now the Competition and Consumer Act 2010). Further, the AEMC understands that one measure to protect confidential information from unauthorised use or disclosure is to enter into a confidentiality deed with a party seeking access to confidential TFP data-set.

The proposed Regulatory Disclosure Data will be a core set of financial and physical data useful to both building blocks and TFP regulation. It is not meant to be exhaustive and would not impede the AER's ability to seek additional specific information through its existing powers. The intended outcome will be the collection of a standardised, relevant and robust regulatory data-set which is consistent with best practice regulation.

3.3.2 Requirement on the regulator to produce an Annual TFP Report

The proposed Rule requires the AER to publish an Annual TFP Report by 1 March each year which:

- *complies with the specified principles for calculating TFP*
- *uses the Regulatory Disclosure Data and only alters it in specified circumstances*
- *provides an assessment of the possible use of TFP-based methods in regulatory determinations*

- *presents TFP index results for all included service providers, for the industry as a whole and for relevant groups of service providers identified by the AER as facing similar operating environment conditions*

- *includes all data used in calculating the TFP index results.*

In addition to making the Regulatory Disclosure Data Reports publicly available, an important part of the process will be an Annual TFP Report by the AER on its progress in developing TFP indexes and a potential TFP methodology for price determinations. The Annual TFP Reports will provide a means for the AER to discuss its work on measuring TFP growth and development of a TFP methodology.

The Annual TFP Reports will have a number of benefits. Firstly, they will facilitate analysis of the Regulatory Disclosure Data and help identify any problems with the data at an early stage. This will allow refinement of data collection and reporting as necessary so that a robust data-set can be established quickly. Once a few years of data are available the focus of the annual reports could move to undertaking 'paper trials' of a TFP methodology for price and revenue determinations. This will assist with refining the methodology and help build stakeholder confidence in the approach. While it is expected the Annual TFP Reports will only use Regulatory Disclosure Data, the AER can also consider the use of other historical data if it can be proven to be consistent with the definitions laid out in the AER's Regulatory Disclosure Data Guidelines.

Secondly, the Annual TFP Reports will help improve stakeholders' understanding of TFP before a TFP methodology is applied. Similarly, they will promote understanding of possible TFP growth figures and their key drivers. The Annual TFP Reports should be at least as detailed as the reports prepared by Economic Insights staff for the Commerce Commission in New Zealand and for Jemena and those released by the ESC.[17] They should clearly explain all aspects of the construction of output and input prices and quantities variables, the derivation of total output and total input quantity indexes and the resulting TFP and partial productivity indexes. Movements in the relevant indexes from year to year should be clearly explained to promote understanding of the drivers of TFP and all the data used to construct the indexes should be included in appendices. The Economic Insights Model report provides a guide for detail required on a TFP methodology for price determinations.

Thirdly, the AER's publication of Regulatory Disclosure Data Reports and Annual TFP Reports should facilitate the use of TFP indexes as a benchmarking tool for use in building block determinations. This will require work not only on TFP growth but also on TFP levels and the influence of operating environment conditions on both TFP levels and TFP growth. This work will, in turn, inform the formation of service provider groups for use in a TFP methodology.

17 Denis Lawrence, Regulation of Electricity Lines Businesses, Analysis of Lines Business Performance – 1996–2003, Report for the Commerce Commission, December 2003; Economic Insights, The Productivity Performance of Jemena Gas Networks' NSW Gas Distribution System, Report for Jemena Gas Networks, August 2009; PEG, TFP Research for Victoria's Power Distribution Industry, Report for the ESC, December 2004.

The AER's ability to amend data will be limited to adjusting for structural differences to improve the consistency of the data and to adjusting certain years' data for certain service providers because of exceptional circumstances. Ideally the reporting requirements for the Regulatory Disclosure Data should eliminate as many inconsistencies as possible but some (such as the treatment of overheads) may remain and require some standardisation of treatment. It is also possible that the impact of particularly large and unusual one-off events may need to be removed from the data. An example of such an occurrence was the impact of the cable failure leading to the Auckland CBD outage in February 1998 and its aftermath. The effects of this highly unusual event were removed from the TFP series used by the New Zealand Commerce Commission.

Any adjustments made to the data supplied by the service providers must be fully and clearly explained and quantified by the AER. This is essential for transparency of the calculations and to ensure service providers retain ownership of the data used and resulting estimates. It should be noted that several service providers have been concerned about the calculation of the ESC's TFP indexes because they have not been able to replicate the data used or reconcile it with data they have previously supplied to the regulator. The Victorian DPI also noted that extensive questions were raised regarding the accuracy of the ESC's database.[18] To the extent that such problems can be avoided then all stakeholders will have more confidence in the process. To facilitate this process the AER will be required to publish both data and index results including and excluding any alterations.

As noted in the preceding section, an important part of ensuring there is transparency and ownership of the process by all stakeholders is to ensure that all data supplied by service providers and used by the AER in the calculation of TFP indexes are in the public domain to the maximum extent possible. Successful arguments for granting commercial-in-confidence status to any of the relatively high level data used in TFP analysis should have to be exceptionally compelling.

3.3.3 Conditions needed to be met before a TFP methodology could be applied

The proposed Rule lists the following assessment factors for consideration in testing whether a Total Factor Productivity-based methodology could be used for the determination of prices and revenues:

1. *Regulatory Disclosure Data of sufficient length to establish reliable TFP trends are available, robust and consistent both through time and across service providers*

2. *calculation of Total Factor Productivity indexes that represent an accurate measure of productivity growth for individual, as well as grouped, providers is possible;*

3. *sufficient service providers are included in each group for calculating Total Factor Productivity indexes for distribution determinations so that the Total Factor Productivity*

18 Victorian DPI submission, February 2010, p.9

index cannot be manipulated by an individual provider or a collective of related providers with common ownership; and

4. *calculation of Total Factor Productivity index growth rates using historic data represent a fair and reasonable estimate of future productivity growth potential for providers in that grouping.*

The AER would be required to use the Regulatory Disclosure Data in making its assessment and to inform stakeholders on its assessment in the Annual TFP Report.

A TFP-based methodology for the determination of prices and revenues would require robust and consistent data from service providers to be available. The data needs to be consistent both over time (so that variations in TFP reflect actual performance changes rather than changes in data coverage or definitions) and across service providers (so that comparable activities are being covered). In its Draft Report the AEMC found that existing data are not currently consistent, reliable nor robust. Therefore, the first requirement for implementing a TFP methodology is the creation of Regulatory Disclosure Data that are consistent and robust and which can support an appropriately specified TFP calculation.

An important feature for the Regulatory Disclosure Data is that the data be consistent with the detailed definitions set out in the Guidelines developed by the Working Group(s). The AER may also, in consultation with service providers, supplement the Regulatory Disclosure Data by backcasting to earlier years (i.e., to the period before the start of the Regulatory Disclosure Data) provided any backcasted data can be proven to be consistent with the definitions laid out in the AER's Regulatory Disclosure Data Guidelines. We are of the view that at least 8 years of robust and consistent data will be required to establish a TFP growth rate that could be used in a TFP methodology for price and revenue determinations.

The AER will, therefore, be required to assess and report on whether available data are sufficiently robust and consistent to support rigorous TFP analysis to the high standard that would be required to support a price or revenue determination using a TFP-based methodology.

The second requirement is that TFP indexes can be calculated that accurately represent individual service provider, overall industry and service provider group productivity. This requires availability of consistent data for the variables required to satisfy the principles for calculating TFP set out in the following section.

The third requirement that needs to be met is that groups of service providers facing reasonably comparable productivity growth potential can be formed and there are a sufficient number of service providers in each group so that no single service provider or collective of related providers with common ownership can influence the group outcome unduly. It is only once robust and consistent data becomes available and TFP indexes have been calculated for each service provider that service providers will be able to be placed into groups with similar productivity growth potential. The AER will need to report on progress with measuring individual service provider productivity,

with assessing the impact of operating environment conditions on productivity growth and on the grouping of service providers.

The fourth requirement is that historic TFP growth rates are a good predictor of likely future TFP growth potential for that group of service providers. This requires conditions facing service providers to be relatively stable over time. A number of service providers submitted that they are likely to face a number of potentially large changes that will make future conditions less stable than historically. Examples quoted included climate change initiatives, the development of smart grids and likely increases in required replacement investment or the so-called 'wall of wire' effect.

Once robust and consistent Regulatory Disclosure Data are available the AER will be able to test the productivity impacts, if any, of the changes foreshadowed by some service providers. An important part of assessing whether this condition is met would be forming a view on whether safeguard mechanisms built into a TFP-based methodology would provide adequate insurance for the emergence of unexpected cost shocks.

3.3.4 Principles for calculating TFP

The proposed Rule states that the AER must comply with the following principles when calculating TFP:

- *must use the index number approach - econometric approaches are not permitted;*
- *must be designed to avoid systematic bias in the TFP growth estimate;*
- *must use output quantities that accurately reflect standard control service*s *supplied by providers;*
- *capital user costs are to be set exogenously, are to be consistent with the service provider's regulatory asset base (RAB) and are to be consistent with the property of financial capital maintenance (FCM); and*
- *measures of capital input quantities are to accurately reflect the physical service potential of assets employed in the provision of standard control services by providers.*

We consider that there should be some prescription in the Rules to guide how the AER calculates TFP indexes and growth rates when preparing the annual report. Such prescription will provide certainty to service providers and cut the administrative costs of the AER. Therefore we have a developed a set of principles which the AER must comply with when calculating TFP. These principles are based upon our analysis of the various possible calculation specification used to measure TFP.

Given the relatively small number of observations available in Australia, productivity will have to be calculated using the index number method. This method is also the most transparent and reproducible of the alternative ways of estimating productivity growth.

The TFP index should not exhibit any systematic biases. If there are systematic biases present in the TFP growth rate then the resulting X factor may be too high or too low leading to service providers earning inadequate or excessive returns, respectively.

Output quantities used in calculating the TFP growth rate will need to accurately reflect the services supplied and charged for. For example, using relatively erratic measures such as peak demand as proxies for contracted reserved capacity would be likely to cause significant inaccuracies and potential biases in the measured TFP growth rate.

The cost of capital measure used in the TFP growth measure needs to be based directly on the return of and return on the RAB and be consistent with ex ante financial capital maintenance. FCM refers to the requirement that investors be given the opportunity ex ante to recover the full opportunity cost of their investments in present value terms. FCM is a key regulatory principle and plays a central role in building block regulation. It is important that the TFP index uses capital costs consistent with ex ante FCM if economic efficiency is to be achieved. To satisfy ex ante FCM annual capital costs will need to be calculated exogenously using a rate of return based on the weighted average cost of capital.

The capital input quantity used in calculating the TFP growth rate will need to accurately reflect the physical service potential of the assets employed by service providers (that is, the depreciation profile used in forming the capital input quantity needs to be consistent with physical network asset depreciation characteristics). Energy network assets are characterised by relatively little decline in their service potential over their lifetime (provided they are properly maintained). Overestimating the rate of decay in annual capital input service potential would bias the TFP growth rate upwards and could result in too high an X factor being set.

During this Review, we have also discussed other key aspects of the design of the TFP methodology for determining prices and revenues such as the method for setting initial price, the process for moving to and from a TFP based determination and the use of safeguards mechanisms. We consider that it would be better to leave consideration on these issues to a later stage once the conditions set out in the preceding section have been met.

More details on the calculation of TFP indexes are presented in Appendix D.

4 Steps for possible future implementation of a TFP-based methodology

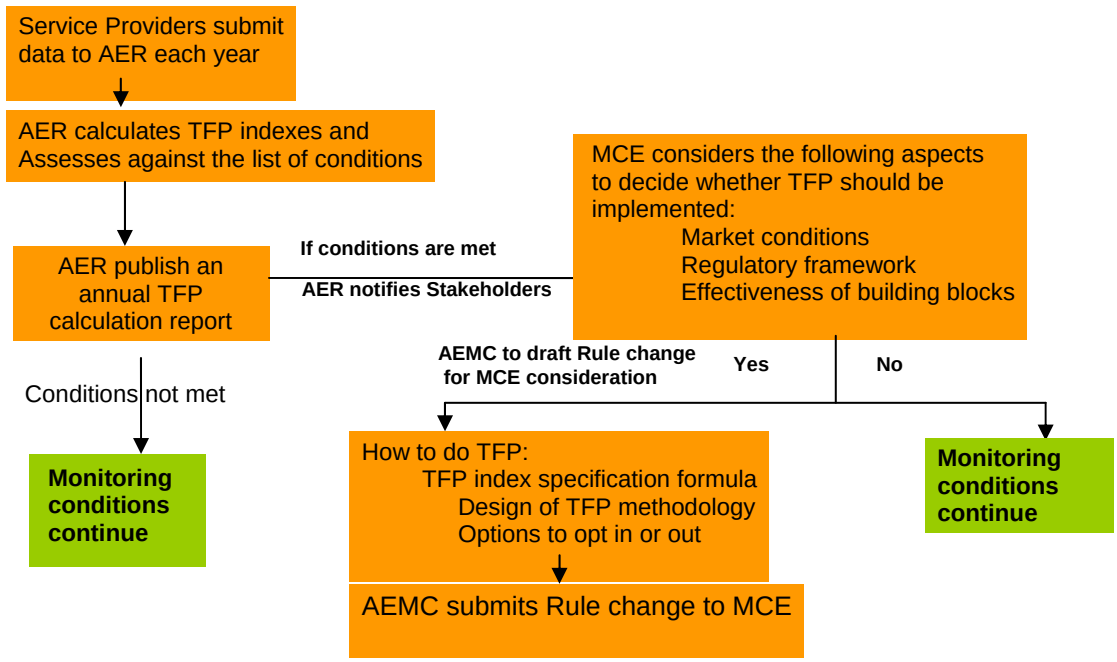
The preceding chapter set out details of the proposed Rule for Regulatory Disclosure Data collection and testing of the conditions required to be met before proceeding to the possible use of a TFP-based methodology for determining prices and revenues. In this chapter we consider the possible steps for future implementation of a TFP-based methodology. The issues we consider include:

- the decision procedure going forward;
- jurisdictional implementation issues;
- TFP-based methodology design; and
- interaction with possible reforms to building blocks.

4.1 Decision procedures

The decision procedure for possible future implementation of a TFP-based methodology is outlined in Figure 4.1.

Figure 4.1 Decision procedure



Service providers are to submit their annual Regulatory Disclosure Data Reports to the AER within three months of the end of each reporting year. The AER would develop a TFP calculation specification consistent with the principles discussed in section 3.3.4. The AER is then required to calculate TFP indexes and growth rates for each included service provider, for the industry as a whole and for groupings of service providers based on similarity of operating environments and, therefore, TFP growth potential.

The AER would also test how differences in operating environments influence relative productivity changes across the industry and the stability and predictability of TFP growth over time.

The AER then assesses whether the conditions set out in section 3.3.3 are, or are likely to be, met. These include the availability of Regulatory Disclosure Data of sufficient length to establish robust and consistent TFP trends, the calculation of accurate TFP indexes, the inability of a service provider to influence trends within their group and whether historic TFP trends represent a reasonable estimate of future achievable TFP growth. This assessment is to inform whether a TFP methodology can be implemented in either the gas or electricity sectors.

By 1 March each year the AER is to publish its Annual TFP Report setting out its TFP calculations and its assessment of whether the conditions are met. If the assessment is that the conditions set out in section 3.3.3 are not met then no further action is taken that year and the process is repeated the following year. The AER would, however, be expected to undertake ongoing research on and development of TFP indexes and groupings and possible refinements to data collection.

If the AER's assessment is that the conditions are met for a sector or an industry grouping, then the AER notifies stakeholders and the MCE considers whether the implementation of a TFP-based methodology should be initiated. Key factors this decision would be based on include prevailing market conditions at the time, the performance of the regulatory framework at the time and the effectiveness of building blocks regulation. If the MCE decides that conditions at the time do not warrant initiation of the implementation process then no further action is taken that year and the process is repeated the following year.

If the MCE decides that initiation of the implementation process is warranted then a Rule change proposal will be developed for the MCE's consideration. The Rule change proposal is to include details of the TFP index specification and formula and the design of the TFP-based methodology including how service providers would be allowed to opt into the TFP-based methodology and whether and how they would be allowed to then opt out at a later date.

In all scenarios, the AER will still be required to publish its annual report on TFP indexes and growth rates given the benefits this report will provide to stakeholders and policy makers.

Although the Economic Insights Model demonstrated that an appropriately specified TFP-based methodology is able to adequately handle quite large external shocks, a TFP-based methodology will normally be best suited to relatively stable market and technological conditions. In deciding whether to initiate implementation once the AER assesses that the conditions in section 3.3.3 are met, the MCE would therefore need to have regard to the expected stability of market and technological conditions in the period ahead.

Factors raised by a number of submissions as potentially contributing to market instability include the introduction of a carbon price and incentives for greater energy

efficiency and increased use of distributed generation. There are also potential measures arising from the Victorian Bushfires Royal Commission which could change the productivity trend for Victorian electricity service providers. A forthcoming significant technological change quoted by a number of submissions was the roll out of 'smart' grids and accompanying changes. While service provider submissions generally argued these potential sources of future instability would be reasons to delay introduction of a TFP-based methodology until these changes were bedded down, others argued that the stronger incentives for innovation afforded by a TFP-based methodology would allow service providers to better cope with and respond to these changes.

The MCE would need to weigh up the potential instability caused by likely market and technological changes and the relative ability of TFP-based and building block methodologies to cope with these against the benefits of the stronger incentives associated with a TFP-based methodology.

4.2 Jurisdictional implementation issues

In its submission the Victorian DPI argued that Victoria was the most mature state in terms of TFP analysis and that Chapter 6 of the NER allows for the form of regulatory control to be set for each jurisdiction. It argued that it would not be inappropriate for the AER to apply and administer a TFP-based regulatory approach in Victoria using existing 'legacy' data and methodologies or to develop an alternate index method using data that is already available. DPI argued this could occur at the same time that the AER developed a national TFP measure on a 'wider and more thorough basis'. It argued that Victoria could then transition to the national framework at a subsequent stage.[19]

The AEMC is of the view that state regulatory frameworks should not be allowed to evolve separately from the approach being adopted nationally. Such an approach would be at odds with the development of a national energy market and could put at risk the considerable economic benefits that have flowed from having a common institutional framework across jurisdictions. Furthermore, TFP specifications and methodologies should be developed rigorously and consistently and then data collection mechanisms put in place to support those specifications rather than specifications being tailored to fit the limited available data. Available data are incomplete, lack consistency and do not have the requisite degree of stakeholder ownership in many cases. In previous submissions the Victorian DPI has noted that extensive questions have been raised regarding the accuracy of the database used by the Victorian regulator in its TFP research.

The AEMC is of the view that a common framework for possible implementation of a TFP-based methodology should be developed for all of the National Electricity Market. Similarly, there should be common Regulatory Disclosure Data across all jurisdictions and the requirements and definitions for that data are to be developed by the AER in

19 Victorian DPI submission, December 2010, p.2

conjunction with the Regulatory Disclosure Data Working Group(s). The proposed Rule does allow the AER to consider using additional historical data to supplement the Regulatory Disclosure Data but only if it can be proven that that data complies with the definitions set out in the Guidelines.

The proposed Rule requires the AER to form industry groupings of service providers facing similar operating environment conditions and, hence, facing similar future productivity growth potential. The formation of these groupings will be done on the basis of AER research on the drivers of productivity growth and analysis of TFP results obtained from the Regulatory Disclosure Data using specifications that meet the principles for calculating TFP indexes set out in section 3.3.4.

The proposed Rule also provides for the AER to make an assessment of whether the conditions for possible use of a TFP-based methodology for determining prices and revenues are met at either the industry or group level. The AER could thus make the judgment that conditions for a group of service providers are met before they are met for the industry as a whole. However, it should be noted that industry groupings are to be formed on the basis of similarity of operating environment conditions rather than simply on the basis of geographic proximity.

Furthermore, groupings also have to have sufficient service providers included so that an individual service provider or included related service providers with common ownership cannot unduly influence the group TFP growth rate. If service providers in one jurisdiction were allocated to different groupings based on their operating environment conditions then it is likely service providers from other jurisdictions would also have to be included in those groupings to ensure the TFP growth rate was sufficiently exogenous to any one included service provider.

The formation of relevant industry groupings of service providers and the assessment of whether the conditions in section 3.3.3 are met for those groupings will be a matter for the AER.

In the event that the AER advises that the conditions can be met for a sub-set of service providers and the MCE considers that a TFP methodology should be implemented, the TFP methodology established in the Rules will not be designed specifically for that sub-set but for all service providers in that sector. This ensures that the TFP methodology will be consistent across the industry.

4.3 TFP-based methodology design issues

In its Design Discussion Paper[20] the AEMC set out a range of design options that need to be considered in implementing a TFP-based methodology for the determination of prices and revenues. The Economic Insights Model subsequently illustrated how one particular set of design choices would work in practice compared to the building blocks approach. In the Draft Report we indicated that decisions regarding the detailed

[20] AEMC, Design Discussion Paper for the Review into the use of total factor productivity for the determination of prices and revenue, 28 August 2009.

design of a TFP-based methodology would be deferred until such times as the required conditions were met and that the initial Rule would concentrate on data collection and testing. That approach has been maintained in this Final Report. However, a number of submissions have raised design questions and we briefly discuss three of these issues as follows in this section:

- whether a TFP-based methodology should be established and whether it should be of the opt in and opt out form;
- how starting price adjustments should be calculated; and
- the approach to transmission regulation.

4.3.1 Availability of options

The introduction of a TFP-based methodology option would have a number of benefits and costs. The benefits include making a more light handed but higher powered form of incentive regulation available to service providers. This may be attractive to some service providers and facilitate the achievement of higher productivity growth than would otherwise be the case. This could also lead to higher benefits to consumers in the long run. There may also be a benefit in implicitly providing potential competition to the existing building blocks form of regulation as a means of ensuring that the regulatory framework does not become captured, stagnant or otherwise unresponsive.

However, there are also potential costs in having two alternative forms of regulation available. These include the need for both service providers and regulators to investigate a wider range of options and to maintain the expertise to do so. It may also reduce the degree of certainty for stakeholders going forward.

Whether it is sensible to introduce an alternative form of regulation that service providers can opt into will depend on circumstances at the time the conditions identified in section 3.3.3 are met. These will include views on the likely stability of future market conditions and technologies and views on the performance of building blocks regulation at the time. It should be noted, however, that irrespective of whether the TFP-based methodology is ultimately introduced and whether service providers then make use of the alternative, there will be substantial gains from introducing the Regulatory Disclosure Data provisions presented in this report. Robust and consistent data is a prerequisite for sound regulation and for evaluating the success or otherwise of that regulation. It will also facilitate greater use of a range of benchmarking methods in the application of existing building blocks methods and help to reduce information asymmetries between stakeholders.

In their submission Multinet and United Energy argued that not only should service providers have sole discretion in opting into a TFP-based methodology once it is established, they should also be able to opt out subject to satisfying an 'exceptional

circumstances' test.[21] The latter was proposed to be included to reduce the scope for service providers to game an unrestricted opt out capability.

There are advantages and disadvantages in allowing service providers to opt in and then opt out of an alternative form of regulation. The advantage is that it provides a safeguard mechanism against unforeseen adverse external developments and would allow the service provider to maintain its profitability in such circumstances. The disadvantage is that it, at best, reduces the incentive power of the alternative form of regulation and, at worst, opens up new avenues for service providers to game the regulatory framework by 'cherry-picking' available forms of regulation. For example, service providers could opt into a TFP-based methodology and then defer expenditure before opting back into building blocks regulation and seeking an allowance for the deferred expenditure. The Multinet and United Energy proposal provides a potential way of mitigating the risks of gaming occurring although service providers will still be operating from a position of superior knowledge compared to the regulator in such negotiations.

The availability and details of opt out provisions will be decided once a decision has been made to introduce the TFP-based methodology following the conditions identified in section 3.3.3 having been met.

4.3.2 Starting prices

A number of submissions have commented on the importance of methods used to set starting prices (or so-called 'P_0' adjustments). For example, Jemena noted that P_0 decisions were at least as important as decisions regarding the X factor under a TFP-based methodology.[22] In the Draft Report we presented a number of options for determining starting prices and expressed a preference for resetting prices to equate revenues and actual costs in the last year of the preceding regulatory period with a provision for the regulator to check that input prices used by service providers were efficient to reduce gaming opportunities for service providers. The Economic Insights Model demonstrated that setting starting prices in this way would lead to service providers who achieved industry (or group) average productivity growth rates having the present values of their revenues equal to the present value of their costs over the regulatory period.

The AEMC notes that the Commerce Commission in New Zealand is currently exploring alternative ways of setting starting prices in the context of a default TFP-based methodology but where service providers have the ability to opt out into a building blocks-based alternative. The Commerce Commission is currently proposing to reset starting prices such that suppliers may be expected, ex ante, to earn at least a normal return over the regulatory period given industry-wide trends in revenue and

21 Multinet and United Energy submission, December 2010, p.8

22 Jemena submission, December 2010, p.3

costs.[23] While the context of the New Zealand regulatory framework is quite different to that applying in Australia, the AEMC will monitor developments in New Zealand.

Decisions regarding the starting price method to be used in a TFP-based methodology in Australia would be made after the decision to implement a TFP-based methodology has been made.

4.3.3 Transmission regulation

In its submission Grid Australia argued that a TFP-based methodology is not appropriate for use in determining prices and revenues because of the lumpy nature of transmission investments, difficulties in measuring transmission outputs and differing geographic and physical network characteristics.[24] The submission went on to argue that consideration of data collection from transmission service providers be deferred. Gas transmission pipeline businesses have made similar arguments.

While the AEMC is cognisant of the difficulties of applying a TFP-based methodology to transmission service providers, we note that many of the same problems apply to the application of existing building block methods and asymmetric information remains a significant problem for regulation of transmission service providers. At a minimum, collection of Regulatory Disclosure Data from transmission service providers will increase the range of benchmarking analyses that can be undertaken for transmission service providers in building block reviews.

However, there may be a case for considering alternative variants of TFP-based and building block methodologies to address the characteristics of transmission. One such variant could be the inclusion of an output incentive, somewhat along the lines of Ofgem's RIIO approach but where the output measure focuses on quantification of primary transmission output functions and required capabilities and performance levels. Another alternative is where a proportion of transmission costs, for example maintenance operational expenditure, is linked to productivity movements. Some preliminary thoughts on such an output incentive measure are presented in Appendix E.

The AEMC is of the view that information asymmetries and the unusual characteristics of transmission networks make the development and collection of Regulatory Disclosure Data for transmission service providers at least as important as it is for distribution service providers. We see no case for deferring Regulatory Disclosure Data requirements for transmission service providers, nor for the requirement for the AER to publish TFP indexes and growth rates.

Therefore we agree that it appears unlikely that it would be appropriate to implement a TFP methodology either for the gas transmission sector or the electricity transmission sector. In Gas, there is a degree of common ownership and operation and also because

23 Commerce Commission, *2010-15 Default Price-Quality Path Starting Price Adjustments and Other Amendments*, Update Paper, Wellington, April 2011.

24 Grid Australia submission, December 2010, p.1

lumpy capital expenditure may cause problems for the TFP index.[25] Applying a full TFP-based methodology in the electricity transmission sector may not be effective because of the difficulty in measuring outputs related to system security and reliability, the lumpiness of capital expenditure and given the small number of service providers.

Given this conclusion there is a question as to whether the AER should assess the suitability of a TFP methodology against the specified conditions in relation to the transmission sectors. At this stage we consider there is merit in allowing the AER to conduct such testing based on the transmission data. Our conclusion about the suitability of TFP for the transmission sector is based upon current understanding and not based upon empirical testing. Therefore the analysis would benefit from allowing these issues to be tested more fully. It is also possible that in the future, further work is done which addresses the challenge of quantifying the outputs of a transmission business.[26]

4.4 Interaction with possible reforms to building blocks

The decision to delay introducing the full set of Rules for a TFP-based methodology until such time as the conditions identified in section 3.3.3 are met is not intended to permit a re-examination of the economic case for a TFP-based methodology at a later date. However, it would be prudent to assess the effects of introducing a TFP-based methodology on the regulatory framework at that time as, in the interim, there may have been refinements to the building blocks regime that achieve some of the benefits available from a TFP-based methodology.

One issue with introducing a TFP-based methodology as an alternative to building blocks regulation is that it could lead to having two alternative forms of regulation working in parallel. While this adds to the flexibility of the regulatory regime, it will add to transaction costs and creates possible gaming incentives. Further consideration of these effects plus the effectiveness of the building block regime at that time should happen before a TFP-based methodology is implemented.

During this Review, stakeholders have identified potential problems with the current building block approach and also raised other possible reforms besides the TFP approach. We note that the Rule Change from the Victorian Minister, which led to this Review being initiated, raised concerns about the ability of the current arrangements for building blocks to promote efficient outcomes for consumers given the subjective nature of decisions and the difficulty of the regulator in overcoming the information advantage of the service providers.

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25 We note that while the concentration of ownership in gas transmission is a problem for introducing TFP, it may be a positive for getting comparative data reporting.

26 We understand that Ofgem have done considerable work on defining transmission businesses outputs. See http://www.ofgem.gov.uk/Networks/rpix20/ConsultReports/Documents1/rpt-outputs.pdf.

To better understand the concerns on the current building blocks arrangement, we conducted a survey of market participants and published a perspective report.[27] That survey found that the service providers saw the benefits of the building block approach as relatively straight-forward, stable and certain. However respondents to the survey also identified a number of problems with the current approach. These include the inability of building blocks to cater for innovation, the problems of information asymmetry, subjective decisions by the regulator. Concerns were also raised on the merits review process.

To assist stakeholders and to stimulate and broaden the discussion on the appropriate framework for network regulation, we also published a report by the Brattle Group that outlined possible options for amending the current building block approach..[28]

The options identified by the Brattle Group focused on four key areas:

- setting prices to strengthen incentives;
- improving the quality of information;
- improving the regulatory process (including the appeals process); and
- how to promote innovation in the gas and electricity sectors.

In response to the Brattle Group report a number of stakeholders noted:[29]

- changes to the building block approach should be considered but, for many stakeholders, this should only occur after all service providers have been the subject of an AER regulatory decision;
- changes to the building block approach should be considered in preference to introducing a TFP methodology;
- the TFP Review should not be delayed while possible amendments to the building block approach are considered; and
- one significant issue with the building block approach that should be reviewed is the focus on efficient costs of a service provider.

Ofgem has recently undertaken a significant review of the regulatory approach and process that it and its predecessors have used over the last 20 years. It found that the existing frameworks have led to businesses being too focused on five year price cycles and also on engaging with the regulator rather than their customers. [30] It also observed

27 AEMC, Perspectives on the building block approach, 30 July 2009.

28 The Brattle Group, *Options for reforming the building-blocks framework*, 16 December 2009. (*Brattle Group Reform of the Building Blocks Framework*)

29 Submissions from Grid Australia, EnergyAustralia, ActewAGL Distribution, SP AusNet, ENA and APIA.

30 Ofgem, 'Regulating energy networks for the future: RPI-X@20 Recommendations, Consultation', 26 July 2010.

that there was limited consideration of innovation and 'how best to deliver' with the businesses having a potential bias for capital solutions rather than non-network options.

Ofgem has recommended retaining the existing ex ante form of price control with, however, a number of important modifications. The modifications recommended by Ofgem include:

- providing stakeholders with a greater opportunity to influence Ofgem and network company decision making. It considers that there is a need to involve customers more in the appeal process;
- setting outputs that network companies are expected to deliver to ensure: safe and reliable services, non-discriminatory and timely connection and access terms, customer satisfaction, limited impact on the environment, and delivery of social obligations;
- extending the length of the price control period from five years to eight, with provision for a mid-period review of the outputs that network companies are required to deliver;
- adopting a transparent and proportionate approach to assessing the price control package such that the intensity and timescale of the assessment would reflect the quality of an individual companies' business plan and its record for efficient output delivery;
- requiring a company to provide market testing evidence that its proposals reflect long-term value for money. This would include the option to involve third parties in delivery and ownership of large and separable projects, where this is expected to drive innovation, long-term value for money, and/or more timely delivery; and
- introducing a time-limited innovation stimulus package that would be open to projects at any point in the innovation cycle, and to both network companies and third parties, for innovation related to delivering the networks required for a low carbon energy sector.

The AEMC has noted that it is important to consider what amendments could be made to the current form of the building blocks approach applied in Australia to address its deficiencies and improve regulatory outcomes. This is part of the process of continual improvement and development of regulation of energy markets. For example, the AER raised the issue of the imbalance of incentives between operational and capital expenditure as a general matter that requires further consideration during the Review into the Cost Recovery for Mandated Smart Metering Infrastructure.[31] That Review has

31 AER, Response to AEMC Draft Report - Request for Advice on cost recovery for Mandated Smart Metering Infrastructure, p.22, 18 June 2010.

also identified an issue with the strength of incentives being too high for capital assets which have relatively short asset lives (that is, less than 15 years).[32]

32 AEMC, Draft Report, Request for Advice on Cost Recovery for Mandated Smart Metering Infrastructure, pp.20 -21, 18 June 2010.

Abbreviations

AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
CAPM	capital asset pricing model
DEA	Data Envelopment Analysis
DPI	Victorian Department of Primary Industries
DTe	Office of Energy Regulation (Energiekamer Directie Toezicht Energie)
ECM	efficiency carryover mechanism
ENA	Energy Network Association
ERA	Economic Regulatory Authority
ESC	Essential Services Commission of Victoria
FCM	financial capital maintenance
GPAL	Gas Pipelines Access Law
MCE	Ministerial Council on Energy
NAS	Network Advisory Services
NEL	National Electricity Law
NEO	National Electricity Objective
NER	National Electricity Rules
NGL	National Gas Law
NGO	National Gas Objective
NGR	National Gas Rules
PEG	Pacific Economics Group
RAB	Regulatory Asset Base
RIN	Regulatory Information Notices

RIO	Regulatory Information Order
SAIDI	System average interruption duration index
SAIFI	System average interruption frequency index
TFP	total factor productivity
WACC	weighted average cost of capital

A Consultation process

On 21 November 2008, the AEMC initiated a review into whether the National Electricity Rules (NER) or National Gas Rules (NGR) should be amended to permit these applications of a TFP methodology. The need for this Review was identified following consideration of initial submissions on the Rule change proposal on a TFP methodology for electricity distribution network regulation lodged by the Victorian Minister for Energy and Resources in June 2008 (Victorian Proposal).[33] Conducting this Review is also consistent with the recommendations made by the Expert Panel on Access Pricing (Expert Panel) to the Ministerial Council on Energy (MCE).[34]

This Review covers the gas and electricity transmission and distribution sectors, and its objective is to provide advice to the MCE on:

- whether there would be circumstances in which a permitted application of a TFP methodology would contribute to either the national electricity objective (NEO) or the national gas objective (NGO); and
- where appropriate, recommend for the MCE's consideration draft Rules to allow a TFP methodology for any individual or group of service providers.

A.1 Outline of process

The various stages and documents released for the Review are set out in the table below. All the documents are available from the AEMC website.

Table A.1

Date	Stage
12 December 2008	Release of Issues Paper and consultant report *Brattle Group International Review Report* and *London Economics International Review Presentation*
11 February 2009	Public forum on Issues Paper
28 April 2009	Release of Revised Statement of Approach Paper
12 June 2009	Release of consultant reports: *Economic Insight Sensitivity Report*, *Economic Insight Data Availability Report* and *Brattle Group*

33 On 23 June 2008, the Victorian Minister for Energy and Resources submitted a proposal to amend the NER to allow the use of a TFP methodology as an alternative economic regulation methodology to be applied by the AER in approving or amending determinations for electricity distribution service providers.

34 The Expert Panel considered in its Final Report to the MCE (April 2006) that, while there was merit in encouraging the development of a TFP methodology, it did not represent the perfect solution to the perceived problems of economic regulation. It noted that there are many issues that would need further consideration before a TFP methodology would become a practicable option.

Date	Stage
	Incentives Report
23 July 2009	Release of *Perspectives on the Building Block Approach*
21 August 2009	Release of consultant report: *NAS Expenditure Profiles Report*
28 August 2009	Release of Discussion Paper
28 September 2009	Workshop on Discussion Paper: electricity sector
2 October 2009	Workshop on Discussion Paper: gas sector
17 December 2009	Release of Preliminary Findings and consultant reports: *Brattle Group Review of Options in Victoria*, *Brattle Group Reform of the Building Blocks Framework* and *Economic Insights Index Specification Issues*.
1 February 2010	Public forum on Preliminary Findings
29 June 2010	Release of consultant report: *A model of building blocks and total factor productivity-based regulatory approaches and outcomes by Economic Insights*
12 November 2010	Release of Draft Report
29 November 2010	Workshop on Economic Insights modeling and Draft Report

A.2 Issues Paper

On 12 December 2008, the AEMC released a Framework and Issues Paper (Issues Paper) to commence the Review. The rationale, scope and approach to the Review were set out for stakeholder comment. The Brattle International Review Report was also released which provided information on the use of TFP by energy regulators in a selection of overseas jurisdictions. Presentation slides from London Economics were also released at this time.

A public forum on the Issues Paper was held on 11 February 2009. Following the public forum and receipt of submissions, AEMC staff also met with a variety of stakeholders.

After considering the issues raised by interested parties in their submissions to the Issues Paper, the AEMC decided to amend its approach to the Review. A revised statement of approach was released on 28 April 2009. This informed parties on the amended approach that would be taken for the remainder of the Review.

On 12 June 2009, the AEMC released three reports that it had commissioned. The first, a report on the current availability of data suitable to support the calculation of a TFP index, was prepared by Economic Insights.[35] The second report, also from Economic Insights, reported on a sensitivity analysis of TFP estimates to variations in the

35 Economic Insights, *Assessment of data currently available to support TFP-based network regulation*, 9 June 2009.

methodology used in their construction.[36]A report was also prepared by The Brattle Group. This report discussed the extent and role of incentives under a TFP methodology.[37]

On 23 July 2009, the AEMC revised its timeline for the TFP Review to allow sufficient time to take into consideration a number of consultant reports and other new material. The AEMC released its report *Perspectives on the building block approach* on 30 July 2009. A report by NAS was released on 21 August 2009.[38]

A.3 Discussion Paper

The AEMC's Discussion Paper was released on 28 August 2009. This paper was designed to respond to stakeholders' comments that further information on the design of a TFP based revenue and pricing methodology (TFP methodology) was required to enable them to reach a view on the relative merits of applying a TFP methodology. The Discussion Paper presented a design example of a possible TFP methodology for consultation and discussion. The release of the Discussion Paper was consistent with the Revised statement of approach which outlined our intention to conduct a co-operative approach with stakeholders to analyse issues relevant to the development of a TFP methodology suitable for the Australian energy context.

In addition to inviting stakeholders to make written submissions in response to the Discussion Paper, workshops on the design example from the Discussion Paper were held in September and October 2009.

A.4 Preliminary Findings

Following the consideration of submissions to the Discussion Paper as well as matters raised at the workshops, the AEMC released its Preliminary Findings for the Review on 17 December 2009. The purpose of this report was to step through an analysis of the potential advantages and disadvantages of including a TFP methodology in the NER and NGR. The report also discussed whether the conditions necessary for a TFP methodology exist within the sectors of the energy market.

In addition, a number of consultant reports were released in conjunction with the Preliminary Findings. These prepared by The Brattle Group (*Review of incentive power and regulatory options in Victoria* and *Options for reforming the building-blocks framework*) and Economic Insights (*Total factor productivity index specification issues*).

A public forum to discuss the Preliminary Findings was held on 1 February 2010. Submissions to the Preliminary Findings were also invited from stakeholders.

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36 Economic Insights, *Energy network total factor productivity sensitivity analysis*, 9 June 2009.

37 The Brattle Group, *Incentives under total factor productivity based and building-blocks type price controls*, June 2009.

38 Network Advisory Services, Issues in relation to the availability and use of asset, expenditure and related information for Australian electricity and gas distribution businesses, August 2009.

The AEMC subsequently released an excel model prepared by Economic Insights that compared a TFP methodology with the current building block approach that is applied by the AER to electricity distribution service providers. This modeling also included a number of scenarios to assist stakeholders in their assessment of the relative effect of the building block approach and a TFP methodology. It also provided the opportunity for stakeholders to test their own scenarios. The models were accompanied by the Economic Insights report *A model of building blocks and total factor productivity-based regulatory approaches and outcomes* (29 June 2010).

The AEMC held a workshop to explain the workings of the Economic Insights model and also how the AEMC has had regard to the modeling results in reaching its draft recommendations. The workshop was held at the AEMC Offices, Sydney on Monday, 29 November 2010.

A.5 Draft Report

On 12 November 2010, the AEMC published the Review's Draft Report. The Draft Report concluded that the use of a TFP-based methodology as an alternative to the building blocks approach would have the potential to promote the national energy objectives subject to certain conditions being satisfied. The Draft Report set out the reasoning for this recommendation and provided an opportunity for stakeholders to comment on the assessment. A two-stage approach was recommended for implementing the arrangements to facilitate the introduction of a TFP-based methodology in the future when conditions permit.

B Reference material

As part of this Review, the AEMC requested several consultants to undertake specific studies to inform it and stakeholders on matters relating to the design and use of a TFP methodology. Below are summaries of these different reference materials. Any opinions expressed in this appendix are the views of the authors of the reference material and do not necessarily represent the views of the AEMC.

B.1 Brattle International Review Report

The Brattle Group, *Use of total factor productivity analyses in network regulation: case studies of regulatory practice*, October 2008. (Brattle International Review Report)

B.1.1 Scope

The AEMC requested The Brattle Group review case studies on regulators' use of TFP methodologies in setting price and revenue controls primarily for energy network companies in NZ, the UK, the Netherlands, Ontario in Canada, and selected jurisdictions in North America.

For each case study, the Brattle International Review Report covers:

- the contextual framework, the industry structure and institutional framework in the relevant market;
- how a TFP methodology is applied in network regulation and specification of the key design features to a TFP methodology;
- how the TFP framework has evolved (a historical and structural perspective) and the rationale for applying a TFP methodology in the market, and if there is any indication of future changes to the regime;
- observations on the performance of a TFP methodology; and
- identification of the conditions necessary for the successful application of a TFP methodology.

B.1.2 Observations from The Brattle Group

General observations from the Brattle International Review Report include:

- the reasons for using a TFP methodology and its specific design are difficult to identify due to the different jurisdictional institutional settings;
- TFP analysis can be used to set the rate for changing the price cap, but not for setting initial prices to achieve a reasonable profit;

- a TFP methodology is simple in concept for the regulator, but may be difficult to adopt if it does not meet all the objectives set for the regulator;
- the TFP analysis requires an appropriate benchmark set of firms to be relevant for the regulator to set prices;
- in some cases, regulators may be concerned that better performing firms may not maintain the average rate of productivity growth in the future while other firms require higher targets to encourage improvement. Here, regulators may set different efficiency targets for different firms using methodologies other than a TFP analysis with a relative productivity analysis;
- TFP analysis measures the rate of productivity change of a group of firms over time, but does not measure 'inefficiency'. Other methods such as Data Envelopment Analysis (DEA) or stochastic frontier methods can determine inefficiencies;
- some regulators use TFP methodologies (such as partial productivity method) as part of the building block approach, rather than for explicitly setting the X factor; and
- TFP methodologies can be technically difficult and controversial, with different TFP methodologies providing different results and disagreement between regulated firms and other stakeholders on the preferred method to apply.

Specific observations from the Brattle International Review Report are also made on each of the case studies. These are summarised below.

Electricity distribution in NZ

The Brattle Group observed that a TFP methodology is used for electricity distribution in NZ (where there are 28 electricity distributors) to reduce the regulatory effort for setting price controls. Here, if the threshold price, which is set by a TFP methodology, is breached, the building block approach is applied.[39]

Company-specific X factors are applied under the NZ approach. The X factor is higher for companies with below average relative TFP levels, and for companies with above average profitability.

A TFP methodology was used in NZ because regulatory accounts spanning over a number of years were already available from electricity distributors as a result of previously instigated legal requirements.

Quality of service has not yet been addressed under a TFP methodology in NZ. This needs to be resolved in order to avoid penalising firms that invest to improve service

39 Since the publication of the Brattle International Review Report, the NZ regulatory framework for electricity distribution has changed and taken effect from 1 April 2009 (subpart 9 of Part 4 of the Commerce Act 1986 (NZ)).

quality. NZ legislation does not specify a TFP methodology for the regulation of electricity distribution companies.

Energy networks in the UK

The Office of the Gas and Electricity Markets (Ofgem) has a wide discretion over how price controls are set. Under its building block approach, Ofgem uses TFP analyses as part of its review of companies' cost forecasts.[40] This allows for the determination of the rate that operating costs might be expected to fall during the regulatory period. Here, a TFP methodology is not used to set the X factor. The Brattle Group characterizes Ofgem's approach as a 'partial factor productivity' approach by the fact that it has considered evidence from TFP studies within its building block approach. For instance, Ofgem uses the building block approach and comparisons between companies to determine a reasonable level of operating expenditure for the start of the regulatory period. A productivity growth assumption is also applied to the starting level of operating expenditure to determine the allowed level of operating expenditure for the regulatory period.

Ofgem assumes that the rate that unit operating costs might fall during price control. It also assumes the rate that less productive firms will be able to reach to the level of the more productive firms.

Ofgem uses evidence from different TFP methodologies, including from the UK electricity distribution sector, and sectors in other countries. The TFP analysis is only one part of the information that Ofgem uses to set prices. The formulaic method used with the TFP data is unclear.

Electricity distribution in the Netherlands

In the Netherlands, firm-specific X factors were set by the Office of Energy Regulation (Energiekamer Directie Toezicht Energie (DTe)) based on DEA at the first regulatory period 2001-03. An outcome of this was the requirement for less productive firms to reduce their prices more quickly than more productive ones. As a consequence, all firms had the same X factor in subsequent regulatory periods using pure TFP analysis.

Pursuant to the Electricity Act 1998 (Netherlands), the DTe developed a TFP methodology for determining the price cap to promote efficient operations. It used a pure TFP analysis to establish and apply the same X factor to all firms in subsequent regulatory periods.[41]

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40 The Brattle Group notes that the gas sector consists of one transmission network and eight distribution networks. Under electricity, the transmission network is owned by the same corporate group as gas, and some of the electricity distribution networks are under common group ownership.

41 There are ten electricity distribution firms in the Netherlands.

Here, a TFP methodology is based on data which only spans from the beginning of the first regulatory period 2001-03. The TFP growth rate measurements are based on three years of data.

There have been several legal challenges from the regulated electricity distribution companies on the DTe's decisions relating to X factors. Accordingly, these decisions have been revised following these appeals. The Brattle Group suggests that these disputes may have been partially due to the DTe's consultation process on setting the X factor, and the formulaic method in using the TFP analysis to set the X factor.

Gas distribution in Ontario, Canada

Here, there were two proposed TFP methodologies by the advisors (Pacific Economics Group) to the Ontario Energy Board (the regulator) and the advisors (Dr Paul Carpenter of The Brattle Group and Professor Jeffrey Bernstein of the Florida International University) to Enbridge (one of two major gas utilities in Ontario). The two approaches were based on similar input data-sets taken from a group of US gas distribution companies, but resulted in different X factor proposals.

The Brattle Group observed that this was an example of the problem with econometric-based TFP methodologies where the results are:

- sensitive to the precise specification of the model;
- not robust, difficult or impossible to reproduce; and
- less likely to be agreed upon.

Uses of a TFP methodology in selected jurisdictions in North America

A number of jurisdictions in North America, including Ontario, Massachusetts, California and Maine, have used a TFP methodology to set price caps for energy distribution. The approach has not been specified as a requirement in relevant legislation, but has developed over time in each jurisdiction.

For energy distribution in the US, companies are regulated by state public utility commissions and the legislative framework only provides for cost of service (rate of return) regulation. As exceptions to the rule, Ontario, Massachusetts, California and Maine are the only jurisdictions in the US which use price caps regulation. In these particular jurisdictions, as each company has its own rate case, the issue of whether an industry-wide X factor or a company-specific one should be used does not arise.

The building block approach is uncommon in North America. Instead, prices are reset with reference to costs for the most recent year with available actual data or a forecast for the year following the rate case. Prices then remain at this level until a new rate case is requested by the company or customers.

In the regulated part of the US telecommunications sector, a TFP methodology has predominantly been adopted for setting prices. A major issue was applying this to only the regulated part of the companies' business. Technological changes and new competition have now reduced the regulated parts of these businesses and so a TFP methodology has been applied less for that sector.

B.1.3 Comments from the ESC

The ESC submitted that Brattle International Review Report did not refer to PEG's incentive power model, which it considered to be 'the most comprehensive, rigorous assessment of the incentive effects of alternative regulatory regimes that has been presented in Australia'. The ESC considered that the incentive effects of a TFP methodology and the building block approach should take this into account and build on this work. It also stated that the ESC's research does not support The Brattle Group's main conclusions.[42] For instance, the ESC considered that The Brattle Group did not consider:[43]

- ex ante incentives related to cost projections;
- long-term cost reduction initiatives when comparing a TFP methodology and the building block approach;
- 'light-handed' review of company costs under a TFP methodology;
- implementation and administrative costs of rival regimes; and
- the ESC's detailed argument on why a TFP methodology provides for stronger incentives than the building block approach.

The ESC also disagreed on a number of points in the Brattle International Review Report. In particular, the ESC commented on:[44]

- information asymmetries being ameliorated by a 'menu' approach of using a TFP methodology as a benchmarking tool;
- regulators benefiting from more information than less;
- the TFP outputs including service quality; and
- a TFP methodology measuring physical quantities.

42 ESC submission, June 2009, p. 5.

43 ibid., pp. 6-7.

44 ibid., pp. 8-9.

B.2 Economic Insights Sensitivity Report

Economic Insights, Energy network total factor productivity sensitivity analysis, 9 June 2009. (Economic Insights Sensitivity Report)

B.2.1 Scope

The AEMC requested Economic Insights conduct a sensitivity analysis of TFP estimates to variations in the methodology used in their construction to determine whether this was a material issue. The Economic Insights Sensitivity Report focuses on examining sensitivity to different output and input specifications, lengths of the time period used, index and weighting methods used, and the method used to calculate average growth rates.

For the sensitivity analysis of TFP results, aggregate Victorian data for electricity and gas distribution was used. The electricity data covered 1995 to 2007 while the gas data covered 1998 to 2007.

B.2.2 Findings from Economic Insights

Electricity distribution

For electricity distribution, Economic Insights found that the average annual growth rate of the output index is relatively sensitive to its specification with previously used specifications providing estimates ranging from 2.0 to 2.9 per cent. The average annual growth rate of the input index is also relatively sensitive to its specification with previously used specifications providing estimates ranging from 0.6 to over 1 per cent over the period since 1995 and a larger difference for the period since 2002.

Depending on which TFP specification is chosen, Economic Insights observed TFP growth rates ranging between 1 and 2.2 per cent over the whole period.

Gas distribution

For gas distribution, Economic Insights found that the average annual growth rate of the output index is also relatively sensitive to its specification with previously used specifications providing estimates ranging from 0.7 to over 1.7 per cent. Depending on which method is used to measure capital input quantities, the average annual input quantity index growth rate ranges from –0.4 to –1.8 per cent. This difference is more pronounced for the period since 2002 with average annual growth input rates ranging from –0.7 to –2.5 per cent.

Depending on which TFP specification is chosen, Economic Insights observed TFP growth rates ranging between 1.5 and 3.5 per cent over the period since 1998. For the more recent period since 2002, the difference is even greater with a growth rate difference of 2.5 percentage points.

B.2.3 Conclusion from Economic Insights

Economic Insights concluded that TFP analyses of Australian electricity and gas distribution systems will be quite sensitive to the specifications chosen. For electricity distribution, specifications which place more weight on throughput and peak demand output measures will exhibit higher TFP growth and more volatility than specifications that place more weight on customer number and system capacity output measures. For gas distribution, specifications which place more weight on customer number and system capacity output measures will exhibit higher TFP growth but less volatility. In both cases TFP measures which use the constant price depreciated asset value as a proxy for capital input quantities will exhibit higher growth than those using physical proxies for capital input.

Economic Insights also concluded that TFP analyses of Australian energy distribution systems will be relatively sensitive to the output and input specifications chosen, the time period examined and the method used to calculate growth rates. It stated that it is therefore important to specify the correct methodology in any future implementation of a TFP methodology.

B.3 Economic Insights Data Availability Report

Economic Insights, *Assessment of data currently available to support TFP–based network regulation*, 9 June 2009. (Economic Insights Data Availability Report)

B.3.1 Scope

The AEMC requested Economic Insights provide an assessment of whether currently available data and current regulatory reporting requirements are sufficiently robust and relevant to adequately support the implementation of a TFP methodology. Economic Insights was also requested to advise on possible courses of action to address any identified gaps in the quality and availability of such data.

B.3.2 Findings and conclusion

Coverage and definitions

In the Economic Insights Data Availability Report, Economic Insights found that the coverage of currently available historical regulatory data varied both between jurisdictions and over time. Economic Insights suggested that the available regulatory data has only concentrated on financial data. It considered that it is both financial data and its associated physical quantity data that is relevant for TFP analysis.

Nevertheless, Economic Insights considered that gaps and differences in coverage over time and across jurisdictions exist in financial data that has been collected to date. It also observed that there are many variables which remained inadequately defined,

which makes it difficult to compare across service providers, jurisdictions and time periods.

Consistency

According to Economic Insights, the consistency of regulatory data is variable across time and jurisdiction including operating expenditure.

Economic Insights regarded the transfer of network regulation to the AER as an opportunity to achieve greater uniformity of data for the future, but it will be difficult to compile a robust historical database. It also considered that there is a loss of corporate knowledge from stakeholders that would assist in determining whether past data is consistent and comparable across jurisdictions.

Accessibility

Economic Insights found that the current regulatory data is either not publicly available or, if available, is represented in aggregated format. It considered that the transparency of the TFP process is compromised by the lack of availability of all relevant data in the public domain.

B.3.3 Way forward proposed by Economic Insights

As the currently available data was found by Economic Insights to be not sufficiently robust for the purposes of a TFP methodology, it recommended ways forward to address this issue.

Economic Insights suggested that:

- a well-specified and robust national TFP database can be developed for the electricity and gas distribution industries. This database would allow for the potential to apply an alternative method of regulation in the future and address the information asymmetry issues under the building block approach;
- the AER's draft Regulatory Information Order (RIO) could include more information on outputs and inputs and consistent cost data. The extra information required would be readily available and not be onerous for service providers to supply;
- service providers and other stakeholders should be consulted on the data variables required for TFP analysis and their detailed definition;
- inconsistencies and problems in the available data for TFP analysis would be identified and rectified only by actually carrying out TFP studies and using that data;
- it will take a number of years before there is sufficient data available for a TFP methodology to commence; and

- however, a TFP methodology may commence as early as the next round of reviews if necessary, including conducting 'paper trials' of a TFP methodology compared with the building block approach.

B.4 Brattle Incentives Report

The Brattle Group, *Incentives under total factor productivity based and building-blocks type price controls*, June 2009. (Brattle Incentives Report)

B.4.1 Scope

The AEMC requested The Brattle Group compare the strength of incentives facing regulated firms under the AER's currently applied the building block approach in accordance to the NER, and an alternative TFP methodology proposed by the Victorian Proposal.

The building block approach and a TFP methodology were compared according to the strength of the incentives.

B.4.2 Conclusion from The Brattle Group

Based on the comparison between the building block approach and the Victorian Proposal, The Brattle Group concluded:

- in terms of improved cost control incentives, the difference between the Victorian Proposal and the building block approach is small, giving a marginal benefit under a TFP methodology;

- as a TFP methodology is an option under the Victorian Proposal, only service providers expecting higher prices under this approach than the building block approach would request a TFP methodology. Service providers may also be protected if a TFP methodology is an option as they would expect to earn some return if firms were efficient compared to a pure TFP methodology. On the other hand, if firm-specific factors were taken into account under a mandatory TFP methodology, service providers would also be protected;

- the Victorian Proposal does not address the issue of a service provider gaming the cost forecasts in order to accelerate the increase in prices by the regulator. Under the building block approach, incentive mechanisms such as the 'menu' approach mitigate this problem;

- the regulator would benefit in using a TFP methodology as one source of information for setting prices under the building block approach as it would add more information to improve the current framework; and

- further study should be taken to assess the availability of data required for TFP studies, the comparability between the different jurisdictions on energy within and outside of Australia, and the possibility to design a robust TFP methodology.

B.5 NAS Expenditure Profiles Report

Network Advisory Services, *Issues in relation to the availability and use of asset, expenditure and related information for Australian electricity and gas distribution businesses*, August 2009. (NAS Expenditure Profiles Report)

B.5.1 Scope

The AEMC requested Network Advisory Services (NAS) to investigate what publicly available expenditure and asset information exists for Australian electricity and gas distribution service providers. In particular, NAS was requested to look into the degree of stability of capital and operating expenditures over time and whether there is a 'wall of wire' looming for the Australian electricity and gas distribution sectors.[45]

For the gas distribution sector, NAS found that capital and operating expenditure information are publicly available for: AGL in NSW from 1996-97 and for other NSW distribution service providers from 1999-2000; Victorian distribution service providers from 1998; Envestra in South Australia from 1998-99; ActewAGL in the ACT from 1999-2000; AlintaGas in Western Australian in 2000; and Queensland distribution service providers from 2000-01 (except for Allgas which only has operating expenditure information available from 1999-2000).

B.5.2 Findings from NAS

Actual capital expenditure: 1950 to the mid 1990s

NAS indicated that it was unable to find any existing publicly available data-set of capital expenditure information for the electricity and gas distribution sectors across Australia that could be used for TFP analysis and understanding the profile of investment in Australian electricity and gas distribution infrastructure.

Information is available for distribution-specific capital expenditure data in annual reports for some service providers. For these cases, NAS did not consider this information to be feasible for preparing a comprehensive data-set of capital expenditure information.

Actual operating expenditure between 1950 to the mid 1990s was not reported on by NAS.

Actual capital and operating expenditures: mid 1990s to the present day

Generally, there was no consistency of data across jurisdictions. Some data were available but spanned for short timeframes.

45 Wall of wire' refers to the need to replace large quantities of ageing assets in a relatively short timeframe. This replacement pattern may arise if the initial commissioning of assets also occurred in bursts.

For the electricity distribution sector, NAS found that capital and operating expenditure information are publicly available for: NSW and Victoria from 1995-96; South Australia and Tasmania from 1999-2000; Queensland and the Northern Territory from 2001-02; and Western Australia and the ACT from 2002-03.

For the gas distribution sector, NAS found that capital and operating expenditure information are publicly available for: AGL in NSW from 1996-97 and for other NSW distribution service providers from 1999-2000; Victorian distribution service providers from 1998; Envestra in South Australia from 1998-99; ActewAGL in the ACT from 1999-2000; AlintaGas in Western Australian in 2000; and Queensland distribution service providers from 2000-01 (except for Allgas which only has operating expenditure information available from 1999-2000).

Forecast capital expenditure: the present day to 2029

NAS indicated that it was unable to obtain current capital expenditure forecast information for electricity and gas distribution service providers between the present day and 2029.

Age profile of distribution assets

For electricity distribution, NAS found that:

- Many electricity distribution service providers' recent regulatory submissions and proposals to their regulators include information about the age profile of their network assets;
- most of the publicly available asset age information provided by the service providers is qualitative in nature and describes the historical development, and current state, of the networks; and
- some service providers have provided quantitative and graphical details of their assets' age profiles, which highlights particular types of ageing assets.

For gas distribution, NAS found that:

- There is relatively little publicly available information in gas distribution service providers' access arrangement information documents, or elsewhere, about the age profile of their assets;
- available asset age information is generally limited to what is necessary to justify regulatory depreciation forecasts, as part of the building block approach requirements; and
- some gas distribution service providers' access arrangement information documents have provided qualitative information.

NAS indicated that it has not sought, nor had access to, information on asset registers for both electricity and gas distribution service providers. It recommended that these should be reviewed.

B.5.3 Conclusion from NAS

NAS found that there are various factors that affect the availability, quality and comparability of historic expenditure information for Australian distribution service providers in both the electricity and gas sectors. These factors limit the conclusions that can be drawn in relation to:

- the stability of capital and operating expenditures over time;
- the feasibility of past expenditure providing a reasonable indication of forecast expenditures; and
- the possibility of an impending 'wall of wire'.

NAS noted that there were a variety of factors that limit it from drawing conclusions about historic and forecast expenditure and asset age profiles for the distribution sectors. These would not necessarily affect the AER from applying a TFP methodology in the future. It suggested that the AER can request service providers to provide or prepare the relevant information via a Regulatory Information Notice (RIN) or RIO. However, NAS noted that this will depend on how effectively the service providers are able to backcast existing information into a format suitable for the AER.

B.6 London Economics TFP Experience Presentation

London Economics, *Experience with TFP methods in regulation of North American electric utilities*, 18 November 2008. (London Economics TFP Experience Presentation)

London Economics provided a presentation on TFP methodologies in North America to the AEMC. Specific jurisdictions it considered included California, Canada and New England.

The key points from the London Economics TFP Experience Presentation were:

- a TFP methodology is an exception rather than the norm in North America;
- there is no agreed model for a TFP methodology in North America;
- hybrid models with earnings sharing mechanisms are preferred;
- choosing relevant geographical regions and historical time periods for comparative analysis have been difficult for regulators; and
- regulators in North America have limited awareness of overseas trends and tend to be followers.

The London Economics TFP Experience Presentation concluded that:

- although there is a renewed interested in Canada, a TFP methodology is not extensively used for rate setting in North America;
- comparative TFP studies are challenged by differences between the North American utilities; and
- there appears to be small interest in adopting formulations based on TFP analysis, although it improves incentives.

B.7 AEMC Perspectives Report

AEMC, *Perspectives on the building block approach*, 30 July 2009. (AEMC Perspectives Report)

B.7.1 Scope

In submissions made to the Issues Paper regarding this Review, stakeholders suggested that the AEMC should understand and identify the deficiencies with the current building block approach before considering changes to the current framework. Stakeholders requested that the AEMC investigate the benefits and costs associated with the building block approach.

In response to these submissions, the AEMC conducted a survey of stakeholders in the form of a questionnaire. The questionnaire was sent to 40 stakeholders, with 18 responses received.

In these questionnaires, the AEMC enquired as to:

- the benefits and drawbacks of the building block approach;
- the adequacy of incentives or presence of disincentives;
- whether recent national reforms improved or detracted from the application of the building block approach;
- whether the building block approach was adversarial in nature; and
- evidence on the nature and quantum of costs incurred in participating in assessments of revenue proposals or access arrangements and conducting merits reviews and appeals of regulatory decisions.

The AEMC Perspectives Report compiles and describes the results of the survey process undertaken by the AEMC through the responses to the questionnaires received from stakeholders.

B.7.2 Results from the survey

Participating stakeholders considered that the main benefit of the building block approach is that it is a relatively straight-forward, stable, certain and understandable process which yields sufficient incentives for service providers to seek cost efficiencies. The major drawbacks of the building block approach appear to be that it fails to cater adequately for innovation, there is a risk that the regulator may set the level of efficient prices too low leading to insufficient returns and that the regulator is exposed to information asymmetry.

Stakeholders noted that the building block approach may be adversarial at times, but it was acknowledged that this depends upon the relationship between the regulator and service provider.

Recent energy market reforms, for the most part, are regarded to have improved the application of the building block approach although respondents indicated that some areas of reform remain. For instance, some concerns included:

- the lack of merits review available for the AER's cost of capital parameters;
- the limited review rights under the NGL and NGR as the avenues to apply for merits review are now more limited, compared to those previously available under the Gas Pipelines Access Law (GPAL);
- the AER has been provided with wider investigative and information gathering powers under the NGL and NGR compared to under the previous regimes;
- the introduction of merits review to the NEL and NER has made the regulatory review process more costly, adversarial and compounded the problem of information asymmetry;
- the introduction of legislatively prescribed timelines into the regulatory review process, combined with the practice of receiving late information from service providers, has increased the administrative costs for the regulator and made it more difficult for it to fully consider information in the decision making process;
- the risk of a perceived 'mechanical' application of the AER service incentive scheme arrangements which would render it susceptible to gaming; and
- a greater prescription of economic concepts in legal instruments has been created under the new regime which may not necessarily be in the long term interests of consumers.

C Why a TFP-based methodology could promote the national energy objectives

In undertaking this Review, the AEMC has had regard to the NEO and NGO as well as the Revenue and Pricing principles.[46] The national energy objectives are founded on the concept of economic efficiency, with explicit emphasis on the long term interests of consumers. This encompasses not only the price at which services are provided, but also the quality, reliability, safety and security of the energy network systems. It also covers the principles of good regulatory design and practice in order to promote stability and predictability of the regulatory framework, minimise operational interventions in the market, and promote transparency.

The AEMC has identified five criteria against which to assess whether a TFP methodology would contribute to the national energy objectives and would be consistent with the Revenue and Pricing principles. These are:

- cost incentives – the strength of the incentives on the service provider to pursue cost efficiencies and the extent to which such cost efficiencies are shared with end-users;
- investment incentives – the ability of the framework to ensure efficient investment to promote long term innovation and technical progress for the benefit of the service provider and end-users;
- good regulatory practice – clarity, certainty and transparency of the regulatory framework and processes to reduce avoidable risks for service providers and users;
- cost of regulation – minimisation of the costs and risks of regulation to service providers and electricity and gas users; and
- transition and implementation issues – appropriate resolution of transition and implementation issues and costs.

In this appendix we assess the performance of a TFP methodology for setting price or revenue paths against each of these criteria before making an overall assessment against the objectives. The assessment of how a TFP methodology meets these criteria is against the counterfactual of the present building block approaches for gas and electricity and whether maintaining the current arrangements would best promote the achievement of the national energy objectives. The relative advantages and disadvantages of the current application of the building block approach are thus discussed in the assessment of a TFP methodology.

46 NEL, ss. 7-7A and NGL, ss. 23- 24.

C.1 Efficiency incentives

Using a TFP methodology has the potential to create stronger incentives for service providers to pursue cost efficiencies compared to the building block approach because of two possible effects:

- a TFP methodology could provide higher returns to the service provider when it makes investments and improves its operating practices which deliver continuing productivity improvements; and

- it reduces the scope for the service provider to boost returns by exploiting its information advantage over the regulator.

The higher returns are caused by the differences in timing when prices, and hence revenues, are adjusted for ongoing productivity improvements. With the TFP index being calculated using a time series of historical data the effects of ongoing productivity improvements would take time to feed through into a higher X factor. However under the building block approach, the regulator would be able to look forward and factor into the price caps any expected cost savings caused by continuing productivity improvements at the next review.

As illustrated in the Economic Insights model constructed for the AEMC, for relatively static changes such as one-off and recurrent opex reductions and one-off capex reductions, building block and TFP-based regulatory regimes of similar regulatory period length provide broadly similar efficiency incentives to service providers. However, TFP-based regimes provide substantially stronger incentives than building block regimes to reduce rates of input growth. For example, TFP-based regimes offer far stronger incentives for reduced opex growth and for ongoing capex reductions than does the building block approach.

This stronger incentive to achieve ongoing reductions in input growth rates under a TFP-based methodology arises because in the building block case the service provider retains all of the benefit of this reduced cost over the first out-period but in the review for the second period the regulator recognises this change in both the cost level and the growth rate of costs and builds this into the building block analyses. Assuming changes are implemented near the start of the first regulatory period, the service provider hence retains none of the benefits in the second and subsequent out-periods whereas part of these benefits are retained under a TFP-based methodology.

There would also be more pressure on all service providers to out-perform, or at least maintain, the rate of industry group productivity growth. A TFP methodology would increase the profits for the service provider from both making investments and changing operating practices which deliver continuing productivity improvements. The risk to the service provider of not innovating and matching the performance of its industry peers would be greater under a TFP methodology. A TFP methodology has the potential to better encourage a service provider to seek out new ideas to improve its processes and lower its prices on an ongoing basis. Conversely, a poor performing service provider would face more risks under a TFP methodology than it would under

the building block approach as it would need to at least achieve the industry group average productivity growth to earn its benchmark rate of return. This need to match peer performance should drive greater productivity growth and innovation. This potential for additional efficiency under a TFP methodology could lead to lower prices for consumers in the long term.

The incentives under a TFP-based methodology depend not only on how the X factor is set but also on how prices are reset. The AEMC currently favours an initial price (Po) reset for the first year of the new regulatory period based on the change in revenue required to realign actual revenue for the last year of the preceding regulatory period with the annual revenue requirement for the last year of the preceding period. The annual revenue requirement for the last year of the preceding regulatory period includes all non-capital costs plus the return on and return of capital where the latter components are calculated the same as they would be for the building block approach (except that they apply to one year only and are based on actual rather than forecast costs).

This approach to price resets would maximise the efficiency properties of the TFP methodology because it allows service providers to recover their efficient costs over the regulatory period provided they achieve at least average industry group TFP growth performance. It provides a mechanism that protects both service providers and consumers by ensuring prices do not diverge from efficient costs for too long a period. This gives service providers the confidence to continue investing in the sector while striving to achieve superior productivity performance. It ensures customers will not pay prices in excess of efficient costs for extended periods while also reducing the risk of system failure as may occur if the service provider is not covering its efficient costs for a prolonged period.

If there are regular price resets then there may be limited need for additional safeguard mechanisms such as off-ramps or capital modules. However, these types of safeguards may have a role to play if longer regulatory periods are adopted under a TFP-based methodology. There is a trade-off between certainty of cost recovery and incentives for efficiency in relation to the use of price reset and safeguard mechanisms. Resolution of this trade-off should be left to the time when the service provider moves to a TFP methodology as it will depend upon the commercial nature of each service provider and its attitude to risk.

Under a TFP methodology, the information asymmetry problem would diminish because:

1. the regulator would be less reliant on the service provider's forecasts and more reliant on previous industry group results instead; and

2. the use of a TFP growth index should help to ensure that changes in prices match changes in efficient costs for the service provider.

This decreases the ability of the service provider to earn rents (at the expense of customers) from exploiting its information advantage over the regulator and reduces the need for close examination (and possible modification) of forecasts by the

regulator. This places more onus on the service provider to seek additional profits through making real productivity improvements. Efficiency will improve as price changes are more likely to better reflect changes in underlying efficient costs and there is less risk of the service provider earning undue excess profits.

If there were significant changes in market characteristics then a TFP methodology may not be as effective in alleviating information asymmetry to the extent that market changes break the link between historical and future productivity growth. However, the building block approach also has similar difficulties in dealing with uncertainty.

A TFP methodology would not improve the balancing of incentives between operating and capital expenditures. Under a TFP methodology, periodic price resets would continue and the rules for which actual capital expenditure is rolled into the RAB would be the same. Hence, the factors which influence the relative incentives between these two types of expenditure would be the same under either a TFP methodology or the building block approach.

An extra benefit from a TFP methodology is likely to be improved incentives for managerial efficiency and the adoption of innovative responses to unforeseen circumstances and new technologies although we cannot be certain of the extent of this impact at this time.

C.2 Investment incentives

For an economic regulatory approach to provide adequate investment incentives it must provide service providers with a reasonable opportunity to recover their prudently-incurred costs. Failure of a regulatory methodology to ensure that service providers are given the opportunity to recover efficient costs would damage investment incentives and put at risk system security, reliability and business continuity.

In assessing whether a TFP-based methodology provides service providers with a reasonable opportunity to recover their efficient or prudently-incurred costs in this section the AEMC has considered the following issues:

- under 'business as usual' conditions does a TFP-based methodology allow a reasonable opportunity for cost recovery?
- does a TFP-based methodology provide a reasonable opportunity for cost recovery when there are future changes affecting the industry as a whole?
- does a TFP-based methodology provide a reasonable opportunity for cost recovery when there are future changes affecting one service provider in isolation?
- if a TFP-based methodology were to increase the risks of revenues not being sufficient to cover prudently-incurred costs can appropriate safeguards be put in place to ameliorate those risks?

- would changing from the building blocks to a TFP-based methodology symmetrically increase the risks for the service provider and hence increase its benchmark weighted average cost of capital (WACC)?

TFP based regulation gives service providers achieving industry average productivity growth the opportunity to recover their revenue requirement. It thus provides service providers with a reasonable opportunity to recover their prudently-incurred costs and maintains investment incentives. Those service providers achieving above industry average productivity growth have the opportunity to exceed their revenue requirement. However, those service providers that do not achieve industry average productivity growth rates do not fully recover their revenue requirements.

An important result from the Economic Insights Model is that errors in forecasts in building block regulation can lead to significant divergences of realised revenue from actual revenue requirements. These errors in building block regulation can lead to greater variability in profitability outcomes than those typically seen under a TFP-based methodology under normal conditions. Because forecasting errors will inevitably occur in practice, the model indicates that TFP–based regulation has the potential to be a less risky alternative compared to building block regulation under normal circumstances.

The Economic Insights Model also demonstrates that a TFP-based methodology can handle significant changes and adverse shocks affecting the industry as a whole relatively well provided there are regular price resets. For example, the three fixed five–year period TFP–based option performs best of the TFP-based options in the scenario involving an anticipated increase in mandated standards. And, with resets every five years, the TFP-based approach can handle even large changes such as a 'wall of wire' effect and produce similar profitability outcomes to the business as usual base case.

If there were significant cost increases that affect only one service provider under a TFP-based methodology then it may be more difficult for that service provider to fully recover its business-specific cost increases than may be the case under the building block approach. The materiality of this problem would depend on whether or not the increase in costs trend corresponds with an upward shift in the trend of an output class which is billed (for example, volumes and connections).

The AEMC is of the view that price resets and other safeguard mechanisms such as off-ramps are largely substitutes and thus there may be limited need for additional safeguards if there are regular price resets. Indeed, including additional safeguards in this case could substantially weaken the incentive properties of a TFP-based methodology. However, there may be a role for safeguards in ameliorating risk and maintaining investment incentives if service providers propose relatively long TFP-based regulatory periods.

Overall, there are unlikely to be extra financing costs to service providers under a TFP methodology compared to the building block approach. In principle, there would be no reason why a TFP methodology could not provide similar levels of certainty for

investors as the building block approach. A TFP methodology may result in additional risks for the service provider but this would be offset by the potential to earn higher returns. Therefore, applying the same WACC in both approaches should not diminish the incentive on the service provider to make economic investments.

C3 Good regulatory practice

In assessing the merits of a TFP-based methodology, consideration needs to be given to whether introducing a TFP-based methodology would lead to any diminution of the clarity, certainty and transparency currently incorporated into economic regulation under the NER and NGR. The analysis must also include consideration of the impact that a TFP-based methodology may have on the consistency of how economic regulation is applied.

The formation of rules for a TFP-based methodology would include the specification of criteria and circumstances relevant to the exercise of regulatory discretion. This task must take into account the requirements of good regulatory principles and practice. In this way, requirements such as clarity and certainty of regulation would be met.

The work to increase regulatory consistency in the energy sector is an ongoing process. The introduction of a TFP-based methodology would not hinder this work. In fact, it may provide a framework to assist in developing greater regulatory consistency. Specifically, the introduction of a TFP-based methodology would provide support to move toward greater consistency in regulatory reporting.

While introducing a TFP-based methodology may diminish the flexibility for jurisdictional differences to continue under the current arrangements because of the need for standardised data and practices, this issue can be managed in the detailed specification of the rules relevant to a TFP-based methodology.

C4 The costs of regulation

To assess this issue, a comprehensive view should be taken of the 'cost' of regulation. It includes the resources and time expended by service providers, regulators and other parties that participate in regulatory processes. This includes both the cost incurred during the regulatory determination process and also the ongoing (or intra-regulatory period) costs on parties to support the regulatory methodology. Consideration of the costs incurred to establish a TFP methodology is also needed. The potential costs of a TFP methodology must be compared to the regulatory costs of proposals, consultation, consultant assessments, draft determinations, proposal revisions, final determinations and possibly appeals after the determination that are incurred under the current arrangements.

The cost of a TFP methodology based revenue determination is expected to be less than the costs incurred in the building block approach based determination.

Time and resources will be required to establish a TFP methodology, in particular, to implement an appropriate regulatory reporting regime. However, a reporting regime that provides a robust and relevant data-set for each sector is required irrespective of what revenue determination methodologies are set out in the NER and NGR. Accordingly, the additional cost for such a regime to provide TFP relevant data is unlikely to be excessive because there is substantial overlap in the data required for either the TFP or building block method. The additional cost for a reporting regime to provide TFP relevant data is likely to be small given the type of information requests and compared to the current costs in applying the building blocks method which amount to at least $327 million per regulatory cycle.[47]

There is potential for the occurrence of reviews and appeals to be less under an established TFP methodology than under the building block approach, if the decision making process becomes more mechanical. If this eventuates then regulatory costs will fall. However, the likelihood of reviews is difficult to gauge and it should be acknowledged that the introduction of any new revenue determination process may result in a higher likelihood that decisions will be reviewed in the short term.

On balance, there is potential for savings in regulatory costs to occur under a TFP methodology. These savings would be greater if a TFP methodology leads to the use of longer regulatory periods. However, it is difficult to form a definitive conclusion on the cost of regulation impact of the introduction of a TFP methodology to the NER and NGR as it will depend upon the detailed design and the number of service providers being regulated under a TFP methodology.

C5 Transition and implementation issues

Demand management incentives are an important transitional issue that needs to be assessed when evaluating a TFP-based methodology.

Using a TFP methodology to determine revenues and prices would provide slightly better demand management incentives for electricity distribution service providers than the building block approach. A TFP methodology is likely to have more inbuilt incentives to undertake demand management because it includes an incentive to utilise assets well. This has the effect of encouraging the service provider to undertake demand management activity prior to the construction of new assets.

The building block approach needs the addition of an external mechanism such as the demand management incentive scheme to provide service providers with appropriate incentives to improve asset utilisation. In contrast, a TFP methodology incorporates some demand management incentives. However, it is also feasible to operate a demand management incentive scheme in conjunction with a TFP methodology and so there would be minimal transition issues.

47 AEMC 2009, Review into the use of total factor productivity for the determination of prices and revenues: perspectives on the building block approach, 30 July 2009. (Perspectives Report)

C6 Overall assessment

This Review was initiated to advise the MCE on whether providing for a TFP methodology in addition to the existing arrangements would contribute to the NEO and NGO.

A TFP methodology attempts to expose regulated service providers to competitive market like pressures by linking their prices and revenue to the recent productivity performance of the industry group as a whole instead of basing them on an assessment of forecast service provider-specific costs. This approach therefore offers a potentially innovative alternative to the existing building block approach. It is argued that a TFP methodology can deliver stronger performance incentives, lower regulatory administrative costs and redress the information asymmetry issues faced by regulators. As a result of these effects, it is argued that a TFP methodology would increase benefits available to consumers by lowering prices in the long run.

In order to assess whether a TFP methodology would promote the national energy objectives the AEMC developed the five key criteria considered in this appendix for testing whether a TFP methodology would promote economic efficiency and would be consistent with the Revenue and Pricing Principles. These criteria cover cost incentives, investment incentives, good regulatory practice, the costs of regulation, and transition and implementation issues.

The assessment of how a TFP methodology would meet these criteria is against the counterfactual of the current building block approaches for gas and electricity. This requires identifying problems with the current arrangements and determining whether a TFP methodology would address these issues.

Although the current building block approaches seem to perform well in promoting investment, there are questions on whether the current arrangements adequately promote efficiency, whether they exacerbate information asymmetries facing the regulator, and whether administrative procedures are inappropriate and too costly. These could be leading to higher prices for customers.

A key disadvantage of the current arrangements is the ability of a service provider to use its information advantage strategically to exploit the regulatory process to increase its profits to the disadvantage of consumers. The inadequacy and inconsistency of the current regulatory reporting requirements seem to add to this problem.

Based on its assessment against the five key criteria the AEMC is of the view that inclusion of a TFP-based methodology for setting price or revenue paths would contribute to achieving the NEO and NGO. It has the potential to improve economic efficiency and would be in the long term interests of consumers.

D How to calculate a TFP index

To estimate TFP growth for an energy network service provider, a method is needed to combine changes in the quantities of a diverse range of outputs and inputs into measures of the change in total output quantity and total input quantity. There has been some debate about the appropriate method to employ in measuring TFP growth including the time period over which to undertake the calculation and how output and input quantities should be specified and measured. It is important that the index specification used accurately measure productivity growth of the industry to ensure that service providers are provided with a reasonable opportunity to recover the efficient costs incurred in providing regulated services.

The AEMC requested Economic Insights to examine the sensitivity of TFP results to differences in output and input specification. The report found that differences in specification could lead to material differences in measured TFP growth rates.[48] In a subsequent report Economic Insights examined output and input specification issues in more detail.[49]

The detailed design and construction of a TFP index will be tasks for the AER. However, the AEMC has identified certain key principles that the TFP index needs to comply with for it to provide an accurate measure of industry productivity growth and, when combined with other aspects of a TFP-based methodology for determining prices and revenues such as the use of appropriate starting prices, for it to allow service providers the opportunity to recover their efficient costs. The key principles that the industry TFP measure needs to comply with are included in the proposed Rule and were discussed briefly in section 3.3.4. The principles are:

- the index number method must be used;
- the measure creates no systematic bias in the TFP growth estimate;
- the measure is consistent with the service provider's regulatory asset base;
- output quantities used in the calculation accurately reflect the services supplied and charged for;
- capital user costs are set exogenously and are consistent with the property of financial capital maintenance;
- the measurement of capital input quantity accurately reflects the physical service potential of assets employed in the provision of standard control services (that is, the depreciation profile used in forming the capital input quantity is consistent with physical asset depreciation characteristics).

48 Economic Insights, *Energy network total factor productivity sensitivity analysis*, 9 June 2009

49 Economic Insights, *Total factor productivity index specification issues*, 7 December 2009

The model prepared by Economic Insights demonstrates that distribution businesses achieving at least industry average productivity growth rates can be expected to at least recover their revenue requirement when the TFP index complies with these principles and an appropriate TFP-based regulation methodology is used. In this Appendix we provide further information on the principles.

D1 Index number method

A TFP index is generally defined as the ratio of an index of output growth divided by an index of input growth. Growth rates for individual outputs and inputs are weighted together using revenue or output cost shares and input cost shares, respectively. In other words, the TFP index is essentially a weighted average of changes in output quantities relative to a weighted average of changes in input quantities. The Economic Insights Specification Report noted that TFP indexes have a number of advantages including:

- indexing procedures are simple and robust;
- they can be implemented when there are only a small number of observations;
- the results are readily reproducible;
- they have a rigorous grounding in economic theory;
- the procedure imposes good discipline regarding data consistency; and
- they maximise transparency in the early stages of analysis by making data errors and inconsistencies easier to spot than can be the case using some of the alternative econometric techniques.

To operationalise the index number concept a way is needed to combine changes in diverse outputs and inputs into measures of change in total outputs and total inputs. Different index number methods take this weighted average change in different ways.

In the Design Discussion Paper we recommended that the AER be permitted to choose the index number method it considers appropriate, provided the method chosen satisfies the important technical requirement of being 'superlative' (that is, it can provide a close approximation to an arbitrary smooth function). Both the commonly used Fisher and Törnqvist index number methods are superlative.

The Fisher index technique is increasingly favoured by statistical agencies because it satisfies all the desirable axiomatic properties for price and productivity indexes.

D2 No systematic bias

The second principle is that the TFP growth measure does not create any systematic bias. If the TFP growth estimate is biased upwards relative to actual industry productivity growth then there is a risk that service providers will not be able to

recover their efficient costs because the X factor will be set too high. Conversely, if the TFP growth estimate is biased downwards then there is a risk that service providers will earn excessive returns.

An upward bias in the measured TFP growth rate could result, for example, from overestimating the rate of decay in capital input service potential. This would produce an artificially high TFP growth measure and an X factor that was correspondingly too high. A downward bias in the measured TFP growth rate could result, for example, from underestimating the annual cost of capital inputs where capital input quantities are increasing at a slower rate than operating input quantities. This would lead to too little weight being placed on the slower growing input and result in an underestimate of TFP growth and hence in too low an X factor being set.

D3 Consistency with the service provider's RAB

The TFP growth measure needs to be consistent with the service provider's regulatory asset base (RAB). This means that the annual capital cost included in the TFP measure needs to be based directly on the return of and return on the RAB and be consistent with ex ante FCM.

The main practical implication of this condition is that the cost of capital measure used in the TFP growth measure needs to be consistent with financial capital maintenance (FCM). FCM refers to the requirement that investors be given the opportunity ex ante to recover the full opportunity cost of their investments in present value terms. This requires that they be able to recover their investment in real terms – referred to as the return of capital – while receiving compensation for the opportunity cost of that capital including an allowance for risk – referred to as the return on capital. If investors can be assured of ex ante FCM with regard to the RAB - and new investment is incorporated in the RAB - then they will be indifferent between investing in the industry and other alternative forms of investment. FCM is a key regulatory principle and plays a key role in building blocks regulation. It is, thus, important that the capital user cost used in the TFP measure is consistent with ex ante FCM based on the RAB if the subsequent use of the measure in a TFP-based methodology for determining prices and revenues is to promote economic efficiency.

D4 Output quantities

The fourth principle is that output quantities used in calculating the TFP growth rate accurately reflect the services supplied and charged for.

Some submissions commented on the issue of whether just billed outputs should be included or whether both billed and unbilled outputs should be included. Because network industries are natural monopolies the price of billed outputs will typically not equal their marginal cost (as would be the case in a competitive industry).

Furthermore, some key output dimensions that would be charged for in competitive industries may not be charged for at all in networks. Jemena provided examples of the

disparity that can exist between network output and the basis of charging that has evolved as accepted practice or for convenience.[50] Economic Insights has recently shown that all network outputs – both billed and unbilled – should ideally be included in the productivity measure and that each output should be weighted by the difference between its price and marginal cost in deriving the X factor.[51]

The ESC and PEG submissions argued that only billed outputs should be included in the productivity measure as this is the only way service providers can recover their costs.[52] While costs are ultimately recovered from billed outputs, the Economic Insights report noted that prices for these outputs are higher than they otherwise would be if there are important network outputs that are not billed for and this deviation of prices from marginal costs has a detrimental impact on economic efficiency.

Because marginal costs are not readily observable and their estimation would currently require the use of econometric methods, it is likely to be necessary to rely on including only billed outputs with revenue share weightings in TFP measures in the short to medium term. We advise that the AER should undertake further research on the feasibility of obtaining accurate marginal cost measures and including unbilled as well as billed outputs in TFP measures.

Most distribution TFP studies have incorporated outputs covering throughput (reflecting variable volume-based charges), customer numbers (reflecting fixed charges) and measures of either peak demand or system capacity. Some studies have used peak demand measures as a proxy reflecting demand-based charges for large users. However, using relatively erratic measures such as system peak demand as proxies to reflect demand-based charges and contracted reserved capacity charges would be likely to cause significant inaccuracies and potential biases in the measured TFP growth rate. The output variables listed in Appendix F seek to include direct information in the Regulatory Disclosure Data on demand–based charges and quantities – an area where existing reporting has been lacking. This should allow more accurate TFP indexes to be constructed in future.

Service quality is an important dimension of output for service providers but one that is typically not charged for explicitly. The Economic Insights Specification Report noted that service quality has also proven to be problematic to include in TFP measures because of the way it is measured. TFP measures cannot readily incorporate an output where the production of more of the output (eg reliability) is measured by a decrease in the relevant measure (SAIDI and SAIFI in this case).

As a TFP-based methodology provides better efficiency incentives than the building block approach and because service quality cannot readily be incorporated within the TFP measure, it is important that an external service quality incentive mechanism

50 Jemena submission, October 2009, pp.4-5.

51 Economic Insights, The theory of network regulation in the presence of sunk costs, Report for the Commerce Commission, 11 June 2009.

52 ESC submission, March 2010, pp. 14-15 and PEG submission, April 2010, pp.10-13.

operates with a TFP-based methodology. In this way, there would be clear and direct incentives to maintain and improve system security and reliability.

Most jurisdictions that have used a TFP method address service quality considerations by way of a separate 'S' factor scheme so that the overall price cap becomes of the form CPI–X+S. The best approach to handling service quality issues and providing the appropriate incentives to maintain or improve service quality is likely to be to continue the use of a separate mechanism similar to that currently operated by the AER rather than attempting to include service quality measures directly in the TFP index.

D5 Capital user costs

The fifth principle that needs to be met is that annual capital costs used in calculating the TFP growth rate need to be set exogenously and be consistent with the property of FCM. As noted under the third principle above, achieving ex ante FCM is an important prerequisite for regulatory outcomes to be consistent with promoting economic efficiency. Annual capital costs that are consistent with ex ante FCM can normally only be implemented using an exogenously specified capital cost based on the RAB, regulatory depreciation parameters and the weighted average cost of capital.

Calculating the annual capital cost endogenously as the difference between revenue and operating costs will not result in ex ante FCM-consistent capital costs except by accident. A number of TFP studies have used this approach to measure capital costs. While it measures realised or ex post capital costs and may provide an approximation for ex ante costs for utility industries where there has been a history of building blocks regulation, it would not be appropriate to use this approach in a TFP index that was subsequently used directly in a TFP-based methodology for the determination of prices and revenues where ex ante FCM was an important part of the regulatory framework.

The Economic Insights Model provides an example of how to calculate an exogenous annual user cost of capital that is consistent with ex ante FCM.

D6 Capital input quantities

The last principle that needs to be satisfied is that the measurement of the capital input quantity used in calculating the TFP growth rate accurately reflects the production characteristics of the industry (that is, the depreciation profile used in forming the capital input quantity is consistent with physical asset depreciation characteristics). The actual physical capital input quantity available to service providers each year – or the total service potential of available assets - is the relevant quantity measure for calculating TFP growth. This is akin to the 'carrying capacity' of the asset each year. This quantity is not directly observable and so assumptions need to be made about how asset service potential decays over time. As noted above, overestimating the rate of decay in annual capital input service potential would bias the TFP growth rate upwards and could result in too high an X factor being set. This would mean that service providers would not then have a reasonable opportunity to recover their efficient costs.

The ESC and PEG submissions have advocated the use of 'monetary' measures to proxy the capital input quantity.[53] This would involve using constant price depreciated asset values as a proxy. However, if based on regulatory depreciation, such a series would assume that the service potential or carrying capacity of an energy network capital asset declines in a straight-line fashion. That is, the ability of the line or pipeline to carry energy declines by a given amount each year. With many service providers having opted to front end load depreciation charges such an approach would effectively assume that carrying capacities fall sharply in the early years of an asset's life.

The Economic Insights Specification report noted that, instead of falling off by a given amount each year, the carrying capacity of an energy network asset stays relatively constant over its life. The report also noted that leading statistical agencies have recognised that most capital assets – and structures in particular - maintain their service potential at relatively high levels for most of their lives. As a result Economic Insights argues that proxy measures which reflect a relatively constant service flow over the asset's life will produce more accurate measures of TFP growth and not put the service provider's ability to recover its efficient costs at risk as could occur using a 'monetary' proxy. The 'monetary' proxy overestimates the decay in service potential and hence TFP growth and could lead to too high an X factor being set.

It should be noted that the issue of what proxy to use for the capital input quantity is separate from the issue of what is an appropriate user cost of capital. If either the 'carrying capacity' or 'monetary' approaches to proxying capital input quantities are used, the user cost of capital should be based on the RAB, regulatory depreciation parameters and the weighted average cost of capital in both cases. But the two approaches to proxying capital input quantities will have different implications for the implied price of annual capital inputs. In the case of the 'carrying capacity' approach, the quantity of annual capital input from an asset remains relatively constant over its lifetime while the annual user cost declines over time (as each year the asset has fewer years of life left and so is progressively worth less despite its relatively unchanged annual input to the production process). This implies the price of annual capital input declines over the asset's lifetime. But under the 'monetary' approach to proxying annual capital input quantities, the annual capital input quantity of an asset also declines over time leaving the implied price of annual capital input relatively unchanged over the asset's lifetime. The approach where implied annual capital input prices decline over time for an asset but the asset's annual capital input quantity remains relatively unchanged appears to be the most appropriate for the major network assets.

The detailed formation of a TFP index will need to take the six principles above into account to allow service providers the opportunity to recover their efficient costs. The Economic Insights Model shows that achieving the six principles is possible. The main gap between the model and current circumstances relates to the availability of data, particularly that for demand-based charges, contracted reserved capacity, line capacity and transformer capacity. However, these information gaps can be readily addressed

53 ESC submission, March 2010, p.14, and PEG submission, April 2010, pp.21-30.

by collection of the Regulatory Disclosure Data. Similarly, many other variables are not currently of sufficient consistency and this will also need to be addressed in the Regulatory Disclosure Data. Once consistent and robust Regulatory Disclosure Data becomes available it will be possible to test whether proposed TFP growth measures satisfy the six principles outlined above.

E Possible use of output-based measures in transmission regulation

In section 4.3.3 we noted that Grid Australia in its submission argued that a TFP-based methodology is not appropriate for use in determining prices and revenues because of the lumpy nature of transmission investments, difficulties in measuring transmission outputs and differing geographic and physical network characteristics.[54] However, we also noted that many of the same problems apply to the application of existing building block methods and asymmetric information remains a significant problem for regulation of transmission network service providers (TNSPs). Information asymmetry between TNSPs and the regulator, shortcomings in current regulatory reporting and variability between TNSPs make the assessment of proposals, claims, performance and comparative benchmarking difficult.

Collection of Regulatory Disclosure Data from TNSPs will increase the range of benchmarking analyses that can be undertaken for TNSPs in building block reviews. However, there may be a case for considering alternative variants of TFP-based and building block methodologies to address the characteristics of transmission. One such variant could be the inclusion of an output incentive, somewhat along the lines of Ofgem's RIIO approach but where the output measure focuses on quantification of primary transmission output functions and required capabilities and performance levels.

In this Appendix we review recent work in this area by Ofgem along with some of the steps that have already been taken in Australia to identify valued outputs from TNSPs and that have been incorporated into present regulatory practice. We then examine the scope to extend this approach to the incorporation of more explicit and comprehensive output incentives.

E1 Ofgem's RIIO approach

In its examination of the history, success and development of the UK RPI regulatory regime, Ofgem initiated the RPI-X@20 project and has proposed a new regulatory price control mechanism known as the RIIO model. The RIIO acronym stands for Revenue = Incentives + Innovation + Outputs.

With regard to transmission Ofgem has noted that RIIO is "designed to drive real benefits for consumers; providing network companies with strong incentives to step up and meet the challenges of delivering a low carbon, sustainable energy sector at a lower cost than would have been the case under our previous approach." [55]

54 Grid Australia submission, December 2010, p.1

55 Ofgem 2011, Decision on strategy for the next transmission price control – RIIO-T1, the RIIO-T1 Overview Paper, London, 31 March 2011, Overview page

Ofgem goes on to state that the objective of RIIO is to "encourage network companies to play a full role in the delivery of a sustainable energy sector, and to do so in a way that delivers value for money for existing and future consumers. It does this by:

- rewarding those companies that demonstrably deliver the network services that consumers value, and that deliver the networks needed to drive a move to a low carbon energy sector; companies that do not deliver will be penalised
- underlining our commitment to ensuring efficient companies are able to attract equity and debt through a transparent and stable approach to financeability
- containing the impact on consumer bills of the significant investment needed in the energy networks."[56]

The Ofgem RIIO approach provides conventional revenue incentives (through task performance at costs lower than those predicted in the accepted business plan), plus incentives for innovative initiatives, plus rewards (and penalties) for key output results compared with targets which could be based on either previous performance or specified expectations. The extension of the scheduled regulatory review period from 5 years to 8 years seeks to offer more certainty to the TNSP and to facilitate its financing.

Ofgem notes that it is rewarding delivery for consumers by setting output measures for safety, reliability and customer satisfaction and stakeholder engagement with strong incentives for efficient delivery. TNSPs that perform well in these areas will be able to earn rewards while those that do not will face penalties.

Ofgem has identified six primary output categories for network companies including: customer satisfaction; safety; reliability; conditions for connection; environmental impact; and social obligations. The Ofgem output measures are based on a report by Frontier Economics.[57]

While outputs in the six primary output categories are all recognised by Ofgem as being of value to consumers, not all are readily quantifiable. For instance, with regard to customer satisfaction Ofgem was of the view that a customer survey and discretionary reward for stakeholder engagement should be the key components of the primary relevant output. It proposes to provide a stronger financial incentive in this area of +/-1 per cent of allowed revenue.

For safety, Ofgem proposes the primary output should be for the TNSPs to comply with their legal safety requirements. It does not propose to attach financial incentives to the primary output related to safety.

With regard to reliability, Ofgem proposes that the primary output should be Energy not served and that a symmetrical incentive should be set closely aligned with the value of loss load (VoLL). Ofgem proposes to apply a common collar of 3 per cent of

56 ibid., Executive Summary p1

57 Frontier Economics 2010, RPI-X@20: output measures in the future regulatory framework – A Report Prepared for Ofgem, London, May 2010.

allowed revenue across all TNSPs and to enforce a minimum standard of performance through a licence condition.

Ofgem notes that the definition of timeliness of connection will vary across different types of connection. It plans to set a connections output based on existing legal requirements with a downside penalty for TNSPs taking longer than the required timescales.

With regard to an environmental output, Ofgem notes a broad measure and includes a reputational incentive for both the gas and electricity TNSPs promoting low carbon flows. Ofgem is not proposing to include a social obligations output for TNSPs.

Ofgem also proposes to include a suite of 'secondary' outputs to ensure any risk to the long-term delivery of the primary outputs is managed. These secondary outputs are:

- asset risk (asset health, criticality and replacement priorities)
- system unavailability and average circuit unreliability (ACU)
- faults, and
- failures.

The secondary forward-looking outputs seek to identify and predict aspects of network performance where the effect would fall beyond the normal (short relative to asset life) regulatory period and seek to address the needs of customers in the longer term. In this broader context, Ofgem noted that "delays in efficient network investment could undermine progress towards the UK's renewable energy targets, inhibit a competitive and efficient market, and threaten security of supply." The secondary outputs are thus related to the outputs that TNSPs should deliver in the coming price control period to ensure delivery of primary outputs in future periods and are related to activities such as wider reinforcement works.

The overall objective of including TNSP outputs in the RIIO framework appears to be to provide an incentive for the TNSPs to supply more optimal levels of outputs that are not explicitly priced under current charging mechanisms. The appropriate outputs to include will depend on jurisdiction-specific circumstances and priorities. As a result the emphasis in the UK regime is slanted towards environmental considerations which currently assume particular importance in Europe. However, the output incentive dimension of the RIIO framework could equally be focused on key functional outputs of transmission capability and reliability. In the case of Australia, this could have a role to play in placing greater emphasis on achieving optimal levels of capability and reliability compared to the current revenue cap building blocks regime which tends to be more cost focused. Some aspects of the Australian regulatory framework have already started to move in this direction and they are examined in the following sections.

E2 Service Target Performance Incentive Scheme

The National Electricity Rules were amended with effect from 16 November 2006 by the insertion of a new Chapter 6A titled Economic Regulation of Transmission Services.[58] As well as defining the methodology for determining the Maximum Allowed Revenue through a building blocks approach and the requirement for application of CPI-X escalation throughout the regulatory period, the new Rule includes a requirement for the AER to develop a Service Target Performance Incentive Scheme (STPIS) making the revenue cap of the CPI-X+S form.

The Rule sets out principles for the recognition of quantifiable output performance in areas valued by transmission users leading to the development and implementation of such a scheme which should (as its first item):

(1) provide incentives for each Transmission Network Service Provider to:

   (i) provide greater reliability of the transmission system that is owned, controlled or operated by it at all times when Transmission Network Users place greatest value on the reliability of the transmission system; and

   (ii) improve and maintain the reliability of those elements of the transmission system that are most important to determining spot prices.

These principles recognise that there are locations and times when performance is highly valued (so as not to restrict the economically optimum operation of the market), while there are other locations and times where the performance of transmission system elements may have lesser impact.

In developing the STPIS the AER noted that it aims "to improve the transmission service standards regime by linking service standards incentives more directly to market outcomes."[59] It noted that "the (then) existing incentive scheme … is a useful starting point but has some limitations" and that the scheme "could be improved by targeting outages that have an adverse impact on dispatch outcomes and in doing so focus TNSPs' resources on outages that matter to market participants."

The AEMC had earlier noted in its Chapter 6A final determination that it believes that the existing incentive scheme should continue to be developed to ensure that TNSPs have effective incentives to provide greater reliability of the system at times when the system is most valued and in relation to those elements that are most important to developing spot prices.

This STPIS consists of a service incentive component and a market impact component.

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58 AEMC 2006, National Electricity Amendment (Economic Regulation of Transmission Services) Rule 2006 No 18 16 November 2006

59 AER 2007 Service Target Performance Incentive Scheme – Developing incentives based on the Market Impact of Transmission Congestion – Issues Paper, June 2007, p 5

E.2.1 Service incentive component

The service incentive component scheme parameters are:

- transmission circuit availability
- loss of supply event frequency, and
- average outage duration.

The service incentive scheme component is applied through performance and revenue adjustment parameters applicable to those TNSPs subject to the scheme. However, while standard parameter definitions for the service component are provided, there are also substitute (and differing) parameter definitions and values for some of the TNSPs under the scheme. A desirable outcome of the introduction of Regulatory Disclosure Data requirements would be greater standardisation of all data items and definitions between TNSPs and over time.

In its revenue proposal, each TNSP must submit proposed values for the parameters including a performance target (defining the levels of performance for either financial penalty or reward), as well as a collar and cap which, respectively, indicate the level of performance for maximum financial penalty and maximum financial reward. The TNSP must propose weightings for its parameters which must, in summation, equal the maximum revenue increment or decrement allowable under this scheme for this service component. The maximum increment or decrement under the service component is 1 per cent of the TNSP's maximum allowable revenue for the relevant year.

E.2.2 Market impact component

The AER has developed three indicators of the impact of transmission network congestion on electricity markets to improve the transmission service standards regime by linking service standards incentives more directly to market outcomes:

- total cost of constraints – TOC
- outage cost of constraints – OCC, and
- marginal cost of constraints – MCC.[60]

The AER is of the view that the MCC measure has the potential to best meet relevant criteria. As a result the market impact parameter is the number of dispatch intervals where an outage on a TNSP's network results in a network outage constraint with a marginal value greater than $10/MWh.

60 AER 2007 Service Target Performance Incentive Scheme – Developing incentives based on the Market Impact of Transmission Congestion – Issues Paper June 2007 p 5

In its proposal, each TNSP must submit proposed values for a performance target (derived in principle from its previous average performance) and a cap (which must equal zero dispatch intervals) being the level of performance resulting in the maximum financial reward for the market impact parameter. The maximum revenue increment or decrement under the market impact component is 2 percent of the TNSP's maximum allowable revenue for the relevant year.

The total service standards factor is the summation of the factors for each parameter, and is applied for a calendar year to the average of the Allowed Revenues as adjusted by the CPI and X factors in the determination. There appears to be scope for using increased incentives as the Rules at para 6A.7.4 (b)(3) require a maximum increment or decrement under the scheme to fall between 1 per cent and 5 per cent of the maximum allowed revenue.

The STPIS can be characterised as the application of a CPI – X + O formulation where the O represents incentives (rewards and penalties) for improved service quality performance by the TNSP. It thus has some similarities to the Ofgem RIIO model although only reliability and congestion outputs are included. In the following section we examine the scope to extend the coverage of functional transmission outputs.

E3 Further work on TNSP capability, performance and incentives

A key output of a transmission network is transmission capability which is the ability of the network to handle desired power flows and avoid constraints. It is a dynamic variable depending both on the capacity limitation of individual network elements and the way these elements are operated collectively under different power system conditions. Congestion in the system, or constraint on the way the market can operate at any time imposes economic costs on the market and, hence, on the community.

In its work on developing output measures for Ofgem, Frontier Economics noted that there are two key challenges associated with promoting adequate transmission capability:

- if TNSPs have incentives to connect generation quickly, what outputs are required to incentivise the TNSPs to manage the resulting constraints efficiently?; and

- if constraints are likely to increase as a result of the connections incentive, is there a danger that new generators could be constrained off without another output that incentivises the network operator to ensure that the new generators' power actually flows?[61]

To achieve an efficient level of constraints, Frontier Economics noted that the TNSP must be incentivised to alleviate constraints where the expenditure required to do so is lower than the NPV of the expected reduction in congestion costs resulting from

61 Frontier Economics 2010, RPI-X@20: output measures in the future regulatory framework – A Report Prepared for Ofgem, London, May 2010, p.67-8

alleviating the constraint. Alleviating a constraint might involve expanding network capacity or alternative congestion management measures such as interruptible contracts and demand side management. Ideally, networks would be incentivised to seek the most cost-efficient ways of reducing constraints to the efficient level.

The AEMC has previously note that factors influencing network capability include:

- the network assets that are out of service, either for planned maintenance or due to unplanned outages;
- weather events, for example, the prospect of lightning may reduce the secure flow limits that can be prudently applied in the dispatch process along a particular transmission route; and
- the operating behaviour of electricity producers and consumers, including how that behaviour might be influenced by network support and control contracts with the market operator or TNSPs.[62]

TNSPs can influence network capability by:

- investing to increase the capacity of network elements;
- maintaining network elements to ensure they are capable of operating to their technical limits (ie at their capacities);
- scheduling network outages at times when the value of network capability is relatively low; and
- engaging in other activities, such as the procurement or provision of Network Support and Control Services to enhance network capability.

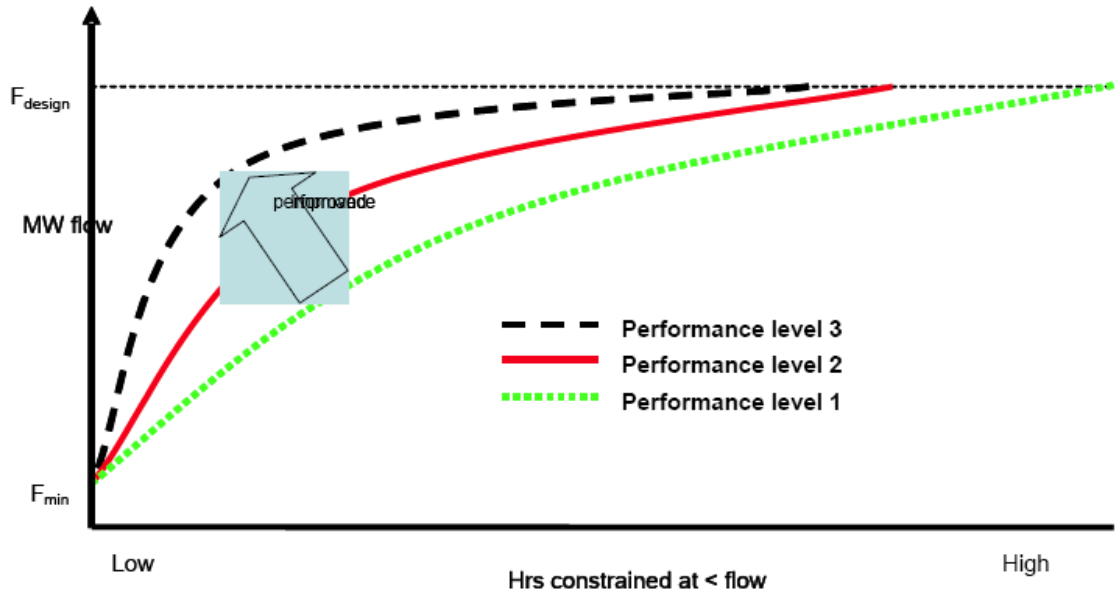
It has been recognised that present regulatory and market mechanisms do not sufficiently encourage and reward delivery of transmission outcomes most valued by users (although the market impact component of the STPIS is a first step in this direction). There may be scope for the application of higher reward/penalty parameters to offer further incentive for valued network capability. As well, further development work is needed on capability definition and the provision of associated incentives relating to network congestion and its effect on the market. One problem is the basing of performance around partial output measures rather than more general measures of transmission capability.

More disaggregated information on network capability (for example over a larger number of possibly congesting flow paths) could enhance any TNSP incentive scheme and improve the ability of market participants to predict likely congestion. It would also provide greater general transparency to the market of the outputs delivered by TNSPs.

62 AEMC 2007, Congestion Management Review – Draft Report , Sydney, 27 September 2007 pp.128-9

A further suggestion recognises that network capability cannot be adequately described by a single number and should instead be represented by a constrained flow versus duration curve which plots the level of flow when binding against the number of hours binding at each level of flow. [63] Higher performance levels would be associated with higher flows available (near the design flow) being constrained for short periods, while lower performance would derive from flows constrained at lower level and for greater periods of time (see Figure C1).

Figure C1: Network capability



In the Congestion Management Review for the MCE the AEMC recommended that the market operator be required to publish a single, central resource for congestion-related information (CIR).[64] The objective of the CIR is to provide information in a cost effective manner to market participants to enable them to understand patterns of network congestion and make projections of market outcomes in the presence of network congestion."

Development of this information, its availability and associated reporting of congestion events should assist in the development and assessment of transmission capability output measures.

Inclusion of a transmission capability output incentive in either the current building blocks or a TFP-based methodology has the potential to improve market outcomes and warrants further investigation. Similarly, there is likely to be a role for including incentives for the other output dimensions included in the Ofgem RIIO framework. The availability of robust and consistent Regulatory Disclosure Data for TNSPs has an important role to play in facilitating these improved outcomes.

63 AEMC 2007, Congestion Management Review – Draft Report , Sydney, 27 September 2007 pp.134-5

64 ibid, p 212

F Proposed required data set

In this appendix we present lists of the variables required to support TFP analysis in each of the four sectors – electricity distribution, electricity transmission, gas distribution and gas transmission.

F1 Electricity distribution

OUTPUTS

DUOS Revenue– $m

From Fixed Customer Charges
From On–Peak Energy Deliveries
From Off–Peak Energy Deliveries
From Contracted Maximum Demand
From Measured Maximum Demand

From Domestic Customers
From Commercial Customers
From Small Industrial Customers
From Large Industrial Customers
From Other Customers
Total – $m

Revenue/penalties from incentive schemes (eg S factor) – $m

Total Energy delivered – GWh

On–Peak Energy Deliveries – GWh
Off–Peak Energy Deliveries – GWh
Summated Contracted Maximum Demand[65] – MW
Summated Measured Maximum Demand[66] – MW
Domestic Customer Energy Deliveries – GWh
Commercial Customer Energy Deliveries – GWh
Small Industrial Customer Energy Deliveries – GWh
Large Industrial Customer Energy Deliveries – GWh
Other Customer Energy Deliveries – GWh

Non–coincident System Annual Peak Demand – MW

Coincident System Annual Peak Demand – MW

Total Distribution Customer Numbers– no

Domestic Customer Numbers
Commercial Customer Numbers
Small Industrial Customer Numbers
Large Industrial Customer Numbers

65 For customers charged on this basis

66 For customers charged on this basis

Other Customer Numbers
Total – no

Reliability

Distribution–related SAIDI
Distribution–related SAIFI

Line losses – %

INPUTS

Total Distribution O&M Expenditure (opex) (excluding depreciation and all capital costs) – $m

Shared allocation of opex overheads to distribution activities (eg head office) included in above – $m

Opex by category

The costs of operating and maintaining the network (excluding all capital costs and capital construction costs) disaggregated as follows[67] *– $m:*

Network operating costs – $m
Network maintenance costs – $m
Inspection
Maintenance and repair
Vegetation management
Emergency response
Other network maintenance
Other operating costs (specify items > 5% total opex) – $m

Total opex – $m

Corporate overhead costs should be allocated to the relevant categories.

Additionally, the following item is required:

An estimate of the opex costs that would be associated with end–user contributed assets that are operated and maintained by directly connected end–users (eg transformers) if the operation and maintenance were provided by the DNSP (please describe basis of estimation). – $m

Direct employees – no

Number of full–time equivalent employees in operating and maintenance activities (including shared overhead allocation). Employee time spent on capital construction projects is to be excluded.

Direct labour cost – $m

Labour cost (including on–costs) of employees in operating and maintenance activities (including shared overhead allocation). Cost of time spent on capital construction projects is to be excluded.

67 Illustrative disaggregation for cross checking purposes

Distribution System Capital Quantities and Capacities

O/H network circuit length – km
- Low voltage distribution
- HV 11 kV
- HV 22 kV
- HV 33 kV (if used as distribution voltage)
- SWER
- S/T 44/33 kV (if used as subtransmission)
- S/T 66 kV
- S/T 132 kV
- (Other voltages)

Total overhead circuit km

U/G network circuit length – km
- Low voltage distribution
- HV 11 kV
- HV 22 kV
- HV 33 kV (if used as distribution voltage)
- S/T 66 kV
- S/T 132 kV
- (Other voltages)

Total underground circuit km

Transformer Total Installed Capacity – MVA
- Zone substation transformer capacity
  - Zone substation capacity where there are two transformation steps (eg 132 kV to 66 kV then 66 kV to 11 kV)
  - Zone substation capacity where there is a single transformation step (eg 132 kV to 22 kV)
- Distribution transformer capacity owned by utility
- Distribution transformer capacity owned by HVCs

Regulatory Asset Base Values – $m
- Overhead distribution assets (wires and poles)
- Underground distribution assets (cables)
- Distribution substations including transformers
- Sub–transmission assets (wires and poles)
- Sub–transmission substations including transformers
- Total – $m

RAB Reconciliation – $m
- Opening value
- Inflation addition
- Regulatory depreciation
- Actual additions (recognised in RAB)
- Retirements
- Revaluation adjustments
- Resulting summation for asset value

Smoothed asset value wrt revaluations

Basis for initial RAB, eg DORC, adjusted DORC, historic cost, etc

Have DORC valuations been undertaken? If so, for which years?

Actual Capital Expenditure – $m

Overhead distribution assets (wires and poles)
Underground distribution assets (cables)
Distribution substations including transformers
Sub–transmission assets (wires and poles)
Sub–transmission substations including transformers
Services
Meters
SCADA and other remote control
Other – IT
Other – non IT
Total Capital Expenditure – $m

Asset Lives – estimated total and residual – years

Overhead distribution assets (wires and poles)
Underground distribution assets (cables)
Distribution substations including transformers
Sub-transmission assets (wires and poles)
Sub-transmission substations including transformers
Services
Meters
SCADA and other remote control
Other – IT
Other – non IT

Value of Capital Contributions or Contributed Assets – $m

Price Index for Labour Inputs

Price Index for O&M Expenditure

Price Index for Network Assets

F2 Electricity transmission

OUTPUTS

TUOS Revenue– $m

From Fixed Customer (Exit Point) Charges
From Variable Customer (Exit Point) Charges
From Fixed Generator (Entry Point) Charges
From Variable Generator (Entry Point) Charges
From Fixed Energy Usage Charges (Charge per day basis)
From Variable Energy Usage charges (Charge per kWh basis)
From Energy based Common Service and General Charges
From Capacity based Common Service and General Charges
From Fixed Demand based Usage Charges
From Variable Demand based Usage Charges

From Other connected transmission networks
From Distribution networks
From Directly connected end–users
From Generators
Total – $m

Revenue/penalties from incentive schemes (eg S factor) – $m

Throughput Energy – GWh

To Other connected transmission networks
To Distribution networks
To Directly connected end–users (please specify voltage)
Total energy delivered – GWh

Maximum demand – MW

Transmission System Capital Quantities and Capacities

Line length by voltage level – km

Network circuit kilometres (route length multiplied by number of circuits per tower at year end) for the following voltage classes:

500 kV
330 kV
275 kV
220 kV
132 kV

Other (please specify)
Total circuit kilometres

Data for each voltage is to be given separately for overhead and underground circuits.

Transmission circuit availability – hours

Total number of hours for the following (force majeure events to be excluded):

Circuit hours actually available
Maximum possible number of circuit hours

Number of loss of connection[68] *events by time – no*

The total and planned numbers of loss of connection (outage) events by the following outage lengths:

less than 0.2 minutes (including momentary unavailability pending a reclosure which is successful)
greater than 0.2 minutes
greater than 1 minute.

Excluded events to include circuit interruptions caused by third party systems such as intertrip signals from another party, generator outage or by customer installations, and force majeure events.

Average outage duration – mins

Aggregate minutes of duration of all and planned outages divided by the number of respective outage events.

68 Give separated data for total and planned events

Excluded events to include circuit interruptions caused by third party systems such as intertrip signals from another party, generator outage or by customer installations and force majeure events.

Line losses – %

INPUTS

Opex

Total Transmission opex (excluding depreciation and all capital costs) – $m

Shared allocation of opex overheads to transmission activities (eg head office) included in above – $m

Opex by category – $m
The costs of operating and maintaining the network (excluding all capital costs and capital construction costs) disaggregated as follows[69] *$m :*

Network operating costs
Network maintenance costs:
- Inspection
- Maintenance and repair
- Vegetation management
- Emergency response
- Other network maintenance

Other operating costs (specify items > 5% total opex)

Total opex – $m

Corporate overhead costs should be allocated to the relevant categories.

Additionally, the following item is required – $m

An estimate of the opex costs that would be associated with end–user contributed assets that are operated and maintained by directly connected end–users (eg transformers) if the operation and maintenance were provided by the TNSP (please describe basis of estimation).

Direct employees – no

Number of full–time equivalent employees in operating and maintenance activities (including shared overhead allocation). Employee time spent on capital construction projects is to be excluded.

Direct labour cost – $m

Labour cost (including on–costs) of employees in operating and maintenance activities (including shared overhead allocation). Cost of time spent on capital construction projects is to be excluded.

Installed transformer capacity – MVA

Transmission substations (eg 500 kV to 275 kV)
Terminal points

69 Illustrative disaggregation for cross checking purposes

Transformer capacity for directly connected end–users owned by the TNSP
Transformer capacity for directly connected end–users owned by the end–user
Other (please specify)

Regulatory Asset Base Values – $m

Overhead lines
Underground cables
Transformers owned by the TNSP
Transformers owned by directly connected end–users
Other assets including:
    Communications equipment
    Land and buildings
    Other items not elsewhere included
Total – $m

RAB Reconciliation – $m

Opening value
Inflation addition
Regulatory depreciation
Actual additions (recognised in RAB)
Retirements
Revaluation adjustments
Resulting summation for asset value

Smoothed asset value wrt revaluations

Basis for initial RAB, eg DORC, adjusted DORC, historic cost, etc

Have DORC valuations been undertaken? If so, for which years?

Actual capital expenditure – $m

Overhead lines
Underground cables
Transformers owned by the TNSP
Transformers owned by directly connected end–users
Other assets including:
    Communications equipment
    Land and buildings
    Other items not elsewhere included
Total – $m

Asset Lives – estimated total and residual – years

Overhead lines
Underground cables
Transformers owned by the TNSP
Transformers owned by directly connected end–users
Other assets including:
Communications equipment
Land and Buildings
Other items not elsewhere included

Value of Capital Contributions or Contributed Assets – $m

Price Index for Labour Inputs

Price Index for O&M Expenditure

Price Index for Network Assets

F3 Gas distribution

OUTPUTS

Gas delivered[70]

- Total
  - Energy – TJ per annum
  - Maximum per day – TJ / day
  - Maximum per hour – TJ / hr
  - Distribution Revenue $m
    - Revenue from fixed charges
    - Revenue from variable charges
    - Total Revenue – $m
  - Number of Customers – no.
- Domestic Volume Based Tariffs
  - Energy – TJ per annum
  - Maximum per day – TJ / day
  - Maximum per hour – TJ / hr
  - Distribution Revenue – $m
    - Revenue from fixed charges
    - Revenue from variable charges
    - Total Revenue – $m
  - Number of Customers – no.
- Non–domestic Volume Based Tariffs
  - Energy – TJ per annum
  - Maximum per day – TJ / day
  - Maximum hour – TJ / hr
  - Distribution Revenue – $m
    - Revenue from fixed charges
    - Revenue from variable charges
    - Total Revenue – $m
  - Number of Customers – no.
- Capacity Based Tariffs
  - Energy – TJ per annum
  - Maximum per day – TJ / day
  - Maximum per hour – TJ / hr
  - Distribution Revenue – $m
    - Revenue from fixed charges
    - Revenue from variable energy charges
    - Revenue from variable capacity charges
    - Total Revenue $m

70 Data should be based where possible on chargeable items.

Number of Customers – no.

Contracted / Reserved / Take or Pay Tariffs

Energy – TJ per annum

Contracted Energy – TJ per annum

Measured Energy – TJ per annum

Contracted Maximum per day – TJ / day

Measured Maximum per day – TJ / day

Contracted Maximum per hour – TJ / hr

Measured Maximum per hour – TJ / hr

Distribution Revenue – $m

Revenue from fixed charges

Revenue from contracted energy

Revenue from measured energy

Revenue from contracted maximum per day

Revenue from measured maximum per day

Revenue from contracted maximum per hour

Revenue from measured maximum per hour

Number of Customers – no.

Tariff elements based on other output items (if any)

Quantity of each output

Distribution Revenue – $m

Revenue from each output

Number of Customers – no.

Revenue/penalties from incentive schemes (eg S factor) – $m

System Performance

SAIDI

SAIFI

Number of interruptions affecting 5 customers or fewer

Number of interruptions affecting more than 5 customers

Unaccounted for Gas – %

INPUTS

Opex

Total distribution opex (excluding depreciation and all capital costs) – $m

Shared allocation of opex overheads to distribution activities (eg head office) included in above – $m

Operating expenses disaggregated as follows[71] *– $m*

Network Operations

Customer Connections

Meter Reading Services

Billing and Revenue Collection

Advertising and Marketing

71 Illustrative disaggregation for cross checking purposes

Regulatory Costs
Change in Provisions
Other Operating Costs (excluding those below)
Subtotal of above – $m

Maintenance expenses disaggregated as follows[72] *– $m*
City Gate Stations
Transmission mains
Distribution mains
Services
Cathodic protection
Supply Regulators
Meters
SCADA and remote control
Other
Subtotal of above – $m

Direct employees – no

Number of full–time equivalent employees in operating and maintenance activities (including shared overhead allocation). Employee time spent on capital construction projects is to be excluded.

Direct labour cost – $m

Labour cost (including on–costs) of employees in operating and maintenance activities (including shared overhead allocation). Cost of time spent on capital construction projects is to be excluded.

Distribution System Capital Quantities and Capacities
Transmission mains – over 1050 kPa g
Weighted average of max sustainable pressure – kPa g
Weighted average of pipe diameter – mm
Pipeline Length – km
High Pressure Distribution mains – up to 1050 kPa g
Weighted average of max sustainable pressure – kPa g
Weighted average of pipe diameter – mm
Pipeline Length – km
Medium Pressure Distribution mains – 20 to 210 kPa g
Weighted average of max sustainable pressure – kPa g
Weighted average of pipe diameter – mm
Pipeline Length – km
Low pressure distribution mains – to 7 kPa g
Weighted average of max sustainable pressure – kPa g
Weighted average of pipe diameter – mm
Pipeline Length – km
Pipeline length by material – km
Polyethylene
PVC
Protected Steel

72 Illustrative disaggregation for cross checking purposes

Unprotected Steel
Cast iron
Other
Service connections (from mains to customer)
Number
Length – km
City Gate Stations – no
Field regulators – no
District Regulators – no
Meter Regulator Installations – no
Meters over 10 cubic metres/hour
Meters up to 10 cubic metres/hour

Regulatory Asset Base Values – $m
City Gate Stations
Transmission mains
High pressure distribution
Medium pressure distribution
Low pressure distribution
Cathodic protection
Services
Supply Regulators / Valve Stations
Meters
SCADA and other remote control
Other – IT
Other – non IT
Total – $m

RAB Reconciliation – $m
Opening value
Inflation addition
Regulatory depreciation
Actual additions (recognised in RAB)
Retirements
Revaluation adjustments
Resulting summation for asset value

Smoothed asset value wrt revaluations

Basis for initial RAB, eg DORC, adjusted DORC, historic cost, etc

Have DORC valuations been undertaken? If so, for which years?

Actual Capital Expenditure – $m
City Gate Stations
Transmission mains
High pressure distribution
Medium pressure distribution
Low pressure distribution
Cathodic protection

Services
Supply Regulators / Valve Stations
Meters
SCADA and other remote control
Other – IT
Other – non IT
Total – $m

Asset Lives – estimated total and residual – years

City Gate Stations
Transmission mains
High pressure distribution
Medium pressure distribution
Low pressure distribution
Cathodic protection
Services
Supply Regulators / Valve Stations
Meters
SCADA and other remote control
Other – IT
Other – non IT

Value of Capital Contributions or Contributed Assets – $m

Price Index for Labour Inputs

Price Index for O&M Expenditure

Price Index for Network Assets

F4 Gas transmission[73]

OUTPUTS

Revenue – $m

From Contracted / Reserved / Take or pay capacity charges
From Measured capacity charges
From Contracted / Reserved / Take or pay throughput charges
From Measured throughput charges
From other charges[74] (if any)
Total – $m

Revenue/penalties from incentive schemes (eg S factor) – $m

Number of gas input locations

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73 In cases where various pipeline segments are used differently eg where major off-takes occur along a line rather than where the line provides a dedicated "point to point" delivery, details of quantities and revenues may be necessary for individual line segments.

74 Details should be provided of quantity and charge associated with any other tariff items eg charges based on the value of the relevant pipeline system rather than its use.

Listing of inputs

Number of off–take locations

Listing of off–takes

Gas throughput – TJ

Contracted / Reserved/ Take or pay Annual total delivery
Measured Annual Total delivery
Contracted / Reserved / Take or pay Maximum Daily Quantity
Measured Maximum Daily quantity
Contracted / Reserved/ Take or pay Maximum Hourly Quantity
Measured Maximum Hourly Quantity
Delivered to connected distribution systems
Delivered to other connected transmission systems
Delivered to directly connected end–users
Delivered to other

Gas maximum throughput capacity – TJ

Annual total delivery
Maximum Daily Quantity
Maximum Hourly Quantity

Reliability

Gas transmission reliability indicators are not well developed and need to be discussed with stakeholders

Unaccounted for Gas – %

INPUTS

Opex

Total Transmission opex (excluding depreciation and all capital costs) – $m

Shared allocation of opex overheads to transmission activities (eg head office) included in above – $m

Operating expenses– $m

Maintenance expenses disaggregated as follows[75] *– $m*

Compressor Stations
City Gate Stations
Transmission mains
Other

Direct employees – no

Number of full–time equivalent employees in operating and maintenance activities (including shared overhead allocation). Employee time spent on capital construction projects is to be excluded.

75 Illustrative disaggregation for cross checking purposes

Direct labour cost – $m

Labour cost (including on–costs) of employees in operating and maintenance activities (including shared overhead allocation). Cost of time spent on capital construction projects is to be excluded.

Transmission System Capital Quantities and Capacities

Transmission mains – over 1050 kPa g
- Weighted average of max sustainable pressure – kPa g
- Weighted average of pipe diameter – mm
- Pipeline Length – km

Other mains – less than 1050 kPa g
- Weighted average of max sustainable pressure – kPa g
- Weighted average of pipe diameter – mm
- Pipeline Length – km

Compressor Stations –no

City Gate Stations –no

Regulatory Asset Base Values – $m
- Transmission mains
- Other mains
- Compressor stations
- City Gate Stations
- SCADA and other remote control
- Other – IT
- Other – non IT
- Total – $m

RAB Reconciliation – $m
- Opening value
- Inflation addition
- Regulatory depreciation
- Actual additions (recognised in RAB)
- Retirements
- Revaluation adjustments
- Resulting summation for asset value

Smoothed asset value wrt revaluations

Basis for initial RAB, eg DORC, adjusted DORC, historic cost, etc

Have DORC valuations been undertaken? If so, for which years?

Actual Capital Expenditure – $m
- Transmission mains
- Other mains
- Compressor stations
- City Gate Stations
- SCADA and other remote control
- Other – IT

Other – non IT
Total – $m

Asset Lives – estimated total and residual – years
Transmission mains
Other mains
Compressor stations
City Gate Stations
SCADA and other remote control
Other – IT
Other – non IT

Value of Capital Contributions or Contributed Assets – $m

Price Index for Labour Inputs

Price Index for O&M Expenditure

Price Index for Network Assets

G Response to submissions on model

The AEMC has received three submissions specifically addressing the Economic Insights Model. These submissions were from Grid Australia (with an accompanying note prepared by Harding Katz), Pacific Economics Group and Energeia.[76] In this appendix we respond to the main points raised in these submissions drawing on advice from Economic Insights.

G1 Grid Australia submission

The Harding Katz note accompanying the Grid Australia submission argues that the criticisms of building blocks regulation made by Economic Insights appear to be a direct consequence of the assumption that under the building blocks model X factors are set to zero rather than to equate forecast revenues and costs in the final year of the forthcoming regulatory period. However, in section 4.2 of the Economic Insights Model Report results using alternative P_0 and X factor combinations are presented and the conclusions remain the same.

It should be noted that Economic Insights' findings regarding the incentive properties of building block versus TFP-based methodologies are invariant to the choice of P_0 and X factor combinations. This is because the building block P_0 and X parameters are not independent of each other and, once one is set, the other is set to equate the net present value of forecast revenue with the net present value of forecast revenue requirements. For convenience Economic Insights has generally set X=0. This is the same approach as adopted in the earlier ESC/PEG stylised model.[77] Economic Insights also reports base case results with $X=P_0$ and X=1.4 per cent (the rate of industry TFP growth).

Setting $X=P_0$ approximately equates end-year forecast revenues and revenue requirements for each out-period. While the latter approach produces a smoother building blocks price path than setting X=0 if the building blocks forecasts are completely accurate, if the building blocks forecasts are not completely accurate (as will inevitably be the case) then the building blocks price path will tend to diverge from the actual unit cost path (and the TFP-based price path) producing a less smooth price path for consumers. Thus, the price path facing consumers under a TFP methodology will be less volatile than that under building blocks in nearly all cases.

The Harding Katz note also argues that because the forecast data used in the modeling are relatively stable this may lead to unrealistically stable TFP outcomes. However, the model is a simulation model comparing scenario outcomes with a business as usual situation. The growth rates for future years are similar to the trends for the historic period for each service provider. Harding Katz quote historic variations in TFP growth ranging from -0.3 per cent to 3.1 per cent compared to the range of forecast TFP growth rates of 1.2 per cent to 1.7 per cent. However, the growth rates of -0.3 per cent and 3.1

76 Grid Australia submission, October 2010; Pacific Economics Group submission, August 2010; Energeia submission, January 2011.

77 Essential Services Commission supplemental submission, May 2009

per cent quoted by Harding Katz are individual year growth rates rather than trend historical growth rates which do in fact also range from 1.2 per cent to 1.7 per cent. It is precisely because there is uncertainty regarding whether we are yet in a 'steady state' situation that the proposed Rule sets out the conditions that need to be satisfied before a TFP-based methodology could be implemented. An important part of this is likely to involve doing 'paper trials' based on actual data over time (once it becomes available).

Harding Katz go on to argue the modeling examines only one TFP specification and, therefore, does not test the sensitivity of the model outputs to alternative specifications. They also argued the chosen TFP specification does not tackle some of the more potentially challenging and important design issues, such as how to address differences in reliability performance or topography. While the AMEC requested that alternative (output and input) specifications not be examined at this stage, it should be noted that the model could be readily adapted to do this. On the impact of operating environment conditions (such as topography), this is something to be examined by the AER in the context of forming one or more industry groups once robust data are available. And reliability incentives would need to be handled by an S factor approach in both TFP-based and building blocks approaches.

In their discussion of forecasting error Harding Katz state that it is 'axiomatic that TFP-based regulation - which does not have any regard to forecast expenditure - is not prone to forecasting error'.[78] In making this statement Harding Katz do not appear not to appreciate that TFP-based approaches simply use a different type of forecasting (ie extrapolation of the past) rather than not needing to make forecasts. Forecasting error is thus a relevant issue for both TFP-based and building blocks approaches.

Harding Katz go on to state that 'In our view, the above scenario illustrates that building block regulation is likely to be superior than TFP-regulation if there is an anticipated step increase in capital or operating expenditure'.[79] However, in making this statement Harding Katz are not comparing like-with-like in terms of regulatory period lengths (5 years for building blocks versus 15 years for the TFP-based option) in the scenario they refer to and they are ignoring the Economic Insights Model Report qualifier that TFP-based regulation can handle step changes provided there are relatively frequent price resets (or equivalent safeguards).

Finally, Harding Katz argue that the model does not include an efficiency benefit sharing scheme for the building blocks model and, therefore, an accurate comparison of retention rates cannot be made. This statement is, however, inaccurate as the Economic Insights Model implements the savings scenario changes at the start of the regulatory period to approximate the effects of having an efficiency benefit sharing scheme under the building blocks model.

78 Grid Australia submission, October 2010, p.5

79 Grid Australia submission, October 2010, p.6

G2 Pacific Economics Group submission

In its submission Pacific Economics Group states that it 'strongly supports' the Economic Insights Model. It goes on to note that any differences between Economic Insights and itself are 'minor'.[80]

The Pacific Economics Group submission then goes on to argue that its approach to measuring annual capital input quantities using so-called 'monetary' proxies is preferable to using measures of physical carrying capacity to proxy annual capital input quantities. The submission claims evidence presented to the Victorian Bushfires Royal Commission supports the case that network assets deteriorate significantly over their lifetime and hence use of 'monetary' measures is reasonable. However, much of the quoted evidence relates to tie wire maintenance rather than the annual carrying capacity of assets. While tie wire and cross arm maintenance is of obvious importance in preventing bushfires it is not necessarily germane to the capability of the asset to provide a relatively constant annual service input, ie to be capable of carrying a similar amount of energy to when the asset was new.

As noted in Appendix D, the actual physical capital input quantity available to service providers each year – or the total service potential of available assets - is the relevant quantity measure for calculating TFP growth. This is akin to the 'carrying capacity' of the asset each year. This quantity is not directly observable and so assumptions need to be made about how asset service potential decays over time. The use of 'monetary' measures based on regulatory depreciation to proxy the capital input quantity assumes that the service potential or carrying capacity of an energy network capital asset declines in a straight-line fashion. That is, the ability of the line or pipeline to carry energy declines by a given amount each year.

The Economic Insights Specification report noted that, instead of falling off by a given amount each year, the carrying capacity of an energy network asset stays relatively constant over its life. The report also noted that leading statistical agencies have recognised that most capital assets – and structures in particular - maintain their service potential at relatively high levels for most of their lives. As a result Economic Insights argues that proxy measures which reflect a relatively constant service flow over the asset's life will produce more accurate measures of TFP growth and do not put the service provider's ability to recover its efficient costs at risk as could occur using a 'monetary' proxy. The 'monetary' proxy overestimates the decay in service potential and hence potentially overestimates TFP growth.

G3 Energeia submission

In its submission Energeia expressed concerns that the approach adopted in the Economic Insights Model used output measures that do not reflect the outputs of a distribution service provider and that the TFP-based approach has an inherent historical bias that leads to outcomes that cannot reflect emerging factors.

80 Pacific Economics Group submission, August 2010, pp.1-2

Energeia argued that distribution output measures should cover capacity and distance components rather than 'energy transported'. However, most distribution service providers base a significant proportion of their charges on energy throughput and this has to be recognised in the TFP measure if service providers are to be able to recover their efficient costs under a TFP-based methodology. In Appendix D we noted that some key output dimensions that would be charged for in competitive industries may not be charged for at all in networks. Economic Insights has recently shown that all network outputs – both billed and unbilled – should ideally be included in the productivity measure and that each output should be weighted by the difference between its price and marginal cost in deriving the X factor.[81]

However, because marginal costs are not readily observable and their estimation would currently require the use of econometric methods, it is likely to be necessary to rely on including only billed outputs with revenue share weightings in TFP measures in the short to medium term.

The Energeia submission goes on to present the results, in graphical form, of a Monte Carlo analysis reportedly using the Economic Insights Model. While no details of the implementation of the analysis are presented and it is thus not possible to assess what has been done, the reported results appear to reinforce the findings of the Economic Insights Model. That is, there is a wider range of revenue versus costs outcomes under a TFP-based methodology than under building blocks and DBs 1 and 2 are disadvantaged in a TFP-based methodology while DBs 3, 4 and 5 fare better under a TFP-based methodology than under building blocks. Since a TFP-based methodology provides incentives for businesses to outperform industry average TFP growth, those that achieve less than industry average TFP growth will be disadvantaged while those that achieve higher than average TFP growth will be advantaged under a TFP-based methodology compared to building blocks. The Monte Carlo analysis thus reinforces this finding.

Finally, the Energeia submission argues that a TFP-based methodology would not adequately cater for the introduction of a carbon price. While the introduction of a carbon price has not yet been included in the Economic Insights Model, the scenarios examined to date show that a TFP-based methodology can cope relatively well with considerably larger shocks (such as a 'wall of wire' replacement investment spike) provided there are regular price resets or appropriate safeguard mechanisms in place. The Energeia interpretation that a TFP-based methodology is intended provide a 'set and forget' solution is thus not correct. Rather, any regulatory regime will require relatively frequent review in a time of ongoing and uncertain changes. The results from the Economic Insights Model show that a TFP-based methodology can handle large shocks as well as the building blocks approach provided resets occur at a similar frequency as under building blocks. At the same time, it is acknowledged that a TFP-based methodology would be more appropriately introduced in a period of relatively stability as foreshadowed by the conditions listed in section 3.3.3.

81 Economic Insights, The theory of network regulation in the presence of sunk costs, Report for the Commerce Commission, 11 June 2009.

H Summary of issues raised in submissions on the Draft Report

Written submissions on the Review's Draft Report were received from ActewAGL, Energeia, Energex, Energy Networks Association, EnergyAustralia, Energy Safe Victoria, Ergon Energy, ETSA Utilities/CitiPower/Powercor, Grid Australia, Integral Energy, Jemena, Multinet Gas and United Energy Distribution, SP AusNet, and the Victorian DPI. Supplementary submissions were received from Jemena and Energy Safe Victoria.

The table below provides a summary of the issues raised by stakeholders in their submissions on the Review's Draft Report. Stakeholder views have been grouped around assessment of a TFP methodology against the national energy objectives, conditions needed to support application of a TFP methodology, and the way forward. The submissions and supplementary submissions received are available on the AEMC website at www.aemc.gov.au.

Topic	Sub-topic	Issues raised in submissions
Assessment of a TFP-based methodology against the national energy objectives	Efficiency incentives under a TFP-based methodology	ETSA/CitiPower/Powercor (p.2) argued the AEMC's assessment was based on purely theoretical analysis instead of actual examples and evidence. Energex (p.1) considered that no significant efficiency point of difference exists between the building block approach and a TFP-based methodology. Jemena (p.1) accepted the Commission's finding that a TFP methodology can advance the national gas and electricity objectives and supported the AEMC's proposed staged approach to advancing the evaluation and possible introduction of a TFP methodology. SP AusNet (p.3) welcomed the Draft Report's conclusion that TFP-based regulation is consistent with the national energy objectives. It argued a sound TFP regime would not only provide stronger incentives for businesses to perform well and earn

Topic	Sub-topic	Issues raised in submissions
		above average returns, but also deliver lower prices to consumers over the longer term. Victorian DPI (p.1) argued a TFP-based methodology offers a potential enhancement to the efficiency of pricing the network component of energy prices, by driving long term dynamic efficiency improvements through stronger incentives to improved network planning and operation.
	Investment incentives under a TFP-based methodology	No comments received
	Good regulatory practice	ETSA/CitiPower/Powercor (p.5) argued the AEMC did not appear to have adequately taken into account overseas experience and findings. It argued Ofgem's findings concluded that the future requirements on network businesses are likely to be different to those that they have previously faced while the Dutch network businesses had appealed DTe's decisions.
	The cost of regulation	Energex (p.1) believed the costs of additional requirements may be substantial based on previous refinements and additions to data reporting requirements and auditing would involve further costs. EnergyAustralia (p.3) considered the cost and magnitude of the TFP data collection exercise should not be underestimated and would not be marginal as the AEMC contended. Ergon Energy (p.2) considered the changes to accounting and information systems required to accommodate necessary data consistency would be extremely costly. It

Topic	Sub-topic	Issues raised in submissions
		argued a comprehensive cost-benefit analysis should have been undertaken to see whether the potential benefits of TFP outweigh the additional costs. SP AusNet (p.3) argued TFP-based regulation can provide a genuine opportunity to deliver a lower cost regulatory regime, and drive network businesses to achieve further cost savings and service improvements.
	Transition and implementation issues	Victorian DPI (p.2) urged the AEMC to bring forward the proposed implementation rule design phase of its review to ensure that this is completed by 2013 in readiness for the next Victorian electricity price determination, and to ensure that it is flexible enough to permit the use of different TFP specifications as necessary to contribute to the objective in relevant jurisdictions. Energex (p.1) suggested that more than one TFP specification should have been considered to provide confidence in the Draft Report conclusions.
	Overall assessment against the objectives	ActewAGL (p.1) fully supported consideration of alternatives and improvements to the current building block approach. But it argued it would be premature to develop draft Rules to introduce a TFP-based methodology at this stage. EnergyAustralia (p.2) considered the AEMC's finding that TFP could promote the NEO should be re-considered as the analysis set out in the Draft Report did not substantiate such a finding. The deferral of the development of Rules to implement a TFP-based methodology was seen as a prudent step (p.5). The ENA (p.7) expressed concern that regulatory determinations based on historic costs only will not provide businesses with a reasonable opportunity to recover at

Topic	Sub-topic	Issues raised in submissions
		least their efficient costs, which is inconsistent with national energy law objectives and revenue and pricing principles. Jemena (p.1) accepted the conclusion that the introduction of a TFP-based methodology in the NEL/NGL would advance the national energy objectives. However, it pointed out that the AEMC did not make an explicit statement in relation to the revenue and pricing principles (p.2). Victorian DPI (p.1) welcomed the AEMC's confirmation that it believed the use of a TFP-based price setting methodology could achieve the national energy objectives. DPI stated it would prefer to see a more specific assessment of the benefits of applying a TFP-based methodology on a jurisdiction by jurisdiction basis.
Conditions needed to support application of a TFP-based methodology	An available, robust and credible data-set	ActewAGL (p.1) noted that establishing a robust and consistent data set was a critical requirement and that the development of the AER's annual reporting process appeared to have stalled (p.2). Energex (p.2) noted that the availability of consistent, comparable and reliable data was critical to the credibility of a TFP-based methodology. It opposed any recommendation to backcast data as this would involve regulator discretion and reduce confidence in TFP outcomes (p.4). EnergyAustralia (p.9) noted that the inappropriateness of currently available data was 'well established and beyond doubt' and backcasting was therefore inappropriate. Ergon Energy (p.8) argued that significant work will need to be done on reporting

Topic	Sub-topic	Issues raised in submissions
		systems to enable the collection of accurate data and it therefore disagreed with the use of earlier historical data as it was likely to be derived differently across service providers which would contribute to inconsistencies in information. Grid Australia (p.5) considered that it is not necessary to collect data in order to conclude that TFP-based regulation should not apply to the transmission sector.
	An accurate measure of industry productivity growth	Grid Australia (p.1) commented that a TFP index will not be able to accurately reflect the transmission industry's productivity growth because of problems associated with lumpy transmission investment, difficulties in measuring service outputs including network reliability, and different geographical and physical characteristics of networks.
	The TFP index cannot be manipulated by service providers	Grid Australia (p.5) pointed out that a TFP index can be influenced by individual service providers, noting the AEMC's observation that Powerlink and TransGrid each hold approximately 30 per cent of the total regulated asset base in the electricity transmission sector.
	Members of an industry group face similar productivity conditions	ActewAGL (p.3) considered that further empirical research is needed in relation to whether all service providers within an industry group face comparable productivity growth prospects. It noted that a key issue is whether differences in operating conditions affect productivity growth prospects.
	The TFP index is a good estimate of future productivity growth	Energy Safe Victoria (p.2) argued that conditions the AER must examine are both unnecessary and counterproductive. It argued that because the TFP-based approach is an option for companies, the companies should be able to decide whether the

Topic	Sub-topic	Issues raised in submissions
		estimated TFP trend is appropriate. ENA (p.8) was concerned that due to differences in productivity conditions between networks, historic TFP growth may not be an accurate estimate of future productivity growth. The factors that can influence productivity include differences in operating conditions and initial levels of productivity. ETSA/CitiPower/Powercor (p.12) commented that past productivity performance may not be a reasonable predictor of future productivity growth because the assumption of a 'steady state' is not supported. It argued ageing asset bases, legislative changes, new regulatory obligations, technological changes, unforeseen demand growth and transitioning to a lower emissions environment would all make future costs different to past costs.
	The TFP index is relatively stable	ActewAGL (p.3) considered that further analysis is required on the possible implications of ongoing and potential changes in energy markets, and whether and how a TFP-based methodology could deal with such changes. Energy Safe Victoria (p.4) argued concern over volatility in TFP trends is misplaced. It noted that year-to-year volatility does not necessarily have implications for stability of the price path, which depends on the behaviour of the long-term trend over a multi-year period.
	Assessment of a TFP-based methodology in the electricity and gas sectors	ETSA/CitiPower/Powercor (p.10) argued that a specific framework should be developed that constrains and guides the AER's assessment of the criteria for whether conditions are met to develop a TFP-based methodology.

Topic	Sub-topic	Issues raised in submissions
		Grid Australia (p.2) welcomed the AEMC's conclusion that it appears unlikely that it would be appropriate to implement a TFP-based methodology for the electricity and gas transmission sectors. SP AusNet (p.7) supported the view that TFP-based regulation is unlikely to be suitable for the economic regulation of transmission.
The way forward	Proposed approach for implementing a TFP-based methodology	All service providers supported the deferral of drafting of Rules for a TFP-based methodology for determining prices and revenues until the necessary conditions are met. They considered that this would allow further testing of a TFP methodology once data starts to be collected and enable: • appropriate consideration of the impacts of climate change policy and smart grids; • further experience to be gained of the current building blocks arrangements; and • further work on the theory and application of TFP regulation to be undertaken.
	How to collect data	Most service provider submissions argued that the AER's current data gathering powers were adequate to accommodate data collection for TFP purposes. ETSA/CitiPower/Powercor (p. 2) argued annual TFP data collection should co-exist in an efficient way with the AER's existing information requests and the AER should provide DNSPs with appropriate time to introduce new, or modify their

Topic	Sub-topic	Issues raised in submissions
		existing, information collection systems which would enable them to collect the required information. Integral Energy (p.2) indicated it expected the AER to follow its usual procedures and conduct an open and transparent public consultation process when developing any revised RIO to accommodate the collection of TFP data. Jemena (p.9) argued that the consultation, guidelines, confidentiality, auditing and level of sign-off features of the proposed Rule were adequately covered in the laws defining existing powers. Multinet Gas and United Energy (p.4) considered the proposal to create new information collection through the exercise of the rule making function would diminish or undermine the safeguards that are currently available under section 28 of the NEL. The ENA (p.6) considered that the proposed Rule change had the potential effect of bypassing procedural protections built into the existing regulatory framework.
	Scope of the data to be collected	Energex (p.3) expressed concerns that the wide-ranging regulatory information sought may be beyond the scope required to establish the preconditions to support TFP. EnergyAustralia (p.7) pointed out that the AEMC can rely on its powers under clause 39 of the NEL to establish a committee comprising key stakeholders to consider and develop the details and content of the draft TFP data collection Rules. TFP data collection rules should be principle-based with robust and transparent

Topic	Sub-topic	Issues raised in submissions
		requirements around the content and scope of the information that the AER can request (p.4). Ergon Energy (p.1) disagreed with an approach whereby wide-ranging data were collected and engineered to fit a TFP specification. It argued there needs to be significant collaboration between service providers and the AER to reach agreement on the data specifications that will be a true reflection of the inputs and outputs of all DNSPs. Grid Australia (p.7) argued the immediate focus should be on data required for distribution network businesses rather than for transmission. SP AusNet (p.5) agreed with the AEMC that the basis for the development of the detailed specifications could be informed by the wide-ranging data groups set out in Appendix E of the Preliminary Findings Paper.
	Requirement on the AER to produce an annual TFP index and calculation report	Energex (p.4) supported the production of an annual TFP report as it will assist the industry's understanding of a TFP-based methodology and whether the pre-conditions exist. ETSA/CitiPower/Powercor (p.9) argued it would be inappropriate for the AER to impose productivity measures that only reflect the outputs of some DNSPs and that do not use real inputs or outputs. It argued approximations for TFP input and output components should not be utilised in the name of efficiency.
	List of necessary pre-conditions for use of a TFP-	Energex (p.2) argued that all conditions must be met and the TFP methodology cannot be applied if any one of the conditions is not met. However, it also believed

Topic	Sub-topic	Issues raised in submissions
	based methodology	that establishing the pre-conditions were met to the satisfaction of most stakeholders will be challenging, given that this may be highly subjective. It suggested determining tolerance levels prior to undertaking the work. The ENA (p.9) considered it was unclear on what basis the AER is to form the judgment regarding whether historical TFP growth is likely to be a reasonable estimate of future potential productivity growth of the industry group. It also noted there was little supporting information or guidance provided to the AER in assessing whether service providers within an industry group face comparable productivity growth prospects. ETSA/CitiPower/Powercor (p. 3) argued that stage two should only commence once detailed pre-conditions for TFP are fully satisfied. Stage Two would involve appropriate consultation, through the AEMC, of all of the matters related to the design, nature and implementation of TFP. Some elements of each of the two stages should be either locked in or locked out now without the ability to be revisited or changed later. The ENA (p.3) supported the AEMC's broad approach of deferral of detailed development on a TFP model to a later stage where more evidence may exist of whether a TFP-based methodology could clearly satisfy the national energy objectives. However, application of a TFP-based methodology should remain a voluntary option, rather than an externally imposed requirement, under future regulatory rules.
	Principles for the design of a	Jemena (p.10) questioned three of the Draft Report's design principles. It argued the ultimate objective must be to arrive at an accurate measure of TFP growth rather

Topic	Sub-topic	Issues raised in submissions
	TFP methodology	than one that was simply stable. It argued there was no objective way of assessing whether a TFP measure was biased. And it argued that it was not appropriate to include the criterion of promoting economic efficiency and not resulting in perverse incentives as this was a separate matter. SP AusNet (p.10) indicated codification of a range of TFP-based methodology design issues should be undertaken in the Stage 2 Review to provide an appropriate degree of regulatory certainty and limit regulatory discretion. It argued such guidelines should be binding, similar to those published by the AER under Chapter 6A and 6 of the NER for electricity transmission revenue resets and in distribution price resets.
	Should TFP implementation be done on an individual State basis or NEM wide?	Victorian DPI (pp. 2-3) argued for a jurisdiction by jurisdiction approach to the introduction of a TFP-based methodology for determining prices and revenues. It argued that Victoria was the most mature state in this regard and the AER should consider introducing a TFP-based option for Victoria using existing 'legacy' data while a consistent national database and methodology are being developed. DPI argued for the Rule design phase to be brought forward to ensure it is completed by 2013 in time for the next Victorian electricity price determination.

I Terms of reference

AEMC TFP Review Terms of Reference, EMO0006, 21 November 2008

Pursuant to s. 45 of the National Electricity Law (NEL) and s. 83 of the National Gas Law (NGL), the Australian Energy Market Commission (Commission) has initiated a review into possible applications of a total factor productivity (TFP) based methodology in the determination of prices and revenues (Review).

Objective of the Review
This Review is seeking to provide advice to the Ministerial Council of Energy (MCE) on:

- the circumstances in which an application of a TFP based price setting methodology would contribute to the NEL and NGL objectives;
- the arrangements including information, reporting and data requirements that need to be put in place to facilitate its application; and
- as appropriate, the development of proposed rules to support the applications of a TFP based form of control for any individual or group of electricity or gas distribution or transmission service providers.

Scope of the Review
Clauses 26I and 26J of Schedule 1 to the NEL and clause 42 of Schedule 1 to the NGL set the following matters relating to the use of a TFP methodology in revenue and pricing decisions and determinations on which the Commission may make a rule on:

a) making or amending an electricity (distribution or transmission) determination;
b) making an electricity access determination;
c) the use of a TFP methodology as an economic tool to inform and assist the Australian Energy Regulator (AER) in the application of the building block approach in making or amending electricity determinations or making electricity access determinations;
d) approving or making (or approving or making revisions or variations to) a full gas (distribution or transmission) access arrangement;
e) for the dispute resolution body to make a gas access determination;
f) the use of a TFP methodology as an economic tool to inform and assist the AER in the application of the building block approach in approving or making (or approving or making revisions variations to) full gas access arrangements; and
g) the use of a TFP methodology as an economic tool to inform and assist the dispute resolution body in applying or assessing the application of the building block approach in making gas access determinations.

The Commission will assess the suitability of each of the above possible applications as part of this Review.

Approach to the Review
In seeking to address the above objectives, the Commission will undertake a staged approach.
The two stages are as follows:

- **Stage 1**: will identify
  a) the circumstances in which the use of a TFP based price setting methodology would contribute to the national electricity objective (NEO) and/or the national gas objective (NGO) in each of the possible applications identified in the scope of the review; and

  b) whether those circumstances exist, or are likely to exist, in the National Electricity Market (NEM) or any market for natural gas services.

- **Stage 2**: will develop draft rules (for either the National Electricity Rules and/or National Gas Rules) to support the application of a TFP based methodology for revenue and pricing decisions and access determinations, as appropriate to the recommendations made in stage 1.

Considerations
In conducting this Review, the Commission shall have regard to:

- MCE statement of policy principles;
- previous reviews and rule determinations relating to framework for energy regulation;
- the Expert Panel's assessment and findings on the use of TFP methodologies in revenue and pricing decisions; and
- analysis previously conducted by the Essential Service Commission of Victoria into the application and use of TFP.

This Review will be conducted in an open and transparent manner to provide all interested stakeholders with the opportunity to contribute at each stage of the Review process. The Commission will have regard to stakeholders' opinions raised during the course of the Review.

Timing and outputs
The Commission will deliver the following outputs for this Review:

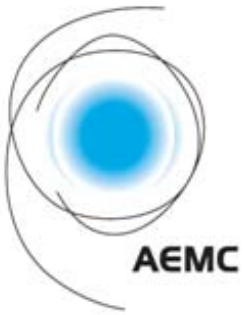
- A **Framework and Issues Paper**, which will identify and consult on the range of issues requiring consideration and inform interested parties on the Commission's proposed assessment criteria;
- A **Stage 1 Draft Report**, which will set out the Commission's proposed recommendations on whether an application of a TFP methodology would promote the NEO and/or NGO; and
- A **Stage 1 Final Report**, which will set out the Commission's findings on whether an application of a TFP methodology would promote the NEO and/or NGO. The Commission will provide this report to the MCE for its consideration and brief it on its findings.

This process for stage 1 can be summarised as follows:

Milestone	Timing
Framework and Issues Paper	December 2008
Framework and Issues Public Forum	February 2009
Stage 1 Draft Report	June 2009
Public Forum	June 2009
Stage 1 Final Report to MCE	August 2009

If the Commission considers that an application of a TFP methodology would promote either the NEO and/or the NGO it would then draft recommended rules under stage 2. The Commission intends to submit any such proposed rules to the MCE by November 2009. Stakeholders will be given an opportunity to comment on any draft proposed rules before the Commission provides them to the MCE for consideration.

J Proposed Initial Rules for the National Electricity Rules



Draft National Electricity Amendment (Use of Total Factor Productivity for the Determination of Prices and Revenues) Rule 2011

The Australian Energy Market Commission proposes the following Rule, based upon version 43 of the National Electricity Rules.

Draft National Electricity Amendment (Use of Total Factor Productivity for the Determination of Prices and Revenues) Rule 2011

1 Title of Rule

This Rule is the *Draft National Electricity Amendment (Use of Total Factor Productivity for the Determination of Prices and Revenues) Rule 2011*.

2 Commencement

In the event that the Australian Energy Market Commission is requested to make this proposed rule, the commencement date of the rule will be specified in the procedure for the making of a Rule by the Commission under the National Electricity Law.

3 Amendment of the National Electricity Rules (Chapter 6 - Economic Regulation of Distribution Services)

Chapter 6 - Economic Regulation of Distribution Services of the National Electricity Rules is proposed to be amended as set out in Schedule 1.

4 Amendment of the National Electricity Rules (Chapter 6A - Economic Regulation of Transmission Services)

Chapter 6A - Economic Regulation of Transmission Services of the National Electricity Rules is proposed to be amended as set out in Schedule 2.

5 Amendment of the National Electricity Rules (Chapter 10 - Glossary)

Chapter 10 - Glossary of the National Electricity Rules is proposed to be amended as set out in Schedule 3.

6 Savings and Transitional Amendments to the National Electricity Rules (Chapter 11 - Savings and Transitional Rules)

Chapter 11 - Savings and Transitional of the National Electricity Rules is proposed to be amended as set out in Schedule 4.

Schedule 1 Amendment of the National Electricity Rules (Chapter 6 - Economic Regulation of Distribution Services)

(Clause 3)

[1] Clause 6.1.2 Structure of this Chapter

After clause 6.1.2(b)(3), insert:

(3A) Part C1 sets out the principles of Total Factor Productivity and the requirement for the *AER* to *publish* an *Annual TFP Report* having regard to those principles and the conditions needed to support the use of Total Factor Productivity approach for the determination of prices and revenues of services classified as *standard control services*;

[2] Clause 6.1.2 Structure of this Chapter

After clause 6.1.2(b)(5), insert:

(5A) Part E1 contains provisions regarding the disclosure, use and protection of information, including the requirement for *Distribution Network Service Providers* to submit annual *Distribution Regulatory Disclosure Data Reports* to the *AER*;

[3] Clause 6.1.2 Structure of this Chapter

In clause 6.1.2(b)(13), omit "and" where lastly occurring.

[4] Clause 6.1.2 Structure of this Chapter

In clause 6.1.2(b)(14), omit "." and insert:

;

(15) Schedule 6.1 sets out the requirements for the content of *building block proposals*;

(16) Schedule 6.1A sets out the requirements for the contents of an *Annual TFP Report published* by the *AER*;

(16) Schedule 6.1B sets out the items of annual *Distribution Regulatory Disclosure Data Reports* required to be submitted by *Distribution Network Service Providers* to the *AER*; and

(17) Schedule 6.2 sets out the opening regulatory asset base for *Distribution Network Service Providers*.

[5] Clause 6.2.8 Guidelines

After clause 6.2.8(a), insert:

(a1) There must be *Distribution Regulatory Disclosure Data Report Guidelines* in force at all times after the first such guidelines are *published* by the *AER*.

(a2) The *Distribution Regulatory Disclosure Data Report Guidelines* must include, provide guidance on and provide worked examples as to:

(1) definitions for terms referred to in each item set out in Schedule 6.1B;

(2) acceptable methodologies for the measurement or valuation of each item set out in Schedule 6.1B;

(3) identification of items set out in Schedule 6.1B that are subject to financial audit requirements; and

(4) identification and management of *confidential information*.

[6] Clause 6.2.8 Guidelines

In clause 6.2.8(e), omit "In" and substitute "Subject to paragraph (f), in".

[7] Clause 6.2.8 Guidelines

After clause 6.2.8(e), insert:

(f) At any time, in making minor and administrative amendments to the *Distribution Regulatory Disclosure Data Report Guidelines*, the *AER* is not required to follow the *distribution consultation procedures*.

[8] New Rule 6.6A Total Factor Productivity

After clause 6.6.3. insert:

Part C1 Use of Total Factor Productivity for the Determination of Prices and Revenues

6.6A Total Factor Productivity

6.6A.1 Principles of calculating Total Factor Productivity

(a) The following constitutes the principles of calculating Total Factor Productivity for *Distribution Network Service Providers*:

(1) an index number method is to be used;

(2) systematic bias in the Total Factor Productivity growth rate is to be avoided;

(3) for output quantities, quantities that accurately reflect *standard control services* supplied by providers are to be used;

(4) for input capital costs:

(i) costs that are set exogenously are to be used;

(ii) costs that are consistent with the regulatory asset base of the provider are to be used; and

(iii) costs that are consistent with the concept of financial capital maintenance are to be used; and

Note

Financial capital maintenance means that a regulated provider is compensated for efficient expenditure and efficient investments such that its real financial capital is at least maintained in present value terms.

(5) for input capital quantities, quantities that accurately reflect the physical service potential of assets employed in the provision of *standard control services* supplied by providers are to be used.

6.6A.2 Publication of Distribution Regulatory Disclosure Data Reports by the AER

(a) As soon as practicable after the *AER* has received a *Distribution Regulatory Disclosure Data Report* from a *Distribution Network Service Provider*, subject to paragraph (b), it must *publish* that report.

(b) The *AER* must not *publish*:

(1) *confidential information*; or

(2) information identified by the relevant *Distribution Network Service Provider* in a *Regulatory Disclosure Data Report* as confidential and only where the *AER*, exercising its discretion with a view that all information reported in a *Distribution Regulatory Disclosure Data Report* should be made publicly available, considers confidential or is commercially sensitive.

6.6A.3 Publication of an Annual TFP Report by the AER and alterations to data contained in Distribution Regulatory Disclosure Data Reports

(a) Not later than 1 March each year, in publishing an *Annual TFP Report*, the *AER* must:

(1) comply with the principles of calculating Total Factor Productivity set out in clause 6.6A.1(a);

(2) consider data contained in *Distribution Regulatory Disclosure Data Reports* submitted to it, and only alter that data in accordance with paragraph (c);

(3) provide an assessment of the factors for consideration to test the possible use of Total Factor Productivity for the determination of prices and revenues set out in clause 6.6A.4, that assessment can either be for *Distribution Network Service Providers* as a whole, relevant groups of providers as identified by the *AER*, or individual providers;

(4) comply with the contents of an *Annual TFP Report* set out in clause S6.1A;

(5) provide Total Factor Productivity index results for *Distribution Network Service Providers* as a whole, relevant groups of providers as identified by the *AER* and individual providers based upon operating environment conditions and using a common specification of outputs and inputs; and

(6) *publish* all data used in calculating the Total Factor Productivity index results.

(b) In *publishing* an *Annual TFP Report*, the *AER* may use historical data only if that data is consistent with the definitions for terms in the *Distribution Regulatory Disclosure Data Report Guidelines*.

(c) For the avoidance of doubt, the *AER* may jointly *publish Annual TFP Reports* required under paragraph (a) and clause 6A.8A.2(a)

(d) In preparing an *Annual TFP Report*, the *AER* may only make alterations to data contained in a *Distribution Regulatory Disclosure Data Report*:

(1) to alter for structural differences to improve the consistency of data; and

Example

For example, the *AER* may only make alterations to data contained in a *Distribution Regulatory Disclosure Data Report* to align relevant Total

Factor Productivity datasets to reflect different classification of *standard control services* between different *Distribution Network Service Providers*.

(2) to alter for exceptional circumstances.

(e) In the event that the *AER* makes an alteration to data contained in a *Distribution Regulatory Disclosure Data Report*, it:

(1) must explain how the alteration to that data was performed;

(2) must give reasons for the alteration to that data; and

(3) must present Total Factor Productivity index results with and without alteration to that data,

in its *Annual TFP Report*.

6.6A.4 Consideration of the use of Total Factor Productivity for the Determination of Prices and Revenues

(a) The following constitutes assessment factors to test the use of Total Factor Productivity for the determination of prices and revenues for *Distribution Network Service Providers*:

(1) a Total Factor Productivity dataset of sufficient length to establish reliable trends that is available, robust and consistent both through time and across providers;

(2) calculation of Total Factor Productivity indexes that represent an accurate measure of productivity growth for *Distribution Network Service Providers* as a whole, relevant groups of providers as identified by the *AER* and individual providers;

(3) sufficient service providers are included in each group such as to allow for calculation of Total Factor Productivity indexes for distribution determinations so that the Total Factor Productivity index cannot be manipulated by an individual provider or a collective of related providers with common ownership; and

(4) calculation of Total Factor Productivity index growth rates using historic data that represents a fair and reasonable estimate of future productivity growth for providers in the relevant grouping.

[9] New rule 6.14A Information Disclosure

After rule 6.14, insert:

Part E1 Information Disclosure

6.14A Regulatory Disclosure Data Report

6.14A.1 Submission of Regulatory Disclosure Data Report to the AER

(a) By no later than 1 November each year, each *Distribution Network Service Provider* must submit to the *AER*, a *Distribution Regulatory Disclosure Data Report* that:

(1) provides a true and fair statement of the financial, asset and operational data for each item set out in Schedule 6.1A;

(2) is certified by the provider's:

(i) Chief Executive Officer; and

(ii) Company Secretary or a Director; and

(3) otherwise complies with the requirements of the *Rules* and the *Distribution Regulatory Disclosure Data Report Guidelines*.

(b) In addition to the *Distribution Regulatory Disclosure Data Report*, the *AER* may require a *Distribution Network Service Provider* to submit, by a date and in the form and manner specified by the *AER*, any additional information the *AER* reasonably requires for a purpose set out in paragraph (c).

(c) The *Distribution Regulatory Disclosure Data Report* submitted by a *Distribution Network Service Provider* to the *AER* under paragraph (a) may only be used by the *AER* for the following purposes:

(1) to monitor, report on and enforce the compliance of the provider with the *total revenue cap* for the provider for a *regulatory control period*, the *maximum allowed revenue* for the provider for each *regulatory year*, and any requirements that are imposed on the provider under a distribution determination;

(2) as an input regarding the financial, asset and operational performance of the provider, to inform the *AER* in regards to its assessment of the Total Productivity Factor approach for the determination of prices and revenues under Part C1 of this Chapter;

(3) as an input regarding the financial, asset and operational performance of the provider, to inform the *AER's* decision-making for the making of *revenue determinations* or other regulatory controls to apply in future *regulatory control periods*;

(4) to monitor and report on the performance of the provider for any scheme that applies to it under Part C of this Chapter;

(5) for the preparation of an *Annual TFP Report*; and

(6) for the preparation of a *network service provider performance report*.

(d) The *AER* may request, or arrange to undertake, verification or independent audit of any information sought by it, or submitted to it, under this rule 6.14A.

[10] New Schedule 6.1A Contents of Annual TFP Reports relating to Distribution Network Service Providers

After clause S6.1.3, insert:

Schedule 6.1A Annual TFP Report

S6.1A.1 Contents of Annual TFP Reports relating to Distribution Network Service Providers

An *Annual TFP Report published* by the *AER* relating to *Distribution Network Service Providers* must include, but is not limited to, the following:

(a) a summary on:

(1) the possible use of the Total Factor Productivity approach for the regulation of prices and revenues of *Distribution Network Service Providers* in accordance with the assessment factors set out in clause 6.6A.4;

(2) related research used to calculate indexes for *Distribution Network Service Providers* as a whole, relevant groups of providers as identified by the *AER* and individual providers;

(b) an assessment of Total Factor Productivity data and methodological matters, including:

(1) identification of the sources of Total Factor Productivity data;

(2) identification of appropriate industry groups;

(3) approach and construction of the specifications for input and outputs variables used to calculate Total Factor Productivity indexes;

(c) an assessment of Total Factor Productivity research conducted by the *AER*; and

(d) Total Factor Productivity index results for each *Distribution Network Service Provider*, as a whole, and for relevant groups of providers as identified by the *AER* based upon operating environment conditions and using a common specification of outputs and inputs.

Schedule 6.1B Distribution Regulatory Disclosure Data Reports

S6.1B.1 Items for Distribution Regulatory Disclosure Data Reports

The following tables set out the output and input items required to be submitted by *Distribution Network Service Providers* to the *AER* in *Distribution Regulatory Disclosure Data Reports*.

(a) Definition of terms referred to in each item set out in the first column of Tables S6.1B.1 and S6.1B.2 are given in the *Distribution Regulatory Disclosure Data Reports Guidelines*, in accordance with clause 6.2.8(a2)(1).

(b) Each item requiring the submission of a $m figure in the second column of Tables S6.1B.1 and S6.1B.2 are subject to financial audit requirements set out in the *Distribution Regulatory Disclosure Data Reports Guidelines*, in accordance with clause 6.2.8(a2)(3).

Table S6.1B.1 Output items for Distribution Regulatory Disclosure Data Reports from Distribution Network Service Providers

Items	Units
DUOS Revenue	
From Fixed Customer Charges	$m
From On–Peak Energy Deliveries	$m
From Off–Peak Energy Deliveries	$m
From Contracted Maximum Demand	$m
From Measured Maximum Demand	$m
From Domestic Customers	$m
From Commercial Customers	$m
From Small Industrial Customers	$m
From Large Industrial Customers	$m

Items	Units
From Other Customers	$m
Total	$m
Revenue/penalties from incentive schemes (eg S factor)	$m
Total energy delivered	
On–Peak Energy Deliveries	GWh
Off–Peak Energy Deliveries	GWh
Summated Contracted Maximum Demand (for customers charged on this basis)	MW
Summated Measured Maximum Demand (for customers charged on this basis)	MW
Domestic Customer Energy Deliveries	GWh
Commercial Customer Energy Deliveries	GWh
Small Industrial Customer Energy Deliveries	GWh
Large Industrial Customer Energy Deliveries	GWh
Other Customer Energy Deliveries	GWh
Non–coincident System Annual Peak Demand	MW
Coincident System Annual Peak Demand	MW
Total Distribution Customer Numbers	
Domestic Customer Numbers	No
Commercial Customer Numbers	No
Small Industrial Customer Numbers	No
Large Industrial Customer Numbers	No
Other Customer Numbers	No
Total	No
Reliability	
Distribution–related SAIDI	

Items	Units
Distribution–related SAIFI	
Line losses – %	

Table S6.1B.2 Input items for Distribution Regulatory Disclosure Data Reports from Distribution Network Service Providers

Items	Units
Total Distribution O&M Expenditure (opex) (excluding depreciation and all capital costs)	$m
Shared allocation of opex overheads to distribution activities (eg head office) included in above	$m
Opex by category *The costs of operating and maintaining the network (excluding all capital costs and capital construction costs) disaggregated as follows*	
Network operating costs	$m
Network maintenance costs	$m
Inspection	$m
Maintenance and repair	$m
Vegetation management	$m
Emergency response	$m
Other network maintenance	$m
Other operating costs (specify items > 5% total opex)	$m
Total opex	$m
Corporate overhead costs should be allocated to the relevant categories	
Additionally, the following item is required An estimate of the opex costs that would be associated with end–user contributed assets that are operated and maintained by directly connected end–users (eg transformers) if the operation and maintenance were provided by the DNSP (please	$m

Items	Units
describe basis of estimation)	
Direct employees Number of full–time equivalent employees in operating and maintenance activities (including shared overhead allocation). Employee time spent on capital construction projects is to be excluded.	No
Direct labour cost Labour cost (including on–costs) of employees in operating and maintenance activities (including shared overhead allocation). Cost of time spent on capital construction projects is to be excluded.	$m
Distribution System Capital Quantities and Capacities	
O/H network circuit length	km
Low voltage distribution	km
HV 11 kV	km
HV 22 kV	km
HV 33 kV (if used as distribution voltage)	km
SWER	km
S/T 44/33 kV (if used as subtransmission)	km
S/T 66 kV	km
S/T 132 kV	km
(Other voltages)	km
Total overhead circuit	km
U/G network circuit length	km
Low voltage distribution	km
HV 11 kV	km
HV 22 kV	km
HV 33 kV (if used as distribution voltage)	km

Items	Units
S/T 66 kV	km
S/T 132 kV	km
(Other voltages)	km
Total underground circuit	km
Transformer Total Installed Capacity	MVA
Zone substation transformer capacity	MVA
Zone substation capacity where there are two transformation steps (eg 132 kV to 66 kV then 66 kV to 11 kV)	MVA
Zone substation capacity where there is a single transformation step (eg 132 kV to 22 kV)	MVA
Distribution transformer capacity owned by utility	MVA
Distribution transformer capacity owned by HVCs	MVA
Regulatory Asset Base Values	
Overhead distribution assets (wires and poles)	$m
Underground distribution assets (cables)	$m
Distribution substations including transformers	$m
Sub–transmission assets (wires and poles)	$m
Sub–transmission substations including transformers	$m
Total	$m
RAB Reconciliation	
Opening value	$m
Inflation addition	$m
Regulatory depreciation	$m
Actual additions (recognised in RAB)	$m
Retirements	$m
Revaluation adjustments	$m

Items	Units
Resulting summation for asset value	$m
Smoothed asset value wrt revaluations	$m
Basis for initial RAB, eg DORC, adjusted DORC, historic cost, etc	
Have DORC valuations been undertaken? If so, for which years?	
Actual Capital Expenditure	
Overhead distribution assets (wires and poles)	$m
Underground distribution assets (cables)	$m
Distribution substations including transformers	$m
Sub–transmission assets (wires and poles)	$m
Sub–transmission substations including transformers	$m
Services	$m
Meters	$m
SCADA and other remote control	$m
Other – IT	$m
Other – non IT	$m
Total Capital Expenditure	$m
Asset Lives – estimated total and residual	Years
Overhead distribution assets (wires and poles)	Years
Underground distribution assets (cables)	Years
Distribution substations including transformers	Years
Sub-transmission assets (wires and poles)	Years
Sub-transmission substations including transformers	Years
Services	Years
Meters	Years

Items	Units
SCADA and other remote control	Years
Other – IT	Years
Value of Capital Contributions or Contributed Assets	$m
Price Index for Labour Inputs	
Price Index for O&M Expenditure	
Price Index for Network Assets	

Schedule 2 Amendment of the National Electricity Rules (Chapter 6A - Economic Regulation of Transmission Services)

(Clause 4)

[1] Clause 6A.1.1 Economic regulation of transmission services generally

After clause 6A.1.1(b), insert:

(b1) Part C1 of this Chapter sets out the principles of Total Factor Productivity, and the requirement for the *AER* to *publish* an *Annual TFP Report* having regard to those principles and the conditions needed to support the use of Total Factor Productivity approach to regulate the revenues that may be earned by *Transmission Network Service Providers* from the provision by them of *transmission services* that are the subject of *transmission determinations*.

[2] Clause 6A.1.1 Economic regulation of transmission services generally

After clause 6A.1.1(k), insert:

(l) Schedule 6A.1 sets out the requirements for content of *building block proposals*.

(m) Schedule 6A.1A sets out the requirements for contents of an *Annual TFP Report published* by the *AER* relating to *Transmission Network Service Providers*.

(n) Schedule 6A.1B sets out items of annual *Transmission Regulatory Disclosure Data Reports* required to be submitted by *Transmission Network Service Providers* to the *AER*.

(o) Schedule 6A.2 sets out the opening regulatory asset base for *Transmission Network Service Providers*.

(p) Schedule 6A.3 sets out the *CRNP methodology* and the *modified CRNP methodology*.

(q) Schedule 6A.4 sets out the application of this Chapter 6A to *AEMO* and *declared transmission system operators*.

[3] New Rule 6A.8A Total Factor Productivity

After clause 6A.8.2. insert:

Part C1 Use of Total Factor Productivity for the Determination of Prices and Revenues

6A.8A Total Factor Productivity

6A.8A.1 Principles of calculating Total Factor Productivity

(a) The following constitutes the principles of calculating Total Factor Productivity for *Transmission Network Service Providers*:

(1) an index number method is to be used;

(2) systematic bias in the Total Factor Productivity growth rate is to be avoided;

(3) for output quantities, quantities that accurately reflect *prescribed transmission services* supplied by providers are to be used;

(4) for input capital costs:

(i) costs that are set exogenously are to be used;

(ii) costs that are consistent with the regulatory asset base of the provider are to be used; and

(iii) costs that are consistent with the concept of financial capital maintenance are to be used; and

Note

Financial capital maintenance means that a regulated provider is compensated for efficient expenditure and efficient investments such that its real financial capital is at least maintained in present value terms.

(5) for input capital quantities, quantities that accurately reflect the physical service potential of assets employed in the provision of *prescribed transmission services* supplied by providers are to be used.

6A.8A.2 Publication of Transmission Regulatory Disclosure Data Reports by the AER

(a) As soon as practicable after the *AER* has received a *Transmission Regulatory Disclosure Data Report* from a *Transmission Network Service Provider*, subject to paragraph (b), it must *publish* that report.

(b) The *AER* must not *publish*:

(1) confidential information; or

(2) information identified by the relevant *Transmission Network Service Provider* in a *Regulatory Disclosure Data Report* as confidential and only where the *AER*, exercising its discretion with a view that all information reported in a *Transmission Regulatory Disclosure Data Report* should be made publislty available, considers confidential or is commercially sensitive.

6A.8A.2 Publication of an Annual TFP Report by the AER and alterations to data contained in Transmission Regulatory Disclosure Data Reports

(a) Not later than 1 March each year, in *publishing* an *Annual TFP Report*, the *AER* must:

(1) comply with the principles of calculating Total Factor Productivity set out in clause 6A.8A.1(a);

(2) consider data contained in *Transmission Regulatory Disclosure Data Reports* submitted to it, and only alter that data in accordance with paragraph (c);

(3) provide an assessment of the factors for consideration to test the possible use of Total Factor Productivity for the determination of prices and revenues set out in clause 6.6A.4, that assessment can either be for *Transmission Network Service Providers* as a whole, relevant groups of providers as identified by the *AER*, or individual providers;

(4) comply with the contents of an *Annual TFP Report* set out in clause S6A.1;

(5) provide Total Factor Productivity index results for *Transmission Network Service Providers* as a whole, relevant groups of providers as identified by the *AER* and individual providers based upon operating environment conditions and using a common specification of outputs and inputs; and

(6) *publish* all data used in calculating the Total Factor Productivity index results.

(b) In *publishing* an *Annual TFP Report*, the *AER* may use historical data only if that data is consistent with the definitions for terms in the *Transmission Regulatory Disclosure Data Report Guidelines*.

(c) For the avoidance of doubt, the *AER* may jointly *publish Annual TFP Reports* required under paragraph (a) and clause 6.6A.3(a).

(c)

(a) In preparing an *Annual TFP Report*, the *AER* may only make alterations to data contained in a *Transmission Regulatory Disclosure Data Report*:

(1) to alter for structural differences to improve the consistency of data; and

Example

For example, the *AER* may only make alterations to data contained in a *Transmission Regulatory Disclosure Data Report* to align relevant Total Factor Productivity datasets to reflect different classification of *prescribed transmission services* between different *Transmission Network Service Providers*.

(2) to alter for exceptional circumstances.

(b) In the event that the *AER* makes an alteration to data contained in a *Transmission Regulatory Disclosure Data Report*, it:

(1) must explain how the alteration to that data was performed;

(2) must give reasons for the alteration to that data; and

(3) must present Total Factor Productivity index results with and without alteration to that data,

in its *Annual TFP Report*.

6A.8A.4 Consideration of the use of Total Factor Productivity for the Determination of Prices and Revenues

(a) The following constitutes assessment factors to test the use of Total Factor Productivity for the determination of prices and revenues for *Transmission Network Service Providers*:

(1) a Total Factor Productivity dataset of sufficient length to establish reliable trends that is available, robust and consistent both through time and across providers;

(2) calculation of Total Factor Productivity indexes that represent an accurate measure of productivity growth for *Transmission Network Service Providers* as a whole, relevant groups of providers as identified by the *AER* and individual providers;

(3) sufficient service providers are included in each group such as to allow for calculation of Total Factor Productivity indexes for *transmission determinations* so that the Total Factor Productivity index cannot be manipulated by an individual

provider or a collective of related providers with common ownership; and

(4) calculation of Total Factor Productivity index growth rates using historic data that represents a fair and reasonable estimate of future productivity growth for providers in the relevant grouping.

[4] Clause 6A.17.1 Information to be provided to AER

In clause 6A.17.1(a), after "In this rule 6A.17" insert "(but excluding clause 6A.17.3)".

[5] Clause 6A.17.1 Information to be provided to AER

After clause 6A.17.1(d)(3), insert:

(3A) as an input regarding the financial, asset and operational performance of the provider, to inform the *AER* in regards to its assessment of the Total Productivity Factor approach for the determination of prices and revenues under Part C1 of this Chapter;

[6] New clause 6A.17.3 Transmission Regulatory Disclosure Data Report Guidelines

After clause 6A.17.2, insert:

6A.17.3 Transmission Regulatory Disclosure Data Report Guidelines

(a) There must be *Transmission Regulatory Disclosure Data Report Guidelines* in force at all times after the first such guidelines are *published* by the *AER*.

(b) The *Transmission Regulatory Disclosure Data Report Guidelines* must include, provide guidance on and provide worked examples as to:

(1) definitions for terms referred to in each item set out in Schedule 6A.1B;

(2) acceptable methodologies for the measurement or valuation of each item set out in Schedule 6A.1B;

(3) identification of items set out in Schedule 6A.1B that are subject to financial audit requirements; and

(4) identification and management of *confidential information*.

(c) At any time, in making minor and administrative amendments to the *Transmission Regulatory Disclosure Data Report Guidelines*, the

AER is not required to follow the *transmission consultation procedures*.

6A.17.4 Submission of Transmission Regulatory Disclosure Data Report to the AER

(a) By no later than 1 November each year, each *Transmission Network Service Provider* must submit to the *AER*, a *Transmission Regulatory Disclosure Data Report* that:

(1) provides a true and fair statement of the financial, asset and operational data for each item set out in Schedule 6A.1A;

(2) is certified by the provider's:

(i) Chief Executive Officer; and

(ii) Company Secretary or a Director; and

(3) otherwise complies with the requirements of the *Rules* and the *Transmission Regulatory Disclosure Data Report Guidelines*.

[7] New Schedule 6A.1A Contents of Annual TFP Reports relating to Transmission Network Service Providers

After clause S6A.1.3, insert:

Schedule 6A.1A Annual TFP Report

S6A.1A.1 Contents of Annual TFP Reports relating to Transmission Network Service Providers

An *Annual TFP Report published* by the *AER* relating to *Transmission Network Service Providers* must include, but is not limited to, the following:

(a) a summary on:

(1) the possible use of the Total Factor Productivity approach for the regulation of prices and revenues of *Transmission Network Service Providers* in accordance with the assessment factors set out in clause 6A.8A.4(a);

(2) related research used to calculate the *TFP Index*;

(b) an assessment of TFP data and methodological matters, including:

(1) identification of the sources of TFP data;

(2) identification of appropriate industry groups;

(3) approach and construction of the specifications for input and outputs variables used to calculate Total Factor Productivity indexes;

(c) an assessment of TFP research conducted by the AER;

(d) Total Factor Productivity index results for each *Transmission Network Service Provider*, as a whole, and for relevant groups of providers as identified by the *AER* based upon operating environment conditions and using a common specification of outputs and inputs.

Schedule 6A.1B Transmission Regulatory Disclosure Data Reports

S6A.1B.1 Items for Transmission Regulatory Disclosure Data Reports submitted by Transmission Network Service Providers

The following tables sets out the output and input items required to be submitted by *Transmission Network Service Providers* to the *AER* in *Transmission Regulatory Disclosure Data Reports*.

(a) Definition of terms referred to in each item set out in the first column of Tables S6.1B.1 and S6.1B.2 are given in the *Transmission Regulatory Disclosure Data Reports Guidelines*, in accordance with clause 6A.17.3(b)(1).

(b) Each item requiring the submission of a $m figure in the second column of Tables S6.1B.1 and S6.1B.2 are subject to financial audit requirements set out in the *Transmission Regulatory Disclosure Data Reports Guidelines*, in accordance with clause 6A.17.3(b)(3).

Table S6.1B.1 Output items for Transmission Regulatory Disclosure Data Reports for Transmission Network Service Providers

Items	Units
TUOS Revenue	
From Fixed Customer (Exit Point) Charges	$m
From Variable Customer (Exit Point) Charges	$m
From Fixed Generator (Entry Point) Charges	$m
From Variable Generator (Entry Point) Charges	$m
From Fixed Energy Usage Charges (Charge per day basis)	$m
From Variable Energy Usage charges (Charge per kWh basis)	$m

Items	Units
From Energy based Common Service and General Charges	$m
From Capacity based Common Service and General Charges	$m
From Fixed Demand based Usage Charges	$m
From Variable Demand based Usage Charges	$m
From Other connected transmission networks	$m
From Distribution networks	$m
From Directly connected end–users	$m
From Generators	$m
Total	$m
Revenue/penalties from incentive schemes (eg S factor)	$m
Throughput Energy	
To Other connected transmission networks	GWh
To Distribution networks	GWh
To Directly connected end–users (please specify voltage)	GWh
Total energy delivered	GWh
Maximum demand	MW
Transmission System Capital Quantities and Capacities Line length by voltage level	km
Network circuit kilometres (route length multiplied by number of circuits per tower at year end) for the following voltage classes: 500 kV	km
330 kV	km
275 kV	km
220 kV	km
132 kV	km

Items	Units
Other (please specify)	km
Total circuit	km
Data for each voltage is to be given separately for overhead and underground circuits	
Transmission circuit availability	
Total number of hours for the following (force majeure events to be excluded)	
Circuit hours actually available	Hours
Maximum possible number of circuit hours	Hours
Number of loss of connection events by time (Give separated data for total and planned events)	
The total and planned numbers of loss of connection (outage) events by the following outage lengths	
less than 0.2 minutes (including momentary unavailability pending a reclosure which is successful)	Minutes
greater than 0.2 minutes	Minutes
greater than 1 minute	Minutes
Excluded events to include circuit interruptions caused by third party systems such as intertrip signals from another party, generator outage or by customer installations, and force majeure events	
Average outage duration Aggregate minutes of duration of all and planned outages divided by the number of respective outage events. Excluded events to include circuit interruptions caused by third party systems such as intertrip signals from another party, generator outage or by customer installations and force majeure events.	Minutes
Line losses	%

Table S6.1B.2 Input items for Transmission Regulatory Disclosure Data Reports for Transmission Network Service Providers

Items	Units
Opex *Total Transmission opex (excluding depreciation and all capital costs)*	$m
Shared allocation of opex overheads to transmission activities (eg head office) included in above	$m
Opex by category	
The costs of operating and maintaining the network (excluding all capital costs and capital construction costs) disaggregated as follows	
Network operating costs	$m
Network maintenance costs:	
Inspection	$m
Maintenance and repair	$m
Vegetation management	$m
Emergency response	$m
Other network maintenance	$m
Other operating costs (specify items > 5% total opex)	$m
Total opex	$m
Corporate overhead costs should be allocated to the relevant categories	
Additionally, the following item is required Number of full–time equivalent employees in operating and maintenance activities (including shared overhead allocation). Employee time spent on capital construction projects is to be excluded.	No.
Direct labour cost	No

Items	Units
Labour cost (including on–costs) of employees in operating and maintenance activities (including shared overhead allocation). Cost of time spent on capital construction projects is to be excluded.	
Installed transformer capacity	
Transmission substations (eg 500 kV to 275 kV)	MVA
Terminal points	MVA
Transformer capacity for directly connected end–users owned by the TNSP	MVA
Transformer capacity for directly connected end–users owned by the end–user	MVA
Other (please specify)	MVA
Regulatory Asset Base Values	
Overhead lines	$m
Underground cables	$m
Transformers owned by the TNSP	$m
Transformers owned by directly connected end–users	$m
Other assets including:	
Communications equipment	$m
Land and buildings	$m
Other items not elsewhere included	$m
Total	$m
RAB Reconciliation	
Opening value	$m
Inflation addition	$m
Regulatory depreciation	$m
Actual additions (recognised in RAB)	$m
Retirements	$m

Items	Units
Revaluation adjustments	$m
Resulting summation for asset value	$m
Smoothed asset value wrt revaluations	$m
Basis for initial RAB, eg DORC, adjusted DORC, historic cost, etc	
Have DORC valuations been undertaken? If so, for which years?	
Actual capital expenditure	
Overhead lines	$m
Underground cables	$m
Transformers owned by the TNSP	$m
Transformers owned by directly connected end–users	$m
Other assets including:	
Communications equipment	$m
Land and buildings	$m
Other items not elsewhere included	$m
Total	$m
Asset Lives – estimated total and residual	
Overhead lines	Years
Underground cables	Years
Transformers owned by the TNSP	Years
Transformers owned by directly connected end–users	Years
Other assets including:	
Communications equipment	Years
Land and Buildings	Years
Other items not elsewhere included	Years

Items	Units
Value of Capital Contributions or Contributed Assets	$m
Price Index for Labour Inputs	
Price Index for O&M Expenditure	
Price Index for Network Assets	

Schedule 3 Amendment of the National Electricity Rules (Chapter 10 - Glossary)

(Clause 5)

[1] Chapter 10 Substituted definitions

In Chapter 10, substitute the following definitions:

confidential information

In relation to a *Registered Participant* or *AEMO* or the *AER*, information which is or has been provided to that *Registered Participant* or *AEMO* or the *AER* under or in connection with the *Rules* and which is stated under the *Rules*, or by *AEMO*, the *AER* or the *AEMC*, to be *confidential information* or is otherwise confidential or commercially sensitive. It also includes any information which is derived from such information.

[2] Chapter 10 New definitions

In Chapter 10, insert the following new definitions in alphabetical order:

Annual TFP Report

The report, or reports, prepared and *published* by the *AER* under clauses 6.6A.3(a) and 6A.8A.2(a).

Distribution Regulatory Disclosure Data Reports

The report prepared by a *Distribution Network Service Provider*, and required to be submitted to the *AER* under clause 6.14A.1(a).

Distribution Regulatory Disclosure Data Report Guidelines

The guidelines *published* by the *AER* for the purpose of reporting *Distribution Network Service Provider's* Total Factor Productivity data to the *AER*, and which is required to be in force at all times by the *AER* under clause 6.2.8(a1).

Transmission Regulatory Disclosure Data Reports

The report prepared by a *Transmission Network Service Provider*, and required to be submitted to the *AER* under clause 6A.17.3(a).

Transmission Regulatory Disclosure Data Report Guidelines

The guidelines *published* by the *AER* for the purpose of reporting *Transmission Network Service Provider's* Total Factor Productivity data to the *AER*, and which is required to be in force at all times by the *AER* under clause 6A.17.4(a).

Schedule 4 Savings and Transitional Amendments to the National Electricity Rules (Chapter 11)

(Clause 6)

[1] After rule 11.[xx], insert:

Part [XX] Use of Total Factor Productivity for the Determination of Prices and Revenues

11.[xx] Rules consequential on the making of the National Electricity Amendment (Use of Total Factor Productivity for the Determination of Prices and Revenues) Rule [Year]

11.[xx].1 Definitions

For the purposes of this rule 11.[xx]:

Amending Rule means the National Electricity Amendment (Use of Total Factor Productivity for the Determination of Prices and Revenues) Rule [Year].

Regulatory Disclosure Data Report Distribution Working Group means the working group established by the *AER* and constituted in accordance with clauses 11.[xx].2(b) and (c).

Regulatory Disclosure Data Report Transmission Working Group means the working group established by the *AER* and constituted in accordance with clauses 11.[xx].3(b) and (c).

11.[xx].2 Distribution Regulatory Disclosure Data Report Working Group and the initial Distribution Regulatory Disclosure Data Report Guidelines and Templates

(a) Not later than [Date], the *AER* must establish a Distribution Regulatory Disclosure Data Report Working Group.

(b) Members of the Distribution Regulatory Disclosure Data Report Working Group must consist of:

(1) an employee of the *AER*, to act as chairperson;

(2) other persons appointed at the sole discretion of the *AER*, acting reasonably, comprising of:

(i) persons representing *Distribution Network Service Providers*; and

(ii) at least 1 person representing the interests of end use customers of electricity

(c) Not later than [Date], the Distribution Regulatory Disclosure Data Report Working Group:

(1) must develop the initial *Regulatory Disclosure Data Distribution Guidelines* that determine the manner and form in which *Regulatory Disclosure Data Reports* are required to be submitted to the *AER*; and

(2) if considered necessary by the working group, must develop the initial *Distribution Regulatory Disclosure Data Report* templates.

(d) In its development of the initial *Distribution Regulatory Disclosure Data Guidelines* and, if considered necessary, the initial *Distribution Regulatory Disclosure Data Report* templates under paragraph (c), the Regulatory Disclosure Data Report Distribution Working Group:

(1) must have regard to matters set out in clause 6.2.8(a2); and

(2) must have regard to the principles of Total Factor Productivity for *Distribution Network Service Providers* set out in clause 6.6A.1(a).

11.[xx].3 Transmission Regulatory Disclosure Data Report Working Group and the initial Transmission Regulatory Disclosure Data Report Guidelines and Templates

(a) Not later than [Date], the *AER* must establish a Transmission Regulatory Disclosure Data Report Working Group.

(b) Members of the Transmission Regulatory Disclosure Data Report Working Group must consist of:

(1) an employee of the *AER*, to act as chairperson;

(2) other persons appointed at the sole discretion of the *AER*, acting reasonably, comprising of:

(i) persons representing *Transmission Network Service Providers*; and

(ii) at least 1 person representing the interests of end use customers of electricity.

(c) Not later than [Date], the Transmission Regulatory Disclosure Data Report Working Group:

(1) must develop the initial *Transmission Regulatory Disclosure Data Guidelines* that determine the manner and form in which

Transmission Regulatory Disclosure Data Reports are required to be submitted to the *AER*; and

(2) if considered necessary by the working group, must develop the initial *Transmission Regulatory Disclosure Data Report* templates.

(d) In its development of the initial *Transmission Regulatory Disclosure Data Guidelines* and, if considered necessary, the initial *Transmission Regulatory Disclosure Data Report* templates under paragraph (c), the Transmission Regulatory Disclosure Data Report Working Group:

(1) must have regard to the principles of Total Factor Productivity set out in clause 6A.8A.1(a); and

(2) must have regard to matters set out in clause 6A.17.3(b).

11.[xx].4 Administration, conduct and decisions of working groups

(a) The *AER* may establish a joint Distribution Regulatory Disclosure Data Report Working Group and Transmission Regulatory Disclosure Data Report Working Group. If the *AER* establishes such a joint working group, it must consist of:

(1) persons representing *Distribution Network Service Providers*;

(2) persons representing *Transmission Network Service Providers*; and

(3) at least 2 persons representing the interests of end use customers of electricity.

(b) At any time, the *AER*, acting reasonably, may remove any member of a relevant working group.

(c) A decision of a relevant working group on any matter may be made by the majority of the members of that working group. Where the members of the relevant working group are equally divided on any matter, the chairperson has the casting vote.

(d) The relevant working groups must meet to carry out its functions set out in clause 11.[xx].2(c) and 11.[xx].3(c) respectively, and is to regulate and conduct its meetings in accordance with the *Rules*.

(e) A person may resign from a relevant working group by giving notice in writing to that effect to the *AER*.

11.[xx].5 Publication of the Distribution and Transmission Regulatory Disclosure Data Guidelines

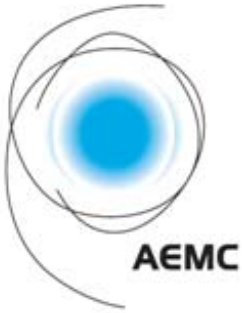
(a) Within 2 *business days* of the decision of a relevant working group in agreeing to the relevant initial guidelines and, if considered necessary and agreeing to the relevant initial templates, the *AER* must *publish* those initial guidelines and templates.

(b) If the relevant working group failed to agree upon the relevant initial guidelines by the relevant dates referred to in clauses 11.[xx].3(c) and 11.[xx].4(c), then the *AER*:

(1) must, acting reasonably in considering any development of the initial guidelines by the relevant working group, within 10 *business days* from the relevant dates referred to in clauses 11.[xx].3(c) and 11.[xx].4(c), determine the initial *Distribution Regulatory Disclosure Data Guidelines* and the *Transmission Regulatory Disclosure Data Guidelines* (as the case may be); and

(2) by no later than 2 *business days* after the determination date referred to in subparagraph (1), must *publish* that guideline or those guidelines.

K Proposed Initial Rules for the National Gas Rules



Draft National Gas Amendment (Use of Total Factor Productivity for the Regulation of Prices and Revenues) Rule 2011

The Australian Energy Market Commission proposes the following Rule, based upon version 9 of the National Gas Rules.

Draft National Gas Amendment (Use of Total Factor Productivity for the Regulation of Prices and Revenues) Rule 2011

1 Title of Rule

This Rule is the *Draft National Gas Amendment (Use of Total Factor Productivity for the Regulation of Prices and Revenues) Rule 2011*.

2 Commencement

In the event that the Australian Energy Market Commission is requested to make this proposed rule, the commencement date of the rule will be specified in the procedure for the making of a Rule by the Commission under the National Gas Law.

3 Amendment of the National Gas Rules

The National Gas Rules are amended as set out in Schedule 1.

4 Savings and Transitional Amendments to the National Gas Rules

The National Gas Rules are amended as set out in Schedule 2.

Schedule 1 Amendments of the National Gas Rules

(Clause 3)

[1] New Rule 99A Total Factor Productivity

After rule 99, insert:

Part 9A Use of Total Factor Productivity for the Regulation of Prices and Revenues

Rule 99A Total Factor Productivity

This Part applies only in respect of a *full regulation pipeline*.

Rule 99B Principles of calculating Total Factor Productivity

(1) The following constitutes the principles of calculating Total Factor Productivity for *full regulation pipeline* service providers:

(a) an index number method is to be used;

(b) systematic bias in the Total Factor Productivity growth rate is to be avoided;

(c) for output quantities, quantities that accurately reflect pipeline services supplied by *full regulation pipeline* service providers are to be used;

(d) for input capital costs:

(i) costs that are set exogenously are to be used;

(ii) costs that are consistent with the regulatory asset base of the provider are to be used; and

(iii) costs that are consistent with the concept of financial capital maintenance are to be used; and

Note

Financial capital maintenance means that a regulated provider is compensated for efficient expenditure and efficient investments such that its real financial capital is at least maintained in present value terms.

(iv) for input capital quantities, quantities that accurately reflect the physical service potential of assets employed in the provision of pipeline services supplied by *full regulation pipeline* service providers are to be used.

Rule 99C Pipeline Regulatory Disclosure Data Report

(1) There must be Pipeline Regulatory Disclosure Data Report Guidelines in force at all times after the first such guidelines are published by the AER.

(2) The Pipeline Regulatory Disclosure Data Report Guidelines must include, provide guidance on, and provide worked examples as to:

(a) definitions for terms referred to in each item set out in Schedule 4;

(b) acceptable methodologies for the measurement or valuation of each item set out in Schedule 4;

(c) identification of items set out in Schedule 4 that are subject to financial audit requirements; and

(d) identification and management of confidential information.

Rule 99D Submission of Regulatory Disclosure Data Report to the AER

(1) By no later than 1 November each year, each *full regulation pipeline* provider must submit to the AER, a Pipeline Regulatory Disclosure Data Report that:

(a) provides a true and fair statement of the financial, asset and operational data for each item set out in Schedule 4;

(b) is certified by the pipeline's:

(i) Chief Executive Officer; and

(ii) Company Secretary or a Director; and

(c) otherwise complies with the requirements of these Rules and the Pipeline Regulatory Disclosure Data Report Guidelines.

(2) In addition to the Pipeline Regulatory Disclosure Data Report, the AER may require a *full regulation pipeline* provider to submit, by a date and in the form and manner specified by the AER, any additional information the AER reasonably requires for a purpose set out in subrule (3).

(3) The Pipeline Regulatory Disclosure Data Report submitted to the AER under subrule (1) may only be used by the AER for the following purposes:

(a) to monitor, report on and enforce the compliance of the *full regulation pipeline* provider of any requirements imposed on the provider under Part 9 of these Rules; and

(b) as an input regarding the financial, asset and operational performance of the provider, to inform the AER in regards to its assessment of the Total Productivity Factor approach for the regulation of prices and revenues under this Part of these Rules.

(4) The AER may request, or arrange to undertake, verification or independent audit of any information sought by it, or submitted to it, under this Part of these Rules.

Rule 99E Publication of Pipeline Regulatory Disclosure Data Reports by the AER

(1) As soon as practicable after the AER has received a Pipeline Regulatory Disclosure Data Report from a *full regulation pipeline* provider, subject to subrule (2), it must publish that report.

(2) The AER must not publish:

(a) confidential information; or

(b) information identified by the relevant *full regulation pipeline* provider in a Pipeline Regulatory Disclosure Data Report as confidential and only where the AER, exercising its discretion with a view that all information reported in a Pipeline Regulatory Disclosure Data Report should be made publicly available, considers confidential or is commercially sensitive.

Rule 99F Publication of an Annual TFP Report by the AER and alterations to data contained in Pipeline Regulatory Disclosure Data Reports

(1) Not later than 1 March each year, in publishing an Annual TFP Report, the AER must:

(a) comply with the principles of calculating Total Factor Productivity set out in rule 99B;

(b) consider data contained in Pipeline Regulatory Disclosure Data Reports submitted to it, and only alter that data in accordance with subrule (3);

(c) provide an assessment of the factors for consideration to test the possible use of Total Factor Productivity for the regulation of prices and revenues set out in subrule (2), that assessment can either be for *full regulation pipeline* service providers as a whole, relevant groups of pipelines as identified by the AER, or individual pipelines;

(d) comply with the contents of an *Annual TFP Report* set out in Schedule 3;

(e) provide Total Factor Productivity index results for *full regulation pipeline* service providers as a whole, relevant groups of pipelines as identified by the *AER* and individual pipelines based upon operating environment conditions and using a common specification of outputs and inputs;

(f) publish all data used in calculating the Total Factor Productivity index results.

(2) In publishing an Annual TFP Report, the AER may use historical data only if that data is consistent with the definitions for terms in the Pipeline Regulatory Disclosure Data Report Guidelines.

(3) In preparing an Annual TFP Report, the AER may only make alterations to data contained in a Pipeline Regulatory Disclosure Data Report:

(a) to alter for structural differences to improve the consistency of data; and

(b) to alter for exceptional circumstances.

Example

For example, the AER may only make alterations to data contained in a Pipeline Regulatory Disclosure Data Report to align relevant Total Factor Productivity datasets to reflect different classification of pipeline services between different *full regulation pipelines*.

(3) In the event that the AER makes an alteration to data contained in a Pipeline Regulatory Disclosure Data Report, it:

(a) must explain how the alteration to that data was performed;

(b) must give reasons for the alteration to that data; and

(c) must present Total Factor Productivity index results with and without alteration to that data,

in its Annual TFP Report.

Rule 99GConsideration of the use of Total Factor Productivity for the Regulation of Prices and Revenues

(1) The following constitutes assessment factors to test the use of Total Factor Productivity for the regulation of prices and revenues for *full regulation pipeline* service providers:

(a) a Total Factor Productivity dataset of sufficient length to establish reliable trends that is available, robust and consistent both through time and across service providers;

(b) calculation of Total Factor Productivity indexes that represent an accurate measure of productivity growth for *full regulation pipeline* service providers as a whole, relevant groups of pipelines as identified by the AER and individual pipelines;

(c) sufficient service providers are included in each group such as to allow for calculation of Total Factor Productivity indexes for price and revenue regulation so that the Total Factor Productivity index cannot be manipulated by an individual pipeline or a collective of related pipelines with common ownership; and

(d) calculation of Total Factor Productivity index growth rates using historic data that represents a fair and reasonable estimate of future productivity growth for *full regulation pipeline* service providers in the relevant grouping.

[2] New Schedule 3 Contents of Annual TFP Reports

After Schedule 2, insert:

Schedule 3 Contents of Annual TFP Reports

1 Annual TFP Report

An Annual TFP Report published by the AER relating to *full regulation pipeline* service providers must include, but is not limited to, the following:

(a) a summary on:

(i) the possible use of the Total Factor Productivity approach for the regulation of prices and revenues of *full regulation pipeline* service providers in accordance with the assessment factors set out in rule 99G;

(ii) related research used to calculate indexes for *full regulation pipeline* service providers as a whole, relevant groups of pipelines as identified by the AER and individual pipelines;

(b) an assessment of Total Factor Productivity data and methodological matters, including:

(i) identification of the sources of Total Factor Productivity data;

(ii) identification of appropriate industry groups;

(iii) approach and construction of the specifications for input and outputs variables used to calculate Total Factor Productivity indexes;

(c) an assessment of Total Factor Productivity research conducted by the AER; and

(d) Total Factor Productivity index results for each *full regulation pipeline* service provider, as a whole, and for relevant groups of service providers as identified by the AER based upon operating environment conditions and using a common specification of outputs and inputs.

Schedule 4 Pipeline Regulatory Disclosure Reports

Part 1Items for Full Regulation Pipelines

The following tables set out the output and input items required to be submitted by distribution and transmission *full regulation pipeline* service providers to the AER in a Pipeline Regulatory Disclosure Report.

(a) Definition of terms referred to in each item set out in the first column of Tables S4.1.1 and S4.1.2 are given in the Pipeline Regulatory Disclosure Data Report Guidelines, in accordance with rule 99C(2)(a).

(b) Each item requiring the submission of a $m figure in the second column of Tables S4.1.1 and S4.1.2 are subject to financial audit requirements set out in the Pipeline Regulatory Disclosure Data Report Guidelines, in accordance with rule 99C(2)(c).Output items for Pipeline Regulatory Disclosure Data Reports from Gas Distribution Pipelines

Items	**Units**
Gas delivered	
Total	
Energy	TJ per annum
Maximum per day	TJ per day
Maximum per hour	TJ per hour

Items	Units
Distribution Revenue	
Revenue from fixed charges	$m
Revenue from variable charges	$m
Number of Customers	No
Domestic Volume Based Tariffs	
Energy	TJ per annum
Maximum per day	TJ per day
Maximum per hour	TJ per hour
Distribution Revenue	$m
Revenue from fixed charges	$m
Revenue from variable charges	$m
Total revenue	$m
Number of customers	No
Capacity Based Tariffs	
Energy	TJ
Maximum per day	TJ
Maximum per hour	TJ
Distribution Revenue	
Revenue from fixed charges	$m
Revenue from variable energy charges	$m
Revenue from variable capacity charges	$m

Items	Units
Total Revenue	$m
Number of customers	No
Contracted / reserved / Take or Pay Tariffs	
Energy	TJ
Contracted Energy	TJ
Measured Maximum per day	TJ per day
Contracted Maximum per hour	TJ per hour
Measured Maximum per hour	TJ per hour
Distribution Revenue	
Revenue from fixed charges	$m
Revenue from contracted energy	$m
Revenue from measured energy	$m
Revenue from contracted maximum per day	$m
Revenue from measured maximum per day	$m
Revenue from contracted maximum per hour	$m
Revenue from measured maximum per hour	$m
Number of customers	No
Tariff elements based on other output items (if any)	
Quantity of each output	
Distribution Revenue	$m
Revenue from each output	$m

Items	Units
Number of customers	No
Revenue/penalties from incentive schemes (eg S factor)	$m
System Performance	
SAIDI	
SAIFI	
Number of interruptions affecting 5 customers or fewer	
Number of interruptions affecting more than 5 customers	
Unaccounted for Gas	%

Items	Units
Opex	
Total distribution opex (excluding depreciation and all capital costs)	$m
Shared allocation of opex overheads to distribution activities (eg head office) included in above	$m
Operating expenses disaggregated as follows	
Network Operations	$m
Customer Connections	$m
Meter Reading Services	$m
Billing and Revenue Collection	$m
Advertising and Marketing	$m
Regulatory Costs	$m
Change in Provisions	$m
Other Operating Costs (excluding those below)	$m
Subtotal of above	$m
Maintenance expenses disaggregated as follows	

Items	Units
City Gate Stations	$m
Transmission mains	$m
Distribution mains	$m
Services	$m
Cathodic protection	$m
Supply Regulators	$m
Meters	$m
SCADA and remote control	$m
Other	$m
Subtotal of above	$m
Direct employees Number of full–time equivalent employees in operating and maintenance activities (including shared overhead allocation). Employee time spent on capital construction projects is to be excluded.	No.
Direct labour cost	$m
Labour cost (including on–costs) of employees in operating and maintenance activities (including shared overhead allocation). Cost of time spent on capital construction projects is to be excluded.	$m
Distribution System Capital Quantities and Capacities	
Transmission mains – over 1050 kPa g	
Weighted average of max sustainable pressure	kPa g
Weighted average of pipe diameter	mm
Pipeline Length	km
Medium Pressure Distribution mains – 20 to 210 kPa g	

Items	Units
Weighted average of max sustainable pressure	kPa g
Weighted average of pipe diameter	mm
Pipeline Length	km
Low pressure distribution mains – to 7 kPa g	
Weighted average of max sustainable pressure	kPa g
Weighted average of pipe diameter	mm
Pipeline Length	km
Pipeline length by material	
Polyethylene	km
PVC	km
Protected Steel	km
Unprotected Steel	km
Cast Iron	km
Other	km
Service Connections (from mains to customer)	
Number	No
Length	km
City Gate Stations	No
Field Regulators	No
District Regulators	No
Meter Regulator Installations	No
Meters over 10 cubic metres/hour	No
Meters up to 10 cubic metres/hour	No
Regulatory Asset Base Values	

Items	Units
City Gate Stations	$m
Transmission mains	$m
High pressure distribution	$m
Medium pressure distribution	$m
Low pressure distribution	$m
Cathodic protection	$m
Services	$m
Supply Regulators / Valve Stations	$m
Meters	$m
SCADA and other remote control	$m
Other - IT	$m
Other - non IT	$m
Total`	$m
RAB Reconciliation	
Opening value	$m
Inflation addition	$m
Regulatory depreciation	$m
Actual additions (recognised in RAB)	$m
Retirements	$m
Revaluation adjustments	$m
Resulting summation for asset value	$m
Smoothed asset value wrt revaluations	
Basis for initial RAB, eg DORC, adjusted DORC, historic cost, etc	
Have DORC valuations been undertaken? If so, for which	

Items	Units
years?	
Actual Capital Expenditure	
City Gate Stations	$m
Transmission mains	$m
High pressure distribution	$m
Medium pressure distribution	$m
Low pressure distribution	$m
Cathodic protection	$m
Services	$m
Supply Regulators / Valve Stations	$m
Meters	$m
SCADA and other remote control	$m
Other - IT	$m
Other - non IT	$m
Total	$m
Asset Lives – estimated total and residual	Years
City Gate Stations	Years
Transmission mains	Years
High pressure distribution	Years
Medium pressure distribution	Years
Low pressure distribution	Years
Cathodic protection	Year

Items	Units
	s
Services	Years
Supply Regulators/Value Stations	Years
Meters	Years
SCADA and other remote control	Years
Other - IT	Years
Other - non IT	Years
Value of Capital Contributions or Contributed Assets	$m
Price Index for Labour Inputs	
Price Index for O&M Expenditure	
Price Index for Network Assets	

Items	Units
Revenue	
From Contracted / Reserved / Take or pay capacity charges	$m
From Measured capacity charges	$m
From Contracted / Reserved / Take or pay throughput charges	$m
From Measured throughput charges	$m
From other charges (if any)	$m
Total	$m
Revenue/penalties from incentive schemes (eg S factor)	

Items	Units
Number of gas input locations	
Listing of inputs	
Number of off–take locations	
Listing of off–takes	
Gas throughput	
Contracted / Reserved/ Take or pay Annual total delivery	TJ
Measured Annual Total delivery	TJ
Contracted / Reserved / Take or pay Maximum Daily Quantity	TJ
Measured Maximum Daily quantity	TJ
Contracted / Reserved/ Take or pay Maximum Hourly Quantity	TJ
Measured Maximum Hourly Quantity	TJ
Delivered to connected distribution systems	TJ
Delivered to other connected transmission systems	TJ
Delivered to directly connected end–users	TJ
Delivered to other	TJ
Gas maximum throughput capacity	
Annual total delivery	TJ
Maximum Daily Quantity	TJ
Maximum Hourly Quantity	TJ
Reliability Gas transmission reliability indicators are not well developed and need to be discussed with stakeholders	
Unaccounted for Gas	%

Items	Units
Opex	
Total Transmission opex (excluding depreciation and all capital costs)	$m
Shared allocation of opex overheads to transmission activities (eg head office) included in above	$m
Operating expenses	$m
Maintenance expenses disaggregated as follows	$m
Compressor Stations	$m
City Gate Stations	$m
Transmission mains	$m
Other	$m
Direct employees Number of full–time equivalent employees in operating and maintenance activities (including shared overhead allocation). Employee time spent on capital construction projects is to be excluded.	No
Direct labour cost Labour cost (including on–costs) of employees in operating and maintenance activities (including shared overhead allocation). Cost of time spent on capital construction projects is to be excluded.	$m
Transmission System Capital Quantities and Capacities	
Transmission mains – over 1050 kPa g	
Weighted average of max sustainable pressure	kPa g
Weighted average of pipe diameter	mm
Pipeline Length	km
Other mains – less than 1050 kPa g	

Items	Units
Weighted average of max sustainable pressure	kPAg
Weighted average of pipe diameter	mm
Pipeline Length	km
Compressor Stations	No
City Gate Stations	No
Regulatory Asset Base Values	
Transmission mains	$m
Other mains	$m
Compressor stations	$m
City Gate Stations	$m
SCADA and other remote control	$m
Other – IT	$m
Other - non IT	$m
Total	$m
RAB Reconciliation	
Opening value	$m
Inflation addition	$m
Regulatory depreciation	$m
Actual additions (recognised in RAB)	$m
Retirements	$m
Revaluation adjustments	$m
Resulting summation for asset value	`$m
Smoothed asset value wrt revaluation	
Basis for initial RAB, eg DORC, adjusted DORC, historic cost, etc	

Items	Units
Have DORC valuations been undertaken? If so, for which years?	
Actual Capital Expenditure	
Transmission mains	$m
Other mains	$m
Compressor stations	$m
City Gate Stations	$m
SCADA and other remote control	$m
Other - IT	$m
Other - non IT	$m
Asset Lives – estimated total and residual	
Transmission mains	Years
Other mains	Years
Compressor stations	Years
City Gate Stations	Years
SCADA and other remote control	Years
Other - IT	Years
Other - non IT	Years
Value of Capital Contributions or Contributed Assets	$m
Price Index for Labour Inputs	
Price Index for O&M Expenditure	

Items	Units
Price Index for Network Assets	

Schedule 2 Savings and Transitional Amendments to the National Gas Rules

(Clause 4)

[1] New Part 4 Schedule 1 Transitional provisions consequent on the Use of Total Factor Productivity for the Regulation of Prices and Revenues

After rule [xx] in Schedule 1, insert:

Part 4 Transitional provisions consequent on the Use of Total Factor Productivity for the Regulation of Prices and Revenues

[xx] Definitions

(1) In this Part:

Amending Rules means the National Gas Amendment (Use of Total Factor Productivity for the Regulation of Prices and Revenues) Rule [Year].

Pipeline Regulatory Disclosure Data Report Working Group means the working group established by the AER and constituted in accordance with rule [xx].

[xx] Pipeline Regulatory Disclosure Data Report Working Group and the initial Pipeline Regulatory Disclosure Data Report Guidelines and Templates

(1) Not later than [Date], the AER must establish a Pipeline Regulatory Disclosure Data Report Working Group.

(2) Members of the Pipeline Regulatory Disclosure Data Report Working Group must consist of:

(a) an employee of the AER, to act as chairperson;

(b) other persons appointed at the sole discretion of the AER, acting reasonably, comprising of:

(i) persons representing *full regulation pipeline* service providers; and

(ii) at least 1 person representing the interests of end use customers for gas.

(3) Not later than [Date], the Pipeline Regulatory Disclosure Data Report Working Group:

(a) must develop the initial Pipeline Regulatory Disclosure Data Guidelines that determine the manner and form in which Pipeline Regulatory Disclosure Data Reports are required to be submitted to the AER; and

(b) if considered necessary by the working group, must develop the initial Pipeline Regulatory Disclosure Data Report templates.

(4) In its development of the initial Pipeline Regulatory Disclosure Data Guidelines and, if considered necessary, the initial Pipeline Regulatory Disclosure Data Report templates under subrule (3), the Pipeline Regulatory Disclosure Data Report Working Group:

(a) must have regard to the principles of calculating Total Factor Productivity set out in rule 99B; and

(b) must have regard to matters set out in rule 99C(2).

[xx] Administration, conduct and decisions of the working group

(1) At any time, the AER, acting reasonably, may remove any member of the Pipeline Regulatory Disclosure Data Report Working Group.

(2) A decision of the Pipeline Regulatory Disclosure Data Report Working Group on any matter may be made by the majority of the members of that working group. Where the members of that relevant working group are equally divided on any matter, the chairperson has the casting vote.

(3) The Pipeline Regulatory Disclosure Data Report Working Group must meet to carry out its functions set out in rule [xx], and is to regulate and conduct its meetings in accordance with these rules.

(4) A person may resign from the Pipeline Regulatory Disclosure Data Report Working Group by giving notice in writing to that effect to the AER.

[xx] Publication of the Pipeline Regulatory Disclosure Data Guidelines

(1) Within 2 business days of the decision of the Pipeline Regulatory Disclosure Data Report Working Group in agreeing to the relevant initial guidelines and, if considered necessary and agreeing to the relevant initial templates, the AER must publish those initial guidelines and templates.

(2) If the relevant working group failed to agree upon the relevant initial guidelines by the relevant date referred to in rule [xx], then the AER:

(a) must, acting reasonably in considering any development of the initial guidelines or templates by the Pipeline Regulatory Disclosure Data Report Working Group, within 10 business days from the relevant dates referred to in rule [xx], determine the initial Pipeline Regulatory Disclosure Data Guidelines; and

(b) by no later than 2 business days after the date referred to in subrule (2)(a), publish that guideline as determined under subrule (2)(a).