AEMC

REVIEW

Australian Energy Market Commission

PRELIMINARY FINDINGS

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

Commissioners

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17 December 2009

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Citation

AEMC 2009, *Review into the use of total factor productivity for the determination of prices and revenues*, Preliminary findings, 17 December 2009, Sydney

About the AEMC

The Council of Australian Governments, through its Ministerial Council on Energy, established the Australian Energy Market Commission (AEMC) in July 2005 to be the Rule maker for national energy markets. The AEMC is currently responsible for Rules and policy advice covering the National Electricity Market. It is a statutory authority. Our key responsibilities are to consider Rule change proposals, conduct energy market reviews and provide policy advice to the Ministerial Council as requested, or on AEMC initiative.

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Abbreviations

AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
APIA	Australian Pipeline Industry Association
CAPM	Capital Asset Pricing Model
Commission	see AEMC
CPI	Consumer Price Index
CPRS	Carbon Pollution Reduction Scheme
DEA	Data Envelopment Analysis
DPI	Victorian Department of Primary Industries
DTe	Office of Energy Regulation (Energiekamer Directie Toezicht Energie)
EBSS	Efficiency Benefit Sharing Scheme
ECM	Efficiency Carryover Mechanism
ENA	Energy Networks Association
ESC	Essential Services Commission of Victoria
EUAA	Energy Users Association of Australia
FCM	Financial Capital Maintenance
GPAL	Gas Pipelines Access Law
MCE	Ministerial Council on Energy
MTFP	Multilateral Total Factor Productivity
NAS	Network Advisory Services
NEL	National Electricity Law
NEM	National Electricity Market
NEO	National Electricity Objective
NER	National Electricity Rules
NGL	National Gas Law
NGO	National Gas Objective
NGR	National Gas Rules
NPV	Net Present Value
Ofgem	The Office of the Gas and Electricity Markets

PEG	Pacific Economics Group
PFP	Partial Factor Productivity
RAB	Regulatory Asset Base
RIN	Regulatory Information Notice
RIO	Regulatory Information Order
Rules	National Electricity Rules and National Gas Rules
TFP	Total Factor Productivity
WACC	Weighted Average Cost of Capital

Glossary of terms

Brattle Incentives Report	The Brattle Group, *Incentives under total factor productivity based and building-blocks type price controls*, June 2009.
Brattle International Review Report	The Brattle Group, *Use of total factor productivity analysis in network regulation: case studies of regulatory practice*, October 2008.
Building block approach	The approach specified by NER and NGR to determine the total revenue of a service provider. Total revenue is the sum of a return on the capital base, depreciation, corporate income tax, increments and decrements resulting from an incentive mechanism and forecast operating expenditure.
Capital module	A mechanism to manage extraordinary capital expenditure during a regulatory period.
Cost pass through mechanism	A mechanism to manage, and pass through to users, specific costs or savings that are incurred by a service provider during a regulatory period.
Depreciation	The amount representing the return to a service provider to cover its investment costs. This is calculated based upon the profile that reflects the nature of the assets over the economic life of the asset.
Demand-Side Participation Review	AEMC 2009, *Review of Demand-Side Participation in the National Electricity Market, Final Report*, 27 November 2009, Sydney
Discussion Paper	AEMC 2009, *Review into the use of total factor productivity for the determination of prices and revenues: Discussion paper*, 28 August 2009, Sydney
Economic Insights Data Availability Report	Economic Insights, *Assessment of data currently available to support TFP-based network regulation*, 9 June 2009.
Economic Insights Sensitivity Report	Economic Insights, *Energy network total factor productivity sensitivity analysis*, 9 June 2009.
Efficiency carryover mechanism	Referred to as the EBSS in the NER. The ECM aims to maintain the strength of efficiency incentives over an entire regulatory period by allowing profits, or losses, earned during a regulatory period to be carried over a set number of years (regardless of whether this moves into the next regulatory period). This ensures that gains and losses would be retained for the same period of time irrespective of when they occur during the regulatory period. It is applied as additional component to the building block approach.
External benchmarking	The comparison of a service providers actual or forecast costs to an exogenous reference level (for example, the most efficient business in the sector). A benchmark is deemed to be external if a business cannot influence the benchmark against which it is assessed through its own actions.
Expert Panel	Expert Panel on Energy Access Pricing
Fixed X	Where X is determined from an estimate of TFP growth and that estimate is fixed for the entire regulatory period.

Industry group	The group of service providers on which the industry TFP index is calculated.
Inputs	Those components which the service providers employs to provide its services.
Issues Paper	AEMC 2008, *Review into the use of total factor productivity for the determination of prices and revenues: framework and issues paper*, 12 December 2008, Sydney.
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.
Normalisation	Adjusting data to account for differences in operating environment conditions.
Off ramp	A mechanism to manage service provider specific exogenous events during a regulatory period.
Outputs	The dimensions of services provided valued by customers.
P_0	Initial price or revenue cap set for the start of the regulatory period.
Perspectives Report	AEMC 2008, *Review into the use of total factor productivity for the determination of prices and revenues: perspectives on the building block approach, 30 July 2009*, Sydney.
Price path (or X factor)	A business-specific adjustment factor set to reflect the efficient level of expenditure that the service provider would need to incur over time to meet the required levels of service reliability and quality, expected demand growth and cost of capital financing
Regulatory period	The period for which the terms of the regulatory determinations on allowed prices/revenue are set. Under the framework established under the NEL, this is referred to as the regulatory control period. Under the framework established under the NGL, it is called the access arrangement period.
Review	AEMC Review into the use of total factor productivity for the determination of prices and revenues.
Revised statement of approach	AEMC 2009, *Review into the use of total factor productivity for the determination of prices and revenues: revised statement of approach*, 28 April 2009, Sydney.
Rolling X	Where X is determined from an estimate of TFP growth that is annually updated using a rolling average approach.
TFP methodology	TFP based revenue and pricing methodology.
Victorian Proposal	Victorian Minister for Energy and Resources, *Rule change proposal to allow the use of total factor productivity methodology in distribution*, 18 June 2008.

Summary

The Australian Energy Market Commission (AEMC) has initiated a review into the use of a total factor productivity (TFP) methodology in determining regulated prices and revenues for electricity and gas service providers (Review). 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 amendments.

This Paper presents the preliminary findings for this Review. It steps through an analysis of the potential merits and disadvantages of a TFP methodology and discusses whether the necessary conditions needed to make the methodology work currently exist or can be established. As the issues being presented are complicated and wide-ranging, it would be beneficial to understand stakeholder views on the preliminary findings before we reach our draft recommendations.

Submissions are requested by 26 February 2010. Prior to this, a public forum will be held on 1 February 2010.

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 network and gas pipeline service providers play in the efficient provision of services and because of the high proportion in customer bills which is accounted 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.

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. A 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. The potential for a TFP methodology to promote economic efficiency has already been recognised with both the National Electricity Law (NEL) and National Gas Law (NGL) permitting rules to allow the use of a TFP methodology to determine regulated prices.

This Review is an opportunity for a comprehensive assessment of the suitability of using a TFP methodology in the national energy markets, 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.

Our approach to the Review

We have taken a staged approach to addressing the question of whether a TFP methodology should be used in pricing and revenue decisions. Firstly, stage 1 will assess whether a TFP methodology would promote either the NEO or NGO with regard to the Revenue and Pricing Principles of both the NEL and NGL.

To support this assessment five key criteria are relevant to the efficient design of the framework used to determine regulated prices. 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 the service provider and users;

- **cost of regulation** - minimisation of the costs and risks of regulation to the service provider 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 no change to the present building block approaches for gas and electricity. This has required identifying the problems with the current arrangements and determining the extent to which a TFP methodology would address these issues.

At the end of this first stage, which is expected to conclude by July 2010, we will provide our findings to the MCE for its consideration (Stage 1 Final Report). If we conclude that rules should be made to facilitate the use of a TFP methodology for either, or both, gas decisions or electricity determinations this Review will proceed to stage 2 and develop draft Rules to be submitted to the MCE. Stage 2 will have regard to considerations from the MCE and also to comments from stakeholders on the Stage 1 Final Report recommendations and analysis.

Preliminary findings

This Paper tests the incentive properties of a TFP methodology and its impacts on investment incentives. It then analyses how a TFP methodology would apply in practice. It discusses the conditions that need to be met for a TFP methodology to work and the effects of introducing a TFP methodology into the NER and NGR. The key findings from this analysis are:

- **A TFP methodology will increase the incentive for service providers to be innovative and seek cost efficiencies compared to the current building block approach.** This is because a TFP methodology gives higher returns to the service provider when it makes investments and improves operating practices which deliver continuing productivity improvements.

- **A TFP methodology can provide a reasonable opportunity for service providers to recover efficient costs.** This might require safeguard mechanisms to be included as insurance against the risk that an efficient service provider becomes incapable of meeting the long term average productivity growth over the medium term.

- **Service providers should be able to choose to opt into a TFP methodology but the subsequent ability to opt out should be constrained.** It is more appropriate to introduce a TFP methodology as an optional alternative and not to mandate replacement of the current arrangements. Service providers should not be able to revert back to the building block approach except in exceptional circumstances. Otherwise, there is a risk that service providers would defer expenditure under a TFP methodology and then seek the recovery of the same expenditure under the building block approach in the next price regulatory period.

- **The conditions needed to support a TFP methodology are more likely to be met in the distribution sectors.** The material difficulties in constructing accurate

productivity measures for transmission and the profile of capital expenditure, plus the more limited number of service providers, means that a TFP approach may not be feasible. The practical application of a TFP methodology to distribution service providers is possible and should be the focus for any further work.

- **It is not appropriate to implement a TFP methodology in the short term as the available data is not sufficiently robust or consistent.** It would be too problematic to try to reconstruct existing data for the purpose of a TFP methodology. Improvements in the current reporting requirements are needed. Also better data is required to understand the factors influencing productivity growth and the correlation between service providers. This is needed to test the practical application of a TFP methodology and to decide on the appropriate classification of the industry for the TFP growth rate to be calculated.

- **Initial focus should be on a work program to establish a better, more consistent data-set.** This Review has highlighted the inadequate nature of the current regulatory reporting requirements. This is a problem for market efficiency and cost reflective regulation irrespective of whether a TFP methodology is applied. Establishing well targeted and consistent regulatory data reporting requirements will not only facilitate the possible introduction of a TFP methodology but would also support the more effective application of the building block approach in the event that a TFP methodology is not applied.

- **Possible additional benefits from a TFP methodology but these are hard to quantify.** A TFP methodology could provide an improved demand management incentive because it encourages better asset utilisation. Also, it has the potential for lower regulatory costs and less appeals on determinations. However, it is difficult to estimate the extent of such benefits as it will depend on the number of service providers which decide to opt into the methodology.

- **The omission of quality of service and reliability measures as outputs may affect the accuracy of the TFP index for distribution service providers.** However, this is not a reason against the inclusion of a TFP methodology. The additional efficiency properties of a TFP methodology still apply and this omission does not provide a disincentive on the service provider to maintain service quality and reliability standards. Ensuring that the service provider improves service quality is still important under a TFP methodology, and an additional service quality incentive mechanism will need to continue to apply.

Therefore, the preliminary finding is that applying a TFP methodology to determine regulated prices will contribute to the promotion of the NEO and NGO in the distribution sectors. Further work should be done on the detailed design of a TFP methodology and crucially, improving the specification and provision of regulatory reporting data from service providers.

There will be additional benefits from establishing a consistent and appropriate targeted regulatory data-set. It would improve transparency and stakeholders' understanding of the performance and efficiency of service providers. It would also increase the regulator's ability to apply other innovative methods to the price determination process (for example, the use of benchmarking). The regulatory price

determination process should also improve as the regulator would need less information provided at every five year reset. Hence, better regulatory reporting requirements are needed not just for distribution but also for transmission.

We are not proposing that more regulatory data be collected nor do we anticipate that the reporting requirements would become onerous. Rather, we consider that there should be a collection of a standardised, relevant and robust regulatory data-set which is consistent with best practice regulation. The minimum data for effective regulation – either for a TFP methodology or the building block approach - should be specified, with consistent definitions established, and reported on. We do not consider that there is a material difference between the minimum data needed for either a TFP or a building block approach. This process would provide an opportunity to centralise the reporting requirements for service providers and remove any ineffective duplication.

The data-set would need to be mandatory for all regulated service providers within each sector (even if the service provider remains subject to the building block approach) and would have to use a common set of detailed definitions. Also it should be audited so that the regulator and service providers have confidence in the data-set and should be made publicly available.

As long as the reporting requirements do not result in onerous compliance costs for service providers, which are not reasonable or cannot be justified by the benefits, then we can see no reason against establishing more effective regulatory reporting requirements. The most appropriate means to collect this data-set would be through the regulator's powers to gather information under the NEL and NGL. There may be benefits from clarifying the NER and NGR to support this process.

Way forward

Given the preliminary findings, we intend to progress to stage 2 of the Review and develop draft Rules, subject to consideration of the submissions received on this Paper. Further work is required on deciding the appropriate formula to calculate the TFP growth and finalising the design of a TFP methodology. It is important that the regulator and service providers are actively involved in this work and therefore we intend to organise further workshops.

However, there are risks with this approach of including a TFP methodology into the NER and NGR. It will take at least eight years before data is sufficient to permit a TFP methodology. In the meantime, significant changes in the industry may occur that could have implications on the effectiveness of a TFP methodology. An important consideration, for example, will be the suitability of applying a TFP methodology in the context of the challenges for service providers arising from the introduction of climate change policies. Also once a TFP methodology is implemented, it is possible that no service provider would decide to opt in.

As a result, it may be appropriate to consider whether there are amendments or other alternatives to the current form of the building block approach that could improve regulatory outcomes. Such changes may also be suitable for the transmission sectors. To facilitate discussion with industry on this, we are releasing a report by The Brattle Group which outlines options to reforming the regulatory framework. We seek

stakeholder views on whether such alternatives should be explored before a commitment to a TFP methodology is made.

Submissions on this Preliminary Findings Paper and the accompanying consultant reports are requested by 5 pm, Friday 26 February 2010. Submissions should refer to project number 'EMO0006' and be sent electronically through the AEMC's online lodgement facility at www.aemc.gov.au.

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1 Introduction

This TFP preliminary findings paper (Paper) presents the Australian Energy Market Commission's (AEMC) preliminary findings for the review into the use of a total factor productivity (TFP) methodology in determining regulated prices and revenues for electricity and gas service providers (Review).

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.

This Review assesses whether a TFP methodology for regulatory determinations should be permitted as an alternative to the building block approach in the national energy markets. This Paper represents the third consultation stage for the Review and provides an opportunity for stakeholders to comment on the preliminary findings arising from our assessment. The purpose is to step through an analysis of the potential merits and disadvantages of a TFP methodology and also to discuss whether the necessary conditions needed to apply this methodology will exist within the energy markets.

Given the complexity and breadth of issues being assessed, it would be beneficial to understand stakeholder views on the preliminary findings before draft recommendations are made. Submissions are requested by Friday, 26 February 2010. Prior to this, a public forum on this Paper will be held on 1 February 2010.

1.1 The Review

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' prices or revenues. Under this application, an estimate of the historical 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, a TFP methodology 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.

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.

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).[2] 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).[3]

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.

1.2 Using TFP in incentive regulation

1.2.1 The aims of incentive regulation

The building block approach and a TFP methodology are alternative methods for applying incentive regulation to the determination of revenues and prices. The aims of incentive regulation are to provide service providers with the opportunity to recover efficient costs while also providing incentives to improve their operating and investment efficiency, service performance, and to ensure that consumers benefit from the gains.

The incentive to reduce costs is provided by setting the prices or revenue to apply during the regulatory period at the start of the regulatory period, regardless of what actual costs during the regulatory period turn out to be. Hence, the service provider is able to earn extra profits from out-performing the allowed revenues or prices. In doing so, incentive regulation attempts to replicate the discipline that competitive market forces would impose on regulated service providers if they were present. These forces compel service providers that realise productivity gains to pass these gains on to their customers in the form of lower prices (after accounting for changes in input prices).

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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 AER in approving or amending determinations for electricity distribution service providers.

3 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.

The two distinct aspects to incentive regulation are the initial level of the cap (on allowed revenue or prices) and the rate of change to the cap over time:

- The initial revenue or price cap is estimated by the regulator to reflect the current efficient level of costs for the service provider (referred to as P_0 determination).[4]

- The rate of change sets the allowed path at which the service provider's inflation adjusted prices or revenues may change over time. This consists of two components: the estimation of the expected efficiency gains of the industry (net of the general economy-wide efficiency growth); and an allowance for the difference between the growth of input prices for the service provider and the economy-wide input price growth rate. The rate of change is typically represented by the X factor within the price path formula CPI-X.

1.2.2 TFP methodology

TFP indices do not measure profitability or efficiency and therefore cannot help regulators to set the initial price or revenue cap at a level that gives the service provider a reasonable return. The initial price or revenue level must be determined by another method, for example, using a simplified building block approach.

However, TFP indices can be used to determine the price or revenue path, providing an alternative to the building block approach of carrying out an analysis of business-specific cost forecast. Under a TFP methodology, the X factor is set according to an external benchmark; that is, the productivity performance (or rate of change in productivity) of a relevant 'industry group' (which would be a group of comparable service providers) over time.

Under a TFP methodology, if the initial cap is set to recover the efficient level of costs (including capital funding costs), and the historical TFP growth rate reflects productivity growth that can be expected going forward, then the service provider should be able to earn a reasonable rate of return and recover efficient costs.

1.2.3 Building block approach

The building block approach attempts to meet the goals of incentive regulation through a different approach. It determines the initial price or revenue cap in the same way as under a TFP methodology, but the rate of change (or price or revenue path) depends on the use of business-specific information under the building block approach, whereas it does not under a TFP methodology. The building block approach requires summing the indexation of the regulatory asset base (RAB) and forecasts of the return on capital, depreciation, cost of corporate income tax, revenue increments or decrements resulting from the operation of an incentive scheme and the operating expenditure of a specific service provider.

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[4] In practice there may be a small forecasting element to this assessment because the regulator will be working from the most recent set of regulatory accounts, which will relate to one (or two) years prior to the first year of the forthcoming regulatory period.

The X factor under the building block approach is a business-specific adjustment factor set to reflect the efficient level of expenditure that the service provider would need to incur over time to meet the required levels of service reliability and quality, expected demand growth and cost of capital financing. In doing so, the regulator is required to make assumptions about the future productivity of the service provider.

The application of incentive regulation to electricity networks and gas pipelines has been constantly evolving with regulators developing innovative methods. In practice, regulators have adopted a variety of approaches to incentive regulation and many schemes use a combination of different models. The application of the building block approach in Australia has gone through substantial reforms over the past ten years.

This Review is part of the continuing progress of monitoring and assessing the performance of the regulatory framework against the goals of incentive regulation.

For incentive regulation, a TFP methodology attempts to expose regulated service providers to competitive market like pressures by linking their prices and revenue to the productivity performance of the industry as a whole instead of basing them on an assessment of business-specific costs. It is claimed that compared to the building block approach, a TFP methodology could deliver stronger performance incentives, lower regulatory administrative costs and redress the information asymmetry issues faced by regulators. However, certain conditions need to be satisfied for this methodology to work and such an approach to regulatory determinations may also have a negative effect on investment certainty.

1.3 Approach to this Review

1.3.1 The Review process

A staged approach has been adopted to address the Review objectives:

- Stage 1 – The AEMC will make an assessment of whether it considers that a TFP methodology would promote either the NEO or NGO and therefore, should have a role in the relevant decision-making processes. At the end of this stage, the AEMC will provide its findings to the MCE for its consideration (Stage 1 Final Report).

- Stage 2 - If the AEMC considers that rules should be made to facilitate the use of a TFP methodology for either, or both, gas decisions or electricity determinations it will then proceed to develop its recommended draft Rules to be submitted to the MCE (Stage 2 Final Report). In doing so, the AEMC will have regard to considerations from the MCE on the Stage 1 Final Report.

The Review focuses on the application of a TFP methodology to determine allowed revenues or prices. In particular, on examining the suitability of a TFP methodology

for the energy distribution sectors, the case for using a TFP methodology in energy transmission regulation is less compelling.[5]

With respect to the use of a TFP methodology as a benchmarking application, the AER is already permitted under both the NER and NGR to have regard to efficiency benchmarks when applying the building block approach. This gives the regulator and the service providers the option of making use of TFP benchmarks.

We approached our assessment 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.

A TFP methodology can take many forms. To assist the assessment, a TFP design example was developed in consultation with stakeholders. This design example has been refined further to reflect stakeholder comments raised at these workshops and in submissions (see Appendix B). The assessment has also taken into account the form of methodology included in the Victorian Proposal (see Appendix C).

This Review has focused on the application of a TFP methodology as an optional alternative to the existing building block approach and not as a mandated replacement. Introducing a TFP methodology as an optional alternative would result in less distortion and risks to the market, and would give time for the methodology to be tested. However, there would be potential disadvantages of having two parallel methodologies for revenue and price determinations.

In approaching this Review, we evaluated the extensive research done on the application of a TFP methodology to energy regulation in Australia.[6] We have engaged actively with stakeholders to assessing the benefits of a TFP methodology and exploring the possible design and application of a TFP methodology. This included:

- releasing various consultant expert reports for consideration by stakeholders; and
- holding workshops on the TFP design example and conducting focused discussion with stakeholders on TFP design issues.

The preliminary findings contained in this Paper have been informed by the comments and analysis provided by stakeholders as well as the experience of the use of a TFP methodology in other countries. In conducting the Review, we also had regard to the future challenges facing electricity and gas service providers, especially with the introduction of a carbon pollution reduction scheme (CPRS) in Australia and the development of smart grids.

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5 The key reasons are the lumpy capital expenditure programs for transmission and difficulty in measuring the appropriate outputs.

6 The ESC has undertaken extensive research into evaluating the use of a TFP methodology. Also, the Utility Regulators Forum discussed a number of TFP methodology issues in 2002.

1.3.2 Assessment framework

In undertaking this Review, the AEMC must have regard to the NEO and NGO and the revenue and pricing principles.[7] The national 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 objectives.

The Issues Paper identified five criteria with which to assess whether a TFP methodology would contribute to the national objectives and would be consistent with the revenue and pricing principles.[8] 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.[9] During the course of the Review, stakeholders asked what exactly is the problem that a TFP methodology is meant to address. The problem is whether maintaining the current arrangements would best promote the achievement of the national objectives.

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

8 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)

9 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.

Throughout this Paper, references to the relative advantages and disadvantages of the current application of the building block approach are included in the assessment of a TFP methodology.

1.4 Outline of the Paper

This Paper starts with assessing the efficiency properties under a TFP methodology to form an understanding of the likely behaviour of service providers who are subject to a TFP methodology:

- Chapter 2 looks at whether a TFP methodology would promote more efficient behaviour.
- Chapter 3 discusses the implications of the design of a TFP methodology for efficiency.
- Chapter 4 evaluates the potential effects on investment and recovery of efficient costs.

In order to focus this aspect of the assessment on the efficiency impacts of a TFP methodology, it is assumed that the necessary data-set is available and that the specification used to calculate the TFP index is resolved. This enables a test of the economic efficiency case for a TFP methodology before addressing the practical application issues.

The Paper then addresses the various practical aspects of implementing a TFP methodology:

- Chapter 5 discusses the conditions needed to support the implementation of a TFP methodology.
- Chapter 6 covers the impacts of introducing a TFP methodology into the current regulatory framework. This provides a comprehensive picture of the benefits and costs of implementing a TFP methodology.
- Chapter 7 provides an assessment of the suitability of a TFP methodology for each of the four energy sectors.
- Chapter 8 concludes with an assessment of a TFP methodology against the criteria and an outline of the way forward for this Review.
- Chapter 9 provides a collation of the preliminary findings.

The appendices provide further background information and supporting analysis. The following three consultancy papers have also been released to support the analysis in the Paper:

- A review of the Pacific Economic Group's (PEG) paper on incentive power and regulatory options in Victoria by The Brattle Group. This report evaluates the conclusions reached in the PEG paper and its relevance to this Review.

- A report from Economic Insights on the specification of a TFP growth index. This report discusses the debate into how the TFP growth index should be calculated and identifies the issues that remain to be resolved.

- An information paper prepared by The Brattle Group on alternative options to incentive regulation. This paper outlines other possible alternatives to a TFP methodology for changing the current arrangements.

1.5 Progress and next steps

The various stages and documents released for the Review, including the next steps, are set out in Appendix A.

This Paper represents a key stage in forming the AEMC's draft recommendations. Once stakeholder comments raised in submissions and at the public forum have been considered, the draft recommendations to the MCE will be releases in April 2010 for further consultation. We are aiming to release our final report on stage 1 of the Review by July 2010 and at that stage we will decide whether it would be appropriate to progress to stage 2 of the Review and draft proposed rules.

1.5.1 Lodging submissions

Submissions on this Preliminary Findings Paper and the accompanying consultant reports are requested by 5 pm, Friday 26 February 2010.

Submissions should refer to project number 'EMO0006' and be sent electronically through the AEMC's online lodgement facility at www.aemc.gov.au.

1.5.2 Registration for the public forum

The AEMC will hold a public forum on this Preliminary Findings Paper on 1 February 2010 in Melbourne. The purpose of the public forum is to:

- allow the AEMC to present its preliminary findings; and

- give stakeholders and interested parties the opportunity to ask questions and discuss issues of concern prior to finalising their written submissions on the Paper.

Stakeholders wishing to attend the public forum are invited to register by completing a registration form available from the AEMC's website at: www.aemc.gov.au.

Further details on the public forum, including an agenda for the forum, will be published on the AEMC's website.

2 Promotion of efficiency under a TFP methodology

This chapter tests the proposition that the separation between regulated prices and specific costs for service providers under a TFP methodology creates better efficiency properties and consequently is more likely to protect the long term interests of customers in respect of the costs of providing regulated services. At this stage, we assume that the necessary data-set is available and the specification of the TFP index calculation has been resolved.

There are three aspects to consider:

- would a TFP methodology increase the incentive for the service provider to make cost efficiencies and become more innovative;
- would a TFP methodology reduce the problems caused by the asymmetry in information between the service provider and the regulator which arises from the service provider having greater knowledge of costs and its performance; and
- would a TFP methodology improve the balancing of incentives between the service provider undertaking operating and capital expenditures.

This chapter focuses on the productive and dynamic efficiency impacts of a TFP methodology. A TFP methodology would also have implications on how the service provider's quality of service and its incentive allow for demand management options to be pursued. These issues are discussed in Chapter 6.

Summary of findings

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

  (a) a TFP methodology provides higher returns to the service provider when it makes investments and improves operating practices which deliver continuing productivity improvements; and

  (b) 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 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.

- There would be more pressure on all service providers to out-perform, or at least maintain, the rate of industry productivity. 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 achieve at least industry average productivity growth to earn its benchmark rate of return. This need to match peer performance would drive productivity and innovation.

- Under a TFP methodology, the information advantage favouring the service provider would diminish as prices would be determined by industry group factors rather than business-specific factors and forecasts. This could lead to improvements in efficiency as it would ensure that prices better reflect underlying efficient costs. Hence, the regulator would be in a better position to set a price path that encourages a service provider to improve its performance and reduces the potential for the service provider to capture informational rents.

- The extent of the information advantage can depend on how uncertain future costs conditions are. A TFP methodology, like the building block approach, does not deal with such uncertainty well. If there was significant uncertainty then a TFP methodology may not be suitable.

- 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.

2.1 Efficiency incentives under a TFP methodology

2.1.1 Issue

Both a TFP methodology and the building block approach are ways to apply a CPI-X form of incentive regulation. Under both methods the incentive to reduce costs would be provided by fixing prices at the start of the regulatory period. The prices would be fixed regardless of what the actual costs are when they become known during the regulatory period. If the service provider can decrease its costs below the price cap then its immediate profits would increase.

The strength of the incentive on the service provider to seek efficiencies depends on how the effort by the service provider, to either makes investments or change operating practices which lead to costs savings, would be rewarded with higher profits. This would depend on:

- the value of extra cost savings which would be retained by the service provider each year;

- the period for which the benefit would be retained; and

- with respect to expenditure which recurs each year, how information on past costs would be taken into account when setting allowed future revenue.

These factors would determine how sensitive the service provider's profits would be in relation to the effort to seek cost efficiencies.[10]

This section of the Paper focuses on the specific question of whether using the TFP growth index to determine the rate of change of the price caps would improve the incentive to become more efficient and innovative compared to the building block approach. It is clear that the strength of incentives would depend on the length of the regulatory period and the application of any efficiency carryover mechanisms (which link future prices to the difference between out-turn and forecast expenditure). Chapter 3 discusses the effect of varying these factors. In this chapter, we assume that all other parameters are constant between a TFP methodology and the building block approach.

It is important that the regulatory framework provides sufficient incentives on service providers to adopt relevant innovations and keep costs at an efficient level, especially as operating conditions may change under climate change policies. In the future energy distribution systems would become 'active networks' that interact with both demand and supply sides. Industrial combined heat and power, distributed renewable generation, and micro-generation units installed by households equipped with smart meters would all pose new challenges to distribution networks to innovate and adopt new technologies.

2.1.2 Preliminary finding

Under a TFP methodology, the incentives for service providers to improve efficiency and be innovative would be stronger than under the building block approach. A TFP methodology would increase the profits for the service provider from both making investments and changing operating practices which deliver continuing productivity improvements. This would provide more encouragement to make on-going productivity improvements compared to the building block approach.

This extra profit is due to the difference in the timing when savings are fed through into prices under either a TFP methodology or the building block approach. In the long term this would lead to lower prices for customers.

Under a TFP methodology, a poor performing service provider would find it more difficult to remain static and not to seek out ways to improve productivity because it needs to achieve at least industry average productivity growth to earn its benchmark rate of return. This would drive more innovation in the industry as service providers would continually seek to be ahead of the average productivity of the industry. Hence under a TFP methodology there would be more pressure on all service providers to out-perform, or at least maintain, the rate of industry productivity.

[10] For a detailed discussion on this, see D Biggar, 'Understanding the role of relative productivity information in natural monopoly regulation in Australia', 11 October 2005.

2.1.3 Reasoning

Both a TFP methodology and the building block approach would allow the service provider to keep the difference between its actual costs and allowed costs for some period of time before price levels are adjusted (this is called 'regulatory lag').

The TFP growth index would be calculated using a time series of historical data of at least eight years. Hence the effects of ongoing productivity improvements would take time to feed through into a higher X factor. In contrast, under the building block approach the regulator is able to look forward and factor into the price cap any expected costs savings caused by ongoing productivity improvements. That is, there is the possibility that the regulator will extrapolate the observed productivity trend when determining future efficient prices. As a result, for constant productivity improvements, there would be a difference in the regulatory lag between a TFP methodology and the building block approach.

To illustrate this, consider a service provider that invests in new systems and processes which increases its productivity growth above that of the industry for an ongoing extended period of time. Under the building block approach, this higher rate of productivity growth for the service provider would be reflected in both the P_0 and the X factor for the service provider at the next price review. The regulator is able to extrapolate the productivity trend when determining the rate of change, in effect benchmarking the service provider against its own historic productivity growth performance.[11]

In contrast, under a TFP methodology the higher productivity growth would only be reflected in the service provider's P_0 at the next price review and its X factor would be set according to the industry average productivity growth. That is, under a TFP methodology, the service provider's X factor for the next regulatory period would be lower than it would be under the building block approach. This unambiguously increases the extra profit (giving a strong incentive) to any effort by the service provider to make continuous productivity improvements. An example is set out in Box 2.1.

While prices would be even lower if the investment to innovate occurred under the building block approach, the incentive for the service provider to innovate is less – hence, it is less likely to occur.

[11] Under the building block approach, the service provider may try to disguise this expected productivity improvement through misleading the regulator at the next price review. However, information provided under the building block approach should demonstrate the continuing productivity improvements. If not, then there is a significant problem with the building block approach.

Box 2.1: Example to show that a TFP methodology provides stronger incentives

Consider that a service provider has option to incur extra management effort in order to control costs. If it invests this effort it expects to reduce operating expenditure by 1% per year, because the new technology can be rolled out across the network. This will take ten years.

During the ten years operating expenditure will gradually fall as the technology is used more widely. If the firm does not invest the effort operating expenditure will be flat. Assume this firm is less efficient than its peers which have already done this operating expenditure control and now have flat costs. So the inefficient firm will take ten years to catch up. Under a TFP methodology X=0, so the 1% per year operating expenditure reduction is extra profits for ten years. This is the size of the incentive to undertake the effort.

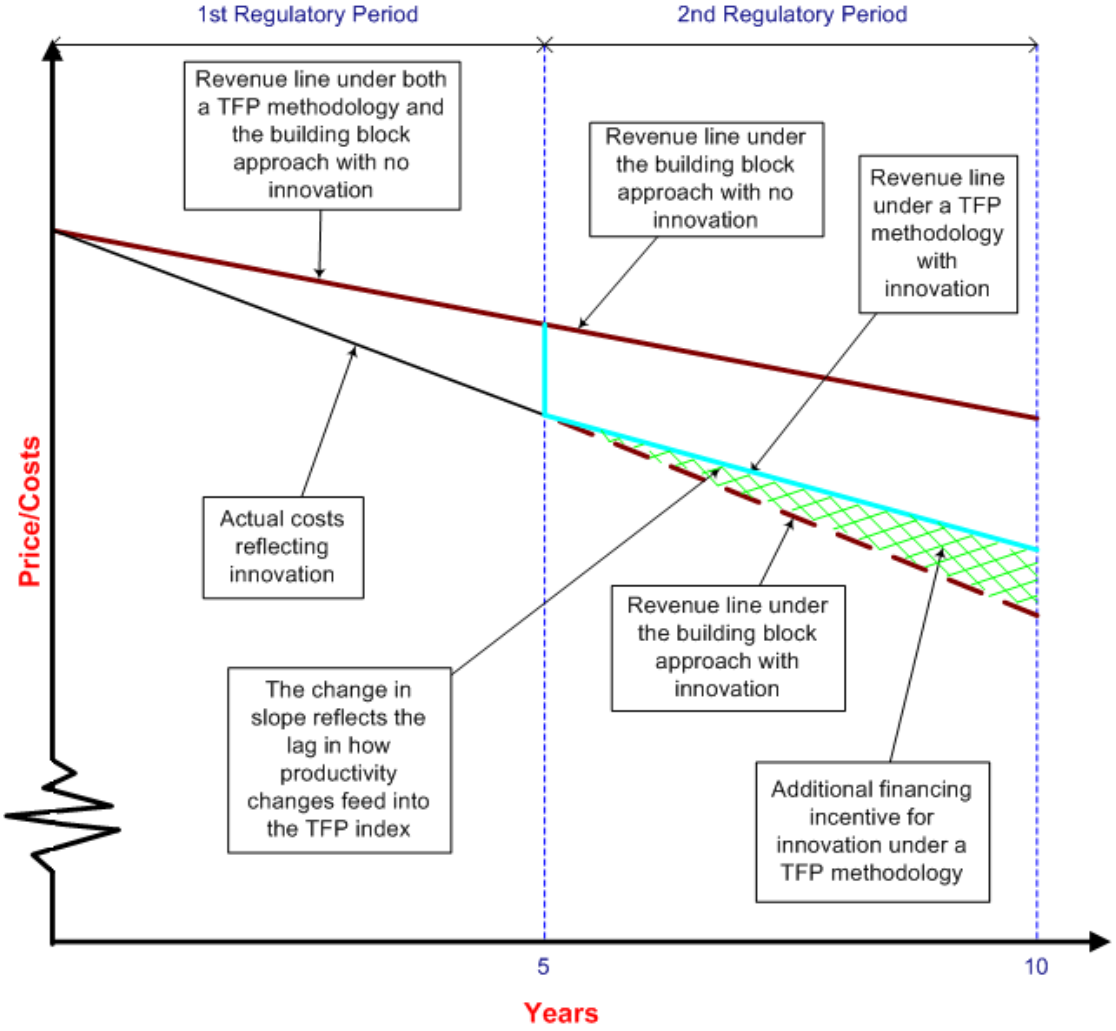
Under the building block approach X=0 initially (say, because the firm puts forward the 'no extra effort' business case). For the first five years the firm gets the same profits as under a TFP methodology. For the second five year period the regulator sets a positive X factor by extrapolating the firm's out-performance. Therefore the incentive to undertake the effort is smaller under the building block approach in this case.

Looking over more than one regulatory period, there would be a positive difference in the strength of incentives under a TFP methodology.[12] A key feature of incentive regulation is that the service provider have a high degree of discretion regarding the operation of the service provider. By increasing the returns to the service provider, the service provider will become more likely to make investments which reduce costs and exploit new ideas and change operating practices. This is because its rewards from doing so is higher.

This will result in the service provider providing the same level of services at a lower level of expenditure. Over time this savings will be passed through to consumers through into lower prices for customers. This is illustrated by Figure 2.1.

[12] The impact of this effect would depend on the length of period of the historical data-set used to estimate the TFP index and also on whether the service provider would be subject to a rolling X form of a TFP methodology.

Figure 2.1 Additional incentive for efficiency and innovation under TFP



In its submission, the AER contended that the level at which the X factor is set does not affect the strength of incentives.[13] In its view, the strength of incentives depends only on the sensitivity of future profit to the increase in effort and not on the absolute level of profit. Hence the marginal value of the extra profit caused by efficiency effort is the same irrespective of the absolute level of profit, and therefore the level at which the X factor is set will not drive incentives.[14]

13 AER submission, 6 March 2009, pp. 7-8. This point is also made in the Brattle Incentives Report, p. 5.

14 This is based upon the assumption that the service provider seeks to profit maximise. This assumption may not always hold. For example, there is the risk of political intervention if networks are seen to earn excessive profits. Also, drawing on analysis based upon decision making of consumers, how the service provider values the change in profits will depend the relative position of the service provider compared to defined 'reference points'. For example, a service providers may be more averse to making a loss than it values higher profits. One such reference point would be the targeted level of dividends set for a government-owned service provider. For commercially-owned service providers, a reference point would be the debt interest cover, or targets set in the manager performance contract.

This analysis is correct from a static perspective after the price path has been settled. However, as illustrated above, it ignores how the process used to set and update the rate of change of the price path over time affects incentives.

In principle, if all other variables remain constant, a TFP methodology would increase the strength of incentives for service providers to pursue cost efficiencies and try to constantly out-perform the industry productivity growth. This effect would only work for changes in the service provider's effort which would result in ongoing productivity growth (that is, a downward trend in costs).

If the change in effort only resulted in a one-off productivity improvement then the incentive would be the same under either a TFP methodology or the building block approach. This is because under both methodologies any one-off productivity improvement will be factored into the level of efficient costs set at the next price review.

There is the question of whether this effect would lead to substantial efficiency improvements. The key advantage of a TFP methodology is that the regulator cannot use the service provider's actual costs in setting the X factor going forward. Under the current arrangements, the service provider does not know how the regulator will exactly set the X factor going forward. There is a possibility that the regulator decides to extrapolate the efficiency trend into the future or make greater use of benchmarking information. Thus, there is some uncertainty for the service provider regarding how a specific effort to control costs in one regulatory period will influence the X factor in the next regulatory period. However, under a TFP methodology there is no such uncertainty.

This is particularly significant as it provides clearer signals regarding how effort by the service provider to make investment which drive down long term costs will be rewarded. Hence a TFP methodology would be more likely to promote long-term cost reduction initiatives, or risky long-term projects (for example, R&D and innovation investments) where regulators would not be well-positioned to assess risks.

This additional incentive property under a TFP methodology would have a material impact on the decisions of service providers and lead to lower prices for customers.[15]

2.1.3.1 Increased risks in maintaining industry productivity

The analysis above indicates that using a TFP index to determine the X factor could be a material improvement on productivity. A TFP methodology would lead to a more competitive discipline on the service provider where profits would become dependent upon how the service provider performs relative to its industry group. There would be more pressure on all service providers to out-perform, or at least maintain, the rate of industry productivity. A poor performing service provider

[15] The Brattle Incentives Report concluded that incentives would be only marginally stronger under TFP. We reach a different conclusion on the basis that there is likely to be a significant number of opportunities for firms to achieve an ongoing downwards trend in cost, rather than one-off or repeated cost reductions that do not form a downwards trend (continual improvements in productivity).

would find it more difficult to remain 'inert' under a TFP methodology than it would under the building block approach as it would need to achieve at least industry average productivity growth to earn its benchmark rate of return.

These additional incentive properties would have a considerable positive benefit through the promotion of innovation.[16] 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 would better encourage a service provider to seek out new ideas to improve its processes and lower its prices.

2.1.4 Other arguments for the promotion of innovation under TFP

The ESC have stressed the benefits of a TFP methodology in improving the incentives for innovation and in encouraging broad energy market objectives. It has put forward two other key arguments to support its position:

- the building block approach encourages a service provider to increase its RAB and not to take risks. Under this form of regulation, capital markets will inevitably establish highly leveraged service providers over time with risk averse management styles; and

- the building block approach suffers from cost allocation issues. This discourages the business from seeking to make profits in competitive services because there is a risk that the regulator will seek to claim the associated profits for the regulated service.[17]

We do not consider that the analysis nor the evidence supports either of these arguments.

The evidence on the actual leverage of service providers shows a reasonable range. The AER has considered the evidence on this issue and did not change the gearing assumption used in capital asset pricing model (CAPM) in its recent weighted average cost of capital (WACC) review.[18] In addition, there is no clear indication that a highly leveraged service provider would necessarily mean low innovation.

Cost allocation issues would remain under a TFP methodology as there would be regular P_0 determinations. Accounting rules regarding the profit associated with the regulated services will still be required. The cost allocation issue would only be less of an issue under a TFP methodology, if it led to longer regulatory periods.

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16 Innovation refers to the process of capturing and exploiting new ideas that could lead to improved products and processes. Innovation and technological progress are crucial for long-term productivity growth of the individual service provider as well as the sector as a whole. The adoption of technical change will be influenced by the regulatory framework and the incentives that it provides.

17 The ESC also commented that service providers have less incentive to mis-report under a TFP methodology because cost allocation has less of an impact on the TFP index than under price caps set using the building block approach.

18 AER, *Final decision: Electricity transmission and distribution network service providers review of the WACC parameters*, May 2009, pp. 116-127.

The issue of how the current arrangements for electricity service providers would promote innovation was discussed in the AEMC Demand-Side Participation Review. The final report of that review states that the existing frameworks probably unduly inhibit expenditure on innovation and that there will be a need for a side-payment mechanism.[19] Although a TFP methodology would assist in promoting innovation, such side-payment mechanisms should remain under a TFP methodology.

2.1.4.1 The PEG incentive power model

Both the Victorian Proposal and ESC's submissions to this Review refer to modelling work prepared by the Pacific Economics Group (PEG) on assessing incentives under various regulatory design options. They have claimed that this work demonstrates the extra efficiency benefits from introducing a TFP methodology relative to the traditional building block approach.

The AEMC has considered this model. In addition, The Brattle Group have prepared a report reviewing the 2005 PEG report that describes this modelling.[20] Brattle states that the assumptions on the TFP methodology used in the modelling by PEG are not consistent with a TFP methodology that is set out in this Review's design example. Therefore the modelling is irrelevant and uninformative to the comparisons made in this Reveiew. In particular, PEG's modelling assumes that under TFP prices are not reset to out-turn costs at the end of the regulatory period there is such a reset under the building block approach. These assumptions predetermine PEG's results as it is self-evident that incentives are weaker under any scheme that resets prices to out-turn costs at the end of the regulatory period relative to one that does not.

Therefore, this modelling analysis from PEG does not inform our assessment on the question of the efficiency benefits of a TFP methodology specifically, although it provides more information on the benefits of different approaches to setting the initial price levels and longer regulatory periods. As discussed in the next chapter, these are not necessarily dependent upon the use of a TFP methodology.

2.2 Addressing the information asymmetry problem

2.2.1 Issue

Under the building block approach, the regulator uses forecast costs provided by the service provider when setting the allowed prices. However, the regulator has imperfect information (asymmetric information) about the service provider's attributes and costs drivers. Furthermore, the service provider has the discretion to make choices not only about how it organises its operations, but also about the mixture of inputs and how hard it will work to minimise costs or what the level of

19 AEMC, *Final Report: Review of demand-side participation in the National Electricity Market,* 27 November 2009.

20 The Brattle Group, *Review of 'Incentive power and regulatory options in Victoria'*, December 2009.

service quality to provide. This gives the service provider an information advantage over the regulator.

This section tests the proposition that a TFP methodology would reduce this problem of asymmetric information between the regulator and service provider.

This information asymmetry problem may lead to a loss in efficiency due to less effort by the service provider to seek cost efficiencies and also because prices would be set too high relative to costs. The regulator faces uncertainty about the efficient level of costs for the service provider. In providing information, the service provider could seek to exploit this asymmetric information to maximise its profits and minimise its risks, subject to meeting its legal obligations.[21] There is also the risk that given the uncertainty over future costs and the need to ensure system security, the regulator may overcompensate the service provider by setting prices which are too high relative to the service provider's true costs.

Incentive regulation attempts to overcome this problem by providing a profit incentive for the service provider to reveal its true costs. However, whether this would be successful depends on the strength of the incentive provided This in turn depends on how the regulator would use the revealed information in setting price caps in the future.[22] It may be more profitable for the service provider to exploit its information advantage and hide its true costs to convince the regulator to set a higher than efficient price cap. Also in the face of information asymmetry, the regulator would have a difficult choice between providing a strong incentive for the service provider to seek cost efficiencies versus the loss of consumer welfare from allowing the service provider to retain excess profits.

2.2.2 Preliminary finding

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

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

This decreases the ability of the service provider to earns rents (at the expense of customers) from providing information to the regulator. This places more onus on the service provider to seek additional profits through making real productivity improvements. Efficiency will improve as it ensures that prices better reflect underlying efficient costs and enables the regulator to set better targeted incentives without the risk of the service provider earning undue excess profit.

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21 Therefore, any factor which makes it more difficult for the regulator to discern the true level of efficient cost from the information provided will have value to the service provider.

22 For a detailed discussion on this see D Biggar, 'Incentive regulation and the building block model', 20 September 2004.

This finding assumes that the data is available to calculate the TFP index and the TFP index provides an accurate measure of future productivity. This depends on the operating conditions being stable. If there was sufficient uncertainty about future conditions, then a TFP methodology may not be as successful in managing information asymmetry.

2.2.3 Reasoning

The extent that the service provider would be able to exploit its information advantage depends on the process used to determine the price caps. The more the process is dependent upon its own information, then the greater the opportunity for the service provider to exploit its information advantage.

Under the current building block approach, the process is based on a 'propose and respond' model. Under this model, the regulator assesses the service provider's proposal and accepts it (in whole or in part) unless it fails to meet specified criteria. Only in those circumstances does the regulator then determine an outcome that best meets the criteria.

Under a TFP methodology, instead of using the service provider's forecast of future costs, the rate of change of the price cap would be set in accordance with the industry TFP growth index. This use of an external measure, instead of the service provider's forecast, would diminish the ability of the service provider to strategically exploit its information advantage. The scope of decisions by the regulator is reduced.

It would not totally alleviate the problem as setting the initial price level under a TFP methodology would be based to a degree on the service provider's forecast costs. This is because the initial price level needs to reflect the efficient costs in that year. However based on the TFP design, the potential for the service provider to make use of its information advantage would be substantially reduced.[23]

Whether efficiency improvements would be achieved would depend on the ability of the TFP index to better measure future productivity compared to the regulator's assessment under the building block approach. If the use of a TFP methodology ensures that prices reflect underlying efficient costs, then there would be efficiency improvements. In theory, it should enable the regulator to set stronger incentives without the risk of undue excess profit for the service provider.

There may also be other benefits to the regulatory framework. The information asymmetry problem can lead to the regulator taking a more intrusive approach leading to more burdensome information requirements on service providers. This in turn, may lead to the regulator becoming too much involved in operational management decisions. In its submission to the Issues Paper, the ESC discussed the problems for the regulator to detect the true level of efficient costs and the difficulties

[23] The regulator will still base its decision on the efficient price for the initial year, and the service provider's forecast of operating and capital expenditures for that year (only operating expenditure for electricity distribution). However, this would be a lot less than estimating efficient costs for the length of the next regulatory period and the regulator should be substantially more informed on the efficient costs for the initial year.

it incurred in obtaining the correct information from service providers when making its regulatory determinations.[24]

However, the level of uncertainty facing the regulator and the extent of the service provider's information advantage depends on how stable and predictable operating conditions would be. If there were significant changes in market characteristics then a TFP methodology may not be a suitable tool to alleviate information asymmetry. This is because the market changes may break the link between historical and future productivity. However, the building block approach also has difficulties in dealing with uncertainty.

2.3 Balancing incentives between operating and capital expenditures

2.3.1 Issue

If the regulatory arrangements encourage service providers to favour capital expenditure over operating expenditure this may lead to service providers adopting an inefficient mix of operating and capital expenditures to operate their network and encourage them to capitalise their operating expenditure.[25] This would lead to higher prices for customers.

The balancing of incentives facing the service provider between the two types of expenditures will depend on:

- the relative proportion of the value savings retained by the service provider between an operating expenditure efficiency and capital expenditure efficiency; and

- the rules by which the regulator sets the allowed revenue for the next regulatory period. Under the NER, all actual capital expenditure is rolled into the RAB. However, for any actual overspend in recurrent operating expenditure, the service provider will have to seek the regulator's approval that such expenditure will be efficient. This may encourage the service provider to favour capital expenditure instead of operating expenditure.

Analysis provided in Appendix D shows that savings retained by the service provider will not be equal between operating and capital expenditures. The benefits that a service provider would realise from an operating expenditure saving is greater than that for a capital expenditure saving of the same size and duration. However, if most capital expenditure reductions were one-off, while operating expenditure

24 ESC submission, March 2009, pp. 40-46.

25 Operating costs might be capitalised in two ways, either through: reclassifying expenditure as capital costs when it would be more appropriately classified as operating costs; or deciding to undertake capital expenditure when operating expenditure represents the most efficient option.

savings were recurring, then the strength of the incentive to make efficiency savings would be comparable for both operating and capital expenditures.[26]

As a TFP methodology would not set individual allowances for operating and capital expenditures there would be a perception that a TFP methodology would not distort the incentive between these two types of expenditure. This perception is now assessed.

2.3.2 Preliminary finding

A TFP methodology would not improve, or make worse, the balancing of incentives between operating and capital expenditures. This is because 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. 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.

2.3.3 Reasoning

Under a TFP methodology, the issue of balancing between operating and capital expenditures would remain. The relative incentive for the service provider to favour one type of expenditure over the other would depend on the greater value of the extra profit retained by the service provider for efficiency under either its operating or capital expenditure.

Under a TFP methodology, the relative incentives between operating and capital expenditures would remain the same as under the building block approach. This is because there would be a requirement for periodic price reviews under a TFP methodology which would affect the value of savings to service providers from making efficiencies. Also, the rules for which actual capital expenditure is rolled into the RAB would be the same. Therefore, a TFP methodology would not improve, although it would not make worse, the balancing of incentives between operating and capital expenditures.

[26] The analysis also highlights the distortion caused when the efficiency benefit sharing scheme is applied to only operating expenditure. This issue was discussed in the AEMC Demand Side Participation Review.

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3 How the design of a TFP methodology would impact on efficiency

This chapter discusses the various design choices for applying a TFP methodology and assesses the extent to which they might impact on the efficiency properties relative to the building block approach.

In Chapter 2 we established that a TFP methodology could promote improved productive and dynamic efficiencies from service providers compared to the current arrangements. This was based upon assessing the economic properties of a TFP methodology separate from the detail on how a TFP methodology would be applied. The actual incentives on a service provider will depend on the detailed design of a TFP methodology and the purpose of this chapter is to test whether our preliminary finding remains correct having regard to such design choices.

The chapter covers the key design choices with applying a TFP methodology. These are:

- the option between applying either a fixed X or rolling X;
- the length of the regulatory period; and
- the method used to determined the initial price determination.

The chapter also discusses whether the exclusion of an efficiency carryover mechanism (ECM) under a TFP methodology would diminish the efficiency properties. It also considers the question of whether introducing a TFP methodology as an optional form of regulation would promote efficiency. Like Chapter 2, we assume that there are no issues with data availability nor with the calculation of the TFP index.

Summary of findings

- The likely design of a TFP methodology would not diminish its additional efficiency properties.
- The incentives would slightly differ under either a fixed X or rolling X form of a TFP methodology. The additional incentive properties from a TFP methodology would occur irrespective of the choice between the rolling X and fixed X. In this regard, there is not a strong case to favour one form over the other.
- A longer regulatory period would increase the incentives to improve cost efficiency under a TFP methodology (it would also do so for the building block approach). However, having longer regulatory periods is not essential to ensure that a TFP methodology delivers stronger incentives.
- The method used to determine initial prices must act to realign prices to efficient costs. This method would be similar to the current building block approach and would not put at risk the additional incentive properties of a TFP methodology.

- It would not be possible to adapt an ECM for inclusion into a TFP methodology. The exclusion of an ECM in a TFP methodology could weaken the efficiency incentive for recurring operating expenditure. However, this needs to be balanced against a TFP methodology's positive effect on how the regulator sets efficiency targets going forward.

- Analysis supports the ability for the service provider to opt into a TFP methodology but its ability to subsequently opt out and revert back to the building block approach should be highly constrained. This is necessary to remove the incentive for the service provider to defer expenditure under a TFP methodology and then seek to get the same funding under the building block approach.

- Constraints on the ability of the service provider to opt out of a TFP methodology and revert back to the building block approach would be needed because of the risk that the service provider may defer expenditure under a TFP methodology.

3.1 Design choices of a TFP methodology

There are a number of essential design parameters to a TFP methodology which will affect how the methodology is applied in determining regulated prices. The Discussion Paper provided a description on the range of variations and how they would affect the way a TFP methodology is applied. This section steps through the main design parameters to a TFP methodology that could affect the efficiency properties. This section covers:

- whether the form of the X factor should be fixed or rolling over the regulatory period;

- the length of the regulatory period; and

- the method used to determine the initial price or revenue cap.

3.1.1 Fixed or rolling X

Under a TFP methodology, the basis for setting the rate of change of prices, which is the X factor, can be either:

- an estimate of the TFP growth index which is fixed over the regulatory period (fixed X). That estimate is the average industry productivity over the defined sample period up to the start of the regulatory period; or

- an estimate that is updated annually during the regulatory period (rolling X). The value of the X factor for the first year of the regulatory period would be estimated from the available time series of data. For the second year, a new value of the X factor would be determined using data that also encompasses the latest year of data and (may exclude the oldest year's data). This would be repeated each year of the regulatory period.

The underlying assumption for applying a fixed X is that productivity in an industry does not vary significantly over time. A fixed X provides certainty about prices during a regulatory period to both service providers and users. The alternative of a rolling X provides for the possibility that the TFP growth does change over time and would be applied when it is appropriate for the growth rate to be updated more dynamically.

Effect on incentives

There would be a difference in the incentives between the fixed X and rolling X form of a TFP methodology. Under a rolling X, each service provider would have to keep up with the changing industry productivity growth in order for it to earn its benchmark rate of return. Therefore during a period when there is positive productivity growth in the industry, a poor performing service provider would face increased risks if it did not maintain the industry productivity growth rate under a rolling X.

A rolling X also ensures that changes in cost trends would be passed onto customers more quickly. Hence under a rolling X, if a service provider out-performs the industry average productivity growth then a proportion of that efficiency would feed through into a higher X sooner than under the fixed X. The extent of that proportion would depend on the length of the period that the index would be measured and the relative magnitude of both the cost reduction and the service provider in question in the TFP index calculation.[27]

The additional incentive property from a TFP methodology would occur irrespective of the choice between the rolling X and fixed X.[28] While a rolling X may strengthen the incentive on the service provider to maintain the industry productivity growth, a fixed X may further delay the adjustment to the X factor by the service provider implementing cost savings. This will increase the value of the cost saving retained by the service provider, thereby strengthening the cost incentive.

With respect to efficiency, we do not consider that there would be a strong case to favour one form over the other. This would be consistent with the design feature of enabling the service provider to choose between either a rolling or fixed X. However a rolling X could have a detrimental effect on certainty. During this Review, service providers argued against the proposal to allow the use of a rolling X on the grounds that it would introduce a degree of randomness and uncertainty into price determinations.[29] This would depend on how stable and predictable the TFP index

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27 Another outcome of a rolling X would be when the service provider incurs a cost increase. A rolling X under a TFP methodology would provide some compensation to the service provider in the form of lower X factor. However, the extent of the adjustment would depend on the TFP index calculation. This is discussed in Chapter 4.

28 This assumes that the calculation of the TFP index can not be unduly influenced by the behaviour of one service provider. Whether this assumption would hold is discussed in Chapter 5.

29 Ergon Energy submission, 22 August 2008, p. 7; Citipower/Powercor/ETSA Utilities submission, 22 August 2008, pp. 3-4.

would be. Service providers may initially be reluctant to select a rolling X form of a TFP methodology.

3.1.2 Length of the regulatory period

The length of the regulatory period between price reset determinations is a key element of any framework for incentive regulation.

At present the NER requires regulatory periods to be a minimum of five years (see NER Chapter 10). The NGR does not specify a minimum or maximum access arrangement period although rule 50 suggests that a five year period would be usual. This section considers how the length of a regulatory period would impact the efficiency properties of a TFP methodology and whether the current provisions need to change under a TFP methodology.

Effect on incentives

The strength of the incentives under any price control setting method depends on the extent to which the arrangement allows a service provider to earn more than the benchmark rate of return set by the regulator, and the extent to which those returns are able to be retained by the service provider in subsequent regulatory periods. Hence, having a longer regulatory period would increase the value of any cost saving retained by the service provider but would also increase the impact of costs being higher than forecasted.

While a longer regulatory period would strengthen the incentives to improve performance, there would be an increase in the potential for unexpected exogenous costs or events to impact on the service provider's achieved returns. In addition, a longer regulatory period would increase the exposure of the service provider and regulator to the risk that the X factor would be set at an incorrect level.

Having regular price determinations is a form of insurance for both the regulator and service provider. Although a regulatory period of longer than five years could be applied under either a TFP methodology or the building block approach, t a longer regulatory period would be less likely to be practical under a TFP methodology than under the building block approach. This is because there would be a greater risk under a TFP methodology that the service provider would end up with prices significantly below costs.[30] We also note that the application of a TFP methodology in overseas jurisdictions has not lead to longer regulatory periods.

One way to manage the risks associated with a longer regulatory period would be to employ safeguard mechanisms such as off ramps. The inclusion of such mechanisms may support longer regulatory periods, however they can affect the incentive properties of a TFP methodology. Hence, there is we see no reason why using a TFP

[30] Also having a longer regulatory period would create issues with the forecast of volumes and the determination of an appropriate WACC for a longer regulatory period.

methodology, instead of the building block approach, would automatically lead to longer regulatory periods.

Our preliminary finding is that the length of the regulatory period is not relevant to an assessment of the merits of a TFP methodology relative to the building block approach. The additional TFP incentive comes from the difference in the approach to setting the X factor in the next regulatory period. This is not dependant on the timing of the determination. Hence, there is no need to change the current NER and NGR provisions regarding the length of the regulatory period.

3.1.3 Determining the initial price or revenue cap

A TFP growth index measures the rate of change in productivity. It cannot be used to assess the level of profitability of a service provider and so does not provide information on the appropriate level of prices in the first year of the regulatory period. Therefore, a TFP methodology tends to often be used in conjunction with another methodology to determine the efficient initial price cap at the start of the regulatory period. The Victorian Proposal suggested using the current building block approach to set the opening prices.

Effect on incentives

The method used to determine the initial price level, especially how information on past actual costs are taken into account and the rules for rolling forward the regulatory asset base, will affect the value of any profit from the service provider making cost efficiencies. Accordingly, it will influence the strength of the incentive to make cost efficiencies.

For a TFP methodology, the initial cap should be set at a level where the service provider has the opportunity to recover the efficient costs for providing the regulated service(s) in the year preceding the start of the regulatory period (see the TFP design in Appendix B). It is important that there are periodic realignments of prices to efficient costs to protect both customers and the service providers from wide divergences between prices and costs. This helps to maintain efficiency properties of a TFP methodology.

Another method would be to use a partial reset of costs to prices. Under this method the P_0 would change at the start of the new regulatory period would to be equal to or less than 100 per cent of the difference between prices and efficient costs.[31] For example, if prices in the last year of the first regulatory period were 110, and costs in the same year were determined to be 100, the change in P_0 change might be eight (that is, prices for the second regulatory period would be moved by 80 per cent of the way towards costs).

We do not consider that such a partial reset methodology would promote economic efficiency. The methodology would strengthen the incentive to control costs because

[31] Pacific Economics Group, *Incentive Power and Regulatory Options in Victoria*, May 2005.

it would weaken the link between reductions in cost and reductions in prices. However, it would also increase the risk of a significant gap between prices and costs. Furthermore, if such a method was systematically applied then there would be a risk that prices would be deliberately set below efficient cost.[32] This would damage investment incentives and would be inconsistent with the Revenue and Pricing Principles.

A 'partial reset' could be applied equally well for a price control based on the building block approach and a TFP methodology. It would not be an essential issue to the assessment of a TFP methodology.

Nevertheless, it is important that the method used to determine initial prices acts to realign prices to efficient costs in order to remove any inefficiencies. This would not put at risk the additional incentive properties of a TFP methodology. However, whether this approach remains correct will depend upon the spread of efficiency levels across the industry group at that point in time. If we assume that the application of the building block approach in previous regulatory periods has removed most existing inefficiencies and industry (or peer group) TFP growth mainly reflects technical change then there would probably not be a problem in removing any (small) inefficiencies as well as realigning revenues with (truly efficient) costs

But, if there is a wide range of efficiency levels and the regulator tries to remove all the inefficiency with the price reset then the result may be an incompatibility between the price reset and the industry (or peer group) TFP growth rate. That is, the observed TFP growth rate will reflect a fair degree of 'catch up' growth which it is not feasible for truly efficient service provider to match. This issue can be addressed by business-specific adjustments to the TFP growth rate to reflect differences in initial (standardised) productivity levels (and hence achievable growth rates going forward.[33] This issue can only be resolved once the necessary data has been collected to enable modelling on the productivity levels of each service provider.

Using a one-year initial price reset under a TFP methodology creates a practical difference with the current building block approach. Under the current building block approach the X factor is used as a price smoothing device and the regulator has to ensure that the combination of both the initial price and the X factor results in allowed total revenue which is set to the level of efficient costs (in net present value terms). As a result, there could a number of different combinations that could meet this condition. However under a TFP methodology, there is effectively only one combination permitted.

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32 That is, if costs turned out to be 120 and prices were 110, the new price would be 118.

33 It was for this reason that the Commerce Commission is adopting what it calls the 'partial building blocks' approach to their initial reset. Under this approach the costs for the reset are taken as current operating expenditure and a user cost of capital based on regulatory depreciation and the WACC applied to the RAB. There is no attempt to remove inefficiencies in the reset process - it is merely realigning revenues with current costs (where the latter uses the WACC or true opportunity cost). This means you could effectively use the TFP database to do the reset and it would be a very low cost exercise.

3.1.4 Application of an ECM to a TFP methodology

An ECM[34] aims to maintain the strength of efficiency incentives over an entire regulatory period by allowing profits, or losses, earned during a regulatory period to be carried over a set number of years (regardless of whether this moves into the next regulatory period). This ensures that gains and losses would be retained for the same period of time irrespective of when they occur during the regulatory period. They are applied as additional component to the building block approach.

It would be difficult to apply such a scheme under a TFP methodology given the absence of annual forecast of expenditure. We have considered possible options to adapt an ECM into a TFP methodology but found that there would be negative effects and concluded that they should not be applied. For example, an option would be to set an annual operating expenditure allowance by using the partial factor productivity trend to extrapolate the operating expenditure allowance in the initial price determination. However, this option would negatively affect the balance of incentives between operating and capital expenditures.[35]

Therefore we consider that a TFP methodology should not incorporate an ECM. The issue then becomes whether the exclusion of an ECM under a TFP methodology would diminish its efficiency properties.

Effect on incentives

The strength of the incentive to make cost reductions depends upon the value of the additional profit which would be retained by the service provider. As shown in Appendix D, there would be a difference in the value, irrespective of whether the cost reduction is an one-off or a recurring reduction in expenditure (that is, a cheaper way of undertaking a given task was identified and can be repeated in the subsequent years).

The question of whether the exclusion of an ECM under a TFP methodology would diminish its efficiency properties only relates to operating expenditure incentive since an ECM is not currently applied to capital expenditure.[36] The effect on incentives will depend upon how the effort by the service provider affects the level of operating expenditure:

If the cost reduction was an one-off saving (that is, a temporary saving in one year) then under either methodologies the service provider would retain 100 per cent of

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34 Referred to as the efficiency benefit sharing scheme (EBSS) in the NER.

35 Partial productivity measures can be impacted on by factor substitution effects (for example, capital expenditure is substituted for operating expenditure resulting in a decline in unit operating costs) and hence can be misleading.

36 If the current arrangement applied an ECM to capital expenditure then there would be a decrease in incentives under a TFP methodology. This is because the RAB would be adjusted sooner under a TFP methodology and the value of the saving retained by the service provider would be less. However any capital expenditure over spend would have less of an impact under a TFP methodology.

the reduction. There would be no difference between the building block approach and a TFP methodology without an ECM.

However if the operating expenditure reduction was recurrent, there would be a difference in the amount of profit retained between a TFP methodology without an ECM and the current building block approach. The extent of the difference would depend on the number of years until the next price reset. Under the building block approach, the ECM acts to provide a constant value. However under a TFP methodology, the value would diminish the closer the efficiency would be made to the next price reset determination.

This is illustrated in Table 3.1. This shows the relative percentage of the net present value of any recurrent saving in operating expenditure which is retained by the service provider under different retention periods (see Appendix D for details of the calculation).

Table 3.1: Percentage of an efficiency saving in operating expenditure retained by service provider

Years to next price reset	2	3	4	5	6	7
Building block approach with a five year ECM	29%	29%	29%	29%	-	-
TFP methodology with no ECM	13%	18%	24%	29%	33%	38%

Note: See Appendix D for calculations. This is based upon a rate of return of 7%.

Whether this would diminish the efficiency incentive with respect to operating expenditure reductions needs to be balanced against the effect identified in Chapter 2, on how the regulator sets efficiency targets going forward. If the recurrent savings in operating expenditure results in a continuing improvement in productivity growth for the specific service provider over a number of regulatory periods compared to the industry productivity average, then there will be a additional benefit for the service provider. This may offset the effect caused by the exclusion of an ECM. Under a TFP methodology, the service provider may retain more value depending on how the efficiency savings are reflected in the X factor going forward.

Therefore it is not clear whether the exclusion of an ECM under a TFP methodology would necessarily diminish the efficiency incentive with respect to operating expenditure.

There was disagreement amongst stakeholders on whether the absence of schemes such as an ECM would materially diminish the service provider's incentives under a TFP methodology. The ESC argued that a TFP methodology would be an optimal form of ECM because service providers would retain a greater share of any benefits from efficiency gains that would be greater than the industry trend in efficiency and would retain those benefits for a longer period.[37] In addition, the Victorian Proposal stated that if an ECM does not prove to be feasible under a TFP methodology, its

37 ESC submission to the Expert Panel, March 2006.

absence would be unlikely to imply a significant diminution of the incentives for efficiency compared to the building block approach in practice.[38]

Some service providers disagreed with this position. Integral Energy considered that if a TFP methodology did not include an ECM then it would lose its incentives for efficiency compared to the building block approach.[39]

We also noted that there are a number of disadvantages with an ECM. In the Demand Side Participation Review the AEMC concluded that the application of an ECM to operating expenditure only acts as a barrier to the efficient uptake of demand side initiatives. We recommended that any expenditure on demand side initiatives is excluded from the ECM.[40] Another possible disadvantage is that it increases the value to the service provider to exploit its information advantage in anticipation that the regulator would set the allowed prices above efficient costs. Exclusion of an ECM would help to address these issues.

3.2 A TFP methodology as an optional alternative to the building block approach

The focus of this Review is on the application of a TFP methodology as an optional alternative to the existing building block approach and not as a mandated replacement. Introducing a TFP methodology as an optional alternative would result in less distortion and risks to the market, and would give time for the methodology to be tested. That option should be at a service provider's discretion and not subject to any agreement from the regulator.

Whether having a TFP methodology as an optional form of regulation would promote economic efficiency needs to be assessed.

Providing service providers with a choice of regulatory options may improve economic welfare if it helps the regulator to overcome the information asymmetry problem by encouraging service providers to reveal specific information. However, in this particular situation it is not clear what the service provider would be revealing by its choice of either a TFP methodology or the building block approach. Importantly, it is not clear how the regulator could make use of that information. It is not clear how the benefit would be signalled to the regulator if the service provider was given the choice between either a TFP methodology or the building block approach.

Instead, the benefit from optionality would be the level of flexibility it gives the service provider to adapt the regulatory framework to its own risk appetite and circumstances. However, optionality should only be permitted if there was a win-win scenario, such that a TFP methodology would lead to increases in efficiencies which would be passed through to customers. Even though a smaller proportion of

38 Victorian Proposal, p. 35.

39 Integral submission, 24 February 2009, p.13.

40 AEMC, *Final report: Review of demand-side participation in the National Electricity Market*, 27 November 2009, p. 25.

the savings would be passed back, the overall amount of savings and hence customer welfare would be greater. If not, there would be a risk that the overall prices would increase as service providers would only choose a TFP methodology if they would obtain higher profits under a TFP methodology than compared to the building block approach.[41]

Therefore the question on whether service providers should have a choice between a TFP methodology and the building block approach would depend on the extent of additional efficiencies that would be created under a TFP methodology. For the reasons set out in Chapter 2, we consider that a TFP methodology would, in principle, have a positive impact on efficiency.

Not having all service providers being subject to a TFP methodology may affect the extent of this benefit. However, there would be likely to be synergies in having a TFP methodology and the building block approach operating as alternative forms of price determination. The performance of service providers under a TFP methodology would improve transparency on the productivity potential of the industry and would inform the regulator in making its decisions based on the building block approach. It would enable the regulator to benchmark more effectively and to use benchmarks to test the rigour of the service providers own forecasts.

As a result, providing a TFP methodology as an optional alternative to the building block approach would promote economic efficiency.

3.2.1 How to apply the option between the different regulatory methodologies

Introducing a TFP methodology as an option would raise questions regarding the procedures governing the service provider's selection and also on the ability for the service provider to revert from a TFP methodology back to the building block approach. The design of the procedures should not create any preserve incentives or damage economic efficiency.

The Discussion Paper addressed this issue. We remain of the view that the initial selection of a TFP methodology should solely be a decision for the service provider once a TFP methodology is included into the NER or NGR.

Regarding the ability for service providers to revert back to the building block approach, there would need to be some constraints on their ability to opt out of a TFP methodology. Further analysis indicates that there is an increased risk that service providers would conserve on their capital and operating expenditures under a TFP methodology and then subsequently apply for the building block approach to recover these costs.

For example, consider the scenario where the service provider initially retains benefits from underspending because the X factor was set on the industry growth rate rather than its own growth rate. Subsequently, the service provider would need to increase its spending to compensate for the initial underspend (that is, to maintain

41 Brattle Incentive Report, pp. 30-40.

compliance with system security standards). In this scenario, there would be an incentive for the service provider to use the building block approach where the X factor would be set based on its higher growth in spending compared to industry information. In contrast, under a TFP methodology, the service provider would have a more onerous X factor based on the lower growth in industry spending caused by its initial underspend. This raises a concern that the additional incentive benefits identified in Chapter 2 would encourage not only productivity improvements, but also deferral of expenditure, if the service provider was free to revert back to the building block approach.

This deferral expenditure issue can also exist under the building block approach. However, it would be easier for the service provider to hide the initial underspend under a TFP methodology as there would not be a specific capital expenditure allowance set. Under the building block approach, the service provider would have to present the same project for funding at the next review because although it received funding at the previous review, it did not spend this funding.

There would also be a risk that frequent movements between a TFP methodology and the building block approach would undermine the benefits of introducing a TFP methodology and the stability of the regulatory regime. Given that, there should be some constraint placed on service providers to have the ability to opt out. We suggest that the ability to opt out should be limited to exceptional circumstances where there would be a risk that the service provider would not have the opportunity to recover efficient costs. This should be determined by the AER. That is, the option to return to the building block approach should only be a part of the 'insurance mechanism' process and not a part of routine regulatory processes.

In moving to a TFP methodology, the service provider is committing to be benchmarked against its industry average productivity growth over the long term. By doing so it is recognising that over the investment cycle this might deliver lower revenues in some years but higher revenues in other years relative to the building block approach. However it is also recognising that it will have more certain treatment of actions which improve productivity over the long term.

3.3 Overall assessment

The purpose of this chapter was to test whether a TFP methodology would lead to more efficient behaviour having regard to the design of the methodology. The discussion above shows that the actual strength of incentives would depend on the design combination of various factors.

Some aspects of the design of a TFP methodology could improve its incentive properties. However, certain other aspects could diminish the efficiency properties of a TFP methodology. With this in mind, the ability of service providers to opt out of a TFP methodology and revert back to the building block approach would need to be constrained.

The exclusion of an ECM in a TFP methodology would diminish the incentive properties in the case of recurring operating expenditure. However, under a TFP

methodology there could be stronger incentives on service providers to pursue recurrent productivity improvements.

An issue for the design is whether the spectrum of possible forms of a TFP methodology should be narrowed in order to ensure that the efficiency benefits would be guaranteed. The AER suggested that the NER and NGR should mandate that the minimum length of the regulatory period for a TFP methodology should be at least seven years to increase the incentives for efficiency and to reduce the regulatory costs under a TFP methodology relative to the current arrangements.[42]

The analysis indicates that the additional incentive properties under a TFP methodology would hold under the assumption that a TFP methodology and the building block approach have the same regulatory periods. We also note that extending the length of the regulatory period would not be exclusive to the introduction of a TFP methodology and can be done under the current arrangements for the building block approach.

If a TFP methodology was implemented in the NER and NGR, then it would be likely that its design would change over time, similar to how the current arrangements have evolved. It may be prudent to have an initial five year regulatory period using a fixed X with the option of safeguard mechanisms until TFP data and a TFP methodology would be considered to be sufficiently robust and service providers have developed a level of comfort and familiarity with a TFP methodology.

42 AER submission, 30 October 2009, p. 6.

4 Recovery of efficient costs and investment under a TFP methodology

The previous chapters assessed whether a TFP methodology would promote cost efficiency. Another key assessment criteria is the effect of a TFP methodology on investment incentives. This chapter now tests the proposition that a TFP methodology inherently increases the risk that an individual service provider will not earn sufficient revenues to recover its costs even if it operates efficiently. This chapter addresses three aspects:

- first, relative to the building block approach, does a TFP methodology systematically increase the risk of an efficient service provider not being able to recover its costs;
- second, if the answer to the first question is yes, then how should this increased risk be addressed? Can a form of safety value be designed in a way that would not destroy the incentive properties of a TFP methodology identified in Chapter 2; and
- whether a TFP methodology would symmetrically increase the risks to the service provider so as to cause an increase in its cost of capital.

This is a crucial aspect of the assessment. Failure of a TFP methodology to ensure that service providers are given the opportunity to recover efficient costs would damage investment incentives and put at risk system security and reliability. It would also be inconsistent with the NEL and NGL Revenue and Pricing Principles which state that:[43]

> A service provider should be provided with a reasonable opportunity to recover at least the efficient costs the service provider incurs in—
>
> (a) providing reference services; and
>
> (b) complying with a regulatory obligation or requirement or making a regulatory payment.

Summary of findings

- The opportunity for service providers to recover efficient costs depends on whether the past rate of growth of industry TFP would provide an accurate prediction of future rates of productivity growth for the industry. A TFP methodology (assuming that the index is robust and measures productivity accurately) will enable a service provider who is capable of delivering average productivity growth over the medium term the opportunity to recover its efficient costs, as long as there are no adverse industry-wide productivity shocks.

[43] NGL, s. 24(2).

- However, there are increased risks for individual service providers who may not be capable of delivering average productivity growth over the medium term. There are a number of scenarios where it could be envisaged that the service provider would have more difficulty to recover business-specific cost increases than may be the case under the building block approach.

- To address this it may be prudent to incorporate safeguard mechanisms (for example, off ramps and a capital module) as insurance for the service provider. As long as the TFP index is correctly calculated, then in principle the inclusion of such safeguards into a TFP methodology should provide a level of opportunity for service providers to recover efficient costs comparable to the opportunity under the building block approach.

- The addition of such safeguards under a TFP methodology would provide better protection against unexpected changes in costs for the service provider compared to the building block approach. The building block approach gives service providers the opportunity to only recover forecast efficient costs.

- How such safeguard mechanisms would be applied is important. The key issue is striking the balance between providing certainty on cost recovery and maintaining efficiency incentives.

- Applying the TFP index rate as the efficiency factor for all regulated costs, and not just new expenditure, is consistent with providing the opportunity for service providers to recover efficient costs.

- Applying the same WACC to both approaches should not diminish the incentive on the service provider to make economic investments. In principle, a TFP methodology could provide similar levels of certainty regarding the treatment of expenditure. A TFP methodology may result in additional risks for the service provider. However, this would be offset by the potential to earn higher profits.

4.1 Opportunity to recover efficient costs

4.1.1 Issue

Whether a TFP methodology provides the opportunity for a service provider to recover efficient costs would be determined by the combination of the initial price cap and the rate of change in the price cap.

The initial price level would be set for a service provider to recover estimated costs in the year preceding the start of the TFP regulatory period, including depreciation and an appropriate return on past investment.[44] Therefore, whether a TFP methodology would lead to any systematic under recovery would depend on whether a change in the price cap (the X factor) provides the service provider with a sufficient revenue allowance to account for future changes in efficient costs.

[44] Under a TFP methodology, the allowed price cap is then set equal to the initial price level rolled forward by the CPI-X factor.

This issue only relates to changes in costs which form the regulated services charges (that is, prescribed services for electricity transmission, direct control services for electricity distribution or reference services for gas). Similar to the current arrangements, costs associated with negotiated services would be recovered through separate mechanisms outside a TFP methodology. Cost pass through mechanisms would also continue to apply as they currently do under the building block approach.

In making this assessment, it is important to note that the X factor would not solely be based upon the TFP index, but would also reflect industry input price inflation. As set out in the Discussion Paper, the X factor under a TFP methodology would contain a term representing the differential between the changes in industry input prices and changes in the economy input prices.[45]

It is important to distinguish between industry-wide changes in costs and business-specific changes. As long as the historical TFP growth trend provides an accurate measure of future trends in productivity, and the service provider is capable of delivering average productivity growth, then it would have the opportunity to recover efficient costs. The risks arise if there are factors which lead to changes in the costs specific to a service provider.

There are three questions to assess under this issue:

- Should the X factor be applied to all costs or only to future expenditure?
- Would a TFP methodology permit the service provider to recover efficient costs when there are changes in the industry-wide cost trends?
- Would a TFP methodology permit the service provider to recover efficient costs when there are changes in the trend in costs for a particular service provider?

How the TFP index is calculated would influence the ability of a TFP methodology to provide the service provider with the opportunity to recover efficient costs. This issue is dealt with in more detail in Chapter 5 when we discuss the TFP index specification.

4.1.2 Preliminary finding

Our preliminary finding is that a TFP methodology would increase the risk of revenues being insufficient to permit an individual service provider to recover its efficient costs. This is because the path of future price changes under a TFP methodology would be based on historic, average productivity. There is therefore a risk that:

1. future productivity growth would be systematically lower than past productivity growth; or

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45 This is reference to as the differential of a differential formula for a TFP methodology. Discussion Paper, 28 August 2009, Chapter 8.

2. an individual service provider would have systematically lower productivity growth than the average.

In contrast, the building block approach provides service providers with an opportunity at the start of the regulatory period to recover expected efficient costs. Although this includes a forecast of expected productivity growth and is not without some risk of under recovery. The key difference between the building block approach and a TFP methodology is that under the building block approach service providers have the ability to seek higher future prices to account for expected increases in efficient costs. The ability to pass through uncontrollable costs would be the same under either the building block approach or a TFP methodology.

The analysis confirms that it would be appropriate under a TFP methodology for the X factor to apply to both new expenditure and sunk costs.

4.1.3 Reasoning

The assessment of a TFP methodology in relation to providing the opportunity for the service provider to recover efficient costs must be compared with the risks under the building block approach.

Under the current arrangements for the building block approach, service providers are permitted to pass through defined types of costs which are considered to be outside the control of the service provider. The same cost pass through provisions would continue under a TFP methodology. Hence, this chapter focuses on the remainder of the service providers costs.

The NER and NGR specify that the application of the building block approach should allow service providers to recover efficient costs ex ante. That is, the price path should be set at the start of the regulatory period to allow the present value of forecast efficient costs to be recovered. Actual returns achieved over the regulatory period may be higher or lower than those forecast at the start of the regulatory period depending on: whether the service provider achieved higher or lower efficiency levels than forecast; whether output exceeded or fell short of initial forecasts; and whether there was an impact of unanticipated events.

Therefore, the service provider is given the opportunity to recover forecast efficient costs. There is no guarantee that actual costs will be recovered as the service provider faces both upside and downside risk (as the regulatory period proceeds) that actual costs will differ to those forecast.

Another important consideration with respect to the assessment of a TFP methodology is the appropriate time horizon with which the service provider should be given the opportunity to recover efficient costs. If there are cyclical changes in the

rate of productivity growth, then assessing a TFP methodology over a short period would be incorrect.[46]

We advocate that at least eight years of historical data be used to set the TFP growth rate for determining the X factor in order to smooth out the effects of business cycles. As under a TFP methodology it would be assumed that the historical productivity growth reflects the long term trend in productivity. This is the timeframe which the opportunity for service providers to recover efficient costs assessed. If ten years of historical data were used then, as long as the productivity growth trend remains, service providers would have an opportunity to recover efficient costs over the next ten years.

The Essential Services Commission of Victoria (ESC) has provided a spreadsheet model to demonstrate the operation and financial implications of a TFP methodology and the building block approach for two hypothetical companies.[47] We found this model to be instructive and are currently developing our own model which will cover a wider range of scenarios and test our preliminary finding on this cost recovery issue. This model is expected to be released in early February 2010 for consultation.

4.1.3.1 Applying the X factor to the initial price cap

The first issue to consider is whether there would be a risk of under recovery from applying the rate of change to all costs included in the initial price cap as the service provider may only be able to make efficiency savings in relation to new expenditure and not past expenditure. It is argued that incentives should be concentrated on 'new' expenditure (that is, operating expenditure and current and future capital expenditure) as there would be little scope to increase the efficiency of sunk assets.[48]

This approach would be effectively allowed for in a TFP methodology, provided that capital input quantities and annual capital costs are measured accurately. This is because under a TFP methodology, the productivity growth index would be calculated across all inputs, which includes the existing assets. Hence to the extent that there would be less scope to improve the efficiency of sunk assets, this would be reflected in a lower measured historical TFP growth rate.

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46 Service providers may alter their utilisation rates of production factors in line with cyclical changes in demand rather than actually alter the level of production factors employed (possibly due to the high costs associated with redundancies, recruitment and 'mothballing', or constructing capital stock). Some of the movement in utilisation rates (for example overtime payments and the hiring of equipment) would be captured in the level of operating costs. However, some utilisation rates, particularly the level of utilisation of capital stock, would be difficult to capture. Consequently, to the extent that movements in capacity utilisation go undetected by the input variables, the resulting TFP growth rate would be biased in a pro-cyclical manner. In other words, TFP growth estimation would be biased upwards during 'boom' periods and downwards during recessions.

47 ESC submission (TFP model), June 2009.

48 D Helm, 'Utility Regulation, the RAB and the cost of capital', paper presented at the Competition Commission Spring Lecture, 6 May 2009.

Thus, using the TFP growth rate in setting the X factor should allow the recovery of efficient costs across both sunk assets and 'new' expenditure. There would be at least some scope to improve the efficiency of sunk assets through retirement timing and utilising operating expenditure effectively. Given this, a TFP methodology would have the advantage of keeping some pressure on service providers to seek out efficiency improvements even for sunk assets.

4.1.3.2 Recovery of industry-wide changes in costs

Under a TFP methodology, the X factor would include an allowance for changes in the industry input prices which would offset any general changes in costs (for example, changes in the price of materials).[49] This would ensure that the TFP price cap moves with industry-wide changes in costs.

Given this, and as long as the conditions hold that the TFP index would be correctly calculated and that past productivity growth rates would provide a reasonable forecast of future productivity, our preliminary finding is that a TFP methodology would provide an opportunity for service providers to recover efficient costs that would be incurred across the industry.

4.1.3.3 Recovery of changes in costs specific to the service provider

If there were significant cost increases that affect only one service provider under a TFP methodology then it would be more difficult for the service provider to recover those business-specific cost increases than may be the case under the building block approach.

The materiality of this problem would depend on whether 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). An assessment of the following two scenarios demonstrates the difference:

1. An increase in the number of prescribed connections above the number of connections allowed for in the initial price cap.

2. An increase in the capital replacement expenditure in order to maintain compliance with system security standards.

The assessment of the first scenario would also depend on whether the service provider would be subject to a revenue cap or a price cap form of regulation.

Under a price-cap form of regulation, if the increase in the business-specific costs was due to an increase in the service provider's billed outputs (for example, connections and volumes), the service provider would receive extra revenue that would off-set the increase in costs. This would ensure efficient cost recovery as long as the service provider's average unit costs do not increase above the historical average unit costs.

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[49] There may be issues with determining the appropriate measure for industry input prices.

If this condition does not hold, then there would be a potential for the under recovery of costs.

The only difference between a TFP methodology and the building block approach in this first scenario is that under the building block approach the service provider would have the ability to request a higher unit cost allowance at the start of the regulatory period. On the other hand, the regulator would only permit the increase if it considered that the increase in costs would be efficient. If the increase in unit costs was not foreseen by the service provider then there is unlikely to be a difference between either the building block approach and a TFP methodology.

The situation would be more difficult for a service provider under a revenue cap form of regulation as there would be no corresponding increase in allowed revenue when outputs increase. Some adjustments would have to be made to allow for future growth in volumes and connections. Otherwise, per unit revenue would fall at a rate faster than that intended to reflect efficiency improvements. To ensure that there would be an opportunity for service providers to recover efficient costs, it would be necessary to move to a cap which included an output driver term or move to an average revenue cap.[50] However this issue of connection risk only arises if the connection is not a negotiated service. The revenue from negotiated services would be unaffected by the choice between a TFP methodology or the building block approach.

A similar outcome would occur under the second scenario. In this case, the service provider is required to incur extra expenditure above the levels that were determined to be efficient for the initial price cap. However, under a TFP methodology there would be no corresponding shift upwards in the cap to account for this extra expenditure.

A rolling X under a TFP methodology would provide some compensation to the service provider only if the increase in expenditure feeds through into a higher input quantity and hence a lower TFP growth rate. However, the extent of that proportion would depend upon the length of the period that the index would be measured and the relative magnitudes of both the increased cost and of the service provider in question in the TFP index calculation. The compensation would not cover all increases in costs.

4.2 Design of safeguard mechanisms

4.2.1 Issue

Given that there would be a risk of under recovery under a number of scenarios, in order to ensure that service providers have an opportunity for efficient cost recovery,

50 A formula based upon $\Delta C = CPI - X + \Delta O$ (where C is operating expenditure and O is output) was used by the ESC in setting the allowed operating expenditure requirements in its 2005 electricity distribution price review and 2007 gas access arrangement review.

some form of safeguard mechanism may be required. This would be a prudent approach to deal with unexpected changes in operating conditions.

The safeguard mechanisms could include:

- off ramps which would trigger an initial price cap reset; [51]
- a capital module, which would permit the TFP price cap to be adjusted upwards if the service provider incurs increases in capital expenditure; or
- as an alternative to the capital module, change the rules for rolling in capital expenditure into the RAB at the subsequent price reset. For necessary efficient expenditure in excess of that allowed under the TFP price path, expenditure would be rolled into the next regulatory period's opening cost base by allowing a return on and return of capital from the point the expenditure was made through to the end of the last regulatory period; or
- include an adjustment factor to the TFP growth index that is specific to each specific service provider.

Further details of these mechanisms were provided in the Discussion Paper. There are two differences between these mechanisms which point to a possible need to combine the mechanisms under a TFP methodology. These differences are:

1. The capital module would only be applied to cost trend increases. However, off ramps can be applied symmetrically to both increases and decreases in costs. This could provide some insurance for consumers against the possibility that exogenous factors lead to jumps in current productivity growth above the historical trend.
2. Capital modules tend to be designed for single large capital expenditure projects. Off ramps can provide protection against a gradual accumulation of increases in costs (that is, where a summation of a number of minor increases in costs causes a material under recovery).

The issue is whether to include such mechanisms. And, if they can be designed in a way that would not destroy the incentive properties of a TFP methodology that have been identified in Chapter 2.

4.2.2 Preliminary finding

The inclusion of safeguard mechanisms would ensure that a TFP methodology provides a reasonable opportunity for the recovery of efficient costs.

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[51] For off ramps the regulator could, in advance, set rate of return threshold (for example, apply two per cent at either side of the cost of capital). For each year of the regulatory period, the out-turn returns achieved by the service provider would be compared to the thresholds. If returns were outside the thresholds (too high or too low), either the regulatory period could be prematurely ended with prices being reset to costs, or prices could be automatically adjusted to bring returns closer to the cost of capital.

Incorporating such safeguards mechanism should not diminish the additional incentive properties of a TFP methodology as long as such mechanisms are designed appropriately and maintained an efficiency discipline on the service provider.

4.2.3 Reasoning

Safeguard mechanisms like those noted above act as a form of insurance against movements in business-specific costs and changes in the industry productivity growth trend. They would prevent prices from moving too far away from costs.

In applying a TFP methodology there would be a fundamental trade-off between the strength of incentive to control costs and the risk of large differences between costs and prices. The more such insurance mechanisms are employed under a TFP methodology, the greater the risk that costs would be transferred from the service provider to the customer.

Whether such safeguard mechanisms weaken the incentive to control costs would depend on how the mechanisms would be designed. The key issue is striking the balance between allowing the service provider the ability to recover efficient costs and maintaining the efficiency incentives on service providers.

If service providers have the ability to pass through increases in costs this could dampen the cost efficiency incentive. However, if an efficiency assessment of past expenditure was applied then such mechanisms may continue to promote efficiency. Furthermore the design of these mechanisms should not create a perverse incentive on service providers to deliberately trigger such mechanisms. Also off ramps would need to be designed with reference to a minimum acceptable level of returns which would ensure that the service provider remains financially stable.

The risk of costs being transferred from the service provider to the customer would also depend on how frequent the safeguard mechanisms would be triggered. Ideally, the mechanisms should be triggered infrequently in order for a TFP methodology to be effective and stable. If the mechanisms were triggered often, then the suitability of applying a TFP methodology for the service provider would need to be questioned.

The following should also be considered when designing safeguard mechanisms:

- Off ramps would need to be designed with reference to a minimum acceptable level of returns which would ensure that the service provider remains financially stable.

- A TFP methodology would need to be designed to prevent any double-counting between recovery of efficient costs via the safeguard mechanisms (plus the cost pass through provisions) and the adjustment to the TFP index following the change in cost trends.

- Importantly such safeguards should not provide any protection against volume risk. Off ramps would only be needed to address any breakdown in the relationship between output changes and input changes. Whether there would be an unexpected shift in outputs would not, by itself, be relevant to the question of

whether a TFP methodology would provide the opportunity for service providers to recover efficient costs.

- Regard to the correct timeframe over which the regulator's obligation to provide service providers with an opportunity to recover efficient costs would be needed. As stated above, for a TFP methodology this timeframe would be the same as the time period of historical data for calculating the TFP index.

- The design of the safeguard mechanisms should not increase the value to the service provider of its information advantage over the regulator.

Stakeholders are invited to comment on the appropriate design of these possible safeguard mechanisms.

A risk in incorporating safeguard mechanisms into a TFP methodology would be that it could diminish the additional incentive properties of a TFP methodology. However, as long as such mechanisms are designed appropriately, then this risk can be adequately mitigated.

Given this analysis, our preliminary finding is that with the inclusion of safeguard mechanisms, a TFP methodology can provide a reasonable opportunity for service providers to recover efficient costs. An important consideration is that if a TFP methodology was implemented as an optional alternative to the building block approach, the service provider would only select to opt into a TFP methodology if it was comfortable that it would be able to recover costs.

4.3 Cost of capital

4.3.1 Issue

The cost of capital facing service providers depends on a number of factors, including investors' perception of the risks facing the service provider and the certainty provided on the treatment of expenditure. This section discusses whether changing from the building block approach to a TFP methodology would symmetrically increase the risks for the service provider and hence increase this cost.

The Revenue and Pricing Principles state that prices should allow for a return commensurate with the regulatory and commercial risks involved in providing the regulated services. Failure to do so would lead to under investment by service providers. This suggests that if under a TFP methodology it became more costly finance investment, then there should be a corresponding increase in the allowed benchmark weighted average cost of capital (WACC).

4.3.2 Preliminary finding

Overall, we consider that there would not 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.

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

4.3.3 Reasoning

Uncertainty about future regulatory decisions and commitments can lead to higher financing costs for service providers. This issue of regulatory commitment arises under the building block approach because of the timing mismatch between the five yearly price setting cycle and the timeframe for financing regulated service providers. Uncertainty in the financial markets about future price decisions and the allowed WACC tends to increase the regulatory risk premium in the cost of capital.

In principle, there would be no reason why a TFP methodology could not provide similar levels of certainty for investors compared to the building block approach. There would be sufficient prescription in the NER and NGR on the application of the methodology. Capital expenditure would be treated the same in the roll-forward methodology that would apply at each price reset determination. Also, it could be argued that the issue of regulatory commitment may diminish if a TFP methodology results in less subjective decisions for the regulator.

A TFP methodology may result in increased risks for the service provider. For example, under a rolling X there would be pressure on each service provider to continually achieve at least the industry average productivity growth to earn its benchmark rate of return. However as shown in Chapter 2, a TFP methodology would offer the potential for higher profits if the service provider out-performs the industry average.

Hence, a possible source of increased risk under a TFP methodology would be the level of volatility in annual profit. If a TFP methodology provides enhanced incentives it should lead to more divergence between the service provider's costs and its regulated prices. However, we do not consider this to be a material issue because under the capital asset pricing model (CAPM) greater volatility in profits would be treated as a diversifiable risk. Also, under the building block approach using the X factor as a smoothing device creates a level of volatility in reported profits.

The actual application (this is, the particular design) of a TFP methodology for the service provider in question would influence its level of uncertainty. The rolling X and the length of the regulatory period are two design parameters that would need to be considered.[52] It is also important to note, that under our current thinking on the design of a TFP methodology, the service provider would have some control on how the methodology would be applied. Therefore, it would be expected that service providers would understand the risks of the various design options and select a design accordingly to their appetite for risk.

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[52] Longer regulatory periods create an issue with respect to the determination of WACC which is whether it would be appropriate to estimate the WACC for the longer regulatory period or to apply some indexation to the risk free rate over the longer regulatory period.

In principle, there would be no reason why a TFP methodology could not provide similar levels of certainty for investors compared to the building block approach. There would be sufficient prescription in the NER and NGR on the application of the methodology. Capital expenditure would be treated the same in the roll-forward methodology that would apply at each price reset determination. Also, it could be argued that the issue of regulatory commitment may diminish if a TFP methodology results in less subjective decisions for the regulator.

For these reasons, service providers would not require a higher WACC under a TFP methodology.

5 Conditions needed for a TFP methodology

Previous chapters have established that a TFP methodology can be designed to promote efficiency, and allow for the recovery of efficient costs.

This chapter removes the previously held assumptions on there being no issues with data availability or the TFP index specification. The removal of these assumptions provides the opportunity to undertake an assessment of the pre-conditions relevant for the practical application of a TFP methodology to the Australian energy markets. The various pre-conditions that are discussed in this chapter are:

- whether there is data currently available that is suitable for a TFP methodology and, if not, what must be done to obtain such data;
- whether a TFP index is able to accurately reflect the industry's productivity growth;
- whether a TFP index can be influenced by service providers;
- if the service providers within the industry group have comparable expectations of productivity growth;
- whether a TFP index is a good estimate of future productivity growth; and
- if the TFP index will be stable over time.

Summary of findings

- A TFP methodology requires reliable and robust data from service providers. However, the existing data are not consistent, reliable nor robust. For a TFP methodology to be available to service providers, a data-set must be created. The AER and service providers must work together in accordance with the NER and NGR to establish a workable regulatory reporting regime with the aim of commencing data collection as soon as practicable. Not only will this aid in the development of a TFP methodology, it will provide relevant information to the regulator under the building block approach, address information asymmetry concerns and provide users with greater comfort that regulated prices reflect efficient costs.
- This should not result in more regulatory data being collected nor for the reporting requirements to become onerous and costly. Rather, it will result in the collection of a standardised, relevant and robust regulatory data-set which is consistent with best practice regulation. The minimum data for effective regulation (either for a TFP methodology or the building block approach) should be specified, with consistent definitions established, and reported on. There is no material difference between the minimum data needed for either a TFP or a building block approach.
- A TFP index must reflect industry productivity to allow the setting of a price path that reflects industry costs. When certain key conditions are met in

designing a TFP index (such as consistency with financial capital maintenance objectives, reflection of service provider activities, and comparability between the service provider and the industry group), it should be an accurate measure of industry productivity growth and allow the recovery of efficient industry costs. However, as transmission outputs may be difficult to value and measure, this may impact on the accuracy of transmission TFP indices. The outputs associated with electricity system security and reliability may also be difficult to measure and value. However, this does not create any disincentive to service providers to improve system security and reliability.

- The structures of some energy sectors indicate that some service providers may have some potential or opportunity to attempt to influence the TFP growth rate. However, the incentive to carry out such action is very limited. On balance, the preliminary finding is that it is unlikely that a TFP index will be unduly influenced by a service provider (or a group of service providers acting together). If this matter remains a concern, criteria on the formation of industry groups can be included in the NER and NGR to address this behaviour.

- 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 are that operating conditions (such as customer density, geographic location and spread) may not significantly influence TFP growth. That is, differences in operating conditions will be captured by the setting of each service provider's initial price level. To confirm this, empirical testing should be undertaken.

- 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. Nevertheless, there are two design features that can protect service providers. First, that service providers have the discretion to select a TFP methodology. Second, the TFP design provides an off ramp mechanism that will allow a reassessment of the service provider's situation if required. In any event, the predictability and stability of the TFP growth rate can be tested once the TFP specification is established and data are collected.

- The preliminary indications are that a well specified and designed TFP index will meet the condition of being a stable index and be able to provide a stable price path. Where a TFP methodology makes use of a rolling X, there is some potential for more growth rate and price volatility. However, this is not expected to be significant as the TFP growth index should not vary significantly and the rolling X is calculated as an eight year rolling average. Nevertheless, it would be appropriate to test the stability of the annual growth rate once the TFP specification is finalised and data is collected.

5.1 An available robust and credible data-set

5.1.1 Issue

For any TFP methodology to be successful, it is important that the data-set used is reliable and robust. Ideally the data-set should also be publicly available and be at least eight years in length to cover at least one business cycle. This discussion considers whether any data exists currently which would satisfy these requirements and, if not, what should be done to develop such a data-set.

5.1.2 Preliminary finding

A TFP methodology requires reliable and robust data from service providers. Good quality data that is relevant to measuring and valuing the outputs and inputs of the service providers will produce a TFP index that can be reliably used to measure industry productivity growth and set the price path for service providers.

However, the existing data on the actual performance of service providers that have been provided regulators cannot and should not be used to calculate a TFP index. The data are not consistent, reliable or robust and would not produce a TFP index that could be relied upon to determine a service provider's price path.

For a TFP methodology to be available to service providers, a data-set must be created. For this reason, it is important that the AER establish a regulatory reporting regime for each energy sector. The AER and service providers would need to work together under the NER and NGR to specify the relevant definitions and details for a workable regulatory reporting regime. The aim should be to collect data through the use of regulatory information orders and notices as soon as practicable.

Not only will the creation of a robust data-set on actual service provider performance aid in the development of a TFP methodology under the NER and NGR, it will provide more consistent and accurate information for use by the regulator under the building block approach, address information asymmetry concerns and provide users with greater comfort that regulated prices reflect efficient costs.

5.1.3 Reasoning

5.1.3.1 Assessment of current data

Economic Insights carried out an assessment of data currently held by all regulators for this Review. It reviewed the usefulness of the data for a TFP methodology. In particular, it considered whether the data could be relied upon for the setting of service provider revenues and prices. Economic Insights found a number of problems with the existing data. These were:

- the extent, quality, uniformity and continuity of the data is variable across jurisdictions and over time;

- regulatory data has focussed on financial information and only very limited physical data is available;
- there is a lack of consistency of definitions, collection requirements, adjustments to the data, and cost allocation; and
- very little of the existing data is in the public domain or, if it is, it is only available in aggregate form.[53]

It was also noted that both regulators and service providers were, in general, of the view that the existing data is not sufficiently robust to support any TFP analysis to a standard needed to set prices.[54] The Economic Insights analysis supported this view.[55]

The ESC's work on developing TFP indices also highlights the importance of reliable and consistent data. Since 2004 the ESC has carried out a TFP methodology. It has concluded that there is 'sufficient data available in Victoria to estimate a reliable TFP trend at the jurisdictional level, and that the information requirements for estimating a reliable trend are not large'.[56] However, it should also be noted that some service providers have been concerned about the calculation of the ESC's TFP indices.[57]

The ESC has also investigated the development of a national TFP trend for the electricity distribution sector. Being reliant on the good will of service providers and other regulators, the ESC had some difficulty in obtaining all the desirable data to calculate TFP indices. This resulted in changes to the methodology, the use of various data sources, and the use of data that was not necessarily suitable for a TFP methodology.[58]

The work from both Economic Insights and the ESC indicate that regardless of the detailed design of a methodology, the matter of a reliable and robust data-set is a key issue.

5.1.3.2 Addressing the lack of data

As a reliable data-set is a key component in having a workable TFP methodology, it is important to identify and specify the minimum data requirements for a TFP methodology and to ensure that data is consistent across service providers.

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53 Economic Insights Data Availability Report, pp. v-vi.

54 DPI and ESC do not share this view. DPI submission, 5 August 2009, p. 2-3; ESC submission, June 2009, p. 13.

55 In addition, the NAS Expenditure Profiles Report indicates that publicly available data is not a reliable information source.

56 ESC & PEG, *Total factor productivity and the Australian electricity distribution industry: estimating a national trend*, December 2006, pp. 2-3.

57 EnergyAustralia submission, 27 February 2009, p. 7.

58 ESC & PEG, pp. 10, 16, 24.

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 environment, 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, or if it is not used for the transmission sectors, 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 address 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. And, in turn, providing users and end-users of the regulated services with greater confidence that prices reflect efficient costs over the long term.

However, regulatory reporting is a cost to service providers, the regulator and users. It will take some resources to establish a 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 to render accurate and relevant regulatory reporting unfeasible. There are also significant costs under the building block approach. Time and effort is expended to understand what data submitted by a service provider actually are (that is, to establish the facts), before the regulator is in a position to analyse and interpret the data presented. The opportunity cost of this task, in terms of more time consuming, intrusive and less rigorously informed regulatory decision making, should also be recognised.

As the benefits from a relevant, accurate and consistent regulatory reporting regime are material, the question is then how to specify and achieve the desired robust data-set. Economic Insights has set out key steps for the development of a robust TFP data-set:[59]

- consultation between the regulator and service providers on the required data variables and their definitions;
- ensure that the variables are relevant to the calculation of a TFP index;
- ensure that the same services can be reported on over time;

[59] Economic Insights Data Availability Report, pp. 11-12.

- undertake analysis of data to identify any issues and inconsistencies and refine process; and

- examine current information gathering processes and amend to accommodate the required TFP data.

The above process should also consider the operation of the existing information gathering powers under the NEL and NGL to ensure that a data collection regime is appropriately defined and consistent with the relevant legal powers.

The initial steps would involve the regulator and service providers developing the data specification and methodology details together, taking into account the different histories and needs of service providers as relevant. 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.[60] It will also result in detailed data requirements that are understood by all parties and have taken into account differences between service providers and jurisdictions.

The AER has already commenced the development of sector specific regulatory reporting regimes. However, its progress has so far been limited with the service providers raising issues on the purpose and scope of the proposed information request.

To address this issue, the NER and NGR could provide greater clarification on establishing and maintaining a regulatory reporting regime for each sector that is relevant to the building block approach and a TFP methodology. It would specify a timeframe for the regulator and service providers to establish a regime as well as require all regulated service providers to provide the specified data and the regulator to report on TFP indices. The rules would also require some form of governance on quality and data and in considering potential changes to the data specification.

In addition, the NER and NGR would set out what data should, at a minimum, be included in a regulatory reporting regime. While this detail is a matter that would be the subject of a working group (that consisted of the regulator and service providers) to resolve, a list of data items has been provided by Economic Insights. This data-set list is provided at Appendix E and would appear to be an appropriate starting point for the data in the regulatory reporting regimes.

It should be emphasised that we are not proposing a wider and deeper collection of information which may be relevant. All data reporting requirements must be justified and cost efficient, especially as the costs will be pass through to customers. The intended outcome will be the collection of a standardised, relevant and robust regulatory data-set which is consistent with best practice regulation. The minimum data for effective regulation – either for a TFP methodology or the building block approach - should be specified, with consistent definitions established, and reported on. We do not consider that there is no material difference between the minimum data needed for either a TFP or a building block approach. This process would also

60 See chapter 6 for more on regulatory principles.

provide an opportunity to centralise the reporting requirements for service providers and remove any ineffective duplication.

5.2 An accurate measure of industry productivity

5.2.1 Issue

The Discussion Paper recognised the ongoing debate on the correct specification to use in calculating the TFP growth rate. Finalising a specification should involve the regulator and service providers and be carried out once it is established that a TFP methodology is to be included in the NER and NGR. This would be in stage 2 of this Review (if stage 2 is required) which will focus on developing detailed draft Rules for the NER and NGR.

Nevertheless, there are some conditions that are relevant to the specification of a TFP index that go to whether it is able to successfully reflect the industry group's productivity. In particular, the issues under current discussion are whether a TFP index would:

- exclude a material output which may undermine the value and usefulness of the index;
- accommodate changes in system security and reliability successfully; and
- accurately measure industry productivity and provide service providers with a reasonable opportunity to recover efficient costs incurred in providing regulated services.

5.2.2 Preliminary finding

One condition relating to the specification of a TFP index is whether the TFP index will be an accurate measure of the industry group's productivity growth. When certain key conditions are met in designing a TFP index, (such as consistency with financial capital maintenance objectives, reflection of service provider activities, and comparability between the service provider and the industry group) it should be an accurate measure of industry productivity growth and allow the recovery of efficient industry costs.

However, the preliminary indications are that there is some potential that a TFP index for the electricity or gas transmission sectors would not be able to capture all the desirable outputs successfully. As a consequence, the TFP index may not be a good measure of industry productivity for the transmission sectors.

Electricity distribution system security and reliability outputs may also be difficult to capture within a TFP calculation. This may impact on the ability of the TFP index to accurately reflect industry productivity for the sector. However, the relevant inputs can be measured even without the corresponding outputs. This does not discourage service providers from undertaking system security and reliability expenditure.

5.2.3 Reasoning

The following discussion draws on the Economic Insights Sensitivity Report.[61] This report documented the results of a sensitivity analysis of TFP estimates to variations in the methodology. The purpose was to determine whether variations in output and input specifications, the time period used, weighting methods and the calculation of the average growth rate would impact on the TFP index. To make this assessment, Economic Insights used actual data from the Victorian electricity and gas distribution service providers.

Economic Insights concluded that the specification of outputs, inputs, time periods, weighting methods and the growth rate calculation method do have an impact on the resulting TFP growth rate. Accordingly, it is important to develop a robust specification and methodology to ensure that the TFP index does accurately reflect the industry group's productivity.

5.2.3.1 Exclusion of outputs

It is desirable that a TFP methodology include all outputs of the service provider. This would include outputs that are not directly billed to users of the asset as well as billable outputs. However, Grid Australia has made particular comments on output data for the electricity transmission sector:

- a key output for electricity transmission is providing a reliable service which is focused on minimising the likelihood of failure and is difficult to measure; and
- output measures that take into account the variety of transmission networks and their service would be 'impossible to design'.[62]

Both comments suggest there is some risk that in the course of specifying outputs for the electricity transmission sector the selected outputs will not accurately reflect all the activities of all service providers. That is, the outputs will be difficult to define and be relevant to all service providers. This will mean that not all of the outputs will be measured and valued in a reliable and consistent manner. As a result, the TFP index may not be a reliable measure of the sector's productivity. If this is the case, the TFP index will not set a price path that recovers industry costs.

This issue may also be relevant to gas transmission service providers. If in this case, then there may also be difficultly in successfully measuring outputs for the gas transmission sector which will impact on the reliability of the resulting TFP index.

The extent of this issue can be assessed, and then addressed, following the collection of data from the service providers.

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

62 Grid Australia submission, 28 October 2009, p. 3.

5.2.3.2 Measuring system security and service reliability

During this review there has been some discussion on whether a TFP methodology is able to accommodate expenditure to meet system security and reliability requirements.

This is particularly an issue for electricity distribution service providers that supply metropolitan areas, especially those covering the larger central business districts. These service providers have been subject to increasing pressure to further increase their redundancy levels.[63] This has resulted in significant expenditure to increase the reliability of the services provided by their assets. In TFP measurement terms, this expenditure could be a substantial input. However, current TFP methodologies do not capture the corresponding output which is akin to a higher level of insurance being provided against exceptional events. Even if reliability measures were included as outputs in a TFP methodology, these may not measure the change in output corresponding to the increased input as the event being insured against may not occur. As a result, the affected service providers will have a lower measured rate of TFP growth than their actual rate due to the exclusion of the system security or insurance output. That is, the TFP index will not be an accurate measure of industry productivity.

If the relevant output cannot be successfully captured then an alternative solution may be to exclude the relevant inputs. However, there may be considerable difficultly in separating out expenditure for system security and reliability from other capital and operating expenditures. In addition, excluding such expenditure would raise the question of whether the service provider would have the opportunity to recover legitimate, efficient expenditure. Accordingly, this is not a satisfactory solution.

Another solution is to include system security and reliability expenditure in the inputs as it is a legitimate expenditure even though there is no corresponding output to represent increased system security. Although there will be some difference between the measured and actual TFP growth for these particular service providers, the capital expenditure undertaken will still be included in the asset base at the start of the next regulatory period. If the system security output is not allowed for in the TFP index then service providers will have a lower rate of measured TFP growth than would otherwise be the case. To the extent that this results in lower X factors then there would be some compensation for the service providers and no disincentive to improve system security and reliability.

Service quality is an important output for service providers. As a TFP methodology provides better efficiency incentives than the building block approach, it is important that an external service quality incentive mechanism operates with a TFP methodology. In this way, there would be clear and direct incentives to maintain and improve system security and reliability.

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63 Economic Insights, *Total factor productivity index specification issues*, December 2009,p. 10.

5.2.3.3 Recovery of efficient costs

Chapter 2 has discussed whether a TFP methodology creates better efficiency properties for service providers. This section considers the proposition that the TFP index provides a price path that will provide a service provider 'with a reasonable opportunity to recover at least the efficient costs the service provider incurs'.[64]

If a TFP index is not an accurate measure of industry productivity then the price path it sets will not provide for the recovery of efficient industry costs.[65] That is, the price path will diverge from efficient costs.

Provided certain conditions are met, a TFP index can be designed to reflect industry productivity and give service providers the opportunity to recover efficient costs during the regulatory period. That is, if:

- capital costs are set with reference to meeting financial capital maintenance needs (that is, the net present value of the return of and return on capital less any scrap value equals the initial value of the asset);
- growth rates for actual outputs and inputs are a reasonable and unbiased estimate of future growth rates;
- outputs and inputs used in the calculation of TFP for the industry group reflect the service provider's activities (this includes billable and non-billable outputs);
- there is reasonable comparability on the relationship over time between changes in outputs and changes in inputs between the service providers within the industry group and the service provider subject to the regulatory decision; and
- the measurement of capital input quantity reflects the actual use of capital (that is, the depreciation profile used is consistent with physical asset depreciation).

The detailed formation of a TFP index will need to take these conditions into account. If a TFP index can be designed to satisfy the above conditions then it will be able to provide an accurate measure if industry productivity growth and give service providers a reasonable opportunity to recover the efficient costs incurred in the provision of the regulated service.

5.3 The TFP index cannot be manipulated by service providers

5.3.1 Issue

This section assesses the possibility that the estimation of the TFP growth rate may be manipulated or influenced by the actions of an individual service provider or a group of service providers acting in concert. If this occurs then the condition that the

64 NGL, s. 24(2) and NEL, s. 7A(2).

65 Assuming that the initial price level is set to recover efficient costs at the start of each regulatory period.

TFP index is to reflect the true productivity of the industry group would be jeopardised.

5.3.2 Preliminary finding

The structure of some energy sectors indicates that some service providers may have a potential or some opportunity to attempt to influence the TFP growth rate. However, the incentive to carry out such action is not clearly apparent. On balance, the preliminary finding is that it is unlikely that a TFP index will be unduly influenced by a service provider (or a group of service providers acting together). Nevertheless, if this matter remains a concern, then the rules included in the NER and NGR can be drafted to include criteria on the formation of industry groups to address this conduct.

5.3.3 Reasoning

There are two aspects to the issue of whether the TFP index can be manipulated by service providers:

- whether service providers have the ability or opportunity; and
- whether service providers have the incentive to attempt to influence the index.

On the first aspect of this issue, an individual service provider may have the ability to influence the TFP index of an industry group if the industry group consists of a small number of service providers. An alternative to this is that there may be a large number of service providers in the group but one individual service provider is much larger than the others and may be considered to be the 'industry leader' of the group. The third possibility is that a number of service providers within the industry group have common ownership, and accordingly, may act together.

The other alternative is that a number of independent service providers act together. This can be discounted from this discussion as such behaviour may breach competition laws. The risk also exists under the building block approach.

The potential for service providers to influence the TFP index can be reduced by forming industry groups that contain several service providers. It should also be remembered that service providers are regulated as separate entities even if they have a common owner. The regulator would be able to take into account common costs and any related party transactions in determining the initial price level.

Nevertheless, the sector with the greatest potential for this issue to arise is gas transmission. Of the eight transmission pipelines currently subject to full regulation, six are owned and/or operated by the APA Group.[66] The gas distribution sector comprises of 11 regulated distribution systems. Envestra and Jemena are both

66 APIA submission, 26 October 2009, p. 3.

owners and/or operators of three systems.[67] There are no common ownership issues arising in the electricity transmission sector although there are only five service providers in total. The electricity distribution sector has the greatest number of service providers and limited common ownership.[68]

The second aspect of this issue that must be considered is whether service providers have an incentive to attempt to influence the TFP growth rate.

There will be a trade-off for a service provider in deciding whether to alter its behaviour. It could forego current profits by reducing productivity growth now in an attempt to secure a lower X factor for future regulatory periods. Alternatively, the service provider could implement available productivity improvements now and obtain higher current profits but incur a higher future X factor. Given time preferences and regulatory risk considerations, it is likely that service providers will discount possible but uncertain future gains heavily in comparison to actions that can increase profits now. As a result, the incentive to reduce current productivity growth to influence future X factors should not be a critical issue.

Furthermore, the incentives to reduce current efficiency to influence the X factor for future regulatory periods are less under a TFP methodology than under the building block approach. This is because productivity improvements have to be foregone for an extended period under a TFP methodology to influence the overall TFP growth rate (particularly if the regression-based trend method is used to calculate the overall growth rate rather than the end-point to end-point method). In comparison, the building block approach typically places significant weight on a recent actual cost data to assess efficiency levels. Accordingly, the service provider may only have to forego productivity improvements for a short period to influence the future period X factor. This makes the potential net benefits from this course of action higher. The potentially adverse incentives associated with a TFP methodology are therefore no worse than similar incentives under the building block approach.

5.4 Members of an industry group face similar productivity conditions

5.4.1 Issue

In considering the merits of a TFP methodology, an assessment of whether service providers face similar productivity conditions must be made. This is an important issue because if service providers within an industry group are not sufficiently comparable then there is some risk that the resulting TFP index may not be a good measure of a service provider's productivity growth. This may mean that the service provider may not have the opportunity to recover efficient costs.

Consideration of this issue is focussed on the factors that affect the productivity of service providers. Other cost factors would be captured in the determination of each service provider's initial price level and are not discussed here.

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67 Issues Paper, p. 106.

68 Issues Paper, pp. 99 & 104.

5.4.2 Preliminary finding

An important condition for a TFP methodology is that service providers within an industry group face comparable productivity growth prospects if managed efficiently. The preliminary indications are that operating conditions (such as customer density, geographic location and spread) may not significantly influence TFP growth. That is, differences in operating conditions between service providers within an industry group will be captured by the setting of each service provider's initial price level.

To confirm that service providers within an industry group do face comparable expected productivity growth rates empirical testing should be undertaken. This can be carried out once the TFP specification is finalised and data has been collected.

5.4.3 Reasoning

During the course of this Review service providers have raised concerns about ensuring that industry groups contain comparable service providers. In considering this issue it is important to make the distinction between aspects of business operations that impact on the determination of the initial price level and factors that influence the prospects for productivity growth of a service provider.

According to the ESC, differences in the extent of undergrounding of electricity lines and customer density will impact on the determination of the price level. However, if there were changes in the undergrounding trends between service providers then this may impact on the TFP growth rate.

The question of what operating conditions may have such an impact is empirical. The ESC's work to date indicates that business conditions do not materially influence the TFP growth rate.[69] Accordingly, the ESC considers that a single X factor for an industry sector would be appropriate. The ESC considers there is no indication that the sectors should be split into sub-groups according to some criteria that indicates different achievable TFP growth rates.[70]

This finding indicates that the most appropriate starting point in setting industry groups is to set an industry group equal to the industry sector. This approach provides a grouping that reduces the opportunity for any undue influence over the TFP growth rate. It also provides no opportunity for service providers to attempt to influence what group they are allocated to.

However, the ESC's research has been based on a limited sample and has used a method that has not been supported by all parties. Empirical work to confirm whether all service providers have comparable productivity growth performance should be undertaken. This can be carried out once the TFP specification is finalised and data has been collected.

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69 ESC submission, May 2009, p. 7.

70 ESC submission, March 2009, p. 16.

If the empirical testing indicates that there are material differences in achievable TFP growth between service providers within an industry then this could be addressed by:

- forming sub-groups that contain more comparable service providers. However, this may raise issues with service providers' ability to influence the growth rate;[71] or
- including business-specific adjustments to the X factor. However, this may raise issues of what methodology should be used for this adjustment, particularly about the regulator making subjective decisions.[72]

5.5 The TFP index is a good estimate of future productivity growth

5.5.1 Issue

A key assumption behind the use of a TFP methodology in regulation is that historical productivity growth measures will accurately predict future productivity growth potential. If this condition does not hold then the price path will not be set in accord with potential productivity growth. This creates a risk that service providers will either significantly over-recover efficient costs or that they will under-recover efficient costs.

To ensure that service providers do have an opportunity to recover efficient costs, an analysis of a TFP methodology must include consideration of whether past productivity performance is a good estimate of future productivity.

If there is uncertainty on whether this condition is met then a TFP methodology could incorporate off ramps or re-openers that allow for an updated X factor to be applied to a service provider. Alternatively, a rolling X factor could be adopted as this will adjust each year, taking into account changes in the industry productivity growth rate.

5.5.2 Preliminary finding

The ability of the TFP growth index to be a good estimate of future productivity growth for the service providers within the industry group is one condition that must be satisfied to establish a successful TFP methodology. The condition 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 may be external factors that impact on what service providers may be required to deliver.

A TFP index can be designed and calculated to be a reliable and unbiased predictor of future productivity growth. Nevertheless, there are two design features that can protect service providers if this condition is not met. First, one feature of the TFP

71 See discussion in this chapter and Discussion Paper, p. 28.

72 Discussion Paper, pp. 53-55.

design is that service providers have the discretion to select a TFP methodology. If a service provider was in some doubt that the TFP index would not be a good estimate of future productivity growth and that it may not be able to recover efficient costs then it would continue to use the building block approach. Second, the TFP design provides an off ramp mechanism that will allow a reassessment of the service provider's situation if required.

In any event, the predictability and stability of the TFP growth rate can be tested once the TFP specification is established and data are collected. This information will be able to assist service providers in selecting their revenue determination methodology.

5.5.3 Reasoning

The use of a TFP methodology in economic regulation is feasible if the past productivity performance of the industry group is a reasonable, unbiased predictor of future productivity growth. If this is true, and a service provider's productivity prospects are consistent with that of the industry group, then the service provider will have a reasonable opportunity to recover efficient costs.

Once an energy market is established and mature demand will tend to grow steadily. The service provider will have steady costs reflecting the stability of the market it services. For example, this may be in the stability in terms of demand growth or technological change. In this scenario, it would be reasonable to expect that past productivity would be a good estimate of future productivity.

However, it has been suggested that this scenario may not have occurred yet in the Australian energy markets. The NAS Expenditure Profiles Report indicates that operating and capital expenditures for electricity and gas distribution service providers have experienced shifts in the past. It also notes that there are a number of cost drivers that may have this effect.[73]

In addition, and perhaps more relevantly, service providers expect that significant changes will occur in the energy markets in the near future. As a result, many service providers doubt that past productivity will be a sound estimate of future productivity. The changes mentioned include the introduction of smart meters and the carbon pollution reduction scheme. In addition, electricity service providers in particular, have referred to their forecast of significant increases in capital expenditure.[74]

If these factors prove to influence the productivity growth of service providers (rather than the price level) then there may be difficulty in relying on past TFP growth to determine revenue and price paths of service providers.

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73 NAS Expenditure Profiles Report, pp. 84-96.

74 This is the 'wall of wire' effect where the need to replace a significant amount of assets is concentrated over a relatively short time, reflecting the pattern of the initial commissioning of assets.

However, it should be noted that it may be ten years before a sufficient time series of data is available to support TFP measurement. Only then will a TFP methodology be usable under the NER and NGR. It should also be acknowledged that under the TFP design service providers have the discretion to select a TFP methodology. If a service provider was in some doubt that the TFP index would not be a good estimate of future productivity growth and that it may not be able to recover efficient costs then it would continue to use the building block approach.

A service provider that has selected a TFP methodology may be concerned that there is some risk that changes in circumstances may result in a situation where the TFP index is not a good estimate of its productivity growth and that it may not have the opportunity to recover efficient costs. In this case, a TFP methodology in the TFP design provides an off ramp mechanism that will allow a reassessment of the service provider's situation.[75]

Without data this issue is difficult to resolve. The most appropriate course of action is to test the predictability, or steadiness, of the TFP growth rate. This can be carried out once the TFP specification is established and data is collected. This information will also be able to assist service providers in selecting their revenue determination methodology.

5.6 The TFP index is stable

5.6.1 Issue

An assessment of the merits of a TFP methodology needs to include an analysis of what impact the methodology will have on the stability of the TFP index as this will have an impact on price path volatility. Increased variability in prices would not be a desirable outcome for either service providers or users.

To assess this issue, regard should be had to the use of a fixed X and a rolling X.

5.6.2 Preliminary finding

The preliminary indications are that a well specified and designed TFP index will be meet the condition of being a stable index and be able to provide a stable price path. Where a TFP methodology makes use of a rolling X, there is some potential for more growth rate and price volatility. However, this is not expected to be significant as the TFP growth index should not vary significantly and the rolling X is calculated as an eight year rolling average. This would moderate the impact of any individual annual change.

Nevertheless, before a TFP methodology is to be included in the NER and NGR then it would be appropriate to test the stability of the annual growth rate once the TFP specification is finalised and data is collected.

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75 See Appendix B for the TFP design. This does not preclude gas service providers from submitting revisions or variations to their access arrangements under rules 51 or 65 of the NGR respectively.

5.6.3 Reasoning

Under the building block approach the price path follows CPI-X where 'X' is a smoothing factor. For some service providers the actual price path will also reflect, for example, approved cost pass through amounts and the operation of an ECM. Even with these additional mechanisms, service providers and their users have reasonable certainty over the regulatory period's price path.

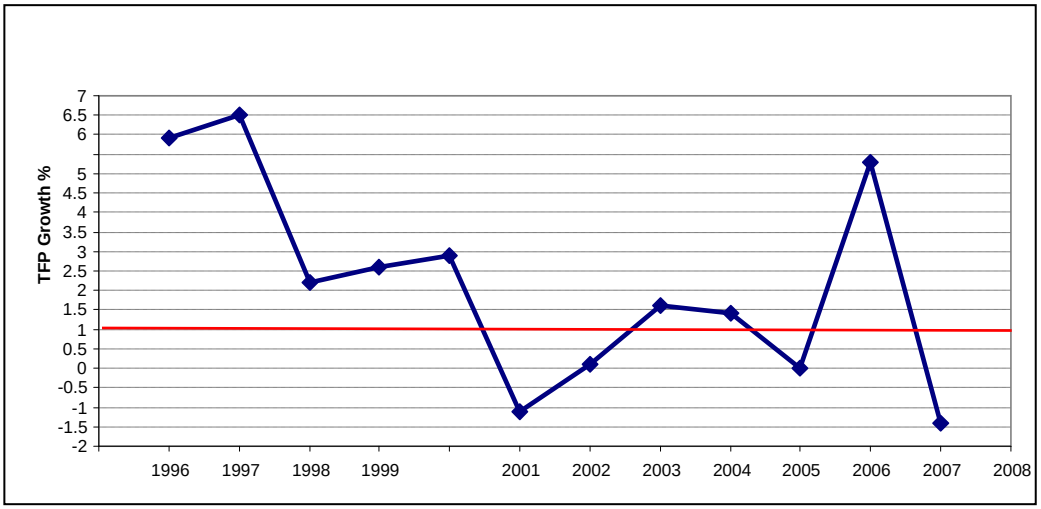
However, the actual total revenue derived from the regulated service will vary during the regulatory period, reflecting the difference between forecast and actual demand. As the service provider would be able to earn more profit if demand increases and any increases in revenues are not outweighed by increased costs, the price cap encourages the service provider to develop the market and increase actual demand.

Under a TFP methodology, the price path can also be described by CPI-X. As under the building block approach, additional elements may also operate. Where a fixed X is used, the volatility in the TFP index and the price path under a TFP methodology would be the same as experienced under the building block approach. Where a rolling X is used, there is the potential for more variability in prices during the regulatory period. However, if the TFP growth rate does not alter dramatically from year to year then the rolling X (which is calculated as a rolling eight year average) will not produce significant variations in prices from one year to the next.

Accordingly, the use of a TFP index to determine the X factor is not expected to result in price path volatility that is significantly more than what may already occur under the building block approach. Neither service providers nor users will have greater uncertainty over prices within a regulatory period under a TFP methodology because the TFP growth rate, if well designed, will be stable.

Nevertheless, the ESC's TFP growth results for Victoria shows some volatility although some of this may be due to the TFP specification used. This is illustrated below.

Figure 5.1: Annual TFP growth for the Victorian electricity distribution industry, 1996 to 2008



Source: ESC & PEG, *TFP research for Victoria's power distribution industry: 2007 update*, December 2008.

Figure 5.1 shows an initial period of very high TFP growth in 1996 and 1997, followed by strong TFP growth in 1998 to 2000. There is then negative TFP growth in 2001 followed by modest TFP growth in 2003 and 2004. TFP growth spikes in 2006 before again going negative in 2007.

The initial very high TFP growth rates are driven by strong throughput and peak demand growth combined with large reductions in operating expenditure in the years immediately following privatisation. Normally such abnormal periods would be excluded from TFP growth rate calculations for setting the X factor. Subsequent movements in the growth rate reflect changes in throughput and changes in peak demand. For instance, peak demand fell in 2001 leading to a large fall in the output growth rate and a fall in TFP growth. Generally, specifications that place a high weight on throughput and peak demand outputs, as the ESC's study does, will tend to be more volatile. The spike in TFP growth in 2006 is caused by a sudden jump in both throughput and peak demand combined with a sudden and unexplained fall in the quantity of operating expenditure of over nine per cent. A change in operating expenditure of this magnitude in a relatively mature regime is more likely to reflect data issues (for example, cost allocation changes) than actual changes. The Economic Insights Sensitivity Report has demonstrated that the ESC's specification was considerably more volatile than specifications that place less weight on throughput and peak demand and which had more realistic measures of capital input quantities.

Service providers have noted that there are some future events that they consider may impact on calculated TFP growth rates. In particular, service providers have expressed some concern about the impact of climate change policies may have on their operations. As such changes may have an impact it would be prudent to test the volatility of the growth rate (and accordingly, the price path) once the TFP specification is established and data is collected.

6 Potential impacts of a TFP methodology on the regulatory framework

This chapter focuses on whether a TFP methodology consequently impacts (either positively or negatively) on the efficient operation of the regulatory framework. Where the analysis identifies a detrimental impact it must then turn to consider whether the impact is so significant that a TFP methodology should not be introduced into the NER and NGR.

The particular components of the regulatory framework discussed are:

- the cost of regulation;
- reviews and appeals of regulatory decisions;
- demand management incentives;
- service quality incentives;
- clarity and certainty of the regulatory framework;
- the development of a nationally consistent regulatory approach; and
- regulatory depreciation.

Summary of findings

Introducing a TFP methodology could lead to additional benefits to the energy markets. However, the extent of such benefits is difficult to estimate and may take a number of regulatory periods before materialising. Such benefits include:

- potential for lower regulatory costs; and
- potential for less reviews and appeals under an established TFP methodology than under the building block approach.

Under a TFP methodology there will be slightly better demand management incentives for electricity distribution service providers.

Regarding other effects of a TFP methodology, no other issues have been identified that would provide a significant reason for not introducing a TFP methodology:

- A TFP methodology does not provide incentives to maintain or improve the quality of service. However, this can be resolved through the use of an external service quality incentive scheme.
- The rules for a TFP methodology will include the specification of criteria and circumstances for the exercise of regulatory discretion where relevant. These rules will take into account the requirements of good regulatory principles and practice.

- The introduction of a TFP methodology will not hinder the move towards a more nationally consistent regulatory framework for the energy markets. In fact, it may assist in developing greater regulatory consistency. Introducing a TFP methodology may diminish the flexibility for jurisdictional differences to continue under the current arrangements because of the need for standardised data and practices under a TFP methodology.

- The use of front-end loaded depreciation schedules or asset lifetimes for depreciation purposes that do not reflect actual asset lifetimes can potentially cause distortions in a TFP methodology. To manage this, service providers using a TFP methodology should, from that period onward, be required to use depreciation profiles that accurately reflect actual asset lifetimes and which are not front-end loaded.

6.1 The impact on the cost of regulation

6.1.1 Issue

In assessing the merits of a TFP methodology, consideration of whether introducing a TFP methodology will lead to lower regulation costs is needed. Proponents of a TFP methodology claim that it will result in substantial savings in the cost of regulation as it removes the need to prepare and assess detailed service provider cost forecasts.

To assess this issue, a comprehensive view should be taken of 'cost' in relation to 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 that are incurred under the current arrangements.

The potential for reviews and appeals on regulatory determinations can also add to the cost of regulation. The question of whether a TFP methodology will lead to less reviews and appeals is discussed in the section 6.2.

6.1.2 Preliminary findings

There is potential for the introduction of a TFP methodology to lead to lower regulatory costs compared to the building block approach. 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 likely to be marginal.

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 lead to the use of longer regulatory periods. However, such savings will only materialise if the number of service providers selecting a TFP methodology is enough to offset the additional costs both in implementing and in maintaining a TFP methodology. For that reason, 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.

6.1.3 Reasoning

While it is important to keep the cost of regulation down, a low cost regulatory regime will not be desirable if it does not achieve the key aims of regulation. The preliminary finding that a TFP methodology will not clearly and significantly reduce the cost of regulation results from consideration of three aspects:

- the cost to all parties in the decision making processes to determine revenues and prices under either a TFP methodology or the building block approach;
- the ongoing – or intra-regulatory period – costs to all parties of regulation; and
- the initial, or set-up, costs to establish the operation of a TFP methodology.

Each of these is discussed in turn below.

6.1.3.1 Cost of the decision making process

The Perspectives Report provided an overview of the costs of making regulatory decisions under the building block approach.[76] Using the information provided for this report the AEMC's analysis indicates that the cost of a revenue determination process using the building block approach could be $342 million for one complete cycle of AER decisions.

76 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)

Table 6.1: Estimated cost of building block approach decisions

	$ million				
	Service provider total cost	Number of service providers	Total	AER total cost	Total
Electricity distribution	15	14	210	8	218
Electricity transmission	10	5	50	5	55
Gas distribution	3	11	33	8	41
Gas transmission	3	7	21	7	28

Source: Perspectives Report, AEMC analysis.

Clearly, each revenue assessment process does cost some millions in total although the proportion to total revenue over a regulatory period may not be significant.

Potential for savings

The decision making approach in both the TFP design and the Victorian Proposal indicates that the cost of making a revenue determination using a TFP methodology will be less than would be incurred using the building block approach. There are two key reasons for this.

Firstly, the periodic assessment of costs and prices under a TFP methodology will not require as much information (both in terms of data and supporting material) from the service provider. Nor would it require as much analysis (economic or engineering based) as under the current building block approach. These factors would reduce the cost and time of an assessment. This will still be the case even with the use of the design elements such as off ramps and the capital module which require some subjective decision making for the regulator. Nor does the continued requirement to forecast demand over the regulatory period negate the potential cost savings under a TFP methodology.

The second reason is that the use of a TFP methodology could support longer regulatory periods. It is acknowledged that long regulatory periods have not been observed in overseas jurisdictions that have used a TFP methodology.[77] However, this possibility could be more relevant for the Australian energy industry. The current forms of the NER and NGR do allow regulatory periods to be longer than five years and this has already had some limited use. Accordingly, to the extent that a TFP methodology encourages greater use of extended regulatory periods, the frequency and cost of a periodic assessment of costs and prices will be reduced. It should also be noted that periodic price resets under a TFP methodology would be less costly as they would focus on actual costs for a specific year rather than forecast efficient costs for the entire future regulatory period as under the building block approach.

77 Brattle International Review Report.

6.1.3.2 Ongoing regulatory costs

There are some tasks that are carried out during regulatory periods. The most notable ongoing regulatory activity for service providers and the regulator is an annual regulatory reporting program. Another is the annual resetting of prices according to the specified price path.

To a large degree annual regulatory reporting and annual tariff adjustments are not dependent on the revenue determination methodology adopted. These activities will be undertaken or required regardless. However, to the extent that there may be a difference in the scope or nature of these tasks reflecting the revenue determination methodology, then there may be a small difference in the ongoing costs of regulation.

The introduction of a TFP methodology to the NER and NGR will require the regulator to calculate a TFP index using data sourced from the annual regulatory reports submitted by all regulated service providers. This is not a difficult or cumbersome task and should represent only a minor additional cost to the regulator.[78]

In addition, the regulator will need to develop and maintain the capacity to assess two revenue determination methodologies. In particular, it will need to be capable of operating concurrent decision making processes that use different methodologies. This capacity will be additional to the current capacity of the organisations but not significant.

The potential difference in the ongoing regulatory costs between the building block approach and a TFP methodology are relatively small. In addition, they may only be short term. As more service providers adopt a TFP methodology these additional ongoing costs should be outweighed by the efficiency and incentive benefits derived from using a TFP methodology. Accordingly, the inclusion of a TFP methodology in the NER and NGR is expected to create only a minor increase in the ongoing regulatory costs for service providers and the regulator.

6.1.3.3 Establishment costs

A TFP methodology requires information on actual costs and quantities for regulated service providers to be reported to the regulator. This can be achieved through an annual regulatory reporting regime. However, an annual regulatory reporting program is expected to operate under the building block approach.[79] If a TFP methodology is available then such a program should also include the provision of TFP relevant information.

The establishment of a robust regulatory reporting regime will take significant resources for both service providers and the regulator. It is important (whether for

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78 The ESC has noted that this task cost approximately $40 000 on each occasion when performed for the Victorian service providers. ESC submission, March 2009, p. 62.

79 AER, *Final annual compliance guideline*, November 2008; AER, *Issues paper: Electricity distribution network service providers annual information reporting requirements*, August, 2008

use under the building block approach or a TFP methodology) that service providers report on comparable items. This will reduce the uncertainty about the relevant facts for a particular revenue or access arrangement proposal. That is, time must be taken to establish and define the reportable items.

Indications are that the additional TFP relevant information is not significant relative to the information that would be collected in any event.[80] Accordingly, the additional work required to make such a program relevant to a TFP methodology may not be a significant burden relative to the requirements under the building block approach.[81]

6.2 The impact on reviews and appeals

6.2.1 Issue

In assessing the merits of a TFP methodology, an assessment of whether introducing a TFP methodology will lead to fewer reviews of regulatory decisions is required. Proponents of a TFP methodology claim that it will result in less reviews and appeals of regulatory decisions. To assess this issue, consideration should be had to the potential scope of matters that could be the subject of review.

6.2.2 Preliminary findings

Providing for the ability of affected or interested persons to seek a review of a regulatory decision is part of a good regulatory framework. This is relevant regardless of the revenue determination process.

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 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.

6.2.3 Reasoning

On some occasions the regulator's decision on setting revenues and prices will be the subject of a merits and/or judicial review process. Any review represents an additional burden on the service provider, regulator and any participating intervener. A process may cost up to $2 million for each party.[82]

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80 Economic Insights Data Availability Report, p. 42.

81 And, as discussed in section 5.1, there are a number of benefits that arise from the collection of relevant and robust regulatory data that should be acknowledged.

82 Perspectives Report, p. 14.

Issues that are raised with the review or appeal body relate to the regulator's use of its discretion to make a decision on a proposal before it. Proponents of a TFP methodology have claimed that because the methodology uses industry information that is known and measurable (rather than relying on service provider specific forecasts) then the scope of potential reviews and appeals is reduced. This would reduce the potential cost and time in making regulatory decisions.

The TFP design does include elements of a regulatory proposal where discretion must be exercised.[83] In these cases, the regulator will (subject to the relevant criteria set out in the NER or NGR and the TFP guidelines) have some discretion about approving the proposal. Since there is a level of discretion there remains the possibility that regulatory decisions may be reviewed or appealed.[84]

In the early period of using a TFP methodology, clarity on the use of discretion may be sought more frequently. In addition, as noted by Energy Networks Association (ENA), the operation of a relatively new and untested methodology will generate uncertainty.[85] As more TFP methodology based decisions are made, any initial uncertainties on the methodology should be resolved. While this appears to be a reasonable expectation, this is not consistent with the recent history of decisions made under the building block approach. Nevertheless, the frequency with which regulatory decisions are subject to review or appeal is difficult to estimate. Accordingly, while an established TFP methodology may reasonably be expected to give rise to less reviews and appeals, the extent of this is unknown.

6.3 Impact on demand management incentives

6.3.1 Issue

An assessment of the merits of a TFP methodology needs to include consideration of whether introducing the methodology will lead to better demand management incentives for service providers. This assessment is focused on the implications for electricity service providers.

In addition, proponents of a TFP methodology claim that the current demand management incentives schemes can operate in conjunction with the methodology. This must also be considered.

6.3.2 Preliminary findings

Using a TFP methodology to determine revenues and prices will provide slightly better demand management incentives for electricity distribution service providers than the building block approach.

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83 This includes setting the initial price level, certain aspects in calculating the TFP index and the use of additional design elements such as off ramps.

84 Although there will be some difference between the two revenue determination approaches on the issues that are subject to review.

85 ENA submission, 30 October 2009, p. 4.

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.

6.3.3 Reasoning

The building block approach does not have very good incentive properties to encourage service providers to manage demand well. There are two key reasons for this. Firstly, the building block approach works with a pricing approach that includes prices based on throughput or commodity.[86] Throughput-based pricing can have the effect of encouraging a service provider to seek out increases in demand. At first sight, demand management and energy efficiency considerations might point to the desirability of having prices applied to non–throughput quantities in a price cap (for example, fixed per customer charges and maximum demand charges rather than throughput charges). This is because incentives to increase throughput and hence revenue and profits where there is reliance on throughput–based charges may run counter to social objectives to manage demand unless there is a separate demand management incentive term in the price cap (such as the 'D' factor in NSW). However, as noted in the AEMC's Draft Report for the Demand Side Participation Review, distribution service providers have an incentive to enter into contracts with key users to reduce demand at peak times if the cost of paying those users to reduce consumption at the peak plus the associated revenue foregone is less than the annual user cost of installing additional capacity. This should remove the need for additional demand side management incentive terms on efficiency grounds.[87]

The second reason is that the current form of the building block approach encourages service providers to build up the asset base through capital expenditure without regard to first achieving good asset utilisation. This is particularly the case in the electricity distribution sector where actual capital expenditure is included in the asset base without any prudency or efficiency assessment by the regulator. Proposals for capital expenditure may rely on the need to build additional capacity to meet increasing demand, or particularly increasing peak demand. Accordingly, the demand management incentive scheme has developed for this sector to encourage service providers to adopt approaches that reduce the growth in demand (particularly peak demand) with the effect of deferring the need to increase the asset base. That is, to encourage service providers to increase their utilisation of the existing assets before building any new assets.

Where a TFP methodology is combined with a pricing methodology that includes throughput-based prices, it will suffer the same drawback as noted first above. A TFP methodology will also suffer from encouraging capital expenditure over operating expenditure to the extent that the initial price setting methodology

86 The split between commodity and capacity based prices varies between service providers.

87 AEMC, *Final report: Review of demand-side participation in the National Electricity Market*, 27 November 2009, pp. 18-21.

includes a prudency or efficiency assessment of operating expenditure and not capital expenditure. However, this incentive is countered to some degree because a TFP methodology is based directly on the inputs and outputs of production. This gives a service provider an incentive to improve its output per unit of input under a TFP methodology. That is, a TFP methodology includes an incentive to utilise assets well. This incentive has the effect of encouraging the service provider to undertake demand management activity prior to the construction of new assets. As a result, a TFP methodology has more inbuilt incentives to undertake demand management compared to the building block approach.

However, many stakeholders agree that demand management schemes can and should work with a TFP methodology. This would mean that an existing scheme could continue to operate if a service provider elected to use a TFP methodology for determining revenue.

6.4 Impact on service quality incentives

6.4.1 Issue

An assessment of the merits of a TFP methodology needs to include an analysis of what impact the methodology will have on service quality. A number of service providers have expressed considerable concern over the ability of a TFP methodology to promote service quality. Proponents of a TFP methodology claim that outputs related to service reliability should be separated from the TFP index.

6.4.2 Preliminary findings

A TFP methodology does not provide any incentive to maintain or improve the quality of service provided by an electricity or gas service provider. This output is currently effectively unpriced and there are difficulties with including reliability and other common service quality indicators as outputs in a TFP index. However, this issue can be managed. Until a solution to measuring and valuing service quality outputs is found, the most appropriate course of action is to rely on an external service incentive scheme, as is currently done with the building block approach.[88]

Thus, the issue is not so significant or unresolvable that a TFP methodology should not be used to determine revenues and prices.

6.4.3 Reasoning

Relying on a CPI-X framework to regulate a service provider can encourage a decline in service quality as the regulated service provider seeks to 'beat' its target by reducing input use at the expense of current (and particularly) future service

[88] This may be a module to the economic regulation package or dealt with separately under specific government or legal requirements.

quality.[89] Accordingly, a separate service quality incentive framework may operate, as is the case for the electricity distribution sector. The current service performance incentive schemes that operate in conjunction with the building block approach seek to reward service providers that improve their service performance and penalise those that reduce their performance.

Under a TFP methodology the key question is how to include service quality as an output. This is an important issue if service quality inputs (that is, greater expenditure to maintain or increase quality) are captured in the collection of TFP input data while quality output (such as improved service reliability) is not explicitly included in the TFP index.

As discussed by Economic Insights, TFP methodologies have had difficulty in forming a suitable measure of service quality as an output.[90] If a TFP methodology includes the inputs related to service quality then the service provider would actually be penalised for incurring expenditure that goes to improving service quality.

The current solution is to exclude service quality outputs from the TFP index calculations and rely on a supplementary mechanism (such as the service incentive scheme) to provide the desired incentives to service providers to maintain and improve service quality. Conversely, if an appropriate output measure could be incorporated into the TFP index then the need for such a supplementary mechanism would be substantially reduced.

A related separate issue for electricity service providers is whether a TFP methodology would discourage expenditure necessary to maintain (or increase) their system security standards. Improving or maintaining system security is effectively providing an insurance output that customers value but which is very hard to measure. Therefore TFP indices do not generally include a value or quantity for system security output.

There are, however, some reasons to consider that the effect of this omission may not be material in the assessment of whether a TFP methodology can be included in the NER and NGR. If the system security output is not allowed for then electricity service providers will have a lower rate of measured TFP growth than would otherwise be the case. To the extent that this results in lower X factors then there may be at least some reward for electricity service providers and some incentive provided to the industry to improve system security and reliability.

Also, Chapter 4 discussed the need to incorporate safeguard mechanisms into a TFP methodology to cope with externally driven changes in system security expenditure, among other things during the regulatory period. In addition, there will be allowance made for capital expenditure when it is rolled in to the RAB at the subsequent scheduled revenue reset.

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89 Brattle Incentives Report, p. 38.

90 Economic Insights Sensitivity Report, p. 4.

For these reasons, the disincentive to undertake necessary capital expenditure in excess of the amount initially allowed, should be greatly reduced.

Accordingly, while a TFP methodology has difficulty in valuing service quality and system security as outputs and incorporating relevant quantity measures, the issue is not so significant or unresolvable that a TFP methodology should not be used to determine revenues and prices.

6.5 Impact on the clarity and certainty of regulation

6.5.1 Issue

In assessing the merits of a TFP methodology, consideration of whether introducing a TFP methodology will lead to any diminution of the clarity, certainty and transparency currently incorporated into economic regulation under the NER and NGR. There have been some concerns expressed that a TFP methodology will increase uncertainty and, accordingly, regulatory risk.[91] However, proponents of a TFP methodology consider that:

- a TFP methodology can be provided in the NER and NGR that will meet good regulatory practice; and
- the operation of a TFP methodology provides less potential for discretion, and accordingly provides more certainty, than the building block approach.

6.5.2 Preliminary findings

The formation of rules for a TFP methodology will 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 will be met.

6.5.3 Reasoning

In forming rules for the NER and NGR it is important that the established good regulatory principles be followed. These principles are: communication, consultation, consistency, predictability, flexibility, independence, effectiveness and efficiency, accountability, and transparency.[92]

The formation of rules for a TFP methodology can and should take into account these principles. The TFP design includes the proposal that a TFP methodology include the relevant principles and processes as well as the key aspects of the calculation of the TFP index.

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91 Energex submission, 30 October 2009, pp. 3-4; ETSA/Citipower submission, 30 October 2009, p. 2.

92 Utility Regulators Forum, *Best practice utility regulation*, July 1999, p. 4.

Other aspects of the TFP design provide for some regulatory discretion. Where this occurs, any rules that are included in the NER and NGR will require specification of the relevant criteria and circumstances in which this discretion can be used. This detail is important, but does not need to be finalised at this stage of the review process. Similar issues of how the exercise of regulatory discretion should be framed have been addressed in the context of the building block approach, indicating that this matter can be resolved.

6.6 Impact on national consistency objectives

6.6.1 Issue

The analysis of the merits of introducing a TFP methodology as an alternative to the building block approach must include consideration of the impact that a methodology may have on consistency in how economic regulation is applied.

6.6.2 Preliminary findings

The work to increase regulatory consistency in the energy sector is an ongoing process. The introduction of a TFP 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 methodology would provide support to move toward greater regulatory reporting consistency.

However, introducing a TFP methodology may diminish the flexibility for jurisdictional differences to continue under the current arrangements because of the need for standardised data and practices. Nevertheless, this issue can be managed as the detailed specification of the rules relevant to a TFP methodology is formed. There is no reason why this issue should mean that a TFP methodology cannot be introduced into the NER and NGR.

6.6.3 Reasoning

The introduction of a single regulator for electricity and gas transmission and distribution for the majority of jurisdictions significantly improves greater regulatory consistency for the energy industry.

However, at present not all service providers have been the subject of an AER decision making process and differences in regulatory approaches still exist. Over time, it is reasonable to expect that the differences will reduce and the similarities will increase. That is, greater regulatory consistency will occur where needed gradually over time as a direct consequence of having a single decision maker.

One important component of consistency across service providers that has already been identified relates to regulatory reporting. A program to achieve greater consistency has commenced.[93]

Any introduction of a TFP methodology to the NER and NGR would not have any negative impact on the move to greater regulatory consistency. The introduction of a TFP methodology increases the need to form consistent regulatory accounts and reporting program (although this goal is also desirable under the building block approach). However, introducing a TFP methodology may diminish the flexibility for some jurisdictional differences to continue under the current arrangements because of the need for standardised data and practices under a TFP methodology (for example, in capitalisation practices and the classification of services).

6.7 Treatment of regulatory depreciation under a TFP methodology

6.7.1 Issue

Service providers have had some discretion in the selection of depreciation schedules for assets. This has resulted in service providers selecting depreciation profiles that do not necessarily match the physical capability of the assets.

The issues to be addressed are: (i) how do business decisions on depreciation affect the TFP index; and (ii) is there a need to place constraints on depreciation under a TFP methodology compared to the building block approach and, if so, what are the implications for service providers?

6.7.2 Preliminary findings

The use of a regulatory depreciation schedule that is not consistent with the actual life of an asset and which does not broadly reflect its service potential is not desirable for a TFP methodology. The depreciation of an asset in full before the conclusion of its physical life will result in a distortion of the TFP index. If a fully depreciated asset is still being used in providing services then productivity growth will be overstated. Similarly, front-end loading regulatory depreciation when actual asset depreciation is effectively back-end loaded can lead to distortions in TFP growth measures.

To manage this, service providers using a TFP methodology should, from that period onward, use regulatory depreciation profiles that are consistent with the actual service lives of the assets and front-end loading of depreciation charges should not be permitted. If there is a possibility for the service provider to revert back to the building block approach, then the service provider should be required to continue to apply the depreciation schedules that were used for a TFP methodology.

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93 See sections 5.1.3 and 6.1.3.

6.7.3 Reasoning

Under the building block approach the regulatory depreciation schedules used for a service provider's assets must meet the fundamental requirements of providing a return of capital over the life of the asset and providing it only once. The NER also reflects the economic principle of ensuring depreciation rates reflect actual asset lives to the maximum extent possible.[94]

However in practice, service providers have been given some discretion regarding asset depreciation schedules.[95] Accordingly, many service providers have selected front-end loaded schedules, which boost prices and revenue in the earlier years of the asset's life.

This could create a problem for a TFP methodology. Under a TFP methodology, depreciation should closely reflect the actual asset life and not be inconsistent with its service potential profile. In the case of electricity and gas assets, this would tend to rule out depreciation schedules that involve front-end loading. If the constant price deflated asset value (or so–called 'monetary') approach to measuring capital input quantities was used then the depreciation profile would need to closely reflect the actual service potential profile. This would typically involve back-end loading as the actual service capacity of most network assets hardly changes over time until near the end of their lives. If the physical proxy approach to measuring capital inputs is used then there can be more flexibility regarding the regulatory depreciation profile but front end loading should still be avoided as it will still potentially introduce distortions.

Using a front-end loaded depreciation profile the TFP index calculation as still high performing but older assets would receive a low or zero weighting in the TFP calculation even though they may continue to be a high performing input for many years. This would lead to an overestimation of the rate of TFP growth.

The solution to this issue is to require service providers to select depreciation profiles that are more consistent with the service potential profile of assets – and which do not involve front end loading – upon their move to a TFP methodology. That is, from the start of a TFP regulatory period, the remaining depreciation profile should more closely reflect the service potential profile rather than continuing the previous profile established under the building block approach, particularly if the latter has been front-end loaded.

If service providers are able to move from a TFP methodology to the building block approach, then a related issue is what happens to depreciation? It would be preferable to require service providers continue with the depreciation approach set under a TFP methodology. Being able to switch between depreciation rates may provide circumstances where unnecessary volatility in prices results.

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94 Clause 6.5.5(b)(1) of the NER states that 'the schedules must depreciate using a profile that reflects the nature of the assets or category of assets over the economic life of that asset or category of assets'.

95 ESC submission, March 2009, p. 47.

7 Assessment of a TFP methodology in electricity and gas sectors

This chapter provides an assessment of the suitability of using a TFP methodology to determine regulated prices and revenue across each of the electricity and gas sectors. This analysis has been drawn from previous chapters. To assess the potential performance of a TFP methodology, four key questions were considered for each of the energy sectors:

1. Can industry groups be classified in a way which meets the conditions needed to support a TFP methodology?

2. Will the TFP index be an accurate measure of productivity?

3. Will the TFP index be stable?

4. Is the existing data appropriate for a TFP methodology?

Considering these questions for each sector highlights any similarities and differences that exist between the sectors. More importantly, it assists in determining whether a TFP methodology would be an appropriate form of economic regulation in practice for both the electricity and gas markets in Australia. These are discussed in Tables 6.1 to 6.5.

In Chapters 2, 3 and 4, we confirmed that a TFP methodology would promote efficient behaviour and provide an opportunity for service providers to recover efficient costs. This would apply across all four sectors. There may be slight variations in the impacts (for example, demand management incentives may be more relevant to the electricity distribution sector). Also, there may be some differences in the benefits of the additional incentive properties under a TFP methodology as this will depend on proportions between operating and capital expenditures and the potential for innovation. However, on balance, we consider that the economic rationale for a TFP methodology does apply to all four sectors.

Summary of findings

- It is likely that a TFP methodology could be appropriate for use in the electricity and gas distribution sectors. However, in order to confirm this sufficiently robust and relevant data would be required to allow for testing and refining a TFP methodology.

- A TFP methodology would be less likely to be appropriate for the electricity and gas transmission sectors because:

  – For the electricity transmission sector, there are concerns about the stability and accuracy of a TFP growth index. There would be difficulty in measuring outputs related to system reliability and security, and all service providers would need to be comparable to form one industry group. Data would be required to test these issues.

  - For the gas transmission sector, there would be less potential for efficient behaviour due to the more capital intensive nature of this sector. The lumpy nature of capital expenditure may also impact on the reliability of the TFP index. The issues of common ownership and a small number of service providers in this sector may make it difficult to form an appropriate industry group. Data would be required to test these issues.

- On balance, if a TFP methodology was to be introduced to the NER and NGR then the immediate focus of any further work should be on its application to the electricity and gas distribution sectors. However, for the reasons set out in Chapter 5, improved reporting requirements should be applied to all energy sectors.

Table 6.1: Can industry groups be classified in a way which meets the conditions needed to support a TFP methodology?

Electricity distribution	Electricity transmission	Gas distribution	Gas transmission
• Yes – empirical work would be required to check whether comparability of service providers would allow for one industry group. • Ability to have sub groups likely in this sector because there are 13 service providers in this sector.[96]	• Given the limited number of service providers (five service providers across five jurisdictions and two interconnectors) within this sector, it would only be viable for one industry group for this sector.[97] This places greater emphasis on comparability of service providers, and whether there would be a dominant service provider. Note that Powerlink and TransGrid each hold approximately 30% of the total RAB in this sector.[98] Empirical testing would be required to check this.	• Yes – empirical work would be required to check whether all service providers are comparable. • There are seven owners and eleven distribution systems that operate in this sector.[99] • Common ownership would be an issue that needs to be considered in this sector as it may affect the size of the industry group and whether there would be a dominant service provider within the group. Empirical testing would be required to check this.	• As three owners and ten pipelines operate in this sector, it would only be viable for one industry group.[100] Empirical testing would be required to test the comparability between pipelines. • Common ownership and whether there would be a dominant service provider must be considered in setting the industry group. Note that Dampier to Bunbury Natural Gas Pipeline represents over 40% of the total RAB for the sector. Also, APA Group owns or operates the majority of pipelines.[101]

96 Issues Paper, Appendix G.

97 ibid.

98 AER, *Transmission network service providers: Electricity performance report for 2007/08*, October 2009.

99 Issues Paper, Appendix G.

100 ibid.

101 Issues Paper, Appendix G; various AER and ERA decisions on gas transmission pipelines.

Table 6.2: Will the TFP index be an accurate measure of productivity?

Electricity distribution	Electricity transmission	Gas distribution	Gas transmission
• There is difficulty in measuring outputs related to system reliability and security. Also, there may be some external factors that could influence the reliability of the TFP index in this sector. Empirical testing would be required to check this.	• There may be difficulty in measuring outputs related to system reliability and security. There may also be some external factors that could influence the reliability of a TFP index in this sector. • Although reliability would be an issue for all sectors, it would be more so in this sector.	• Outputs are more easily measurable for gas distribution than electricity distribution. • Operating conditions should be more stable in this sector than in electricity distribution, as there may be less external influences. Empirical testing would be required to check this.	• Outputs are likely to be more easily measurable for gas transmission than electricity distribution. • It is expected that there would be less significant external factors that would impact on the TFP index but this should be empirically tested.

Table 6.3: Will the TFP index be stable?

Electricity distribution	Electricity transmission	Gas distribution	Gas transmission
• Limited evidence has been provided on the impact of the 'wall of wire'. If it does exist, then it may impact on the TFP index.	• Smart meters and capital expenditure lumpiness may have an impact on the stability of the productivity trend in this sector.[102] • Limited evidence has been provided on the impact of the 'wall of wire'. If it does exist, then it may impact on the TFP index.	• The productivity trend in this sector would be more stable due to less of an impact from climate change.[103] • It is envisaged that the sensitivity of expenditure would be non-material.	• Where capital expenditure is lumpy, this may have an impact on the stability of the TFP index.[104] • However, if there is minimal capital expenditure, then the TFP index may be relatively stable. Impacts on the TFP index would need to be empirically tested.

Table 6.4: Is the existing data appropriate for a TFP methodology?

Electricity distribution	Electricity transmission	Gas distribution	Gas transmission
No – data would not be appropriate because the coverage of currently available data is 'patchy' across jurisdictions and over time. Where existing data is currently used in TFP studies, substantial 'cleaning up' of the data has occurred.	No - data would not be appropriate because there is too much inconsistency between service providers, making the current data not comparable.	No - data is more sparse and less uniform than electricity distribution data.	No - this sector has the least available data. The existing data is not uniform across the service providers or continuous over time. It is very 'patchy'.

102 AER, *Transmission network service providers: Electricity performance report for 2007/08*, October 2009.

103 AER, *Draft decision – public version, ActewAGL, Access arrangement proposal for the ACT, Queanbeyan and Palerang gas distribution network, 1 July 2010 -30 June 2015*, November 2009.

104 AER, *Transmission network service providers: Electricity performance report for 2007/08*, October 2009.

Table 6.5: Based on the key questions above, would it be appropriate to implement a TFP methodology?

Electricity distribution	Electricity transmission	Gas distribution	Gas transmission
Likely to be appropriate to implement a TFP methodology, but sufficiently robust data would be needed to confirm whether necessary conditions exist and to assist in forming industry groups.	It appears unlikely that it would be appropriate to implement a TFP methodology because of difficulty in measuring outputs related to system reliability and security. All service providers need to be comparable to form one industry group. Data is needed to test these issues.	Likely to be appropriate to implement a TFP methodology, but sufficiently robust data would be needed to confirm whether necessary conditions exist and if service providers are comparable to form industry groups.	It appears unlikely that it would be appropriate to implement a TFP methodology because lumpy capital expenditure may cause problems for the TFP index, and one industry group would be required but common ownership and whether service providers are comparable must be considered.

8 Assessment and way forward

This chapter provides an assessment of a TFP methodology against the criteria set out in Chapter 1. An outline of how this Review will proceed is also provided.

8.1 Assessment against criteria and counterfactual

This Review was initiated to advise the MCE on whether allowing 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 productivity performance of the industry as a whole instead of basing them on an assessment of business-specific costs. These approaches therefore offer 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. However, certain conditions need to be satisfied for a TFP methodology to work and a methodology may also have a negative effect on investment certainty.

As explained in Chapter 1, in order to assess whether a TFP methodology would promote the national objectives we developed five key criteria. These criteria are relevant in testing whether a TFP methodology would promote economic efficiency and would be consistent with the Revenue and Pricing Principles.

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 the 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 could be questions on whether: the current arrangements adequately promote efficiency; the administrative procedures are appropriate; and costs are not unwarranted. These could be leading to higher prices for customers. The Victorian Proposal identified such concerns with the current arrangements which provided the impetus for this Review.

The problems with the current building block approaches are about more than the need to strengthen incentives for efficiency. 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 of the current regulatory reporting requirements seems to add to this problem.

The Perspectives Report set out a number of drawbacks to the building block approach identified by service providers and regulators. Relevantly, these were that the decision making process for setting revenues and prices:

- was very information and data intensive;
- had become heavy-handed over time;
- was lengthy; and
- results in significant costs being incurred.

In terms of the five criteria set out in Chapter 1, our preliminary findings on the inclusion of a TFP methodology in the NER and NGR are provided in Table 8.1.

Table 8.1: Assessment of a TFP methodology

Criteria	Assessment
Cost incentives	A TFP methodology will provide service providers with incentives to minimise costs and seek out efficiencies in their business operations by allowing them to retain the gains from implementing productivity improvements schemes longer than compared to the building block approach. In the longer term, this should lead to service providers becoming more efficient and innovative and lower prices for customers.
Investment incentives	A TFP methodology, when combined with appropriately designed safeguard mechanisms, can give service providers the opportunity to recover efficient costs. It would provide incentives to invest without any greater risk than under the building block approach.
Good regulatory practice	Sufficient clarity, certainty and transparency of the regulatory framework for a TFP methodology can be achieved through providing sufficient prescription on the methodology in the NER and NGR. This would be to the same level as the building block approach.
Cost of regulation	There is the potential for the cost of regulation to be less under a TFP methodology compared to using the building block approach. However, this is difficult to estimate as it will depend on the number of service providers deciding to opt in.
Transition and implementation	In principle, a TFP methodology can be applied with proper resolution of any transition and implementation issues. Resources and costs will be required to implement the methodology but the additional data collection costs will be minor compared to the wider process of improving data collection for regulation. More work is needed on finalising the design of a TFP methodology and the TFP index calculation.

As indicated by this assessment there is more work to be done before a TFP methodology will be available to service providers as an alternative to the building block approach. A key area is the collection of data. As discussed in Chapter 5, improvements in data are expected to have significant benefits. However, this goal will take time to achieve.

It will take at least eight years before data is sufficient to permit a TFP methodology. In the meantime, significant changes in the industry may occur that could undermine the suitability of a TFP methodology. Also once a TFP methodology is implemented, it is possible that no service provider would decide to opt in. To date, most service

providers have expressed reluctance to use a TFP methodology. In particular, the transmission service providers may remain under the building block approach.

Given this, it may be appropriate to consider whether there are amendments, or other alternatives, to the current form of the building block approach that could address its deficiencies and improve regulatory outcomes. This is part of the process of continual improvement and development of energy regulation. To provide information on other possible alternatives we are releasing a report prepared by The Brattle Group which outlines some of the amendments and alternatives that could be considered.[105] We invite stakeholder views on whether such amendments should be explored further.

8.2 Way forward

This Paper has been released to provide stakeholders with an opportunity to consider and comment on the preliminary findings of the AEMC on whether a TFP methodology should be included in the NER and NGR.

A public forum on this Paper will be held on 1 February 2010. Stakeholders are requested to provide written submissions in response to this Paper and the accompanying consultant reports by Friday 26 February 2010. Submissions can be lodged online through the home page of the AEMC's website, quoting project number 'EMO0006'.

In addition to the comments received from stakeholders on this Paper, the following will also be taken into account in developing the Draft Report:

- reports from consultants commissioned by the AEMC;
- stakeholder submissions on the three consultant reports released with this Paper;
- stakeholder submissions received throughout this Review;
- information on a TFP methodology and the regulation of electricity and gas service providers in Australia and overseas;
- work on a TFP methodology carried out by the ESC; and
- the Expert Panel Report.

It is anticipated that the Draft Report for this Review will be released in April 2010 and the Final Report for stage 1 in July 2010. If the Stage 1 Final Report concludes that rules should be made to facilitate the use of a TFP methodology for either, or both, gas decisions or electricity determinations then this Review will proceed to stage 2 and draft Rules will be submitted to the MCE for consideration.

105 The Brattle Group, *Options for reforming the building-blocks framework*, December 2009.

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9 Preliminary findings

This chapter sets out the various preliminary findings presented in this Paper. The supporting reasoning and discussion behind these findings are provided in the relevant chapters.

Chapter 2 - Promotion of efficiency under a TFP methodology

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

  (a) a TFP methodology provides higher returns to the service provider when it makes investments and improves operating practices which deliver continuing productivity improvements; and

  (b) 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 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.

- There would be more pressure on all service providers to out-perform, or at least maintain, the rate of industry productivity. 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 achieve at least industry average productivity growth to earn its benchmark rate of return. This need to match peer performance would drive productivity and innovation.

- Under a TFP methodology, the information advantage favouring the service provider would diminish as prices would be determined by industry group factors rather than business-specific factors and forecasts. This could lead to improvements in efficiency as it would ensure that prices better reflect underlying efficient costs. Hence, the regulator would be in a better position to set a price path that encourages a service provider to improve its performance and reduces the potential for the service provider to capture informational rents.

- The extent of the information advantage can depend on how uncertain future costs conditions are. A TFP methodology, like the building block approach, does not deal with such uncertainty well. If there was significant uncertainty then a TFP methodology may not be suitable.

- 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.

Chapter 3 - How the design of a TFP methodology would impact on efficiency

- The likely design of a TFP methodology would not diminish its additional efficiency properties.
- The incentives would slightly differ under either a fixed X or rolling X form of a TFP methodology. The additional incentive properties from a TFP methodology would occur irrespective of the choice between the rolling X and fixed X. In this regard, there is not a strong case to favour one form over the other.
- A longer regulatory period would increase the incentives to improve cost efficiency under a TFP methodology (it would also do so for the building block approach). However, having longer regulatory periods is not essential to ensure that a TFP methodology delivers stronger incentives.
- The method used to determine initial prices must act to realign prices to efficient costs. This method would be similar to the current building block approach and would not put at risk the additional incentive properties of a TFP methodology.
- It would not be possible to adapt an ECM for inclusion into a TFP methodology. The exclusion of an ECM in a TFP methodology could weaken the efficiency incentive for recurring operating expenditure. However, this needs to be balanced against a TFP methodology's positive effect on how the regulator sets efficiency targets going forward.
- Analysis supports the ability for the service provider to opt into a TFP methodology but its ability to subsequently opt out and revert back to the building block approach should be highly constrained. This is necessary to remove the incentive for the service provider to defer expenditure under a TFP methodology and then seek to get the same funding under the building block approach.
- Constraints on the ability of the service provider to opt out of a TFP methodology and revert back to the building block approach would be needed because of the risk that the service provider may defer expenditure under a TFP methodology.

Chapter 4 - Recovery of efficient costs and investment under a TFP methodology

- The opportunity for service providers to recover efficient costs depends on whether the past rate of growth of industry TFP would provide an accurate prediction of future rates of productivity growth for the industry. A TFP methodology (assuming that the index is robust and measures productivity accurately) will enable a service provider who is capable of delivering average

productivity growth over the medium term the opportunity to recover its efficient costs, as long as there are no adverse industry-wide productivity shocks.

- However, there are increased risks for individual service providers who may not be capable of delivering average productivity growth over the medium term. There are a number of scenarios where it could be envisaged that the service provider would have more difficulty to recover business-specific cost increases than may be the case under the building block approach.

- To address this it may be prudent to incorporate safeguard mechanisms (for example, off ramps and a capital module) as insurance for the service provider. As long as the TFP index is correctly calculated, then in principle the inclusion of such safeguards into a TFP methodology should provide a level of opportunity for service providers to recover efficient costs comparable to the opportunity under the building block approach.

- The addition of such safeguards under a TFP methodology would provide better protection against unexpected changes in costs for the service provider compared to the building block approach. The building block approach gives service providers the opportunity to only recover forecast efficient costs.

- How such safeguard mechanisms would be applied is important. The key issue is striking the balance between providing certainty on cost recovery and maintaining efficiency incentives.

- Applying the TFP index rate as the efficiency factor for all regulated costs, and not just new expenditure, is consistent with providing the opportunity for service providers to recover efficient costs.

- Applying the same WACC to both approaches should not diminish the incentive on the service provider to make economic investments. In principle, a TFP methodology could provide similar levels of certainty regarding the treatment of expenditure. A TFP methodology may result in additional risks for the service provider. However, this would be offset by the potential to earn higher profits.

Chapter 5 - Conditions needed for a TFP methodology

- A TFP methodology requires reliable and robust data from service providers. However, the existing data are not consistent, reliable nor robust. For a TFP methodology to be available to service providers, a data-set must be created. The AER and service providers must work together in accordance with the NER and NGR to establish a workable regulatory reporting regime with the aim of commencing data collection as soon as practicable. Not only will this aid in the development of a TFP methodology, it will provide additional information to the regulator under the building block approach, address information asymmetry concerns and provide users with greater comfort that regulated prices reflect efficient costs.

- This should not result in more regulatory data being collected nor for the reporting requirements to become onerous and costly. Rather, it will result in the

collection of a standardised, relevant and robust regulatory data-set which is consistent with best practice regulation. The minimum data for effective regulation (either for a TFP methodology or the building block approach) should be specified, with consistent definitions established, and reported on. There is no material difference between the minimum data needed for either a TFP or a building block approach.

- A TFP index must reflect industry productivity to allow the setting of a price path that reflects industry costs. When certain key conditions are met in designing a TFP index (such as consistency with financial capital maintenance objectives, reflection of service provider activities, and comparability between the service provider and the industry group), it should be an accurate measure of industry productivity growth and allow the recovery of efficient industry costs. However, as transmission outputs may be difficult to value and measure, this may impact on the accuracy of transmission TFP indices. The outputs associated with electricity system security and reliability may also be difficult to measure and value. However, this does not create any disincentive to service providers to improve system security and reliability.

- The structures of some energy sectors indicate that some service providers may have some potential or opportunity to attempt to influence the TFP growth rate. However, the incentive to carry out such action is very limited. On balance, the preliminary finding is that it is unlikely that a TFP index will be unduly influenced by a service provider (or a group of service providers acting together). If this matter remains a concern, criteria on the formation of industry groups can be included in the NER and NGR to address this behaviour.

- 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 are that operating conditions (such as customer density, geographic location and spread) may not significantly influence TFP growth. That is, differences in operating conditions will be captured by the setting of each service provider's initial price level. To confirm this, empirical testing should be undertaken.

- 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. Nevertheless, there are two design features that can protect service providers. First, that service providers have the discretion to select a TFP methodology. Second, the TFP design provides an off ramp mechanism that will allow a reassessment of the service provider's situation if required. In any event, the predictability and stability of the TFP growth rate can be tested once the TFP specification is established and data are collected.

- The preliminary indications are that a well specified and designed TFP index will meet the condition of being a stable index and be able to provide a stable price path. Where a TFP methodology makes use of a rolling X, there is some potential for more growth rate and price volatility. However, this is not expected to be

significant as the TFP growth index should not vary significantly and the rolling X is calculated as an eight year rolling average. Nevertheless, it would be appropriate to test the stability of the annual growth rate once the TFP specification is finalised and data is collected.

Chapter 6 - Potential impacts of a TFP methodology on the regulatory framework

Introducing a TFP methodology could lead to additional benefits to the energy markets. However, the extent of such benefits is difficult to estimate and may take a number of regulatory periods before materialising. Such benefits include:

- potential for lower regulatory costs; and
- potential for less reviews and appeals under an established TFP methodology than under the building block approach.

Under a TFP methodology there will be slightly better demand management incentives for electricity distribution service providers.

Regarding other effects of a TFP methodology, no other issues have been identified that would provide a significant reason for not introducing a TFP methodology:

- A TFP methodology does not provide incentives to maintain or improve the quality of service. However, this can be resolved through the use of an external service quality incentive scheme.
- The rules for a TFP methodology will include the specification of criteria and circumstances for the exercise of regulatory discretion where relevant. These rules will take into account the requirements of good regulatory principles and practice.
- The introduction of a TFP methodology will not hinder the move towards a more nationally consistent regulatory framework for the energy markets. In fact, it may assist in developing greater regulatory consistency. Introducing a TFP methodology may diminish the flexibility for jurisdictional differences to continue under the current arrangements because of the need for standardised data and practices under a TFP methodology.
- The use of front-end loaded depreciation schedules or asset lifetimes for depreciation purposes that do not reflect actual asset lifetimes can potentially cause distortions in a TFP methodology. To manage this, service providers using a TFP methodology should, from that period onward, be required to use depreciation profiles that accurately reflect actual asset lifetimes and which are not front-end loaded.

Chapter 7 - Assessment of a TFP methodology in electricity and gas sectors

- It is likely that a TFP methodology could be appropriate for use in the electricity and gas distribution sectors. However, in order to confirm this sufficiently robust

and relevant data would be required to allow for testing and refining a TFP methodology.

- A TFP methodology would be less likely to be appropriate for the electricity and gas transmission sectors because:
  - For the electricity transmission sector, there are concerns about the stability and accuracy of a TFP growth index. There would be difficulty in measuring outputs related to system reliability and security, and all service providers would need to be comparable to form one industry group. Data would be required to test these issues.
  - For the gas transmission sector, there would be less potential for efficient behaviour due to the more capital intensive nature of this sector. The lumpy nature of capital expenditure may also impact on the reliability of the TFP index. The issues of common ownership and a small number of service providers in this sector make it difficult to form an appropriate industry group. Data would be required to test these issues.
- On balance, if a TFP methodology was to be introduced to the NER and NGR then the immediate focus of any further work should be on its application to the electricity and gas distribution sectors. However, for the reasons set out in Chapter 5, improved reporting requirements should be applied to all energy sectors.

A Steps to the Review

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

Date	Stage
12 December 2008	Release of Issues Paper
12 December 2008	Release of consultant report Brattle Group International Review Report and London Economics International Review Presentation
11 February 2009	Public forum on Issues Paper
27 February 2009	Close of submissions 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 Incentives Report
23 July 2009	Release of Perspectives on the Building Block Approach Report
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
30 October 2009	Close of submissions on Discussion Paper
17 December 2009	**Release of Preliminary Findings Paper**
1 February 2010	Public forum on Preliminary Findings Paper
26 February 2010	Close of submissions on Preliminary Findings Paper
April 2010	Release of Stage 1 Draft Report
July 2010	Provide Stage 1 Final Report to MCE
July 2010	Consultation on Stage 2 Draft Rules (if required)
September 2010	Provide Stage 2 Final Report on Draft Rules to MCE (if required)

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B TFP design

B.1 Development of the TFP design

B.1.1 Discussion paper

During this Review, stakeholders had commented that they required more detailed information on the design of a TFP methodology. This would enable them to consider the possible merits of applying a TFP methodology as a method to determine revenues and prices. Accordingly, the AEMC released a Discussion Paper on 28 August 2009 that set out an example of a TFP methodology.

The TFP design was then the subject of two workshops held in September and October 2009. These workshops provided a valuable forum to discuss the TFP design and its implications for the electricity and gas sectors. Thirteen written submissions were also received.

B.1.2 Amendments

In light of the discussions at the workshops and the written submissions, the details of the TFP design have been reconsidered and certain amendments to the design have been made. This amended TFP design has been referred to, as relevant, in this Paper. It is set out, in full, in section B.2 of this appendix. The amendments made to the initial design example are discussed below.

Service provider discretion on returning to the building block approach after a TFP regulatory period

The initial TFP design allowed service providers to select a revenue and pricing determination methodology for each regulatory period. Subsequent assessment of this issue has reconsidered the impact that this discretion may have on the overall stability of the regulatory framework, price stability, and the timing of discretionary operating and capital expenditures. It was concluded that complete discretion for the service provider may not be consistent with a robust regulatory framework and that it may encourage perverse behaviour by some service providers. As a result, this aspect of the TFP design has been amended. The amended TFP design provides that a service provider may return to the building block approach if it can satisfy the regulator that under a TFP methodology it will not have the opportunity to recover efficient costs over the long term.

The particular details of the scope of the regulator's decision, the information required and the timing of this decision will require further consideration when forming draft rules for a TFP methodology.

The selection of industry groups for the TFP index calculation

The initial TFP design provided two options for stakeholders to consider:

- that an industry group be comprised of all regulated service providers in a sector; or
- that an industry group be comprised of some of the regulated service providers in a sector.

Further analysis of this issue indicates that it would be preferable for an industry group to consist of all the regulated service providers of a sector. This provides the greatest number of service providers within each industry group and limits the ability of any individual service provider to influence the TFP index (if it had the incentive to do so). In addition, service providers would not be able to select their industry group nor would the regulator be required to make a decision that may rely on a subjective assessment.

However, it may be that subgroups are feasible for the distribution sectors. Subgroups may result in groups of more comparable service providers – improving the reliability of a TFP index. The use of subgroups does raise concerns about the ability of service providers to influence the TFP index through behaviour or the selection of a subgroup.

To make an assessment on industry groups (that is, the use of whole sector groups and the possible use of subgroups) an analysis of the data collected through the regulatory reporting program should be undertaken when the data is available. In making this assessment, consideration should be had to the number of regulated service providers, whether any one service provider represents a significant proportion of an industry group's TFP index and whether there are any issues arising from the common ownership of service providers within an industry group.

Assessment of costs for the initial price level

There was some confusion over the initial TFP design provisions that set out the method to determine the initial price level for a TFP regulatory period. The amended TFP design includes some rewording of this element to clarify the design. In brief, it is intended that a service provider would submit an estimate of costs for the last year of the current regulatory period (for example, in a five year regulatory period, this would be estimates (or updated forecasts) for the fifth year). To aid in its assessment and in setting of reasonable costs, the regulator would consider these estimates in light of actual costs for that period (for a five year regulatory period, there should be actual data for the first, second and third years).

B.1.3 Issues for further consideration

The workshop discussions and submissions also raised a number of other issues that have not been necessary to resolve at this time for the purposes of this Paper. However, they are matters that do require consideration before a TFP methodology can be used to determine revenues and prices. These issues are:

- specification of the TFP index calculation method – a number of parties noted that more detail on how the TFP index would be calculated is required. In particular, that the outputs, inputs and weightings must be determined. These are not matters for the AEMC to decide on alone. As the majority of stakeholders stated, a consultative process would be the most appropriate method to resolve these matters.

- details on 'audited historical data' – it was noted that the requirements for auditing may need to be specified. Details on the requirements of providing actual cost data would add to the clarity of the regulatory reporting process. These details can be resolved as part of the consultative process on the TFP index specification.

- setting the initial price level – a few stakeholders queried the details of the initial price level methodology. Some rewording has been included in the amended TFP design. However, this issue should receive further consideration in drafting rules for the NER and NGR to ensure that the method is clear.

- details of the additional design terms – in general, it was agreed that greater detail would be required on the scope and discretions of the additional design terms of a TFP methodology. While it would be appropriate for some instruction on the operation of these elements to be provided in regulatory guidelines, the scope and discretions of parties would require clarification for rules to be drafted.

- business-specific adjustments to the X factor – there was disagreement among stakeholders on the need and workability of allowing the regulator to make business-specific adjustments to the X factor. In part, the need for an adjustment would depend on how well the industry X factor predicts productivity growth for a service provider. As raised by the AER, this in turn will be influenced by the formation of the relevant industry group. Further assessment and specification of this element of the TFP design would be required before it can be concluded that it is a necessary and workable part of a TFP methodology.

B.2 Amended TFP design

This section sets out the various elements of the amended TFP design discussed in this Paper.[106] As a general principle, the same TFP design would be used for the electricity revenue determinations and gas access arrangements.

Applying a TFP methodology

- A high level of prescription on the TFP methodology would be included in the NER and NGR. All the TFP principles, key mechanics (such as formulas, calculations and definitions), key rights and obligations and procedural requirements would be clearly and comprehensively established in the NER and NGR.

106 New text is shown in italics. Deleted text from the initial design is indicated by strikethrough.

- In addition, the regulator would produce a set of non-binding TFP guidelines covering two aspects of the methodology:

  – technical matters on which the regulator would have discretion as a complement to the ~~Rules~~ *NER and NGR*; and

  – those aspects of the methodology that could be adapted by the service provider to its circumstances, subject to the regulator's approval.

- The initial selection of a TFP methodology and its continued application beyond the first regulatory control period would be a decision for the service provider. No approval of the regulator would be required.

- Once the service provider selects the TFP methodology for its regulatory determination, the same timetable and processes currently applicable for the building block approach would apply. The only change would be that for electricity, the regulator would have to prepare a framework and approach paper covering the possibility of a service provider using either a TFP methodology or a building block approach.

- ~~The decision to revert back to using the building block approach after a regulatory period using the TFP methodology would lie with the service provider. No approval by the regulator would be required. The timetable and processes currently set out in the NER or NGR would apply.~~ *A service provider may return to the building block approach after a regulatory period using a TFP methodology if it can satisfy the regulator that under a TFP methodology it will not have the opportunity to recover efficient costs over the long term.*

- The principles and mechanisms of the TFP methodology would be locked in for a particular service provider and would remain unchanged for the entire regulatory period.

Calculating the TFP growth rate

- Only an index number approach would be permitted for calculating TFP. The regulator would 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).

- The specification for calculating the TFP growth rate (that is, inputs, outputs and weightings) would be prescribed in the NER and NGR. However, at this stage further analysis and consultation is needed to determine the correct specification.

- *For defining the industry group, it is preferred that there be one single TFP growth rate factor that would be applied to any service provider within the respective sector. However, further analysis is required to confirm that this approach is appropriate for each relevant sector. Further analysis will also indicate whether sub-groups are viable.* ~~For defining the industry group, two options for further discussion are presented:~~

(a) there would be one single TFP growth rate factor that would be applied to any service provider within the respective sector. This would be based on the average TFP growth rate for all regulated service providers in that sector; or

(b) the industry would be divided into subsets according to operating conditions. There would be four sub-groups:

(i) urban, high density

(ii) urban, low density

(iii)rural, high density

(iv)rural, low density

- In both options, all service providers operating in the sector would be required to provide TFP data, even if they have not elected to use the TFP methodology themselves. For gas, all covered pipelines would be included (even if the covered pipeline is subject to light regulation).

- The regulator would only be permitted to remove a service provider from the calculation under exceptional circumstances such as if there are serious gaps or problems with the data provided by that service provider.

- Inclusion of data on any businesses which are outside the jurisdiction of the NEL or NGL (for example, overseas businesses) would not be permitted.

- The regulator would be required to use audited historical data as provided by the service providers. It would only be permitted to make adjustments to the data to:

  – adjust for structural differences to improve the consistency of the data (for example, for different classifications of services); or

  – to adjust certain years data for certain service providers because of exceptional circumstances.

- Any adjustments would be made transparent and done in accordance with the guidelines. The data-set used would be available to all service providers to allow them to undertake their own modelling (subject to any confidentiality issues). Normalising the data for operating environment differences would not be permitted.

- The regulator would have the option to decide whether to use an average annual growth rate approach or a regression–based trend method in calculating the TFP growth rate.

- The regulator would be required to use the longest time period that is possible provided that the available data is robust. It would also need to be consistent with a minimum time series of eight years of data being required before a TFP methodology could be applied to revenue determinations.

- If the service provider is subject to a rolling X under the TFP methodology then the inputs and output weights would be updated on an annual basis as well.

Setting the initial cap

- The method to set the initial price or revenue cap at the start of the regulatory period would be a partial building block approach where the regulator:
  - determines the level of operational and capital expenditure for *the last year of the current regulatory period based upon the estimated costs for* that year *and* a reasonable assessment of actual costs incurred in the current period;
  - calculates the regulatory asset base in accordance with the existing roll forward methodology;
  - estimates the efficient rate of return for the duration of the new regulatory period in accordance with the existing methodology; and
  - estimates the efficient tax for the initial year in accordance with the existing methodology.
- This method would be used regardless of whether under the current regulatory period the service provider is using the building block approach or a TFP methodology. It would be applied both to electricity and gas distribution service providers.

Additional design terms

- Longer regulatory periods are consistent with a TFP methodology and would be available to service providers. This is consistent with the current provisions of the NER and NGR which provide service providers with the ability to propose an extended regulatory period under the building block approach. That is, for electricity service providers, a regulatory control period would be at least five years. For gas service providers, an access arrangement period could be of any length. Service providers and regulators would have the same level of discretion as currently exists.
- A cost pass through mechanism would be available for service providers to include in their revenue or access arrangement proposals at their discretion. The regulator would then respond to the proposed mechanism within the decision making process.
- A service provider could include a capital module in its proposed revenue or access arrangement to recover actual efficient, extraordinary significant increases in capital expenditure during a regulatory period. The regulator would need to be satisfied that the expenditure is outside the scope of the cost drivers that are taken into account in setting the X *factor*. Discussions with stakeholders would be needed to determine the most appropriate design of this module.

- Off ramps would be available under a TFP methodology. An off ramp mechanism would:
  - be proposed by the service provider or required by the regulator;
  - clearly specify the 'off ramp event' at the start of the regulatory period. This could be an specified event or a rate of return or revenue band (for example, that the actual rate of return varies by more than 20 per cent of allowed rate of return);
  - require an 'off ramp event' to be significant; and
  - require that the need and specification of an off ramp mechanism be assessed for each forthcoming regulatory period.
- Service providers would propose the form of *the* X *factor* (that is, either a fixed or rolling X) for the duration of the forthcoming regulatory period. In making its proposal, a service provider should take into account the length of the forthcoming regulatory period, and the use of off ramps and cost pass through mechanisms.
- The service provider can propose any combination of the all design elements for the regulator's approval (similar to the current arrangements). The regulator's assessment on the proposed package would have regard to the NEO or NGO and the revenue and pricing principles.
- An efficiency carryover mechanism should be excluded from operating in conjunction with a TFP ~~based~~ methodology as it is not consistent with that methodology.
- Any efficiency carryover mechanism existing at the commencement of a TFP regulatory period should continue to run its course as initially planned.
- The existing demand management and service incentive schemes would continue to be available to service providers under a TFP methodology. There should be no difference in their operation that reflects a service provider's use of either a building block approach or a TFP methodology to the determination of revenues and prices.

Price path under a TFP methodology

- The allowed rate of change of the price cap under the TFP methodology would be calculated in accordance with the following formula:

$$\Delta \text{ allowed prices for regulated business} = \Delta \text{ consumer prices} - \{[\Delta \text{ industry TFP} - \Delta \text{economy TFP}] - [\Delta \text{ industry input prices} - \Delta \text{ economy input prices}]\}$$

- A separate measure for industry input prices growth would be included into the determination of the X factor, and prescribed in the ~~Rules~~ *NER and NGR*. Further work and consultation with the industry would be required to determine the

most appropriate measure. The producer price index would be used for the economy input price growth term.

- An additional term would be included in the formula for determining the X factor to permit the regulator to make business specific adjustments. Such adjustments would only be justified if the regulator considers that the industry TFP growth rate should be adapted to reflect a significant difference in the productivity growth potential of that specified service provider. The regulator's decision would need to be consistent with the relevant national objective and the revenue and pricing principles. The adjustment could be positive or negative.

Further analysis would be needed to develop the appropriate framework, including the potential use of benchmarking techniques, governing this decision.

C Victorian Rule change proposal

C.1 Overview of the Victorian policy on TFP

On 23 June 2008, the Victorian Government submitted a proposal to amend the NER to allow the use of a TFP methodology as a form of economic regulation for approving, or amending, determinations for electricity distribution service providers (Victorian Proposal). The TFP methodology would be applied by the AER and would be an alternative to the existing building block approach.

The Victorian Proposal provides flexibility for a distribution service provider to request the AER to change the pricing determination methodology from the building block approach to a TFP methodology. The AER would be required to apply a threshold test to determine whether it would be appropriate for a TFP methodology to be applied to that service provider and also a calculation objective to ensure that the TFP methodology could be applied on a consistent basis and that the price path would be likely to track expected costs over the regulatory period. The Victorian Proposal would also permit the service provider to revert back to the building block approach with the AER's consent.

The Victorian Minister for Energy and Resources considers that there are benefits, without any loss to efficiency, in having the flexibility of applying a TFP methodology as an alternative to the building block approach. The inclusion of a TFP approach would:

- strengthen the incentive for the regulated distribution service provider to minimise costs;
- solve the information asymmetry problem with the current building block approach;
- potentially decrease the likelihood of contentious disputes between the AER and the service provider; and
- decrease the administrative costs of regulation.

The Victorian Minister for Energy and Resources considers that this application of a TFP methodology would only be appropriate for distribution service providers and not for transmission service providers.

The Victorian Proposal refers to, and addresses the points raised by, the Expert Panel on Access Pricing (Expert Panel) in its 2006 Final Report to the MCE. An outline of the relevant findings of this Expert Panel Report are set out below following an overview of the key design features of the Victorian Proposal.

C.1 Overview of the Victorian TFP design

C.1.1 Applying a TFP methodology

- The service provider must propose and consent to the application of a TFP methodology.
- The AER's consent is required for the service provider to revert back to the building block approach after having used a TFP methodology.
- The AER would be required to make a series of key decisions on the application and implementation of a TFP methodology for which it will be required to release supporting guidelines.[107]

C.1.2 Calculating the TFP growth rate

- The AER would be required to determine the methodology for the calculation of the X factor.
- The AER would apply a 'threshold test' to ensure that it is appropriate for a TFP methodology to be applied for that service provider. That test would consist of assessing:
  - whether historical TFP growth is a good forecast of future efficiency;
  - whether the service provider's expected productivity is not likely to be different from the TFP growth rate; and
  - whether the available data are adequate and of good quality.
- The AER would determine the industry group (that is, the pool of distribution service providers) for the purpose of calculating TFP.
- Use of overseas data would be allowed.

C.1.3 Setting the initial price cap

- The initial price cap methodology would be based upon the existing building block approach.
- The AER would determine the nature of the relationship between P_0 and the X factor.

[107] The AER will be tasked with key decisions, including: TFP calculation methodology and data; approval of a service provider's choice between a rolling X factor or fixed X factor; calculation of the initial price cap (based on the building block approach); application of 'threshold test' and application of 'calculation objective'.

- There would be an adjustment to the initial starting price for past performance rewards or penalties under the existing incentive mechanisms.

C.1.4 Additional design terms

- The length of the regulatory period would be determined by the AER (with a minimum regulatory period of five years). The scheduled review would provide an opportunity to check the application of a TFP methodology and to reset prices to costs.
- Cost pass through mechanisms for agreed specific events would be allowed.
- There would be no re-openers and off ramps of the allowed price path during the regulatory period.
- The service provider would be able to request either a rolling X or a fixed X for the regulatory period (approval by the AER would be required).
- The AER would have the option to include an ECM in a TFP methodology if it can establish an appropriate mechanism.
- Service standards and demand management incentive schemes would be incorporated into a TFP methodology.

C.1.5 Price path under a TFP methodology

- The AER would apply a 'calculation objective' (referred to as the 'TFP criterion'), the purpose of which is to ensure that the allowed price path is likely to track expected costs and that a TFP methodology operates on a consistent basis. The criterion are:
  - weighting of outputs should reflect revenue structure;
  - depreciation should be consistent; and
  - RAB should be used to set initial prices.
- One X factor would be used, so there would be no adjustments in the allowed price path for circumstances specified to that service provider.

C.2 Expert Panel Report to the MCE

The Expert Panel on Energy Access Pricing was established by the MCE in December 2005 to advise on a model to achieve a common approach to revenue and network pricing across the energy markets. The Expert Panel was tasked with developing common arrangements covering both pricing principles and regulatory guidance

supporting the application of such principles. The Expert Panel provided its final report to the MCE in April 2006.[108]

As part of its review, the Expert Panel assessed the application of a TFP methodology to network regulation. The Expert Panel's view was that the adoption of a TFP methodology to access regulation for energy service providers was likely to be a worthwhile development for the electricity and gas distribution sectors in particular. It noted that the case for a TFP methodology appeared to be less compelling for electricity transmission where significant lumpiness over future capital expenditure demands is an important part of the industry landscape.

However, the Expert Panel noted that expectations of the potential benefits of a TFP methodology need to be kept in perspective. It noted that many critical operational and policy parameters remain to be resolved before a TFP methodology can be implemented. Furthermore, the cost information on which a well functioning TFP methodology must rely on is in a relatively poor state of development for the Australian energy market.

The Expert Panel concluded that while there is merit in encouraging the development of a TFP methodology for price determinations as one means of reducing the costs of regulation, there are many issues that need detailed consideration before it can become a practicable option.

The Expert Panel further advised that the following criteria should be considered in developing guidance on whether to adopt a TFP methodology or to maintain the existing building block approach:

- the availability of robust, consistent and relevant data over a sufficient period to allow the derivation of TFP estimates. The required data includes:
  - price and output information for each of the services that is subject to price control;
  - cost information, distinguishing between operating costs, capital costs, depreciation, regulatory asset values and return on capital; and
  - ideally, various physical input and output measures, such as employee numbers, line length, transformer capacity, number of customers, and maximum demand;
- whether the industry in which it is proposed to adopt a TFP methodology is in a relative 'steady state', such that very substantial changes in costs are unlikely over the foreseeable future; or
- alternatively, to the extent an industry is not in a relative 'steady state', whether adequate flexibility can be built into the design of the P_0 and X factor reset mechanisms to accommodate such uncertainty; and

108 Expert Panel on Energy Access Pricing, *Report to the Ministerial Council on Energy*, April 2006.

- the extent to which there may be a need to reflect factors that may cause variations in the rate of change in TFP within an industry, such as climate, topography, density or technology.

The Expert Panel also considered that there are a range of specific issues that would need to be addressed in order to make a TFP methodology effective. These include:

- the appropriate duration of the regulatory period;
- how existing service incentives mechanisms will be included; and
- whether there may be triggers for re-opening prices.

The Expert Panel recommended that the NEL and NGL include provisions that enable the AEMC to make rules in relation to a TFP methodology and that the MCE direct the AEMC to undertake a review, by 31 December 2008, that addresses:

- the circumstances in which the application of a TFP methodology would contribute to the NEO and NGO;
- the data collection arrangements that need to be put in place to facilitate its application; and
- as appropriate, the development of draft rules to support the application of a TFP methodology for any individual or group of electricity or gas distribution or transmission service providers.

The MCE accepted the first recommendation of including in the NEL and NGL provisions to enable the AEMC to make rules to allow the application of a TFP methodology. It did not act on the second recommendation of directing the AEMC to undertake a review.

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D Balancing incentives between operating and capital expenditures

The current arrangements can provide service providers with distorted incentives between operating and capital expenditures. This may lead to service providers adapting an inefficient mix of operating and capital expenditures in operating their network. This may also encourage service providers to capitalise their operating expenditure.

This appendix attempts to quantify how the incentive to make cost efficiencies would depend on the type of expenditure. This is to support our analysis in Chapter 2 on whether a TFP methodology would not distort incentives and also in Chapter 3 on the exclusion of an ECM under a TFP methodology.

D.1 Distortion in incentives

Chapter 2 explains that the strength of the incentive on the service provider to seek efficiencies would depend on sensitivity of profits to changes in effort. This depends on the value of the extra savings which is retained by the service provider, the length of time that the extra savings is retained, and in the case of expenditure which is recurrent, how actual expenditure savings will affect the setting of allowed revenue in the next regulatory period.

The current arrangements allow service providers to retain the benefits of efficiency savings (for both capital and operating expenditures) for a fixed period of time regardless of when the saving is made. However, the proportion of the savings retained by the service provider for operating and capital expenditures will not be equal. The benefits that a service provider would realise from an operating expenditure saving is greater than for a capital expenditure saving of the same size and duration. This is shown in Table D.1, which sets out the proportion of a $1m efficiency saving that is retained by the service provider under different retention periods for the following types of efficiency:

- one-off operating expenditure saving – this could include lower than expected maintenance faults resulting from good weather and fewer faults on the network. The benefits of this saving would not be realised again;
- permanent operating expenditure saving – this could include lower maintenance costs derived from the introduction of more efficient operating practices (for example, more efficient use of depots and work-teams);
- a one-off capital expenditure saving – this could include the deferral of an investment project (for example, because demand did not materialise), the benefits of which (that is, the delayed costs) are not expected to be realised again; and
- a permanent capital expenditure saving – this could include the implementation of innovative asset management techniques that enabled a problematic item of equipment to be retained in service rather than permanently replaced.

Table D.1: Shares of a $1m efficiency saving in operating and capital expenditure retained by the service provider under different retention periods

Retention period (years)	Operating expenditure (one-off)	Operating expenditure (recurring)	Capital expenditure (one-off)	Capital expenditure (recurring)
2	100%	13%	17%	2%
3	100%	18%	24%	4%
4	100%	24%	31%	7%
5	100%	29%	38%	11%
6	100%	33%	43%	14%
7	100%	38%	49%	18%
8	100%	42%	53%	22%
9	100%	46%	58%	26%
10	100%	49%	62%	30%
11	100%	52%	66%	34%

Note: The calculation is based using a rate of return/discount rate of 7%. For operating expenditure, calculations are based on a recurring saving of $1m per year. Hence the share is calculated as the NPV of $1m over the number of years (which the service provider retains the savings before the price cap is readjusted) divided by the NPV of a permanent $1m reduction in prices. For capital expenditure, calculations are based on a one-off saving of $1m in a given year for an asset with an assumed life of 40 years. We also assume that prices are reset to actual costs at the end of the retention period. The capital expenditure benefit is calculated from the sum of the financing cost savings and depreciation on the saved amount, with depreciation savings declining each year.

This table shows the relative strength of the incentives for making operating expenditure reductions compared to capital expenditure reductions.[109] If we assume that both operating and capital expenditure savings are recurring then it is clear that an operating expenditure saving is more rewarding for service providers than a similar reduction in capital expenditure.

However, if we believe that most capital expenditure reductions are one-off, rather than recurring, while operating expenditure savings are recurring, then this conclusion no longer holds. The conclusion would instead be that the strength of the incentive to make efficiency savings is reasonably comparable for both operating and capital expenditures. As the majority of operating expenditure savings tend to be recurrent and permanent while capital expenditure efficiencies tend to be driven by one-off savings this seems to be a reasonable conclusion.[110] Hence the nature of capital expenditure savings, when compared to operating expenditure savings that we assume to be recurring, is central to determining whether service providers need to be given stronger incentives to make capital expenditure reductions.[111]

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109 The loss to the service provider caused by any overspend would be the same percentage.

110 However, we note that service providers have begun to introduce asset management techniques that could deliver further permanent capital expenditure savings.

111 For further discussion see Frontier Economics, *A final report prepared for Ofgem, Developing Network Monopoly Price Controls: Workstream B, Balancing incentives*, March 2003, p. 7.

Table D.1 highlights the distortion caused when the efficiency benefit sharing scheme (EBSS) is only applied to operating expenditure. This issue was discussed in the AEMC Demand Side Participation Review.[112]

The distortion between capital and operating expenditures is also affected by the rules by which the regulator sets the allowed revenue for the next regulatory period. Under the NER, actual capital expenditure is rolled into the RAB. However, for any actual overspend in recurrent operating expenditure, the service provider will have to seek the regulator's approval that such expenditure is efficient. This may encourage the service provider to overuse capital expenditure, but not utilise operating expenditure.

112 AEMC, *Final report: Review of demand-side participation in the National Electricity Market*, 27 November 2009.

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E Regulatory data-sets

The data-sets provided in this appendix are the lists of variables required to support TFP analysis in each of the four energy sectors (that is, electricity distribution, electricity transmission, gas distribution and gas transmission). These data-sets have been developed by Economic Insights and can be found in the Economic Insights Data Availability Report.

E.1 Electricity distribution

OUTPUTS

DUOS – $m

- DUOS from Fixed Customer Charges – $m
- DUOS from On–Peak Energy Deliveries – $m
- DUOS from Off–Peak Energy Deliveries – $m
- DUOS from Contracted Peak Demand – $m
- DUOS from Measured Peak Demand – $m
- DUOS from Domestic Customers – $m
- DUOS from Commercial Customers – $m
- DUOS from Small Industrial Customers – $m
- DUOS from Large Industrial Customers – $m
- DUOS from Other Customers – $m

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

Total GWh delivered

- On–Peak Deliveries – GWh
- Off–Peak Deliveries – GWh
- Domestic Customer Deliveries – GWh
- Commercial Customer Deliveries – GWh
- Small Industrial Customer Deliveries – GWh
- Large Industrial Customer Deliveries – GWh
- Other Customer Deliveries – GWh

Non–coincident Peak Demand – MW

Coincident Peak Demand – MW

Total Distribution Customer Numbers

- Domestic Customer Numbers
- Commercial Customer Numbers
- Small Industrial Customer Numbers
- Large Industrial Customer Numbers
- Other Customer Numbers

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 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) by the following categories:

- 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

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).

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.

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.

O/H network circuit 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 sub-transmission)
- S/T 66 kV
- S/T 132 kV
- (Other voltages)

Total overhead circuit km

U/G network circuit 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 DORC – $m

RAB Reconciliation – $m

- Opening value
- Inflation addition
- Regulatory depreciation
- Physical 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?

Replacement Cost or Optimised Replacement Cost Asset 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 RC or ORC Value – $m

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

Total Capital Expenditure – $m

Asset Lives – estimated total and residual in years

- Overhead lines
- Underground cables
- Transformers
- Other assets

Value of Capital Contributions or Contributed Assets – $m

Price Index for Labour Inputs

Price Index for O&M Expenditure

Price Index for Network Assets

E.2 Electricity transmission

OUTPUTS

TUOS – $m

TUOS from Other connected transmission networks

TUOS from Distribution networks

TUOS from Directly connected end–users

Total TUOS

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

Throughput – GWh

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

Line length by voltage level – kms

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 supply events by time

The total and planned numbers of loss of supply 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. 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

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

Shared allocation of opex 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) by the following categories:

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

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 TNSP (please 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.

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

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)

Optimised replacement cost by nature of asset – $m

Optimised replacement cost (or replacement cost if ORC is unavailable) in current prices for:

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

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

RAB Reconciliation – $m

Opening value

Inflation addition

Regulatory depreciation

Physical 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 by nature of asset – $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

Asset total lifetime by nature of asset – years

Overhead lines

Underground cables

Transformers

Other capital

Estimated residual life by nature of asset – years

Overhead lines

Underground cables

Transformers

Other capital

Value of Capital Contributions or Contributed Assets – $m

Price Index for Labour Inputs

Price Index for O&M Expenditure

Price Index for Network Assets

E.3 Gas distribution

OUTPUTS

Gas delivered

Total

Energy – TJ per annum

Maximum hour – TJ / hr

Distribution Revenue – $M

Number of Customers – no.

Domestic Volume Based Tariffs

Energy – TJ per annum

Maximum hour – TJ / hr

Distribution Revenue – $M

Number of Customers – no.

Non–domestic Volume Based Tariffs

Energy – TJ per annum

Maximum hour – TJ / hr

Distribution Revenue – $M

Number of Customers – no.

Capacity Based Tariffs

Energy – TJ per annum

Maximum hour – TJ / hr

Distribution Revenue – $M

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 to distribution activities (eg head office) included in above – $m

Operating expenses – $m

Network Operations

Customer Connections

Meter Reading Services

Billing and Revenue Collection

Advertising and Marketing

Regulatory Costs

Change in Provisions

Other Operating Costs (excl those below)

Subtotal of above – $m

Maintenance expenses – $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

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.

SYSTEM PHYSICAL DATA

Distribution System Quantities and Capacity

Transmission mains – over 1050 kPa g

Weighted average of max sustainable pressure

- Weighted average of pipe diameter – mm
- Pipeline Length – km

- High Pressure Distribution mains – up to 1050 kPa g
  - Weighted average of max sustainable pressure
  - Weighted average of pipe diameter – mm
  - Pipeline Length – km
- Medium Pressure Distribution mains – 20 to 210 kPa g
  - Weighted average of max sustainable pressure
  - Weighted average of pipe diameter – mm
  - Pipeline Length – km
- Low pressure distribution mains – to 7 kPa g
  - Weighted average of max sustainable pressure
  - Weighted average of pipe diameter – mm
  - Pipeline Length – km
- Pipeline length by material – km
  - Polyethylene
  - PVC
  - Protected Steel
  - Unprotected Steel
  - Cast iron
  - Other
- Service connections (from mains to customer)
  - Number
  - Length – km
- City Gate Stations – number
- Field regulators – number
- District Regulators – number
- Meter Regulator Installations
  - Meters over 10 cubic metres/hour
  - Meters up to 10 cubic metres/hour

ASSET VALUES

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
- Physical 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?

Replacement Cost or Optimised Replacement Cost Asset 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

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 in 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

E.4 Gas transmission

OUTPUTS

Revenue – $m

From capacity charges

From throughput charges

From other charges

Total

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

Number of gas input locations

Listing of inputs

Number of off–take locations

Listing of off–takes

Gas actual throughput – TJ

Annual total delivery

Maximum Daily Quantity

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.

Unaccounted for Gas – %

INPUTS

Opex

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

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

Operating expenses – $m

Maintenance expenses – $m

Compressor Stations

City Gate Stations

Transmission mains

Other

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.
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.

SYSTEM PHYSICAL DATA

Transmission System Quantities and Capacity

- Transmission mains – over 1050 kPa g
  - Weighted average of max sustainable pressure
  - Weighted average of pipe diameter – mm
  - Pipeline Length – km
- Other mains – less than 1050 kPa g
  - Weighted average of max sustainable pressure
  - Weighted average of pipe diameter – mm
  - Pipeline Length – km
- Compressor Stations – number
- City Gate Stations – number

ASSET VALUES

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
- Physical 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?

Replacement Cost or Optimised Replacement Cost Asset Values – $m

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

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 in 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

F 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.

F.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)

F.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.

F.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.[113]

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 quality.

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113 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)).

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.[114] 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 characterises 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.[115]

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114 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.

115 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.

F.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.[116] For instance, the ESC considered that The Brattle Group did not consider:[117]

- 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:[118]

- 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.

F.2 Economic Insights Sensitivity Report

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

116 ESC submission, June 2009, p. 5.

117 ibid., pp. 6-7.

118 ibid., pp. 8-9.

F.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.

F.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.

F.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.

F.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)

F.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.

F.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.

Robustness

Economic Insights' assessment of the available regulatory data supports the view that the data are not sufficiently robust to be used in TFP analysis to determine regulatory pricing and revenue determinations.

F.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.

F.4 Brattle Incentives Report

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

F.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.

F.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.

F.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)

F.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.[119]

F.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.

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.

119 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 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.

F.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.

F.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.

F.7 AEMC Perspectives Report

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

F.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.

F.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.

Stakeholders also reported, in general terms, on the nature and quantum of costs for preparing and participating in regulatory decisions, including reviews and appeals. Some respondents believed that the costs of regulatory compliance were broadly the same over time while others thought that costs were increasing over time. Overall, the figures provided to the AEMC indicate that the cost to a service provider for preparing and participating in a regulatory process have generally accounted for 0.01 to 0.3 per cent of total revenue over a five year regulatory period. There was a view that the likelihood and frequency of appeals and merits reviews over time is likely to diminish as the regulatory regime matures.

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.

G Summary of submissions

The AEMC has consulted on a formal and informal basis with interested parties across the gas and electricity distribution and transmission sectors through a public forum, meetings, workshops and written submissions.

On the Victorian Proposal, the AEMC received written submissions from the AER, Country Energy, ENA, Energex, EnergyAustralia, Ergon Energy, Integral Energy, Jemena, ETSA Utilities/Citipower/Powercor, SP AusNet, and United Energy.

Written submissions in response to the Issues Paper were received from the AER, ENA, Energex, EnergyAustralia, Energy Users Association of Australia (EUAA), Envestra, Ergon Energy, Grid Australia, Integral Energy, Jemena, joint submission from ETSA Utilities/Citipower/Powercor, SP AusNet, Total Environment Centre, Watt Utilities, DPI, and the ESC.

On 28 September 2009 and 2 October 2009, the AEMC held two workshop on its Discussion Paper. Representatives from the following stakeholders attended these workshops: AEMO, APA Group, Aurora Energy, Babcock & Brown Infrastructure, Commonwealth Department of Resources, Energy and Tourism, Country Energy, ENA, Energeia, Energex, EnergyAustralia, Envestra, Ergon Energy, Infrastructure and Regulation Services, Jemena, Citipower/Powercor, NAS, Parsons Brinckerhoff, SP AusNet, Major Energy Users, and the DPI.

Written submissions on the Discussion Paper were received from the AER, ActewAGL, Australian Pipeline Industry Association, Dr Larry Kaufmann, ENA, Energex, EnergyAustralia, Ergon Energy, Grid Australia, Jemena, ETSA Utilities/Citipower/Powercor, and SP AusNet.

An overview of stakeholder views as expressed in written submissions and at the AEMC's workshops is set out below. These stakeholder views have been grouped around the various relevant economic and practical considerations. All written submissions received are available from the AEMC's website.

G.1 Economic considerations

G.1.1 Ability to recover efficient costs

- Considerable doubt was raised by stakeholders that the use of a TFP methodology would ensure the recovery of efficient costs and would allow for appropriate returns for service providers. As a TFP methodology is based upon historical data, it would not provide a reasonable opportunity to recover efficient costs going forward as historic growth factors may not be reflective of future growth. However, DPI, ESC and SP AusNet disagreed.

- Jemena stated that the service provider's ability to recover efficient costs under a TFP methodology would be determined by the combination of P_0 and the X factor. If a TFP methodology is determined centrally so that the X factor is

known, then P_0 would be the principal source of uncertainty. The extent of that uncertainty would be a function of the reset framework and how it is applied.

- Ergon Energy considered that the ability of service providers to recover their efficient costs should be determined by the setting of the initial price cap or revenue cap, and influenced by the TFP design. With respect to the design of a TFP methodology, this would include information quality, TFP growth rate, accuracy of business-specific adjustments, off ramps, capital modules, and pass through events.

- Stakeholders suggested that there would be an inherent difficulty in incorporating qualitative output measures, such as reliability and system security, into a TFP index. Hence, there would be a risk that a TFP methodology could produce a perverse outcome with expenditure leading to increases in input without any compensating effect in output. Therefore, service providers deemed it important that they receive adequate revenue under a TFP methodology to allow them to meet these mandated requirements. Energex also suggested that this issue needs further consideration as it is a fundamental weakness of a TFP methodology. Country Energy added that energy (electricity) and volume (gas) would be unlikely outputs or would be minor and should only be given small weighting because energy is delivered as a function of usage patterns rather than capacity of network delivery. It also considered that Dr Denis Lawrence's specification (being based on physical quantities of inputs) would more accurately reflect true inputs, whereas PEG's use of deflated asset values would be distorting and would not be an effective estimate of available resources for delivering outputs.

- The DPI recognised that, under a full TFP methodology there might be periods where profit may not be achievable due to industry downturn or exogenous factors. Although noting other jurisdictions, it believed that certain elements could be included in the design of a TFP methodology to overcome this issue.

- The ESC stated that service providers' concerns on recovery of efficient costs in this regard are likely to be over-stated. Furthermore, a rolling X and an optional capital investment module should ameliorate any potential concerns on recovery of capital spending.

- SP AusNet, Jemena and Energex considered that service providers should be able to choose either a fixed or rolling X, whereas the ESC favoured a rolling X in the TFP design. Energex added that service providers would be in a better position to determine their operational needs (their choice would reflect how much risk they would be prepared to take) and the interaction with other TFP design elements. Energex suggested that double counting may still exist when the regulator attempts to separate the cost pass through event from the rolling X. EnergyAustralia and Country Energy preferred a fixed X for reasons of certainty, practicality in requiring less updates and minimising administrative costs, providing some opportunity to review, and to maintain consistency between a TFP methodology and the building block approach. On the other hand, it did note that using a rolling X could increase the ability to recover efficient costs. Energex also suggested that if a service provider chose the rolling X under a TFP methodology then the input and output weights should be amended annually to

improve the growth rate accuracy. Other stakeholders, including the AER, did not support including a rolling X in a TFP methodology as it would decrease regulatory certainty and be more costly and onerous.

- Various service providers agreed that additional design terms such as off ramps, capital modules and cost pass through mechanisms should be included under a TFP methodology to insure against future cost changes and to allow for individual service providers to accommodate their specific circumstances and manage risks. Jemena suggested that a cost pass through mechanism was essential, and capital modules and off ramps were desirable for a TFP design. On the other hand, the ESC disagreed with the inclusion of any business-specific adjustments in the TFP design as it believed that a rolling X would keep prices from broadly diverging from costs and maintain earnings within acceptable bounds.

- ETSA Utilities, Citipower and Powercor were of the opinion that off ramps should be optional and the AER should not have the discretion to impose an off ramp on a service provider. ENA added that the AER should not have the discretion to refuse the use of off ramps as this would detract from the certainty that this instrument would otherwise provide. Similarly, Ergon Energy suggested that a service provider should be able to specify an off ramp in its regulatory proposal and nominate it at the start of the regulatory period so that the revenue determination can be re-opened. It noted that the criteria on how the AER decides on whether the off ramp would be accepted or rejected should be specified.

- Energex considered that a TFP methodology would create significant regulatory risk for service providers which would be difficult to minimise unless an off ramp is developed to address regulatory error in setting the initial price level. It assumed that any efficiency benefits would be shared with customers at the time of regulatory reset unless a profitability-related off ramp required sharing to happen sooner. It suggested that this type of off ramp would be fundamental to the design of a TFP methodology as it would substantially affect performance incentives under a TFP methodology and should be clarified in the NER and NGR. It also suggested that off ramps can be used as a risk mitigation tool which would especially assist service providers with no previous experience with a TFP methodology.

- EnergyAustralia considered that the inclusion of additional mechanisms such as off ramps, capital module, cost pass through and adjustments to the X factor would increase the complexity and weaken the design of a TFP methodology. Notwithstanding this, it stated that it would prefer to include these mechanisms although further clarification would be required on their design.

- Country Energy suggested that a cost pass through mechanism would be the same under a TFP methodology as it would be under the building block approach, but a rigorous review of this should be undertaken to avoid unintended consequences. It also considered that a TFP methodology should include a capital module because of the lumpiness and variations in capital expenditure. It regarded this module to be similar to the contingent projects framework for electricity transmission service providers. With respect to off ramps, it saw these as a problem because they would defeat the purpose of a TFP

methodology and result in rate of return regulation. To address this, it suggested that the current service provider's rights under the NGR for submitting a new access arrangement for approval at any time could also be repeated in the NER. This would mean that the service provider would only seek this if there was a substantial reason. Otherwise, the disruption to the market would be too great.

- Ergon Energy also considered that the AER's discretion to refer to other information for the setting of the initial price or revenue cap should be limited to the service provider's information in the RIN, clearly defined, and consulted on. Energex considered that other information could include forecast costs although it would diminish the purpose of a TFP methodology which does not require forecast costs. However, it was of the view that forecast costs would be needed to cover the final year of the preceding regulatory period and to set an appropriate initial price level.

- EnergyAustralia stated that it preferred to apply the building block approach for setting the initial price or revenue cap because it would: maintain the current framework where sunk and current investments are made; maintain the current roll forward of RAB, cost of capital and efficient tax; and allow service providers to be able to revert to the building block approach after applying a TFP methodology in the previous period. It was also concerned with the regulator's discretion to assess actual year three data for year five estimated costs. It questioned what 'a reasonable assessment of costs' would be entailed in an ex-post review of actual costs used by the regulator as one of the factors for assessing estimated expenditure for year five. It preferred a proposed-respond approach for setting the initial cap where service providers would propose their best estimate of year five operating expenditure and capital expenditure and the regulator would assess and respond with its decision and reasons.

- Energex was similarly concerned and referred to the NAS report where, it claimed, NAS was unable to draw any conclusions about the stability of historical capital expenditure and operating expenditure data that would provide a reasonable indication of forecast expenditures. It considered that service providers would have a higher risk in being able to recover efficient costs because of a TFP methodology's backward looking nature for expenditures. Under a TFP methodology, service providers would be subject to a higher cost of capital and rely more on additional design terms such as cost pass through mechanisms. Energex considered that capital modules were an important requirement to compensate service providers that make step changes in expenditure and avoid significant business risks.

- The AER agreed that it would be prudent to include capital modules under a TFP methodology, although such capital expenditure should be subject to regulatory assessment of efficiency. However, the AER claimed that off ramp mechanisms would give rise to regulatory gaming. It was not convinced that a TFP methodology would need off ramps in addition to cost pass through mechanisms and capital modules. It considered that if an off ramp needs to be included in a TFP methodology, the regulator should have significant discretion on whether a determination should be re-opened.

G.1.2 Strength of incentives for cost efficiencies and extent that they are shared with users

- Opinions differed on whether a TFP methodology could (or would be necessary to) improve the strength of incentives for service providers. Many stakeholders argued that there is no conceptual reason to believe that a service provider would have greater incentives to achieve efficiency improvements under a TFP methodology compared to the building block approach.

- Energex stated that the building block approach is a straightforward, stable, certain and understandable process with sufficient incentives for service providers to see cost efficiencies which is based on their familiarity with this form of regulation. Nevertheless, it indicated that it would be too premature to comment on the performance of the new framework given its short time in operation.

- The ESC and SP AusNet suggested that a TFP methodology might not improve productive efficiency, but it would encourage dynamic efficiency. The ESC stated that dynamic efficiency incentives would be superior under TFP indexing approach compared with repeated application of the building block approach. SP AusNet considered that the key component of the incentive properties of a TFP methodology would lie in the ability to have long or indefinite regulatory periods which would create greater certainty for service providers on their long term prices. Jemena noted that if the regulatory periods for a TFP methodology and the building block approach were the same and revenue and prices would be reset regularly, then the incentive properties of the two alternatives would likely to be the same.

- The DPI believed that a TFP methodology could enhance performance incentives for service providers and greater efficiency incentives to the community through lower costs, automatic pass through of industry productivity gains and consumers only required to contribute to costs actually incurred by the industry. SP AusNet also referred to the potential benefits of a TFP methodology in terms of productivity growth over time to users in the form of slower price growth which would benefit consumers.

- The ESC provided an incentive model assessment of various forms of regulation which purports that a TFP methodology would provide the strongest and the building block approach would provide the worse incentives.

- Some stakeholders referred to the Brattle Incentives Report and concluded that the relative incentive properties of the building block approach and a TFP methodology are comparable. This raised doubt about the purported increased incentives and dynamic efficiency benefits available under a TFP methodology. The ESC strongly argued against the findings of the Brattle Incentives Report.

- Grid Australia also referred to the conclusion of the Brattle Incentives Report that where the incentive to control costs is greater under a TFP methodology, a smaller proportion of the cost savings would be expected to be shared with users compared to the building block approach.

- Noting that very high-powered incentives to reduce expenditure are not necessarily preferred, the AER raised the question whether there is a need to significantly increase the power of the current incentives under the building block approach to reduce expenditure.

- Some submissions considered that the strength of incentives of a TFP methodology would depend upon the initial price methodology and the length of the regulatory period.

- Most stakeholders put forward that any application of a TFP methodology should maintain the minimum five year regulatory period and allow for longer regulatory periods at the discretion of the service provider. Country Energy stated that the length of regulatory periods could be reviewed over time to take into account experiences gained. The AER believed that the length of the regulatory period under a TFP methodology should be at least seven years to increase the incentives for business efficiency and to reduce regulatory costs under a TFP methodology relative to the building block approach. On the other hand, EnergyAustralia was of the view that the period should not be anything longer than five years, citing the Brattle Group report that anything longer would increase the risk that prices will be substantially below costs.

- Some stakeholders were concerned about a possible prudency assessment of past expenditure within the methodology to determine P_0 as this would expose service providers to an unacceptable level of risk and uncertainty. There were some arguments against the need to do any assessment on capital expenditure for P_0 since actual capital expenditure incurred in that year would ultimately be included in the RAB and therefore the regulator should accept the service provider's best estimate. Country Energy suggested that the data used for calculating P_0 should not be limited to the last three years, but should also include the fourth year if it becomes available during the review.

- ETSA Utilities, Citipower and Powercor believed that the initial price or revenue cap should be based on forward looking operating and capital expenditures (rather than set by reference to a historic operating and capital expenditures). They added that although cost pass throughs and capital module triggers would be good safeguards within a TFP methodology and should be included in its design, these mechanisms should not be relied upon to address issues that are foreseeable and measurable at the time the AER makes its determination. This would add to the regulatory costs for both the AER and the service provider.

- EnergyAustralia also pointed out that the major driver for its capital expenditure and operating expenditure is its design, reliability and performance licence conditions and these expenditures need to be addressed under a TFP methodology.

- Some service providers suggested that there would be a need for a reconciliation adjustment ('true up') to account for differences between forecast and actual capital expenditures used to set the P_0. It was suggested that this occur early in the TFP regulatory period and not at the end, especially if the TFP regulatory period would be longer than five years.

- SP AusNet did not support a proposal to regularly reset prices to costs as this would undermine the aims of a TFP methodology to delink prices from costs and the incentives that flow from that. Other submissions also recognised that regular P_0 adjustments would significantly weaken the incentive properties for service providers to deliver efficiency savings under a TFP methodology.

- There was some concern expressed about the potential loss of the existing ECM under a TFP methodology. Various service providers believed that the ECM, or some variation thereof, would be equally required if a TFP methodology was introduced to ensure that a TFP methodology would not produce less incentives for productive efficiency than the current building block approach. However, the ESC argued that the ECM would not be needed. Ergon Energy also considered that the EBSS was not feasible under a TFP methodology because the operating expenditure building block would not exist; although it considered that Service Target Performance Incentive Scheme and Demand Management Incentive Scheme could apply under a TFP methodology. Similarly, Country Energy considered that as an ECM would require forecast operating expenditure that would defeat the purpose of a TFP methodology and create overlapping incentive mechanisms. It was uncertain about what impact a national STPIS would have to TFP historical growth for individual service providers and as a whole, given the variation between jurisdictions and over time with demand management and service performance incentive schemes, and suggested more understanding be developed on this issue. Energex suggested that in the absence of an ECM under a TFP methodology, and for consistency with the current NER and NGR, the regulatory period should be more than five years to provide an additional incentive for service providers to continually achieve efficiency gains. Nevertheless, it considered that a service provider would also risk making a loss for a regulatory period if the price cap was set below the level required to achieve efficient cost recovery. It was also of the view that Service Target Performance Incentive Scheme and Demand Management Incentive Scheme should be retained under a TFP methodology because a TFP methodology does not address changes in service quality and the price cap nature of a TFP methodology would be unlikely to create strong incentives for demand management.

G.1.3 Promotion of efficient investment for long term benefits

- Service providers expressed concern that they may be discouraged from making economic investments under a TFP methodology because of the increased uncertainty about the adequacy of allowed revenues, increased risks and volatility in cash flow.

- Some claimed that specific service providers may suffer from business-specific cost increases which would not be captured by an industry TFP rate which could seriously damage efficient investment.

- The ESC believed that utility incentives to make efficiency improvements and efficient investments are very strong under a TFP methodology and, are generally stronger than under the building block approach.

G.1.4 Costs and risks of regulation

- Service providers doubted whether a TFP methodology would lead to lower regulatory costs and burden, especially with respect to the data collection needed under a TFP methodology. Particular concern was raised about the cost of the establishment and maintenance of additional reporting requirements. Country Energy added that no cost benefit analysis has been done to support the argument that regulatory costs would be lower. The ESC argued that the incremental costs associated with a TFP methodology (that is, the cost of establishing a TFP methodology and the costs of administrating a TFP methodology) would be modest because of the considerable research already done and sponsored by the ESC in this regard.

- Some service providers did not support the introduction of a TFP methodology at this time. They suggested that a TFP methodology would not promote the NEO and NGO or the Revenue and Pricing Principles. Some also considered that the costs for a TFP methodology would not be substantially lower than the building block approach to justify a TFP methodology. EnergyAustralia added that a TFP methodology would not be beneficial to customers (as it would likely increase prices), service providers (as it would increase their compliance cost and burden), and the regulator (as it would increase administrative burden). It also stated that a layer of regulatory complexity would be added without clear benefits. Energex and Country Energy also considered that there was insufficient evidence to support a TFP methodology.

- Service providers advocated that, if the building block approach would be required to periodically reset P_0 within a TFP methodology, they were doubtful whether there would be a reduction in regulatory costs and burden. Ergon Energy sought clarification on how the building block approach and P_0 would be applied in the last year of the current regulatory period.

- Service providers did not believe the assumption that a TFP methodology would be less intrusive and less expensive to administer than the building block approach due to: WACC being an input to a TFP methodology, reviews and processes to calculate a TFP methodology; and the fact that some forecasting would still be required under a TFP methodology.

- EnergyAustralia considered that service providers would still require forecast of their costs for management purposes irrespective of the fact that a TFP methodology does not use it. It suggested that service providers would also assess and compare the costs and benefits between a TFP methodology and the building block approach before choosing one and this process would entail forecast of costs.

- The additional cost for the AER to maintain two regulatory systems was also seen by various service providers as a factor to increasing rather than decreasing regulatory costs and burden. Energex added that this would also mean greater complexity in the framework and would be inconsistent with the Productivity Commission's recommendation for the AER to reduce costs and complexity in the AER's reviews of price caps.

- Some service providers considered that a TFP methodology should be an alternative to the building block approach rather than being another part of the building block approach to minimise administrative and regulatory burden on service providers.

- The AER added that, unless a pure TFP methodology were to be introduced, any hybrid TFP methodology or TFP benchmarking tool option would sit higher on the cost continuum than the current building block approach as these methodologies would involve some continuation of the building block approach with the additional cost of the TFP calculation.

- On the other hand, SP AusNet, the DPI and ESC believed that a TFP methodology would reduce the administrative burden and costs to both the regulator and service providers by using known and measurable information instead of relying on business-specific forecast and by reducing the frequency of resource-intensive regulatory reviews.

- Ergon Energy considered that the AER should coordinate with service providers on required information in order to minimise regulatory compliance burden. It also considered that service providers should be compensated for costs associated with providing additional information.

G.1.5 Clarity, certainty and transparency of the regulatory framework and process

- Service providers argued that the current building block approach, although not perfect, is clear, well understood, established and efficient which provides regulatory certainty. Any new regulatory regime should be clear, understood and transparent in order to provide at least the same level of regulatory certainty and confidence. Some were concerned that a TFP methodology may introduce inconsistencies and ambiguity.

- The majority of submissions considered that there should be clear and detailed prescription in the NER and NGR as much as possible, supported by AER guidelines on technical matters which should aid to provide clarity, regulatory certainty and transparency for a TFP methodology. Giving too much discretionary powers to the AER or the inclusion of non-reviewable regulator decisions would lead to regulatory uncertainty that would outweigh any of the benefits from having a TFP methodology. Good regulatory practice does not allow for an important design of a new regulatory regime to be given to the AER to be developed through guidelines, but instead should be developed via industry consultation and provided in the NER and NGR in detail. The DPI disagreed.

- SP AusNet added that the AER guidelines should be binding and should be able to provide guidance on the areas in which the regulator would have discretion, including: technical matters; how that regulatory discretion would be exercised; how service providers may propose business-specific arrangements; and regulatory decision making in considering and approving business-specific arrangements. ActewAGL considered that a high level of guidance should be

given in the NER and NGR on how the AER's discretion and flexibility would be applied. EnergyAustralia considered that the discretion in decision making as currently provided in the NER should not be departed from under a TFP methodology. It further suggested that reliance on guidelines would be a poor substitute to the NER as it would become less transparent, certain and stable.

- Service providers advocated that the current building block approach is clear, well understood, established and efficient. Given this, they considered that it is crucial to guarantee necessary funds from investors and banks, in particular in the current financial climate.

- The DPI maintained that a TFP methodology would increase information transparency reducing regulatory uncertainty.

- The AER considered that it would be beneficial for a trial of a TFP methodology to be undertaken before it is applied in regulatory determinations.

- ENA maintained that any degree of flexibility should be clearly inserted into the NER and NGR in a manner that creates a 'guided discretion approach'. This was considered crucial to maintain regulatory certainty.

- The AER was concerned that providing too much flexibility to service providers would undermine the potential benefits of a TFP methodology.

G.1.6 Innovation

- Some submissions perceived that the building block approach has failed to encourage innovation as it suffers from cost allocation issues between competitive and non-competitive sectors. It also would encourage service providers to have high leverage and therefore have little incentive to innovate.

- In SP AusNet's view, greater certainty for service providers on their long term prices offered by a TFP methodology would facilitate innovation, research and development beyond the current level, including investment in non-network solutions. The ESC believed that a TFP methodology could pursue creativity and innovation in technologies as well as prices, products and services required for the energy industry to meet many of its challenges ahead, including the risks and complications derived from climate change. Country Energy was uncertain how a TFP methodology would cater for innovation and suggested further investigation on this.

- Service providers maintained that any alternative to the building block approach should be capable of accommodating new policy developments such as climate change and the introduction of smart meters. Energex added that the forward looking nature of the building block approach may allow service providers to propose expenditure for new regulated services, or they can seek unregulated services subject to requirements imposed by the regulator.

G.1.7 Optionality and two alternative methodologies working in parallel

- Service providers stressed that only they should be able to initiate the transition from the building block approach to a TFP methodology. They also considered that there should not be an avenue for a TFP methodology to be imposed on a service provider without its consent. They stated that a TFP methodology should be introduced as an option and not as a replacement of the building block approach. However, the AER considered that the regulator should have the ability to approve or reject a service provider's initial nomination of a TFP methodology under high level principles that focus on the achievement of the NEO and NGO.

- ETSA Utilities, Citipower and Powercor believed that the lack of regulatory precedent in this area and the range of unique issues that would need to be considered under a TFP methodology, would warrant the inclusion of a transitional period in the initial phase of the introduction of a TFP methodology. This would be to allow the service provider to make an informed decision as to which approach should be applied.

- Some stakeholders expressed concern that while a TFP methodology might be initially considered and introduced into the NER and NGR as an option, later Rule changes might make it a mandatory regime.

- Service providers argued that the discretion to revert from using a TFP methodology to the building block approach after a regulatory period should lie with the service provider and the AER should not be given any veto in this regard. The ability for service providers to either opt in or opt out of a TFP methodology at their own discretion was considered a necessary condition under the regulatory framework to ensure that a service provider would earn a reasonable rate of return. It was perceived that the risk of appeals or merits reviews would be higher if the regulator had the ability to veto a service provider's decision. Service providers also considered that they would be in a better position to understand their own business and whether the economic framework would be appropriate. Some considered that if service providers chose to be subject to a TFP methodology, then these service providers should be locked in for the full duration of the regulatory period for reasons of certainty and consistency with the building block approach. Energex suggested that service providers would be more likely to choose a TFP methodology even if there would be uncertainty in the approach if they can revert back to the building block approach. Country Energy added that if service providers were allowed to opt in and revert from a TFP methodology, then this would allow them to develop and refine such a methodology and determine if there would be net economic benefits from adopting it. The ESC did not believe that allowing service providers to choose between these options would create perverse incentives.

- The DPI and AER disagreed. The AER claimed that the regulator's approval should be required before a service provider should be allowed back to the building block approach. If not, this would likely give rise to regulatory gaming. Similarly, Energex also saw disadvantages of opting in and out such as: an increase in complexity of the regulatory framework; potential gaming arising due to the service provider's preference for a more favourable commercial outcome;

an increase in administrative costs for the AER and service providers; potential broad differences between service providers under a TFP methodology which would require more regulator consideration of business-specific circumstances when setting the X factor; and an increase in risks to service providers if the industry was not in a steady state or if a TFP methodology does not address the variations in expenditure profiles. Country Energy considered that only one framework (that is, a TFP methodology or the building block approach) should operate at a time because of the significant cost for all services providers and consumers if two alternative methodologies operated simultaneously.

- Some stakeholders were concerned that having two parallel forms of regulatory revenue control would add to regulator's and service providers' regulatory costs and burden.

- Service providers also argued that conducting concurrent revenue determinations if two forms of price setting methodology apply would lead to loss of synergies for the AER and might lead to gaming by the AER if it had a preference for one methodology over another.

G.1.8 Quality of service and demand management

- ENA was concerned about the development of different maintenance and service quality incentive schemes in the medium term. It argued that the TFP design should encourage high levels of service quality and allow service providers to recover the costs.

- Service providers valued service incentives and demand management schemes and argued that they should operate with both the building bock approach and a TFP methodology. The ESC also believed that existing service quality schemes would still be required under a TFP methodology.

- EnergyAustralia did not support the introduction of a TFP methodology until how quality of service and system security expenditure would be incorporated into a TFP methodology are addressed. It also considered that it would be inadequate to omit quality of service from TFP calculations and regulate quality through side constraint or separate the service quality incentive mechanism. Energex also considered that excluding service quality as an output measurement cannot be considered separately from input quality changes and would introduce a distortion into the TFP calculations.

- However, ETSA Utilities, Citipower and Powercor maintained that in practice these incentive mechanisms could not, in their current form, operate in conjunction with a TFP methodology. They argued that in the absence of some form of complex adjustment being made to either the TFP measure of the S and D factors, a service provider's overall efficiency relative to the industry measure would fall as a result of the interaction of these incentive schemes with a TFP methodology.

G.2 Practical considerations

G.2.1 Data problems

- All stakeholders agreed that one of the main problems with the building block approach is the information asymmetry between service providers and the regulator. Where the DPI saw a TFP methodology as a solution to this problem, service providers argued that a TFP methodology has not demonstrated to have lower risks on inaccurate, incomplete and inappropriate data. EnergyAustralia suggested that a TFP methodology would be as information intensive as the building block approach. Country Energy pointed out that information asymmetry would continue under a TFP methodology if the building block approach is used at the start of each regulatory period to set P_0. Energex suggested that under the new framework the AER will be able to access cost information related to electricity distribution and transmission which may address information asymmetry.

- As a robust, consistent and reliable data-set is crucial for the application of a TFP methodology, it would require data availability, comparability and transparency. Most stakeholders agreed that the availability and quality of the existing data is not sufficient for the successful implementation of a TFP methodology. Submissions referred to the Economic Insights Data Availability Report to conclude that a number of material TFP data availability and consistency issues have not been satisfactorily resolved. This means that there is insufficient information available to support a TFP methodology in the near future. Ergon Energy was not sure when good quality data would be available in order to commence a TFP methodology, but both Ergon Energy and Energex considered that a minimum of eight years of data would be required and the audited data that would be used may need to be based on network data as opposed to financial data.

- Energex suggested that a long term historical growth rate may not be the best productivity indicator due to volatility in technological change over time. It also considered that forward consideration of productivity due to new technologies can be problematic. On the issue of the length of period for calculating the TFP growth rate, Country Energy suggested that this would depend on the method chosen which would determine whether it should be no more than five years or at least ten years.

- ETSA Utilities, Citipower and Powercor agreed with the recommendation from the Economic Insights Data Availability Report that a new database should be established through a consultative process with the industry. EnergyAustralia also suggested that consultation should be undertaken on the development of the data-set with a cost and benefit analysis for such a venture, which it suggested would not be an insignificant or inexpensive task.

- The ESC strongly argued against the findings in the Economic Insights Data Availability Report.

- The AER believed that the regulator should have flexibility in conducting rigorous data analysis for the purpose of deriving an accurate, reasonable and robust estimate in its application of a TFP methodology.

- ENA referred to the NAS Expenditure Profiles Report to note that just because the AER is able to ask for specific information, this does not necessarily mean that distribution service providers are able to provide the requested information.

- Service providers considered the data availability problem as a very complex issue which would result in a substantial ongoing cost for the regulator and would be passed on to customers.

- Service providers also argued that a TFP methodology would lead to increased information collection and reporting requirements for service providers, even for those service providers that would not use a TFP methodology. This would increase regulatory burden and costs for service providers and create additional incentives to 'game' provided information. On the other hand, SP AusNet considered it sensible and appropriate that all service providers should provide data for a TFP methodology, even if not applying it. EnergyAustralia suggested that service providers, which choose not to use a TFP methodology but would still be required to record and maintain data, would ultimately pass higher prices onto customers, or some of these service providers may choose to provide best estimates or allocated data instead of more accurate systems which could potentially compromise the robustness of the data. Energex added that more clarity should be given on the information required for service providers to assess the additional costs for such work. It also suggested that consideration should be given on the potential increase in information requirements that would be placed on service providers, including under the RIO, and the potential difficulties in providing information due to differences in data between service providers.

- Service providers argued that there would be a need for transitional provisions for any new data collection requirements and that they should agree with the reporting requirements. EnergyAustralia suggested that service providers would be required to maintain two sets of documents for a TFP methodology and the transition arrangements, including the costs for maintaining two data-sets and reconciling between the two. Energex added that it would appear a new data-set would be required for a TFP methodology.

- The ESC and the DPI argued that available data for Victoria are good and should be used to start using a TFP methodology now. While they recognised that the overall data quality for all Australian states and territories might not be optimal, in their view, that is no reason to preclude a TFP methodology from being instituted in the NER and NGR and TFP indexes to be construed.

- In relation to the information asymmetry problem faced by the current building block approach, EnergyAustralia referred to the substantial information gathering powers afforded to the AER under the current regulatory regime and the significant penalties attached to non-compliance. Failure to comply with a request for relevant information may currently result in the Australian Competition Tribunal refusing leave to apply for merits review of an AER decision. However, Ergon Energy referred to the mixed successes from the AER's

attempts to implement a uniform RIO across NEM service providers or even a RIN across a number of distribution service providers. It considered that making more efficient use of these combined powers and threats would already partially reduce the information asymmetry problem.

- EnergyAustralia referred to the suggestion in the Economic Insights Data Availability Report that the AER's proposed RIO could be extended to include the information necessary for the application of a TFP methodology. EnergyAustralia disagreed however with the assumption made by Economic Insights that such exercise would be relatively small. Distribution service providers have indicated significant problems with the breadth of the draft RIO as it stands, so contemplation of an extension to its scope to allow for the possibility of a TFP methodology is likely to be strongly opposed by the industry.

- Some service providers submitted that any 'cleaning' of or adjustments to audited TFP data would be inappropriate and unacceptable as this would undermine confidence in the integrity of the TFP estimation process and regulatory framework. The AER stated that any cleaning up of data should encompass standardised, widely accepted quantitative methods of data cleansing for the purpose of more rigorous analyses which should not include manipulation or transformation of data in response to unexpected or seemingly unreasonable results. EnergyAustralia questioned whether it would be the regulator or service provider who would be responsible for making adjustments, and how will adjustments for exceptional circumstance be triggered. If it would be the regulator, would the regulator have any knowledge of the data and what would be the criteria for making adjustments? On the other hand, if it would be the service provider, would service providers be required to provide two versions of the same data as part of its annual regulatory requirement? The ESC viewed that the regulator should be permitted to clean up data to prevent gaming and to ensure consistency across the industry.

- ETSA Utilities, Citipower and Powercor maintained that normalisation of data would be critical to ensure that differences between service providers do not have a significant influence on the industry-wide TFP measure. Ergon Energy suggested that adjustments may need to be made to changes or differences in: the service provider's reported data, factors contributing to the differences, regulatory obligations, cost allocation methods, capitalisation policies, and service classifications. Country Energy also considered normalisation of the data to be necessary to ensure comparability of data, but suggested that it would be a subjective and not a straightforward task. It also suggested that if business-specific adjustments were made, this would reduce regulatory certainty and predictability, dilute incentives and make a TFP methodology the same as the building block approach.

- Energex saw some merit in allowing business-specific adjustments for business-specific circumstances such as addressing uncertainties on the productivity potential of service providers. It noted that business-specific adjustments are treated as an important part of a TFP methodology in the US. However, it suggested that there would be a risk of arbitrary adjustments and lack of transparency unless principles on this are specified in the NER and NGR, and added complexity and regulatory subjectivity to the scheme, potentially leading

to a diminished appeal for a TFP methodology. It also suggested that an agreed template should be used for all service providers to provide the data which would avoid the regulator from making subjective decisions if they were to clean up the data. Nevertheless, it considered that back-casting historical expenditure into a specific TFP format would create uncertainty on the data's integrity. It also considered that allowing for business-specific adjustments where better performing service providers would otherwise be penalised under an average TFP growth rate (the convergence effect) appears to be based on an assumption that some service providers are better managed than others and that better performing service providers would be disadvantaged by a more lenient benchmark for previously poor performing service providers. It suggested that this convergence effect would often be due to the exit of service providers and that the productivity growth mechanism would be excluded from the regulatory environment. It submitted that an adjustment to the starting productivity level may not be necessary. Country Energy also referred to the convergence effect, stating that this would also need to be addressed when using a historical TFP methodology, otherwise X factors when used in price paths would underestimate the future costs for service providers.

G.2.2 TFP index calculation

- There was ongoing disagreement between stakeholders on the TFP index calculation specification. However, there was widespread agreement amongst stakeholders that these issues need to be resolved before any service provider would consider seeking to be regulated under a TFP methodology.

- The ESC and the DPI favoured the index specification of Pacific Economics Group and Jemena favoured the specification of Economic Insights. EnergyAustralia and Country Energy also agreed with the index method, although EnergyAustralia considered further work would be required on determining the most appropriate method. Nevertheless, EnergyAustralia suggested that service providers should be able to propose an indexing method which would be assessed by the regulator. Although Energex broadly agreed with the index number approach, it considered that econometric studies could provide for more robust TFP estimates due to its ability to estimate exogenous variables which may be relevant for business-specific adjustments to the X factor. It also suggested that the producer price index would be a reasonable way to measure economy-wide input price growth, but that the economy-wide productivity index has not been considered.

- The AER maintained that the regulator should have the flexibility to decide on the index method. Ergon Energy was not clear how the AER would decide on the index approach and considered that the chosen method should be confirmed before a regulatory determination is made.

- Service providers were concerned about expenditure to maintain reliability standards if there would be no corresponding change to output performance.

- Some service providers questioned wether a TFP methodology would appropriately recognise the difference between standard and non-standard services.

- Jemena argued to fix the approach to calculating the TFP growth rate in the NER and NGR instead of leaving it to the regulator.

- Submissions considered that finding comparator service providers to form an industry would be difficult for a number of reasons, including geographical conditions, customer bases or energy demand profile or load density, operating conditions, accounting practices, physical attributes of the network and characteristics of the assets, ownership or organisational structures, network services provided, regulatory environment, and service standards. There are many reasons why service providers may be different and these differences should be taken into account when defining the industry group.

- Some stakeholders suggested that urban versus rural and density were key considerations in defining the industry group. However, it was also acknowledged that these groups should not be too small. ActewAGL accepted that a single TFP growth rate may need to be calculated (as the option of splitting might result in sample sizes which would be too small) provided there is scope for the AER to make business-specific adjustments. EnergyAustralia was concerned that if the AER would be given discretion to make business-specific adjustments, then it would be inconsistently applied over time and inconsistent with the NER and NGR. ETSA Utilities, Citipower and Powercor argued to divide the industry at a minimum on the basis of rural and urban interests. On the other hand, SP AusNet argued for a single TFP growth rate factor that would be based on the average productivity across the entire regulated sector. Jemena favoured a single TFP value for each industry sector (gas distribution and electricity distribution). The AER suggested that one single TFP growth rate should be considered further along with the option of a broader sub grouping, which would be preferred, that approximately captures a sufficient number of analogous regulated service providers. Energex preferred groups based on different operating conditions to benchmark productivity against similar service providers, although it considered that smaller size groups would have more influence on the benchmark TFP level and therefore less incentive to operate efficiently. It also considered that the classification of industry groups would be a contentious issue, noting that it has high density urban and high density rural coverage and was therefore unsure which sub-group it would be classified under. Country Energy did not consider the four categories in the sector to be very useful because these would only be partial proxies for differences between service providers, creating further unresolved differences and less meaningful conclusions could be drawn if there was a small number of service providers in each category.

- EnergyAustralia's transmission assets are classified as dual function assets under economic regulation where they are under the same economic regulation as distribution assets. It questioned how the X factor would be determined in this situation. It could not indicate a preference on which option should define an industry group, noting that parts of its business could fit into the industry sub-groups.

- Ergon Energy could not choose between single or different growth rate factors without more information on TFP inputs, outputs and weightings and how specific circumstances would be handled under a TFP methodology. However, it considered that inputs and outputs for calculating the TFP growth estimate should be reviewed independently with reference to international best practice, factors affecting Australian electricity and gas service providers, and service providers' ability to measure and quantify inputs and outputs. It also stated that appropriate consultation and agreement with service providers should be given to any review of inputs and outputs. EnergyAustralia was also of the view that more work needs to be done on the design of inputs and outputs. Energex suggested that input and output specifications and calculation for growth rates should be specified in the NER and NGR. It considered that determining these may be a contentious issue given the opposing views of Economic Insights and PEG, and noted that this is still an issue in New Zealand. It also suggested that data collection and reporting should be the key drivers for specifying inputs, outputs and weightings to minimise regulatory costs. On the other hand, it considered that Economic Insights' approach appeared to be more appealing and practical at this time due to the reason that the current revenue shares may not reflect outputs delivered to customers.

- Energex suggested that the average annual growth rate approach may be more prone to 'end point' problems, requiring data analysis to control cyclical effects. However, it considered that depending on the data and method, non-trivial differences in average TFP growth rate estimates could be a result.

- Some submissions maintained that it may be necessary to address differences between service providers relating to relative efficiency levels or the service provider's ability to respond to incentives. ETSA Utilities, Citipower and Powercor stated that when the division between rural and urban is made, the effect of any further difference in productivity potential arising as a result of differences in customer density between service providers could be accommodated through either the normalisation of data or through a business-specific adjustment factor.

- The majority of service providers considered that no overseas jurisdictions should be included in the TFP data-sets. However, the AER saw some potential in including overseas service providers as a data sample. Energex also saw it as a way to check for reasonableness in Australian TFP estimates.

- Various stakeholders argued that a business-specific adjustment factor should be included in the TFP calculation. The ESC disagreed and also Jemena stated that if a TFP methodology were to be an optional alternative to the building block approach, it would be more efficient to proceed without business-specific adjustments, at least in the first instance. The AER argued that business-specific price path adjustments under a TFP methodology would add significant complexity to the administration of a TFP methodology and would provide substantial grounds for challenges and disputes regarding the regulator's discretion in this regard. Country Energy also considered that disputes would continue under a TFP methodology because of the range of variables that would result in a range of possible answers which involve significant amounts of money. This would undermine the potential benefits of a TFP methodology.

- Energex supported a single X factor for simplicity and stability, noting that business-specific adjustments can be made to the X factor. Multiple X factors, on the other hand, would have more potential to influence individual service providers.

- Energex also considered that the regulator could adjust the X factor if it considers that there would be a significant difference between the productivity growth potential of the service provider and the industry TFP. However, it regarded that the NEO and NGO and the Revenue and Pricing Principles give the regulator such discretion that may substantially impact on the service provider's profitability. It sought more guidance on the regulator's discretion on this.

- Country Energy submitted that an X factor that would reflect an individual service provider's situation would be important for achieving the NEO, NGO and Revenue and Pricing Principles. It also identified a range of factors that would differ between service providers and would need to be considered when trying to determine an X factor. This would allow for a reasonable forecast of productivity growth for each individual service provider.

G.2.3 Industry support and participation

- SP AusNet has indicated that it would consider using a TFP methodology if it were available. However, this would depend on the detail of the design. SP AusNet did not support a TFP methodology based on the building block approach. Jemena explicitly supported the further development of the TFP alternative.

- Any interest from stakeholders in using a TFP methodology was as an option and not as a mandated replacement for the building block approach. There is a clear consensus among all service providers that a TFP methodology must not be mandatory.

- Country Energy considered that the problems with the current building block approach has not been clearly defined to understand what a TFP methodology would be addressing.

G.2.4 Industry specific issues

Electricity

- Some service providers argued that climate change and smart meter infrastructure challenges for electricity mean that historical TFP is unlikely to be a good indicator of future performance and productivity gains.

- Service providers reported significant increases in future capital expenditure and that differences in jurisdictional reliability standards drive differences in investments.

- Ergon Energy considered that real inputs and outputs should be reflected under a TFP methodology rather than the use of approximations. If approximations were to be used, it considered that service providers should be consulted with and it should be agreed.

Gas

- There seems to be more interest in the application of a TFP methodology from the gas sector compared to the electricity sector (SP AusNet and Jemena).

- However, it was acknowledged by service providers that the variation between gas service providers can be significant which would affect the comparability of these networks for any TFP index calculation.

- Service providers also noted that it would not be possible to collect data from uncovered pipelines. However, it should be possible to collect data from light regulation pipelines.

Transmission

- There is no support amongst service providers to apply a TFP methodology as the required necessary conditions do not exist for this sector. In particular, the nature of transmission capital expenditure, which is lumpy and cyclical in nature, would not be consistent with the application of a TFP methodology.

- Grid Australia argued that applying a TFP methodology to the transmission sector could not deliver the wide range of business-specific outcomes that the AER has considered appropriate in its recent revenue cap decisions and would therefore lead to inappropriate outcomes in terms of revenue, profits and investment.

- According to service providers, the task of specifying inputs and outputs for electricity transmission would likely be controversial because of the differences in terms of asset base value, average asset ages, jurisdictional planning standards, generation mix and the wide variation in the physical characteristics of the network.

- Australian Pipeline Industry Association (APIA) argued that a TFP methodology would not be a useful approach for gas transmission pipelines as the available sample size is not large enough to warrant developing benchmarks for a TFP methodology and because every pipeline in Australia is faced with unique circumstances which means that there is little merit in applying a comparative benchmarking process to these pipelines.

- Also, by referring to the Economic Insights Data Availability Report, Grid Australia argued that information and data availability would be an even greater problem for the transmission sector. The AER made the same point.

- However, the ESC believed that a TFP methodology would be suitable for electricity and gas transmission, although the benefits may be less pronounced than for electricity or gas distribution.

- Grid Australia strongly considered that any additional information requirements to implement a TFP methodology for distribution must not be automatically extended to transmission service providers.

Distribution

- Some submissions asserted that the necessary conditions to implement a TFP methodology do not presently exist in the distribution sector. They argued that the industry is not in a relatively steady state yet (due to the rolling out of advanced metering, smart networks and CPRS). Energex referred to the NAS Expenditure Profiles Report, in which it states that the use of past expenditure to forecast expenditure would create uncertainty and therefore questions the steady state of the industry. They also argued that the industry or business life cycle's forward looking capital expenditure does not have a relatively smooth profile yet (for example, NSW capital expenditure forecasts submitted for the 2009-14 distribution revenue determinations) which are both requirements for a successful application of a TFP methodology. As a result, Energex considered that there is a timing mismatch between cost incursion and benefit realisation, which is further exacerbated by large capital investments. However, the DPI, the ESC and SP AusNet did not agree and considered the sector to be relatively stable and investment to be consistent.

- The AER stated that the quality of the available data from distribution service providers is variable across jurisdictions.

- Energex suggested that the differences in tariff structures across the electricity distribution sector and use of billable outputs and revenue weights would result in a calculation of atypical TFP estimate growth.

- Energex considered that the heterogeneity of electricity distribution networks and differences in age, growth and expenditure profiles need to be recognised.

- Energex suggested that the contingent project mechanism used in the electricity transmission sector would not be suitable for the electricity distribution sector because of the greater volume and smaller scale projects, and would not address large unanticipated projects due to projects being identified at the beginning of the regulatory period.

G.2.5 Overseas application of a TFP methodology

- Service providers argued that until today, applications of TFP methodologies overseas have been very limited and has raised a number of concerns. The ESC and the DPI disagreed.

G.3 TFP as benchmarking tool

- Stakeholders acknowledged that using a TFP methodology for benchmarking may be beneficial to the AER's current regulatory process. Some service providers have put forward a TFP methodology as a benchmarking technique to justify expenditure proposals.

- SP AusNet and the AER supported the consideration of measures to allow for the use of a benchmarking-informed building block approach to facilitate the transition towards a TFP methodology.

- The AER considered that there would likely be merit in adopting the use of a TFP methodology as a benchmarking tool under the current building block approach in order to enhance information availability to the AER.

- EnergyAustralia cautioned against mandating the use of a TFP methodology as a benchmarking tool in the NER and NGR as it would be inappropriate to apply TFP indices to the building block approach until an appropriate set of indices has been developed.

G.4 Alternative methodologies

- Some service providers were not convinced that the material deficiencies that exist within the building block approach could be remedied through a TFP methodology. Hence, other alternative methods to incentive regulation should also be analysed and considered.

- Service providers argued that regulatory approaches where the linkage between costs and revenues is relaxed are the way of the future. A TFP methodology in its purest form is one such alternative. However, the effectiveness of such a TFP methodology would depend on its detailed design.

- Also, according to some service providers, a TFP methodology is just one of various alternative methods available. Other alternative measures were advocated on the basis that they would achieve similar, or even better, results than a TFP methodology. For example:

  - changes to the existing detailed parameters of the building block approach (as suggested by Energex);

  - adjustments to the ECM to address the balance between the incentive to reduce costs and share savings with users (as suggested by Grid Australia);

  - extending the EBSS period which may deliver the same benefits of having longer regulatory periods under a TFP methodology (as suggested by Integral Energy); or

  - or a glide path method where a service provider's price path for a regulatory period would be set to 'glide' from today's price to the price (at the end of the period) that would be required to yield a benchmark rate of return assuming the service provider's costs and volumes were to remain

constant at today's levels throughout the regulatory period (as suggested by Jemena).

- The AER noted that lengthening regulatory periods under the building block approach would increase the incentives for service providers to reduce costs. However, it would create challenges for the assessment of forecast costs and demand.

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