The Brattle Group

Options for Reforming the Building-Blocks Framework

December 16, 2009

Dr. Toby Brown
Dr. Paul Carpenter

Prepared for

The Australian Energy Market Commission

TABLE OF CONTENTS

1. INTRODUCTION AND SUMMARY

The Australian Energy Market Commission (AEMC) has asked us to write a short paper describing the range of ideas that have been raised in recent thinking about the future of the building-blocks framework for energy network regulation, both in Australia and elsewhere. The context for the paper is the AEMC's review of a Total Factor Productivity (TFP) option for setting prices as an alternative to the current building-blocks approach.[1] During the AEMC process to date a number of interested parties have mentioned possible reforms other than the TFP option, or have identified potential problems with the current building-blocks approach which are not addressed by the TFP option. This is part of the motivation for our paper, the purpose of which is to stimulate and broaden the current discussion.

In writing this paper we have reviewed submissions to AEMC's TFP review process to date, and we have also reviewed current thinking in the United Kingdom because the UK employs a similar building-blocks framework for energy network regulation. It is also clear that many of the topics currently being debated are not new, having been raised at various times during the evolution of the current framework in Australia.[2] We have drawn on those discussions where appropriate.

Some of the suggestions we describe in this paper are relatively "incremental" and others may involve significant reform. Some might be implemented through evolving regulatory practice, guidelines, changes to the Rules, or they might require new legislation. The current regulatory framework stems from primary legislation,[3] the market Rules, and the history of regulatory practice in Australia (as well as formal legal precedent). The various options for changing the current framework might require changes at any of these levels.

---

1 The documents associated with the TFP review are available from the AEMC website.

2 See, for example the Productivity Commission's *Review of the Gas Access Regime*, Productivity Commission (August 2004), *Expert Panel on Energy Access Pricing, Report to the Ministerial Council on Energy* (April 2006), *Comparison of Building Blocks and Index-based Approaches*, Farrier-Swift report for the Utility Regulators' Forum (July 2002), *National Electricity Market, Principles for the Regulation of Transmission Revenues Issues Paper* (May 1998).

3 For example, the *National Electricity Law* and *National Gas Law* state that only building-block or TFP approaches may be used.

For each of the options identified we highlight the key features of the option and describe how it might improve the regulatory framework. The purpose of this paper is to show the range of possible reforms that might be made, as a means to stimulate and broaden the debate. This paper does not attempt to be comprehensive or to attempt a full assessment of the advantages or disadvantages of any of the options, or to make any particular recommendations. Since the focus of the AEMC's process to date has been on the TFP option, we mention this option only briefly in this paper.

We have structured this paper around four broad themes which emerge from this review: 1) setting prices to strengthen incentives; 2) improving the quality of information; 3) improving the regulatory process; and 4) delivering innovation and new outputs. While we recognize that there are necessarily some overlaps between these themes, we believe that this may be a helpful way to organise the discussion.

The summary table below lists the options discussed in the report, and indicates the main rationale for each option, and the jurisdiction in which the option has been discussed or implemented. Two points emerge from the table: first, within each group of options (theme) there are different rationales or main objective for what is proposed; second, TFP is one among many possible reforms, both looking at the framework as a whole and looking specifically at options for strengthening efficiency incentives.

Table 1: Summary of options

Option	Target	Evidence base
Setting prices to strengthen incentives		
TFP alternative	Efficiency	North America
Other methods for benchmarking costs	Efficiency	wide
Off-ramps	Profits	North America
Glide-path	Light-touch	
Partial reset	Efficiency	
Ex post approaches	Light-touch	other sectors
Fine-tune efficiency incentives	Efficiency	wide
Decoupling	New outputs	wide
Output measures	New outputs	wide
Dealing with uncertainty	New outputs	UK
Set-aside funds	New outputs	wide
Prudency	Efficiency	wide
Ownership models	Efficiency	UK
Improve information		
Benchmarking	Efficiency	wide
Menu approach	Efficiency	UK
Enhanced business plans	New outputs	UK
Risks with too much information	Innovation	
Improve the process		
Duration of the price control	Efficiency	
Make greater use of competition	Efficiency	
Stakeholder processes	New outputs	UK
Negotiated settlements	Profits	North America
Customer appeals	Profits	
Regulatory discretion	Profits	
Delivering innovation		
New technologies	New outputs	UK
New outputs	New outputs	UK

Notes
In "Evidence base" we indicate whether this option has been implemented in other jurisdictions.
By "Profits" we mean options designed to reduce the risk that firm profits turn out very high or very low; by "New ouputs" we mean options designed to encourage the firm to produce desired outputs other than cost-control, such as improved service quality.
By "Light-touch" we mean that the regulatory regime is designed to be cheaper to operate by making scrutiny of regulated firms less intense.

2. SETTING PRICES TO STRENGTHEN INCENTIVES

Under the current building-block structure, prices[4] to be charged for network services are set on the basis of a forecast of what costs will be for the forthcoming period. The regulated firms provide cost forecasts as well as information on out-turn costs in the current period. On the basis of this and other information the regulator determines a reasonable allowance for costs (including a return of and on capital) for the forthcoming period.[5] The basic format is that prices are reset at the start of the new period, and subsequently evolve such that $P_n = P_{n-1} \times (1 + CPI - X)$.[6]

In this section we describe options for changing the way that prices are set so as to strengthen the financial incentives for regulated firms to improve efficiency or achieve other regulatory objectives.

2.A. TFP ALTERNATIVE

Under TFP the rate at which prices change over time is equal to the observed TFP growth rate in a comparator group of firms. Under one formulation,[7] initial prices are reset to firm-specific out-turn costs at the start of each period, as under the current building-block approach. The difference is that X is determined by the TFP methodology rather than on the basis of firm-specific cost forecasts.

The advantages and disadvantages of TFP have been extensively discussed in the AEMC's TFP review. However, it is worth emphasizing that the essential feature of TFP is that it is one way of setting prices partly with reference to a cost benchmark that is external to the firm in question.

---

4 In this report, for ease of exposition we talk of setting *prices*. Depending on the degree to which the network company is exposed to volume risk, it might be more accurate to refer to setting *revenues*, but the discussion in this report applies equally to both.

5 See *Incentives Under Total Factor Productivity Based and Building-Blocks Type Price Controls*, report prepared for the AEMC by *The Brattle Group* (June 2009) for more detailed description of the building-block process.

6 i.e., prices increase at the rate of inflation less an "efficiency factor", X.

7 The TFP approach could be combined with other modifications, such as longer price control periods or "partial P0 resets", discussed below.

2.B. OTHER METHODS FOR BENCHMARKING COSTS[8]

The point of benchmarking is that a firm which does well is rewarded with extra revenue, and a firm which does less well is penalised. Thus, firms have an incentive to perform well (control costs more effectively). TFP is a kind of benchmarking method because each firm's performance is effectively compared to an external productivity benchmark—in this case the rate of change of the firm's prices is determined by the historical observed rate of productivity growth across a comparator group of firms. Thus, firms which achieve below-average cost inflation earn additional revenue over the control period. There are a number of other methods for benchmarking firms against one another.

- Statistical methods may be applied to out-turn cost data from a group of firms to identify an empirical "efficiency frontier". (This is sometimes referred to as Data Envelopment Analysis.) The prices for each firm can then be set on the assumption that they move some way towards the efficient frontier over time.
- Bottom-up engineering cost models can be used to generate a theoretically-efficient network. The firm's actual network can then be benchmarked against the engineering model.
- Partial factor productivity analysis compares firms with one another on the basis of, for example, unit operating costs.

Each of these methods has been used in the context of building block determinations in various jurisdictions.[9] However, it is probably better to describe these methods as generating inputs to the regulator's price control decision, rather than *determining* the decision in a mechanistic way.[10] All of the methods suffer to some degree from the risk that significant determinants of future costs will not be adequately captured in the model, or the risk that the model itself will introduce artefacts into the results.[11] All of these (along with TFP) are methods for producing a

---

8 We consider below methods for benchmarking other outputs, such as service quality.

9 For example, regulators in Sweden have used an engineering model; the UK regulator, Ofgem, has used partial productivity analysis and/or operating cost benchmarking, and the Dutch regulator has used data envelopment analysis.

10 DEA was used to set prices in the Netherlands, but the process was not judged to be successful (see *Use of Total Factor Productivity Analyses in Network Regulation: Case Studies of Regulatory Practice*, report prepared for the AEMC by *The Brattle Group* (October 2008)).

11 For example, the model may require a "scale" variable, which might be a combination of number of customers, peak load, and total energy distributed. If the composition of the scale variable is adjusted, the

forecast of future costs. They are perhaps best regarded as tools for challenging the firm's own cost forecasts rather than mechanistic ways of setting future prices.

2.C. OFF-RAMPS

A standard price control would have prices determined in advance for five years. During the price control period prices evolve according to the price control settlement, but do not change in light of out-turn costs. Under an "off-ramps" mechanism prices would be fixed in advance as under the standard approach, but firm profitability would be measured each year during the price control. If profits turn out to be above or below pre-set thresholds, prices would automatically adjust to bring profits back within the "acceptable" band.

A similar alternative to the "off-ramp" concept would involve the triggering of a new price control if firm profitability moved outside the acceptable band. We also discuss below a somewhat different approach whereby a cost shock could lead to the price control being re-opened, subject to some kind of test of whether the firm had managed its costs efficiently.

The purpose of off-ramps would be to remove the risk that during the term of the price control firm profits might be significantly above or below normal. With this risk removed it would be possible to adopt stronger incentives to control costs (for example, by setting X based on "external" benchmarks, increasing the length of the price control period, and so on).

The disadvantage of off-ramps is that with the guarantee that profits will not be too high or too low, the firm's incentive to control costs is weakened. A further disadvantage is the difficulty (and expense) of making accurate measurements of profitability. While it may be possible to "fine tune" the application of off-ramps, the fundamental trade-off remains that reducing the risk of extreme outcomes simultaneously reduces the strength of incentives. Off-ramps have been

relative scores of the firms are likely to change, and there may be no robust method for selecting an optimal definition of the scale variable.

used in some North American jurisdictions, but not as refinements to a building-block approach.[12]

2.D. GLIDE-PATH

The idea behind the "glide-path"[13] is that if, at the price control review, the regulator finds that costs have fallen, instead of imposing a P0 reset to bring prices back into line with costs at the start of the new regulatory period, the regulator sets prices so that they will move back in line with costs by the *end* of the next period. During the next period prices move ("glide") smoothly from the current level to the new cost-based level. The effect of the glide-path would be to allow the firm to retain efficiency benefits over a longer horizon, because the reset of prices to costs is delayed by a further five years relative to the standard approach.

Hence, the advantage of the glide-path is that it would give a stronger efficiency incentive. The disadvantage is that customers would have to wait longer to see the benefits of the efficiency improvements in prices. In principle the glide-path might be applied symmetrically when costs are rising (i.e., if the firm is currently losing money because costs have risen faster than prices, it would continue to lose money until the end of the following price control period), but in practice we suspect that this might not be sustainable.

The glide path approach could be applied in conjunction with a "standard" approach to forecasting future costs, so that the target level of prices at the end of the price control period would be the regulator's forecast for future costs, based on a review of company forecasts. Alternatively the regulator could make a TFP-based forecast of costs, or assume constant costs.

The glide path approach appears to have similar properties to other mechanisms for adjusting the strength of cost-control incentives (such as increasing the length of the price control, "partial resets", or making use of efficiency benefit sharing schemes.)

---

[12] A more usual context would be a "rate freeze", where the off-ramp is offered as a protection to the firm. Under the typically relevant legislation in North America, the firm must agree to a rate freeze—it cannot be imposed by the regulator.

[13] In addition to being raised during the AEMC's ongoing assessment of TFP, the "glide path" concept was also discussed in the Productivity Commission's *Review of the Gas Access Regime*, Productivity Commission (August 2004).

2.E. PARTIAL RESET

Under a "partial reset" approach prices at the start of a new price control period are not reset to the firm's own costs at the end of the preceding control period. Rather they are moved part way towards costs. Hence "partial resets" would have stronger cost control incentives. They would operate in a very similar fashion to the "glide path" or to a simple lengthening of the price control period.

It is not clear that any of these mechanisms for strengthening incentives are compatible with the need to ensure that profits are not significantly below normal for extended periods. In particular, if, at the end of a price control period, prices were *below* the firm's costs, it is difficult to see how the regulator would be able to implement a price control which deliberately kept prices below costs.

2.F. *EX POST* APPROACHES

Standard CPI–X approaches can be termed "*ex ante"* methods of regulation because, by definition, the ability of the firm to exercise monopoly power is controlled before it is exercised. The opposite approach, an "*ex post"* approach, would be to allow firms to set their own prices, subject to the threat of subsequent intervention if the regulator decides that the prices are unreasonable. Ex post approaches may be cheaper to operate (since they do not rely on a regular price control review process), and may give stronger incentives for efficiency and innovation. Where there is the prospect of competition in the medium term, they are more likely to be pro-competitive, because the incumbent firm's prices are not as tightly regulated and are therefore more likely to support entry.[14] However, ex post approaches are also more likely to result in the regulated firms earning high profits.

In the UK the possibility of switching to ex post methods has been discussed in the context of Ofgem's RPI–X@20 review.[15] However, opinion generally seems to be that for energy networks

[14] Airports regulation in Australia is an example of a framework that has moved over time from an ex ante to an ex post approach. See, *Light-Handed Regulation of Airports, the Australian Experience*, IATA (April 2007).

[15] See *Regulating energy networks for the future: RPI–X@20 Principles, Process and Issues*, Ofgem (February 2009), together with documents on Ofgem's "web-forum" at http://www.ofgem.gov.uk/Networks/rpix20/forum/Pages/forum.aspx.

the risk of incumbents abusing a monopoly position is high, and the potential for competitive entry is low, and that therefore ex ante approaches are to be preferred.

In New Zealand the "threshold" mechanism that was applied to electricity distribution businesses from 2001 to 2009 had some characteristics of an ex post approach. The regulator set price thresholds on the basis of a fairly "light-touch" review of the firms' performance. Firms were not prevented from raising prices above the thresholds, but any which did so would then be subject to a more in-depth price control review process.

2.G. FINE-TUNE EFFICIENCY INCENTIVES

Any process for setting prices where there is some regulatory lag (i.e., prices are set at out-turn cost, but with a delay) gives the regulated firms an incentive to control costs, because if they are able to reduce costs the firms will earn additional profits until the cost reduction feeds through into lower prices. The degree to which, and speed with which, changes in the firm's costs are reflected in the firm's prices determines the strength of the incentive. In general there are trade-offs associated with setting cost control incentives: for example, the longer that firms retain the benefit of cost reductions, the stronger are incentives but the lower are the benefits for customers in the form of lower prices; the weaker the link between the firm's prices and the firm's own costs, the greater the risk that exogenous cost shocks may threaten the financial viability of the firm and its ability to undertake necessary investment. Given these trade-offs, it may be desirable to adjust the strength of incentives. Furthermore, under standard building-block type controls different kinds of expenditure may be subject to different incentives: for example, it may be that the firm is able to keep 100% of any operating cost savings, whereas it will only keep a fraction of any capital expenditure savings.[16] A number of options have been proposed which allow the strength of cost-control incentives, or incentives to undertake certain kinds of expenditure, to be adjusted.

[16] Since network assets are long-lived: the regulatory framework normally remunerates the firm for its investment in assets over a period of (say) 30 years. Thus, the regulatory asset base is adjusted to actual capex at the end of the price control, and the firm only benefits from additional return of and on capital in respect of avoided capex for the duration of the current price control.

In the UK Ofgem has "equalised incentives" for most kinds of operating and capital cost expenditure, essentially by capitalising a fraction of operating costs. Furthermore, it has implemented a mechanism which ensures that cost-control incentives do not change over time during the price control (without such a mechanism, there is likely to be a weaker incentive to control costs at the end of a price control period, just before the next reset).[17]

These mechanisms are similar in effect to the efficiency benefit sharing schemes which have been implemented in Australia.

Another way to adjust incentives is to set explicit "sharing factors". Rather than using all cost forecasts as inputs to the price control decision in the standard way, the regulator could set cost "allowances" for specific tasks. During the price control period the firm reports actual expenditures, and the difference between actual and forecast costs is split between the firm and customers, perhaps subject to a cap/floor arrangement. For example, the electricity system operator in the UK has operated under such an arrangement for system balancing costs: if out-turn costs are in the range £600m–630m the costs are fully passed through, and outside this range the system operator is paid 25% of cost savings or pays 15% of over-runs, in both cases up to a maximum of £15m.[18]

2.H. DECOUPLING

"Decoupling" refers to the possibility that regulated revenues can be made independent of the quantity of energy (or capacity) that the network handles. Decoupling is thus a (partial) move towards revenue rather than price control, and it gives the regulated firm some protection from volume risk.

Decoupling is usually suggested in the context of concerns that giving regulated firms an incentive to increase the volume of energy they distribute may not be compatible with government environmental objectives. Alternatively, in a situation in which government policy is

---

[17] See *Electricity Distribution Price Control Review Initial Proposals—Incentives and Obligations*, chapter 19, Ofgem (August 2009).

[18] Figures are for 2009/10. See *National Grid Electricity Transmission and National Grid Gas System Operator incentives from 1 April 2009*, Ofgem (2009).

to encourage energy efficiency (or energy conservation), it may be unreasonable to make the regulated firm worse off if the quantity of energy it distributes declines as a result.[19]

2.I. OUTPUT MEASURES

CPI–X type price controls provide the regulated firm with an incentive to control costs. However, there are usually outputs other than cost efficiency (and thus low prices) which the regulator will wish to encourage the firm to deliver. Additional terms can be added to the price control formula to provide the firm with incentives to produce these additional outputs. The classic example is service quality: in the absence of a quality incentive, it is likely that a firm subject to price-cap regulation will tend to reduce service quality over time, since providing a high quality service is expensive. In order to encourage the firm to maintain or improve service quality, an additional term is added to the price control formula, such that if service quality is improved the firm earns additional revenue. Clearly, in order for such a system to work, the regulator must be able to define an objective measure or indicator of the desired output. A typical service quality incentive scheme might use a combination of measures relating to the frequency, duration, and impacts (energy unsupplied or customers affected) of outages. Indicators relating to the firm's call centre response times have also been applied.

A similar approach can in principle be used for any desired output which can be measured objectively.

2.J. DEALING WITH UNCERTAINTY

In some circumstances the regulator might be particularly uncertain about the magnitude of the firm's future costs because the drivers of cost are both uncertain and outside the firm's control. The regulator is reluctant to provide a generous cost allowance, for fear that the firm will make excessive profits, and similarly reluctant to provide an allowance that may prove too small. However, the regulator may be able to provide a cost allowance that adjusts automatically if the

[19] This principle is presumably behind the design of "demand management incentives" for electricity distribution companies in Australia, which may be allowed to claim additional revenues if they can demonstrate that revenues would otherwise fall due to efforts to promote demand management and the company's exposure to volume risk under its price (rather than revenue) control. See, for example, *Demand management incentive scheme for the ACT and NSW 2009 distribution determinations, Demand management innovation allowance scheme*, AER (February 2008).

relevant cost drivers are sufficiently well understood and measurable. For example, the firm may expect significant quantities of new distributed renewable generation to request connection, but be unsure of the timing and the magnitude. To set a fixed cost allowance for connecting the new generation would be to risk significant under- or over-spend. As an alternative, the regulator may be able to define a cost allowance in terms of a per MW unit cost. In this way, provided that the firm's costs are likely to be proportional to the number of MW connecting, the regulator can maintain the efficiency incentive of the price cap without risking significant over- or under-spending, in the face of significant uncertainty.[20,21]

Where there are costs completely outside the control of the firm the regulator may decide to treat these costs as a pass-through. Costs in this category are treated outside the price control framework and are passed through directly to customers. Property taxes (local business rates) might be an example of a pass through item.

Alternatively, the regulator may decide to provide the company a cost allowance in the normal way (i.e., the regulator sets the price control on the basis of a cost forecast broken down into various categories), but allow the firm to request a "reopener" part way through the price control under certain circumstances. In the UK water sector such reopeners are explicitly provided for under the relevant regulatory rules, and have been granted on occasion.[22,23] In contrast, in the UK energy sector, there are no explicit rules providing for reopeners, although Ofgem recognises that its legal duty to ensure that an efficient firm can access necessary financing might mean that price controls would be reopened in response to significant unforeseen events. For material but less significant impacts, the regulator may simply be able to agree with the firms to record unfunded expenditure in a special account and recover it (or add it to the regulatory asset base) at the start of the following price control.

---

20 Ofgem has implemented such an arrangement in both electricity distribution and transmission.

21 We discuss below other options which might be relevant here: the "menu" approach, which can be used to encourage firms to reveal their own forecasts about future costs; and contracting out, which can be used to ensure that costs for a discrete project are reasonable.

22 For example, Ofwat allowed additional revenues part way through a price control in response to unexpected demand from some firms' customers for new water meters.

23 Reopeners are also possible under the *National Gas Law*.

In designing mechanisms to address this kind of uncertainty, the regulator will consider trade-offs. For example, fully insulating firms from uncertainty may blunt incentives for them to help manage the uncertainty (e.g., by investing in better forecasting ability). Exposing firms to risks that they cannot control may push up the firms' costs, and such mechanisms add complexity to the regulatory framework, thereby risking unintended consequences.

2.K. SET-ASIDE FUNDS

Another mechanism which can be used to encourage regulated firms to undertake specific activities is to provide funding for these activities as a set-aside or ring-fenced part of the price control. Thus, a limited amount of money can be spent on the defined activities, but if it is not spent on these activities it cannot be spent on other things (and cannot be retained by the firm as "efficiency" savings). The activities so funded will thus not normally be subject to cost control incentives—setting aside the funds operates effectively in the same way as a direct "pass through" of these costs. One example of such a mechanism in use in Australia is the funds available for demand side management.[24] In the UK Ofgem has used this mechanism to provide funding for a limited amount of "undergrounding" (replacing existing or planned overhead cables with buried cables) in areas of particular conservation interest.

It is worth noting that, in aggregate, the measures described in sections 2.I–2.K above can be used to target many different activities of the regulated firms. For example, Ofgem's latest electricity distribution price control proposals contain specific schemes addressing the following subjects:

- incentive for connecting distributed generation;
- incentivised pass-through for managing the cost of transmission system exit charges;[25]
- incentive for reducing distribution losses;
- set-aside fund for undergrounding in conservation areas;
- incentive for customer service (telephone response times and broader customer satisfaction survey);

[24] See, for example, *Demand management incentive scheme for the ACT and NSW 2009 distribution determinations, Demand management innovation allowance scheme*, AER (February 2008).

[25] i.e., the distribution network operator does not pass through all of the transmission system charges to its customers, but has an incentive to control these (to facilitate trade-offs between costs incurred by the distribution and transmission networks).

- incentive to improve service to customers exposed to particularly frequent interruptions;
- incentive to reduce overall interruptions;
- additional customer service reward scheme; and[26]
- network output measurement.[27]

2.L. PRUDENCY

Regulators (and customers) may be concerned about the risk that firms may invest in assets that are not necessary. Such concerns may partly motivate the choice of CPI–X incentive regulation rather than "rate of return" regulation, since under the former the firm has a greater incentive to avoid unnecessary capital expenditure.[28] Although a CPI–X price control gives the firm an incentive to avoid unnecessary capital expenditure, the regulator may nevertheless apply a "prudency test" before allowing actual capital expenditure to enter the regulatory asset base at the start of a new price control period. The Gas Rules[29] provide for a regulatory test to be applied to new capital expenditure before it is added to the regulatory asset base, although there is no such test in the Electricity Rules.

In the UK Ofgem has been careful to point out that only "efficient" capex will go into the asset base at the start of the new price control,[30] but in practice only small amounts of capex have been "disallowed". Nevertheless, Ofgem has developed tools to help test whether capex is necessary by encouraging the regulated firms to obtain contractual commitments from future users before investing. Thus, for example, customers are required to bid at auction for long term rights to flow gas onto the transmission network. If the auctions show that additional capacity may be needed, the regulator will agree additional funding during the price control.[31] In Ofgem's RPI–X@20

---

26 This scheme is similar to the innovation scheme described below.

27 This scheme develops measures of network capacity and underlying asset condition which could form the basis of an output scheme in future (i.e., there is currently no direct financial arrangement associated with the measures).

28 The theoretical problem of "gold-plating" under cost of service regulation is well-known (the Averch–Johnson effect).

29 Gas Rules s. 79 ("New capital expenditure criteria"). Note that there are limits to the AER's ability to apply discretion under this rule.

30 "We reserve the option to disallow costs from entering the RAV if they are demonstrably inefficient or unnecessary.", *Transmission Price Control Review*, paragraph 7.21 (Ofgem 2006).

31 In the US a similar but somewhat less formal approach may be taken where regulatory approval for new pipelines is easier if the promoter can point to a successful "open season" process for a significant proportion of the proposed new capacity.

project it is considering wider use of a mechanism for ex post review of whether investment was necessary, recognising that it would be necessary to specify in advance the detail of any new test to be applied.

2.M. OWNERSHIP MODELS

In some jurisdictions the regulatory framework for energy networks was designed as part of a privatisation process, and all of the regulated firms are under private ownership. In other jurisdictions at least some of the regulated firms remain in public ownership. This fact adds to the challenges facing the regulatory framework because it is not obvious that publicly-owned firms will respond in the same way as privately-owned firms to financial incentives flowing from the way that prices are set. First, private owners are assumed to be profit-maximising, and to ensure that their firms are managed accordingly. Public owners (governments) may have other objectives in addition to or instead of maximising profits. Second, public owners may be less well able to align the interests of their firm's managers with their own, for example because there is no market data (share price) on firm performance. Third, in some circumstances publicly-owned firms may be either better (and more cheaply) able to raise debt finance (with a government guarantee) than an equivalent privately-owned firm, or unable to raise debt finance at all (if this is not permitted by the relevant legal rules). It seems reasonable to suppose that these factors may lead to the incentive properties of any given regulatory framework being different for publicly-owned firms.

One possible response to this potential problem is for the regulator to require publicly-owned firms to put in place incentive arrangements for senior staff which mimic the discipline that private shareholders would normally be expected to impose. Such a mechanism has been used in the UK rail and water sectors, where there are firms without private equity investors.[32] The regulator requires the firms to publish details of how the employment contracts of senior managers link salary and bonuses to the underlying performance of the business.

[32] In this case the firms are not publicly-owned, strictly speaking, but are 100% debt-financed companies "limited by guarantee". See *The Proposed Acquisition of Railtrack PLC by Network Rail Ltd—A Statement by the Rail Regulator*, Office of the Rail Regulator (June 2002) and *Management Incentive Plan Statement 2009–10*, Network Rail (2009).

3. IMPROVE INFORMATION

Under the building blocks approach a forecast of future costs is a component of the regulator's decision on the price control. The regulated firms submit cost forecasts for the regulator's review. Since, once prices are set, the firm's profits depend on the difference between actual out-turn costs and the forecast used to set prices, the firm has a strong incentive to submit an exaggerated cost forecast.

There are a number of tools the regulator might apply in reviewing company cost forecasts. All of these depend on access to reliable information from the regulated firms—both sufficiently detailed cost forecasts and accurate figures on actual historic costs. Typically the regulator will require firms to file annual "regulatory accounts", for which the regulator specifies the form and content in some detail (backed up with powers to force the firms to comply). Developing the specification of the regulatory accounts and checking their application may be a significant work-stream for the regulator between price control reviews. We have not reviewed the AER's regulatory accounting rules, but we note that the availability and quality of information has been raised as a significant issue during AEMC's TFP review.[33] Having good quality information about out-turn costs is a pre-requisite for any method of setting prices, but we do not think that any significant methodological issues are associated with this: it is a matter of developing and enforcing a system of regulatory accounts that is fit for purpose.

In this section we focus on methods for improving the cost *forecasts* available to the regulator.

3.A. BENCHMARKING

There is a range of benchmarking tools that the regulator can use to review critically each firm's cost forecast. The forecast can be compared with the forecasts of other firms, as well as with out-turn costs of the target firm and its peers. In effect, any of the methods described in sections 2.A and 2.B above can be used: for example, if the firm's forecast implies that X needs to be no bigger than 1%, but historic TFP growth is 5%, the regulator can ask the firm for further justification.

[33] See, for example, *Assessment of Data Currently Available to Support TFP–based Network Regulation*, prepared for the AEMC by Economic Insights (June 2009).

It will always be open to the regulated firm to argue that certain specific factors mean that its costs can be expected to be higher than the regulator's benchmark for reasons outside the firm's control. Since the firm has better information about its operations than does the regulator, such arguments can never be entirely dismissed (see following sub-section).

3.B. MENU APPROACH

The regulator is in a difficult position when reviewing the firm's cost forecasts. First, by definition the firm has better knowledge of its own operations than anyone else, including the regulator. Second, the regulator knows that the firm has an incentive to present cost forecasts that are biased upwards. Third, the regulator wants to give the firm strong incentives for efficiency but does not want firm profits to be too high (or too low) for very long. The regulator is obliged to set prices high enough that an efficient firm will be able to earn normal profits. The upshot is that the regulator is forced to put significant weight on the firm's cost forecasts, because it is difficult to justify doing anything else in light of the firm's superior expertise in relation to its own operations. This is sometimes referred to as the problem of "information asymmetry".

Under the "menu approach" the firm is in effect rewarded for submitting unbiased cost forecasts.[34] Ofgem's implementation of the menu approach (known as the "Information Financial Incentive")[35] operates by allowing the firm to select a cost allowance from a range of options. If it picks a large allowance the price control will be set higher, but the regulator will "claw back" a relatively large proportion of any future efficiency gains that the firm makes.[36] If the firm picks a relatively small allowance it will get a tougher price control (lower prices), but the firm will be able to retain a larger proportion of subsequent efficiency gains. Any firm which, on the basis of its superior knowledge of its operations, expects *not* to be able to make future cost savings will choose high prices. Any firm which does expect to make future cost savings will volunteer for *lower* prices because, in so doing, it will be able to keep more of its cost savings. In both cases, the firm is better off choosing the option that is closer to its own unbiased cost forecast.

---

[34] See "REx Incentives: PBR Choices that Reflect Firms' Performance Expectations", Johannes P. Pfeifenberger, Paul R. Carpenter, and Paul C. Liu, *The Electricity Journal* (November 2001).

[35] See *Electricity Distribution Price Control Review Initial Proposals—Incentives and Obligations*, chapter 19, Ofgem (August 2009).

[36] i.e., this price control option has relatively weak cost control incentives.

Applying the menu approach requires judgement on the part of the regulator to define the range of options.

3.C. ENHANCED BUSINESS PLANS

The minimum information that is required to operate a building-block price control is a forecast of costs broken down into sufficient detail that the resulting required revenue can be calculated. This might be as simple as splitting costs into capital and operating costs, with the former divided into different asset classes with different depreciation profiles. Much more information is necessary if the regulator is to be able to carry out detailed benchmarking of the firm's forecasts. For example, the regulator might ask the firm to break down its cost forecasts to the level of specific projects (capex) and specific activities (opex). The firm might also be required to indicate cost drivers, and provide information to allow unit costs to be calculated and benchmarked.

As part of its RPI–X@20 review, Ofgem has raised the possibility of requiring firms to produce more detailed business plans as inputs to the price control process.[37] The additional detail contemplated includes the following:

- the plans could cover more than just the five-year price control period, thus indicating how the firm's actions during the forthcoming period fit into a longer-term perspective of what the network will deliver; and
- the plans could incorporate an "options analysis"—to the extent that networks face greater uncertainty in the services they might be required to produce over the longer term, there might be advantages from investing to "keep options open", for example by over-sizing certain network components, and the detailed business plan could explain and justify the firm's approach to such options.

[37] In the UK (as in Australia), electricity network operators are already required to produce business planning documents.

3.D. RISKS WITH TOO MUCH INFORMATION

Additional information may be helpful to the regulator in setting prices. However, the additional information comes at a cost, both for the firms that provide the information and for the regulator analysing it. In principle, the collection of additional information should be justified by an assessment of its costs and benefits.

It has been suggested that making some kinds of information publicly available might itself stifle innovation. We suppose that this suggestion is based on the fear that publishing information on research and development activity might allow faster adoption of successful innovations by other firms, and hence (under a system of benchmarking) reduce the benefits of innovation to the innovating firm.

4. IMPROVE THE PROCESS

In this section we discuss possible improvements to the overall price control review process. It has been suggested that the current process in Australia could be made more efficient, and that the degree to which AER decisions have been subject to appeal signals that improvements could be made to the current process.[38]

The expense of the process is presumably partly related to the intensity with which the regulator scrutinises firms' cost forecasts. The degree to which the regulator's decisions are subject to appeal may be related to both a) the intensity of scrutiny and b) the degree of discretion exercised by the regulator (and how this is exercised), and c) the extent to which the relevant legislation (Rules) makes clear that the regulator is expected to exercise discretion, as well as the direct costs of the appeals process to appellants. While subjecting the firms' cost forecasts to a lesser degree of scrutiny might reduce the risk of appeal by the regulated firms, it might lead to appeals from customer representatives.

4.A. DURATION OF THE PRICE CONTROL

Self-evidently, if prices were set for longer than five years, the cost of the process would be less on average, other things equal. Incentives for cost control would be greater, but the risk that profits would be too high or too low by the end of the price control would also be higher. If, at the same time the price control period were lengthened and the review process were made more "light-handed", it is possible that the risk of profits turning out too low might be mitigated. In that case, "light-handedness" would presumably mean scrutinising firm cost forecasts with reduced intensity, thereby increasing the risk that profits would turn out high.

4.B. MAKE GREATER USE OF COMPETITION

Benchmarking (including TFP-type arrangements) is a way for regulators to mimic the action of competitive forces. Competition can also be harnessed more directly to encourage innovation and control costs. To a degree some of the benefits of competition will be brought within the regulated sector by virtue of the fact that the regulated firms will contract out some of their

[38] See discussion in *Perspectives on the building block approach*, AEMC (July 2009).

operations (in the same way that any business is likely to use subcontractors from time to time). Some subcontracting is likely to happen under a standard building-block price control framework—in part, one of the ways in which the incentive to control costs will operate is by forcing firms to contract out those activities which they cannot afford to do (inefficiently) in-house.

At the extreme, as more and more of the firm's activities are contracted out, a "franchising model" emerges. In theory, an alternative to the price control framework would be for the regulator to run a franchising competition for the right to operate network assets. Bidders in the competition would, given a P0, submit price paths (or, equivalently, values of X) at which they would be prepared to run the network, and the regulator could select the bidder with the lowest trajectory (largest X). Although this may seem an extreme scenario, in a number of cases the entirety of network operations has been contracted out.[39,40]

A more realistic option might be for the regulator to mandate the use of contracting out in certain areas of operation, or in respect of certain capital projects.[41]

Some areas of a network's activity might be directly opened to competition. For example, new connections to the network could in principle be made by third parties.

4.C. STAKEHOLDER PROCESSES

An emerging regulatory practice deemed to be good in Australia and other jurisdictions is for the regulator to consult stakeholders at various stages of the process of setting price controls. The

---

[39] For example, the Norweb electricity distribution business in the UK was sold to new owners in November 2007, with the new owners contracting out operations back to the original owners.

[40] One commentator in the UK has opined that the possibility of contracting out utility operations reveals that regulators may have systematically over-estimated the weighted average cost of capital for the business as a whole. This is the "split cost of capital" argument, which asserts that the regulatory asset base can be financed almost entirely by debt. The weighted average cost of capital for the business as a whole should then include a significant proportion of debt, whereas regulators have tended to assume a capital structure closer to that needed to support the activity of operating (and adding to) the network. See, for example, *Utility regulation, the RAB and the cost of capital*, speech of Dieter Helm to the UK Competition Commission (May 2009), available at http://www.competition-commission.org.uk/our_role/cc_lectures/cc_spring_lecture09.htm.

[41] See also the arrangements for electricity transmission in Argentina, described below.

Electricity Rules, for example, require that AER analysis must have been published before it can be relied on in setting price controls. Consultation and stakeholder workshops are also used by the AEMC in its work. But it is also possible for external stakeholders to play more formal roles in the regulatory process.

The regulator might have two related objectives in seeking to enhance customer engagement. First, in some circumstances the regulator may face a choice (for example, a trade-off between cost and service quality), where the views of customers may be a very significant input to the decision. Second, in some circumstances it may be that firms and customers together can negotiate a "better" outcome than could be reached by the regulator alone, where the customers have bargaining power not held by the regulator.[42] This second point is addressed in section 4.D below.

In its RPI–X@20 review Ofgem contemplates three possible models for increased stakeholder (customer representative) participation.[43] One option would be to facilitate formal meetings between the regulated firm and its customers (or their representatives), at which specific issues would be discussed. The discussions would inform subsequent regulatory decision making, for example on the trade-off between prices and quality.

A second option would involve similar meetings between the regulated firm and its customers, facilitated by the regulator, but with certain decisions on components of the price control formally delegated to this forum. Thus, if the firm and its customers were able to reach agreement there would be no further involvement from the regulator.

A third option is for customer representatives to be directly involved in the regulator's deliberations. For example, Ofgem contemplates the possibility that customer representatives could sit on the sub-group of executive and non-executive board members that oversees the price

---

42 The clearest example of this is that in a regime where customers or their representatives have the ability to appeal regulatory determinations, customers can offer *not* to appeal a settlement, in return for specific concessions from the firm. This point is further explored below.

43 These ideas are based on the model developed by the UK Civil Aviation Authority in its regulation of UK airports, known as "Constructive Engagement" (between the airport and its airline customers).

control review process. This group provides regular feedback and direction to the staff in charge of the review, and also has direct contact with senior staff at the regulated firms. Towards the end of the review the sub-group reports to the full Ofgem board which takes the final decision on the price control.

In some jurisdictions a model of involving customers in decision-making has been taken further. In Argentina large customers of the transmission network have in effect taken decisions on when and how the network should be expanded.[44]

4.D. NEGOTIATED SETTLEMENTS

The previous section described methods that help the regulator find out what stakeholders want from the regulatory decision-making process (i.e., the point of these mechanisms is to obtain information useful to the regulator). Stakeholders (customer representatives) can also be involved more directly in actually *determining* regulatory outcomes. Such mechanisms have evolved in North American jurisdictions, where the standard framework is that prices remain level until either the regulated firm or its customers ask the regulator to review them. In some jurisdictions it is possible for the firm and its customers to negotiate new rates. Once agreement is reached there is a legal presumption that the regulator will approve the new rates.

There are two possible explanations for why firms and customers might prefer a negotiated settlement. First, it may be that negotiation is cheaper (in terms of the cost of the process, rather than the outcome). Second, it may be that the outcome of negotiation might be better *for both sides*. There is some suggestion that the second of these two possibilities is the correct explanation for the US experience (the costs of negotiated and "standard" rate cases have been estimated to be similar). The hypothesis is that both customers and the firm can obtain a better deal from negotiating because either side may be able to offer something valuable to the other which the regulator could not impose following the standard process. Specifically, each side can undertake not to request new rates for a certain period of time, and these undertakings can be binding.[45] Without such "extra" negotiating possibilities, it is difficult to see why negotiations

[44] See *Regulation, Over-regulation and De-regulation*, Stephen Littlechild, occasional lecture to the Centre for the Study of Regulated Industries (November 2008).

[45] *Ibid.*

would lead to a different outcome from a regulated procedure (or, indeed, why both sides would agree to negotiate).[46]

4.E. CUSTOMER APPEALS

A further avenue for stakeholders (customer representatives) to be involved in the regulatory process is through the ability to appeal regulatory decisions. A right of appeal, whether or not exercised, would presumably lead the regulator to put more weight on involving stakeholders throughout the regulatory process than would be the case if there was no possibility of the final decision being challenged. Ofgem is considering the introduction of customer appeals for price control decisions (which are currently only appealable by the regulated firm), as part of its RPI–X@20 review. Clearly, the degree to which the right for customers to appeal a price control decision has an impact on the process would depend on the arrangements for providing adequate customer representation.

4.F. REGULATORY DISCRETION

Different jurisdictions codify the duties of regulators in greater or less detail.[47] It might be argued that there is a trade-off to be made: on the one hand, a greater degree of prescription would presumably tend to reduce uncertainty, which may make it easier (cheaper) for regulated firms to attract investment; on the other hand, less prescription may allow regulatory practice to improve over time. It may be helpful to consider two factors relating to regulatory discretion. First, in principle the regulator might have discretion in how it balanced the interests of customers and firms. This kind of discretion seems unlikely to be beneficial. Second, the regulator might have discretion over exactly what methods and procedures it uses to reach decisions. In contrast, it would seem beneficial for the regulator to be able to exercise discretion in this area.

---

[46] Note, however, that in Canada there may be real cost savings from negotiation, because a negotiated settlement can be multi-year, whereas otherwise (unlike in the US) rate cases typically must be filed every year.

[47] We note, in particular, a contrast between Australia, where the rules for conducting price controls are quite detailed, with the UK, where there are no rules more detailed than the over-arching legislative duties on the regulator (broadly equivalent to the "National Gas and Electricity Objectives" in Australia).

Regulatory discretion has been an important part of the debate over designing the regulatory framework in Australia. In particular, there has been much discussion over whether the regulator should be required to set the "best possible" price control, in light of all the relevant legal objectives, or whether it should accept the regulated firm's proposed price control as long as the proposal meets certain criteria (i.e., the regulator should accept a "good proposal", even if the regulator could potentially create a better alternative). The latter has become known as the "propose–respond" model. It has also been suggested that the regulatory framework should contain a presumption in favour of accepting the regulated firm's proposals.[48]

[48] See, for example, the Productivity Commission's *Review of the Gas Access Regime*, Productivity Commission (August 2004), and *Expert Panel on Energy Access Pricing, Report to the Ministerial Council on Energy* (April 2006).

5. DELIVERING INNOVATION

In this section we address possible reforms to the building blocks approach aimed at fostering innovation. By innovation we mean two related things: innovation in the sense of investing in research and development and deploying the new technology, and innovation in the sense of delivering new outputs. Innovation is partly about using new technologies to operate energy networks more efficiently, and partly about operating the networks to deliver new outputs, such as rapid connection of renewable generation.[49]

5.A. NEW TECHNOLOGIES

On one view incentive regulation encourages firms to find new and more efficient ways of operating. This might be through organisational changes, or it might be through adopting new technologies. Firms which innovate are rewarded through the normal mechanism of retaining part of the efficiency savings they achieve. An alternative view is that regulated firms will invest less in innovation than would be socially optimal, for example because regulators will tend to pass on to customers the benefits of innovation too quickly. There is some evidence from the UK that energy networks have tended to invest less in R&D over time compared to pre-privatisation levels, though it is not clear where the "optimal" level of spending may lie. Anecdotally, the network companies do not seem willing to help take new technologies out of the (academic) lab and into field testing. Ofgem has already put in place specific "add-ons" to promote innovation, whereby the companies in effect have a cost allowance in the price control specifically set-aside for defined R&D projects.[50]

Ofgem seems to think that without further change the current framework will not deliver the "step change" in innovation needed to help meet climate policy goals, particularly on electricity networks where it seems that adopting new technology may be beneficial. Ofgem's current thinking seems to be that, over time, an enhanced regulatory framework, with greater use of

[49] While the discussion here primarily relates to electricity networks, innovation in this context may also apply to gas networks, for example in relation to new ways of operating the networks, or technology for smart metering and remote isolation.

[50] The "innovation financial incentive".

output measures, stronger efficiency incentives, and enhanced use of competitive forces in some areas, will deliver the right incentives for innovation. However, in the short-term Ofgem is likely to develop further specific schemes to encourage innovation. Three types of scheme are considered. The first involves an open application process, whereby the networks would make proposals to the regulator for specific R&D projects. Successful applications would receive partial funding. A second scheme would employ an open competition, where the regulator would solicit applications from both regulated companies and third-parties, and the regulator would exercise more control over the type of project funded. The third would be a "prize fund", whereby parties could apply for part of the fund after they had carried out an R&D project and could demonstrate its successful outcome.[51]

5.B. NEW OUTPUTS

In some jurisdictions electricity networks are expected to change significantly in response to government policies aimed at reducing the carbon intensity of the electricity system. The networks are expected to become "smarter", with greater adoption of remote switching and other control technologies, and the roll-out of real time meters and automatic meter reading infrastructure. At the same time, in many places distribution networks are expected to have to connect large quantities of renewable generation, and may see significantly altered and more volatile flow patterns in consequence.

The regulatory response to these pressures may include many of the measures described above. For example, MW revenue drivers can be used to address uncertainty about the quantity of distributed generation that may connect during a price control period. Rapid roll-out of smart meters may necessitate a pass-through or partial pass-through of costs.

[51] A scheme of this kind is proposed for the forthcoming electricity distribution price control. See *Electricity Distribution Price Control Review Initial Proposals—Incentives and Obligations*, chapter 1, Ofgem (August 2009).