

RIIO Economics

Examining the economics underlying Ofgem's new regulatory framework

Dr Cloda Jenkins^{1,2}

Working paper presented to CCRP Winter Workshop 2011

Abstract: In October 2010 Ofgem concluded its review of energy network regulation, RPI-X@20, with a decision to implement a new regulatory framework. RIIO regulation is about using incentive mechanisms that enable network companies to raise revenue from consumers consistent with delivering outputs, innovation and associated efficiency savings over the long-term. This paper briefly describes the context of the RPI-X@20 review and explains how the RIIO model was designed to be consistent with a set of core economic principles for effective incentive regulation.

Key words: regulation, energy, incentives, RPI-X.

1. Introduction³

In October 2010 Ofgem published its decision to introduce a new regulatory framework for GB energy network companies⁴. This decision marked the conclusion of RPI-X@20, Ofgem's two-year review of the RPI-X price control regime that was first implemented at privatization in 1990.

RIIO, the new regulatory model, is an incentive-based framework that sets a constraint on the revenues that network companies can raise from customers during the price control period. The revenue that can be earned is linked to performance in playing a full role in delivery of a sustainable energy sector and delivering long-term value for money network services. Those that deliver outputs, innovation and associated lower costs have the potential to earn above normal returns and those that don't deliver earn below normal returns.

The RIIO model is being implemented for the first time in the current price control reviews for gas distribution and electricity and gas transmission. It will then be implemented in the 2015 electricity distribution price control review⁵.

This paper provides a brief background of the GB energy network sector and the associated context of the RPI-X@20 review. We set out three economic principles that influenced the design of the new incentive framework. These are that:

- effective incentive regulation will strive to mimic the benefits of dynamic competition;
- to be effective incentive mechanisms need to be clear and credible; and
- appropriately designed incentive regulation can be used to deliver environmental objectives.

¹ Dr Jenkins is a part-time Lecturer of Economics in Kingston University and is Director of an independent economic consultancy, CJ Economics. She was formerly Head of the Regulatory Review at Ofgem. She can be contacted at cloda.jenkins@virginmedia.com.

² All views expressed are the opinions of the author and should not be taken to be the views of Ofgem or any of its employees. I would like to acknowledge very helpful comments from Phil Burns, Hannah Nixon and Steve Smith. I am also grateful for comments received on an earlier version of this paper at the Centre for Competition and Regulatory Policy Winter Workshop February 2011.

³ All papers relating to the RPI-X@20 review, including the final decision paper Ofgem (2010), *RIIO: A new way to regulate energy networks: Final decision, Ref 128/10*, can be found on Ofgem's website at: <http://www.ofgem.gov.uk/Networks/rpix20/Pages/RPIX20.aspx>

⁴ These are the electricity and gas transmission and distribution companies operating in England, Wales and Scotland.

⁵ Eight-year price controls are due to be implemented from April 1st 2013 for gas distribution, electricity transmission and gas transmission. Electricity distribution price controls are due to be implemented from April 1st 2015.

We explain how these principles influenced the design of the RIIO model. We conclude with some thoughts on factors that Ofgem will need to bear in mind when implementing the model to ensure that the effectiveness of the incentive framework is not compromised over time.

As the author of this paper was involved with the design of RIIO this is clearly not an independent assessment. The intention of the paper is to provide the reader with an overview of the new framework and to explain the economic rationale underlying its design. Time and no doubt numerous papers from interested parties will reveal the actual impact of the model.

2. Background and context

GB energy network companies have regional licensed monopoly rights over distribution and transmission assets and the provision of network services using these assets. The companies were privatised in 1990 and have a range of different ownership structures. The licence incorporates, amongst other things, the price control contract that specifies what network companies are expected to deliver and constraints on the revenue that can be earned from customers.

Since privatisation energy network companies have been subject to an incentive-based regulatory regime, RPI-X regulation. The rate of change in average revenue was subject to an annual cap linked to the retail price index (RPI) and an additional X-factor. The X-factor reflected amongst other things expected efficiency improvements, capital investment requirements and rewards or penalties for service performance. This framework has developed and evolved over the last twenty years, adapting to lessons learned from implementing the framework and to the changing nature of network services.

In March 2008 Ofgem announced a fundamental review of how energy network companies were regulated (the RPI-X@20 review). There were two primary drivers of the review:

- the changing nature of energy network services since privatisation, particularly the role the companies could play in delivery of a sustainable energy sector; and
- the need to tidy-up identified concerns with the RPI-X framework.

We discuss each of the drivers here as they both impacted on the design of the RIIO model.

2.1 Changing nature of energy network services

The grid maps and technologies used to provide network services in the post-war era have served customers well but there is concern that these ageing assets may no longer be what are needed. As the physical end-to-end connection from energy sources to final customers the nature and design of energy networks, and the services provided on them, could be a key facilitator of delivery of a secure and low carbon energy sector. However, networks could also be an obstacle to delivery. The scale, shape, location and flexibility of the networks could be one of the most important factors that affects whether new low carbon generation can be transported to customers in required timescales. Similarly, the design of the networks could influence whether and how changing patterns of energy demand are reflected in decisions relating to network enhancement, maintenance and operation.

Because of their role in delivery of a sustainable energy sector, it is expected that network companies will need to make new and different decisions about their ‘pipes and wires’ businesses. There is real uncertainty about what needs to be done and when. This changes the nature of network decision-making which in turn has implications for incentive-based regulation. The focus on sustainable

energy services also changes the timescales that decision-makers need to consider. Companies have always dealt with long-term network assets but this is now coupled with an increasing focus on long-term service provision and a greater focus on future customers. Companies and Ofgem also increasingly need to make decisions relating to delivery of environmental policy objectives.

In the RPI-X@20 review the role of the networks in delivery of a low carbon energy sector was a dominant feature of discussions and debates. Arguably, this was the main catalyst for the decision to significantly adapt the existing framework.

2.2 Tidying-up RPI-X regulation

It is generally accepted that for the core monopoly network industries a regulatory framework will remain in place indefinitely. In this context, the interactions between the regulator and the regulated companies represent a stylised example of mechanism design in a repeated principal-agent game with asymmetric information and uncertainty.

A number of concerns have arisen with the RPI-X framework over time⁶. A number of these reflect the characteristics of the repeated principal-agent game and the design of incentive mechanisms.

- Whilst the incentive to encourage companies to deliver cost savings was in the main successful it had an unintended consequence of shifting the focus away from output delivery. Additional incentive mechanisms were needed, for example relating to quality of service. At times this resulted in RPI-X being complicated and burdensome and there were difficulties striking a balance between cost saving incentives and output delivery incentives.
- Until recently, neither the regulator nor the companies collected consistent information on what the needs of customers were and hence did not know whether the RPI-X framework was meeting them. Absent any encouragement to focus on consumers, companies focused their attention on the regulator and had limited, at best intermittent, interaction with customers of network services⁷.
- Regulators have tended to focus on static benefits of competition, particularly allocative and technical efficiency, when setting five-year price controls. The dynamic benefits of competitive processes were arguably neglected. The risk averse nature of most monopoly networks and the static focus of the regulatory framework resulted in low rates of innovation and companies that are not seen to be open to new ideas. This became increasingly apparent and concerning as the network companies and the regulatory framework struggled to respond to a sector-wide need for a step-change in technology driven by the push for a low carbon energy sector.
- The strength of the incentive to make cost savings has varied between capital and operating costs. This may have affected the choices that companies made arguably with a bias in favour of capital investment solutions, potentially with higher long-term cost.

⁶ These concerns set out here were collated during the RPI-X@20 review and reflect issues raised by a range of different stakeholders, including companies themselves. They reflect views of network company behaviour in general. There are no doubt exceptions and individual companies that operate differently.

⁷ Stakeholders or customers of network services are considered to be anyone that uses or is affected by the provision of network services. This is a significantly wider group than end customers and includes, for example, supply companies, generators, independent network operators and groups representing specific interests such as Age Concern or Friends of the Earth.

- With five-year regulatory cycles, and increased data collection and monitoring, regulators have the opportunity to set future price controls at a level that is considered to be more reflective of actual costs. This is beneficial for allocative efficiency but has knock-on implications for technical and dynamic efficiency through the ratchet effect. Companies may adjust production choices, and the information they reveal, to influence future price controls.
- The strength of the cost saving incentive has also varied depending on when savings were made. Originally with RPI-X the closer the price control review the less benefit a company got from a saving. Regulators have attempted to deal with the problem through redesign of the incentives but there is continued discussion about the impact of the timing of the price control review on company decision-making.
- The process of reviewing price controls every five years has potentially encouraged companies to become overly focused on five-year regulatory cycles rather than the length of time consistent with asset and service delivery planning⁸. The absence of any focus on the long-term in the regulatory framework has implications for decisions relating to innovation, asset stewardship and trade-offs between long-term quality of service and cost savings. Related to this there are potential concerns with the ability of the regulatory framework, and the network companies, to respond and adapt in a timely way to step-changes in technology.
- The five-year cycles may have also resulted in relatively high regulatory burden, with only a brief interlude when one review is completed and implemented before the next starts.
- Regulators have developed and adapted the price control frameworks over time, adding on new mechanisms and requirements. This has led to complaints about increased regulatory burden and complexity of the regulatory regime.
- The tendency to tinker with different aspects of the framework in isolation has also meant that the impact of the package as a whole was not always considered. This piecemeal approach resulted in some arbitrary adjustments to the overall price control. These ‘financeability fudges’ were temporary fixes to problems that would continue to arise at future reviews.

Despite these identified concerns with RPI-X regulation Ofgem recognised that incentives can work if appropriately designed. The aim with RIIO was to build on the successes of RPI-X by developing an adapted incentive framework that was better suited to the changing nature of energy network services and that better reflected the fact that companies and the regulator were making decisions in a long-term repeated game with asymmetric information and uncertainty. Ensuring the new framework was underpinned by economic principles was important for the effectiveness of incentive mechanisms and for the credibility of the overall regime.

3. Economic principles for incentive regulation

Incentive regulation is about setting constraints on what network companies are expected to deliver, providing them with rewards and/or penalties for doing what is required and then leaving them to it. Consistent with the economics of repeated principal-agent games with asymmetric information the regulator delegates responsibility for decision-making to the party with the best available information. In the economic models the regulatory constraints are designed to lead the company to choices that

⁸ This may be more or less than five years depending on the specific aspect of service provision or assets being considered.

are consistent with maximising welfare⁹. Over time the regulated company reveals more information, providing the regulator with a better basis on which to design future incentive schemes.

We set out here three economic principles which were important considerations in the design of RIIO¹⁰. Where these principles are met we expect that more efficient outcomes will be delivered and regulatory frameworks will be closer to ‘good’¹¹. We explain in Section 5 how the RIIO model was designed to be consistent with these principles.

3.1 Effective incentive regulation will strive to mimic the benefits of competition

RPI-X was introduced for British Telecom (1984) with an expectation that over time competition would develop and the need for price controls would dwindle away¹². However, for licensed monopoly network services there is an expectation that some form of regulation will be required indefinitely. It remains the case that the efficient outcomes associated with competition are considered desirable. Regulatory frameworks therefore continue to be designed with the ambition of providing the associated disciplines and incentives on the companies. It is in this sense that incentive regimes should be designed to mimic the benefits of competition.

The concept of competition that is relevant is not ‘perfect competition’ as described in economic textbooks¹³. Arguably with RPI-X regulation regulators have tended to focus on outcomes consistent with allocative efficiency, where price reflects costs, and technical efficiency, where companies deliver at least cost. Dynamic aspects of competitive markets, notably innovation, discovery, learning and adaptation, have been given little consideration. In long-term markets, such as network industries with long-term assets and upfront sunk costs, these dynamic aspects are central to the original aim of mimicking the benefits of competition¹⁴.

Returning the focus of incentive regulation to the benefits of dynamic competition was an important consideration in the design of RIIO. The most relevant aspects of a benchmark competitive industry for the design of incentive regulation include the following.

- Companies operate knowing that there is a risk of losing customers, with switching and entry to the market. They use a range of tools to understand what customers are looking for and strive to be the first to market, or the best in the market, to meet their needs.
- Profits are earned by having higher market share and lower costs. Higher market share is attained by offering services at lower prices and/or higher quality or by offering products that are considered different by customers. Lower costs are attained by innovating, discovering and adopting technologies developed elsewhere and developing new ownership structures. Companies adapt the services they offer and how they produce as technologies change, potentially with cycles of little innovation and then periods of significant technological developments.

⁹ The familiar concepts are that mechanisms are individually rational and incentive compatible.

¹⁰ For an introduction to the economics of regulatory incentives see, for example, JJ Laffont and J Tirole (1993), *A theory of incentives in procurement and regulation*, MIT Press and M Armstrong and D Sappington (2002), ‘Recent Developments in the Theory of Regulation’, *Handbook of Industrial Organisation, Vol III*.

¹¹ See R Schmalensee (1989), ‘Good regulatory regimes’, *RAND Journal of Economics, Vol 20*, pp417-436.

¹² See ME Beesley and SC Littlechild, ‘The regulation of privatized monopolies in the United Kingdom’ *RAND Journal of Economics, Vol 20* and D Helm and G Yarrow (1988), ‘The Assessment: The Regulation of Utilities’, *Oxford Review of Economic Policy*, for a discussion of the objectives of RPI-X regulation.

¹³ G Yarrow, T Appleyard, C Decker and T Keyworth (2008), *Competition in the provision of water services*, Regulatory Policy Institute report for WaterUK provides a useful discussion of concepts of competition and the importance of discovery in competitive markets.

¹⁴ For a discussion of the importance of dynamic competition see J Kay (2007), *The failure of market failure*, Prospect Magazine, August.

- Companies that succeed will earn above normal returns for a period of time but these would be eroded away as other companies compete for the promise of potentially high returns. Companies that don't succeed will earn below normal returns, ultimately exiting the market.
- Companies make decisions by considering revenue and cost implications over a time horizon commensurate with asset lives and/or the expected life of the market.
- Financial markets, debt and equity, take account of the expected variation in revenue and costs when deciding whether to invest and at what rate of return. The cost of finance and the return earned would be commensurate with the risk that the company faces.

With incentive regulation the pressures on company behaviour come from the regulatory contract rather than other companies or customers. An effective incentive-based contract will encourage regulated companies to operate as if there is potential to earn higher returns if they deliver services at the price and quality consistent with what customers want and there is a risk of earning below normal returns where they don't. A regulatory framework that effectively mimics the benefits of competition would encourage companies to seek out lower long-term costs, through innovation and learning, but not at the expense of meeting customer needs. Companies would be encouraged to respond and adapt to changing demands on them in a timely way, for example in response to technology shocks.

3.2 Effective incentive mechanisms need to be clear and credible

To get outcomes consistent with competitive markets the incentives in place need to be clear and credible. Ultimately the rules of the game need to be precise, transparent and bought into by all parties. We set out here what this means in the context of 'real world' mechanism design with asymmetric information and uncertainty.

- The regulator and the regulated companies need to have a mutual understanding of what the company is expected to deliver. The regulator needs to be able to measure and monitor outputs so that the company can ultimately be held to account to deliver them. Without clear outputs companies are likely to make choices which vary from the original intention¹⁵.
- The best available information needs to be used to set required outputs, increasing the chances that they are consistent with what is in the interests of customers. The information is likely to come from a range of sources, including the regulated companies and customers.
- There needs to be common understanding of when and how outputs will be changed. There needs to be transparency on what would trigger a review of outputs and a transparent process for adapting the overall regulatory contract in response to any changes made to output requirements.
- The regulator and the regulated company need a common and clear understanding of what the upside and downside from delivering or not are. Where there is confusion about the scale, nature or timing of rewards and penalties this will potentially affect the company's choices, resulting in unintended consequences of the incentives. As with outputs, there needs to be transparency about when and how reward and penalty schemes might be adapted over time.

¹⁵ Given asymmetric information and uncertainty about the future, there may also be situations where the regulated companies delivers what was intended but that this turns out to not be consistent with efficient outcomes or what is in the customer interest.

- The level of the rewards/penalty schemes need to be calibrated to a point where they are high enough to make a difference but not so high as to be costing customers more than the benefit they receive from the incentive in the first place. Some ‘trial and error’ and/or cautionary judgement may be required here. There must also be a clear, auditable, link between what the company is delivering and the rewards/penalties they earn.
- Where the regulator is encouraging a number of different deliverables the mix of reward and penalty schemes need to be balanced to encourage the company to make efficient decisions across the range of deliverables. If incentives are biased in favour of one set of deliverables companies will make choices that result in these being prioritised.
- The incentives that are in place need to be credible. Where a company places a low probability on a potential reward or penalty arising this will affect their decisions on whether to deliver or not. Credibility is likely to come from legal powers, the details of the regulatory contract and, in the context of repeated price control reviews, the reputation of the regulator¹⁶.
- Regulators need to consider how best to balance credibility, with associated focus on transparency, commitment and a more rules based regime, with the benefits of retaining flexibility and discretion over some aspects of price control decision-making.

3.3 Incentives can be used to deliver environmental objectives

There is much debate about whether and how economic regulators should incorporate environmental objectives into regulatory contracts¹⁷. This is a tricky issue and one which will no doubt be pondered by practitioners and academics for some time. We consider the issue in the context of incentive regulation. We do not touch on wider issues of whether specific environmental objectives should be delivered by energy networks or whether the economic regulators are well placed to design such mechanisms. These are issues that warrant papers in themselves.

Where a regulated company is asked to deliver environmental objectives the costs fall on the company and hence its customers and the benefits are enjoyed by wider ‘society’. This can mean from the company’s perspective that the benefits that it enjoys from delivery are lower than its costs.

Economic theory tells us that it is possible to encourage companies to make choices involving environmental externalities by setting required standards and setting reward and penalty schemes that make it more worthwhile for the company to deliver than not.

Incentives can be effective if the outputs can be defined and if the rewards and penalties can be calibrated in a way that sufficiently reflects the externality effect. This is likely to be difficult, particularly in the absence of a credible price of carbon.

- Outputs are likely to be easier to define if they are closely related to the normal everyday services provided by the regulated business, for example where a company can make a choice to deliver its standard network services with lower carbon emission technologies. Problems are likely to arise if the desired environmental objective is not directly related to the regulated company’s core service or cannot be easily linked to the company’s decision-making.

¹⁶ For a discussion of the importance of credibility and commitment see M Crew and P Kleindorfer (2002), ‘Regulatory Economics: Twenty Years of Progress’, *Journal of Regulatory Economics*, Vol 21, p5-22 and P Burns, C Jenkins, M Mikkers and C Riechmann (2006), ‘The role of the policy framework for the effectiveness of benchmarking in regulatory proceedings’, in T Coelli and D Lawrence (eds), *Performance Measurement and Regulation of Network Utilities*.

¹⁷ See, for example, G Yarrow (2010), *Where next for utility regulation?*, Beesley Lecture, September <http://www.rpieurope.org/Beesley/2010/Yarrow%20-%20Beesley%20lecture%20-%20Where%20next%20for%20utility%20regulation.pdf>

- There is likely to be uncertainty about the potential impact of any environmental output (e.g. providing network capability for electric vehicles) and therefore difficulties valuing the expected impact. The appropriate scale of any reward or penalty will be difficult to calibrate. A range of measures may be needed to encourage particular types of behaviour, for example innovation or working in partnership with others, to stimulate change rather than depending on individual financial incentives.

Designing effective incentives for environmental objectives is feasible but is likely to be more challenging than incentives focused on aspects of a regulated company's business that do not involve externalities. We consider below how RIIO was designed with the aim of meeting this challenge.

4. Overview of the RIIO model¹⁸

The RIIO model is an incentive-based regulatory framework. Figure 1 provides an overview of the main elements of the model. There is no longer an 'X' factor but the strong efficiency incentives are retained within the revenue and related output elements of the regulatory contract. This reflects how price controls have been set in practice for some time and is therefore more a change in notation than in substance¹⁹. We set out here how the components of the price control will be set. We do not discuss two elements of the model that are inter-linked with but outside the price control, namely the Innovation Stimulus Package and the potential that Ofgem could give a third party a greater role in delivery (for example by tendering the right to build and operate a new transmission line).

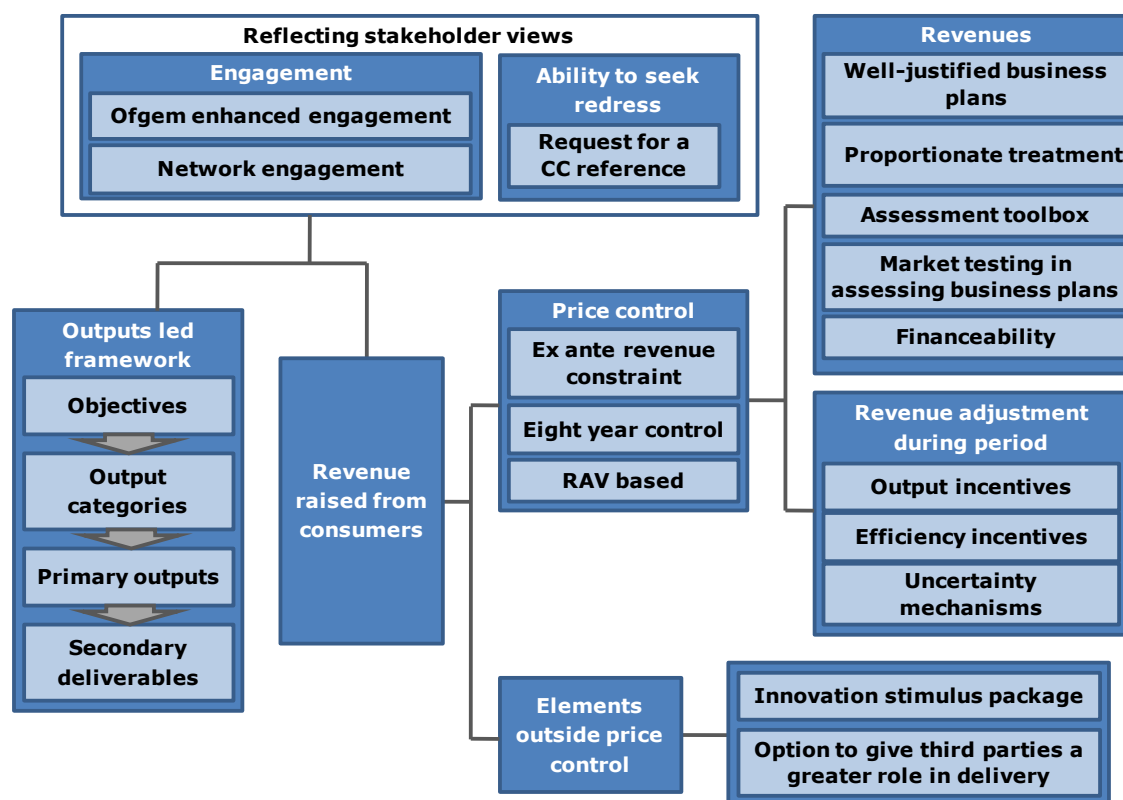
¹⁸ Details of the RIIO model can be found in a range of papers on Ofgem's website:

<http://www.ofgem.gov.uk/Networks/rpix20/Pages/RPIX20.aspx>, in particular in the 'Handbook for implementing the RIIO model'

<http://www.ofgem.gov.uk/Networks/rpix20/ConsultDocs/Documents/RIIO%20handbook.pdf>.

¹⁹ With RPI-X the revenue constraint was presented as an allowed rate of change in average revenue, the X-factor. In practice observed changes in prices did not relate to the 'RPI-X' formula and the determination of the control was far removed from the idea of specifying a single percentage rate of change in efficiency. With RIIO, Ofgem will specify base revenue (£m) for the price control period.

Figure 1: Elements of the RIIO model



4.1 Incentivising longer-term decision-making

Consider a situation where a new technology enables energy flows to be instantaneously managed at local level on an electricity distribution network in response to changes in demand. It involves high upfront costs for four years and delivers higher quality of service at lower operating costs for forty years. A company that is focused on the five-year regulatory cycle may choose to not invest in the technology given the high costs in that period. A company focused on efficient network planning is more likely to invest in the technology recognising the longer-term benefits. The total costs for consumers over the life of the assets would be lower.

Ofgem wants to encourage companies to consider time horizons that are most relevant for efficient planning and delivery decision-making. The extension of the length of the price control from five years to eight years²⁰ is expected to help shift the focus of the companies onto the longer term, at least at the margin. However, it will not remove all problems associated with having a known and identified fixed point at which price controls are reset. The RIIO model is therefore designed to delink a number of aspects of the price control from the review cycle.

- In their business plans network companies will be required to set out a long-term corporate strategy. Companies will be expected to assess alternative options for delivering outputs, setting out longer-term costs and benefits for each. They will need to consider the value of keeping options open where there is uncertainty about how best to deliver. They are also

²⁰ There is a potential mid-period review of outputs to reflect the possibility that what companies are required to deliver may need to change within an eight year period. Other aspects of the price control would not change, except where needed to take account of output changes.

expected to explain how they would adapt to changing demands for network services, for example driven by technological change in generation or in household demand.

- Outputs will be set for the long-term where possible, with transparent provision for changing outputs in response to significant shifts in technology or government policy.
- Where business plans are well-justified, Ofgem expects to include funding in the price control related to delivery of outputs and/or efficiency savings in future periods. Companies will also be encouraged to include in their plans innovation costs focused on delivery of long-term value for money network services.
- A proportion of total expenditure will continue to be financed through the regulatory asset value (RAV) which itself is a long-term instrument that spans a number of price control periods. Where possible Ofgem will give assurance on how long-term projects will be treated at future price control reviews. There is also commitment to not make retrospective RAV adjustments, save through the efficiency incentive rate, as long as outputs are delivered.
- Rewards and penalties associated with cost savings and output delivery will be triggered during the price control review rather than revenue adjustments being made at the next price control review. The length of the price control will not impact on the strength of the efficiency incentive in particular as this will be a pre-determined fixed proportion.
- Companies and third parties will be able to compete for partial funding for innovation projects through the Innovation Stimulus Package. This will operate outside the price control framework with its own timetable.
- Where third parties are involved with some aspects of delivery, for example following an Ofgem-run tender process, the timescales involved will not necessarily be linked to the price control cycle. The decisions on whether to give a third party a greater role in delivery will also be informed by an assessment of the long-term costs and benefits.
- Ofgem is committing to adhere to the financeability principles over time, recognising the importance of transparency and predictability in this area particularly given the scale of the investment requirements in the energy network sector.

The combined effect of these changes and the longer price control period are intended to encourage companies to focus on time horizons that are consistent with efficient long-term decision-making.

4.2 Outputs

Outputs are core to the RIIO model, with the regulatory contract specifying what network companies are expected to deliver in return for revenue earned from customers.

Under RPI-X the extent to which outputs were specified in the regulatory contract has varied over time and across the electricity and gas transmission and distribution sectors (the four energy network sectors). There has not been a comprehensive and consistent set of outputs in any sector despite twenty years of regulation. After privatization the focus was on providing a safe and reliable system, with company and regulatory decisions affected by engineering standards and Health and Safety Executive requirements. Customer service standards also evolved in distribution, arguably in a

piecemeal fashion. In recent years the requirements on companies has expanded, with more focus on customer service, the environment and vulnerable consumers.

The RIIO model moves to a much greater emphasis on incentivising delivery of outputs relating to the customer experience and the environment, with the focus on the six categories of customer satisfaction, reliability and availability, conditions for connection, environmental impact, social obligations and safety. Other measures, for example of asset health or of innovation developments, will not be directly incentivised but will be monitored by Ofgem on a regular basis and in some cases may be linked to base revenue. These secondary deliverables will inform company decisions about enhancement, stewardship and operation of the network, thereby protecting long-term delivery of sustainable network services. Ofgem expects companies to manage these aspects of network service provision efficiently and effectively and would be expected to take action if there is concern that a company is putting the long-term delivery of outputs and value for money at risk.

There is provision within the RIIO model for outputs to be changed over time. This reflects that fact that in some cases outputs will be linked to government energy and environmental policy and will be influenced by technological developments in the sector more widely. At times it may be users of network services and/or the network companies themselves that identify the need for output changes. At other times the impetus may come from the regulator. The aim is to have transparent frameworks in place setting out when and how outputs would be changed during a price control period and from one price control review to another. In this way, RIIO is attempting to balance the need for commitment on outputs with the need to live with and adapt in a timely way to the reality of changing policy and technology.

Under RPI-X there has been, until recent years, limited linkage between the standards set and any understanding of what experience customers want to have from network services. With RIIO the emphasis is on identifying outputs that relate to the aspects of network services that matter to existing and future customers and the broad role that network companies play in delivery of a sustainable energy sector. The regulator and the companies are working with a wide range of stakeholders, through enhanced engagement, to develop output measures that are material, controllable, measurable, comparable, applicable and legally compliant. Ofgem recognises that outputs may be developed that do not meet all these criteria and the strength of financial incentives would be expected to reflect this. In time the aim would be for outputs to be relatively stable, but as the regime is implemented some learning and adaptation is perhaps inevitable.

Where outputs have been developed under RPI-X regulation they tended to be considered separately from the costs and revenue in the price control resulting in a disjointed relationship between delivery performance and the revenue and returns earned. With RIIO, the base revenue estimate, including investment requirements, will be based on an assessment of the efficient costs of delivering the agreed outputs and long-term value for money. The return earned will vary with output delivery performance.

4.3 Revenue constraint

There are three elements to the revenue constraint set out in the regulatory contract:

- base revenue reflecting expected efficient costs required to deliver outputs;
- revenue adjustments for rewards and penalties linked to performance in delivering outputs and long-term value for money; and

- revenue adjustments for any uncertainty mechanisms included in the control.

The overall package is designed to ensure that efficient delivery of outputs is financeable, with the assumption that network companies will make decisions that are consistent with the objectives of playing a full role in delivery of a sustainable energy sector and delivery of long-term value for money. The package will be calibrated so that companies that demonstrably deliver for consumers earn good returns, above the allowed return, whilst those that do not will earn below normal returns.

Base revenue

As with RPI-X regulation, base revenue in the regulatory contract will be determined by estimating required efficient expenditure for the regulatory period. The approach used to assess expected efficient costs provides its own incentives to strive for efficient delivery solutions from the outset. The ‘building blocks’ approach will continue to be used to estimate efficient expenditure, with an allowance for costs expensed each year (termed ‘fast’ money), depreciation and an allowed return on the RAV (which incorporates the remainder of costs, termed ‘slow’ money). RIIO differs from RPI-X, as implemented by Ofgem²¹, in the way the elements of base revenue are determined.

- The company’s business plan will provide the base data for the assessment of expected efficient costs. There are new requirements on what is to be included in the business plan, particularly much more of an onus on the company to demonstrate that costs are efficient over the long-term rather than the regulator having to demonstrate that they are not.
- A new proportionate approach to assessing business plans is being introduced. The extent of scrutiny that a company’s business plan is subjected to, and potentially the timing at which an agreement is reached on the regulatory contract, will depend on the quality of the business plan and the performance in delivering outputs and long-term value for money over time.
- High-level total cost benchmarking analysis of historical costs and planned costs will be used to get a general view of the company’s comparative efficiency level and to determine the extent to which more or less scrutiny of the business plan is needed. The regulator will use a mix of tools to assess expected efficient costs. There will be less reliance on detailed models of individual categories of costs and there is unlikely to be mechanistic links between the results of any statistical analysis and the base revenue determination.
- In the past, capital costs have been included in the RAV and operating costs financed on an annual basis. This has potentially created its own incentive biases. With RIIO, a fixed proportion of total costs will be treated as ‘fast money’, remunerated in the year in which they are expected to be incurred, and the remainder treated as ‘slow money’ and remunerated over the lifetime of the network assets through the RAV. The incentive rate will be the same for fast and slow money.
- The way depreciation charges are set will change. The intention is that there will be no more ‘fudges’ where depreciation is used as a lever to correct identified financeability concerns with the overall price control package. Depreciation will be based on an assessment of the appropriate balance of costs to be paid by existing and future customers, taking account of the expected economic life of assets and uncertainty about future use and usefulness of assets. If

²¹ A number of these changes were first developed for the most recent electricity distribution price control review, DPCR5, which ran in parallel with RPI-X@20.

there are concerns with long-term financeability these will be addressed by reviewing the package as a whole rather than adapting one element in a non-transparent manner.

- Ofgem will continue to set an allowed weighted average cost of capital but there will be more explicit link with the cash flow risk of the business over the long-term, taking account of the risk exposure associated with the proposed regulatory contract.

Company data will remain the primary source of information for setting the price control. To limit the risk of business plan costs being higher than needed there are also incentives in the framework to encourage companies to reveal their best available information on costs at the time of the price control review. The Information Quality Incentive²² (IQI), a mechanism introduced as part of the RPI-X framework in recent years, will be retained and extended to all four sectors. The jury may still be out on the effectiveness of this mechanism, most famous for its complexity, but retaining it is unlikely to have significant negative consequences. Other aspects of the model are intended to provide further information revelation incentives including changes in business plan requirements, benchmarking of forecast costs, the scope for differential treatment at the price control review, the risk of challenge from third parties resulting in a Competition Commission reference, and the threat of Ofgem giving third parties a greater role in delivery.

Rewards and penalties

Ofgem is encouraging energy network companies to play a full role in delivery of a sustainable energy sector and to deliver long-term value for money network services. In the RIIO model there are a number of different incentives designed to collectively deliver these objectives.

- *Output delivery incentives:* reward and penalty schemes for delivery of outputs will be included in the regulatory contract. In some cases financial rewards and penalties will be triggered automatically during the period, in others there will be a review of output delivery performance before financial adjustments are made. For some outputs the focus will be on reputational incentives which will not affect revenue during the period but may affect the proportionate assessment of business plans at future price control reviews. Ofgem has also included backstop threats of giving third parties a greater role in delivery or in extreme cases licence revocation for persistent failure to deliver outputs.
- *Cost saving incentives:* a network company will be able to retain a fixed proportion of cost savings made with the efficiency incentive rate set up-front. The proportion earned is independent of when the savings are made and whether it is a capital or operating cost saving. That is, both fast and slow money will face the same incentive rate. There is also a commitment to not, save in exceptional circumstances, make discretionary adjustments to revenue for differences between actual and allowed costs, except through implementation of the incentive rate, as long as outputs are delivered.
- *Innovation incentives:* there is potential to compete for upfront funding through the Innovation Stimulus Package. There may also be potential to be rewarded where new charging schemes or product offerings are introduced which contribute to delivery of a sustainable energy sector and long-term value for money. More generally, output and efficiency incentives will not be designed around a specific way of delivering or a specific

²² With the IQI the cost efficiency incentive rate varies depending on the extent to which a company's business plan forecast differs from Ofgem's assessment of expected efficient costs of delivering outputs.

capital project. Network companies will be expected to adapt what they are delivering and how they are delivering in a timely way where they face a technology change, for example a change in the nature of consumer demand for electricity.

Where the rewards and penalties are financial they will result in an adjustment to revenue during the regulatory period. Where cost savings are made, the return earned can also be different to that allowed by the regulator. This means that the revenue earned can be higher or lower than base revenue. Reputational incentives will not result in an adjustment to revenue, or costs, but are expected to change behaviour at the margin.

Uncertainty mechanisms

Like other privately owned firms, network companies are responsible for managing normal business risk. They also get the benefit of favourable cost shocks. As with RPI-X, the RIIO price control includes uncertainty mechanisms where there is a risk of costs increasing or decreasing significantly due to factors outside the company's control. The impact of such uncertainty mechanisms on cash flow risk will also be taken into account in the allowed cost of capital.

The aim is to limit the use of uncertainty mechanisms as far as possible, to avoid the risk of undermining efficiency incentives and potentially complicating the price control. Such mechanisms will only be used where they are expected to deliver value for money for existing and future customers and where they protect the network company's ability to finance efficient delivery. Where mechanisms are included they will, depending on their design, result in revenue adjustments during the period or at the next price control review should the identified events arise.

5. Designing RIIO to be consistent with the economic principles

Although not explicitly discussed in working papers or consultations, the economic principles set out in Section 3 underpin the design of the RIIO model. We explain here how the model, as set out in RPI-X@20 consultation and decision documents, was designed to be consistent with these principles.

Inevitably at this stage all we can discuss is the intended impact of the model. Implementation at the next and future price control reviews will determine what outcomes are actually delivered and more in-depth analysis of the model will be warranted in the future.

5.1 Mimicking the benefits of dynamic competition

Several features of the RIIO model were designed with the aim of encouraging companies to behave in a manner similar to what might be observed in a competitive market. In particular, when designing the model Ofgem gave careful consideration to what is needed to deliver the discovery benefits of dynamic competition.

- The focus on output delivery, with associated incentives, is intended to be consistent with a market where companies compete on the basis of quality of service and where companies consider the implications of their decisions for customer satisfaction. Enhanced engagement is expected to play an important role in providing parties with the information needed for determining outputs and the scale of rewards and penalties.
- The model aims to encourage companies to seek out long-term least-cost delivery solutions and to innovate. The most relevant aspects of the model are the fixed efficiency incentive rate, longer-term price controls, allowance for innovation projects in the price control,

recognition of the need to limit ex-post discretionary adjustments when outputs have been delivered and recognition that customers benefit from the learning associated with failed innovation projects as well as from successful ones. The innovation stimulus package was included in the model to provide further encouragement to companies to innovate, including in areas relating to service offerings and charging. The focus on both outputs and long-term least cost is intended to limit the risk of cost reduction jeopardising output delivery.

- Ofgem has emphasised that network companies need to work with their customers (users of network services) and wider organisations in some cases (for example, local government) on an ongoing basis to identify what needs to be delivered and how best to deliver. During a price control period network companies may need to make changes to what was envisaged at the price control review and included in a business plan at the time. The intention is that RIIO provides them with the incentive to adapt in a timely way what they are delivering or how they are delivering. Where changes provide them with cost savings, they will get the benefit through the incentive rate. Where the changes result in new or adapted outputs being delivered provisions will be in place to adjust the regulatory contract where this is considered necessary and appropriate. In essence, a company that responds to changing demands for network services will be rewarded for making changes where the evidence is there of the need for change and the change does not jeopardise other outputs (e.g. safety). In contrast, a company that does not adapt and sticks to an original plan, despite evidence of a need for change, will be penalised. The detail of how companies will be encouraged to learn and adapt on an ongoing basis will be set out in individual price control reviews.
- The model includes incentives which are intended to encourage companies to strive to be better than others in the sector. The relevant aspects of the model include benchmarking of forecast and actual costs and the potential to be treated more leniently at future price controls.
- The intention is that the actual returns that a company earns will be linked to performance in delivering outputs and cost reductions and that companies that don't deliver will earn returns well below the allowed level. The allowed return will be linked to expected cash flow risk.
- There is an expectation that competitive pressures from incentives in the regulatory contract will be reinforced by the threat of Ofgem giving third parties a greater role in delivery. 'Buyer power' pressures may also become more evident through enhanced engagement and the recognition that stakeholders could ask the Gas and Electricity Markets Authority (GEMA) to consider making a price control reference to the Competition Commission²³.

The RIIO model has been designed with an aspiration of mimicking the benefits of competition, with a particular focus on outputs, long-term value for money and innovation. In many ways the model is focused on the original aspiration of RPI-X regulation, namely to deliver discovery benefits of dynamic competition alongside allocative and technical efficiency. Turning the aspiration into reality will depend on the effectiveness of the incentive mechanisms used.

²³ In October 2010 the government announced proposals to merge the Office of Fair Trading and the Competition Commission. A consultation on the merger is expected in 2011. The role of any new body and GEMA's powers in any new institutional structure may change how references are made.

5.2 Effective incentive mechanisms

RIIO was designed to be consistent with the principles for effective mechanism design set out in Section 3.2. We present some observations here on the issues considered most relevant.

- *Clear and transparent deliverables:* Ofgem has introduced a framework and new price review processes to enable price controls to be underpinned by a shared understanding of what energy network companies need to deliver. The hope is that the focus on six streamlined output categories will increase the likelihood of a common understanding, even if there is debate about how best to develop specific metrics. Enhanced engagement, by Ofgem and companies, is intended to provide more and better opportunities for discussion and information sharing on what customers want from energy networks. Increased responsibility on network companies to set out outputs, and associated costs, in their business plans will also encourage early discussions of what is to be delivered. The option of a mid-period review of outputs may also prove helpful as it provides a clear time in which any new outputs, or concern about the relevance of existing outputs, can be discussed in a transparent way.
- *Clear and appropriately calibrated rewards and penalties:* Ofgem has set out principles to be considered when designing rewards and penalties for long-term cost efficiency and output delivery. The principles are intended to be consistent with the criterion of ensuring the mechanisms are transparent and strong enough to affect behaviour. The cost incentive regime in RIIO is not that different from that developed by Ofgem under RPI-X. There is a fixed efficiency incentive rate that is intended to manage distortions between different cost types and the timing of cost savings. The incentive rate is reinforced by additional rewards for innovation, both in the price control and through the innovation stimulus package, and greater focus on the longer-term. Whether the incentive rate will be strong enough will depend on calibration of several aspects of the control at the price control review. Ofgem also recognises the need to make best use of available information whilst at the same time using it in a way that does not undermine the RIIO incentives. This is evident in the proposals on the role of benchmarking and historic information in the setting of price controls and in Ofgem's commitment to not make discretionary adjustments to the RAV. The design of output incentives is arguably less straight-forward and Ofgem recognises the difficulties in this area. There is an aspiration to base rewards and penalties on willingness to pay evidence where feasible. There is also recognition of the need for a holistic approach to implementing output incentive schemes, for example a discussion of the use of balanced scorecards and a 'return on regulatory equity' measure. In other areas there is an expectation that Ofgem and the companies will need to learn from experience with 'trial and error' inevitable early on.
- *Credible incentives:* it is difficult to claim that an incentive mechanism is credible before it has been implemented and it is difficult for a regulator to commit to a new regulatory model that has not been tried and tested. Ofgem has attempted to provide assurances in this area as it is clear that network companies will be reluctant to make the significant changes needed if they do not believe that potential rewards and penalties will be forthcoming. Ofgem has gone some way to increasing credibility by setting out upfront, for example in its 'Handbook for implementing the RIIO model', what the intended design of the regulatory control is. Many aspects of the regulatory contract will be discussed and debated much earlier in reviews, providing more time for parties to reach a better understanding of what is involved. Ofgem has also been clear on what aspects need to be incorporated within licence conditions,

recognising the importance of this tool as a means of providing more certainty to companies and stakeholders. Recognition that third parties could ask GEMA to make a price control reference to the Competition Commission provides extra protection that Ofgem will develop and implement regimes based on well-evidenced arguments and best practice regulation.

How closely the specific mechanisms implemented at price control reviews remain true to the ideals remains to be seen. We discuss in Section 5.3 potential issues that may arise with environmental outputs. Secondary deliverables, where costs and revenue may be linked to outputs that span periods, are also likely to be less clear-cut than primary outputs. This is not surprising given their nature and it will be important that Ofgem and network companies limit these as far as possible. Where they are used there will be greater confidence in them if clear terms are set on what is being delivered and by when. There will also need to be a transparent process for adapting any agreement over time.

The intention is to have a holistic approach to incentive mechanism design to cover all the bases and manage potential knock-on consequences of individual mechanisms. There is a recognition that this could result in a regime that is overly complicated and quite prescriptive.

There are aspects of the regime that may be difficult for Ofgem to live with. If there is a risk of the regulator making retrospective adjustments to limit profitability companies will not respond to the full strength of intended incentives. Of equal importance, network companies need to believe that if they fail to deliver outputs and/or if they have high costs they will earn below normal profits and may even risk licence revocation. Ofgem can really only demonstrate credibility in these areas by developing its reputation to stick with the intentions of the RIIO model when it is implemented. More transparent documents, that set out clearly what is proposed and how it will be implemented, help in so far as they provide something concrete to hold Ofgem to account on. Moving to a potentially more rules-based and prescriptive regime may deliver incentive benefits but there will be downsides, most notably limitations in regulatory discretion which can be beneficial from time to time.

5.3 Incorporating environmental objectives

Under the RIIO model network companies are being asked to play a full role in delivery of sustainable network services. Ofgem aims to encourage companies to take account of the environmental impact of decisions using output incentives.

Outputs relating to customer satisfaction and reliability will be relevant, particularly once the needs of the low carbon energy providers are taken into account in enhanced engagement. Encouraging network companies to reduce carbon emissions on the network itself is also relevant. Ofgem recognises that difficulties are likely to arise with more targeted environmental outputs, for example relating to the proportion of low carbon energy transported. In particular there will be issues relating to output definition and accountability for delivery, for example where delivery of the output requires participation by a wider group of parties in addition to the network companies. Care will need to be taken in balancing the strength of any incentives with the robustness of the output measures.

Although output definition will be difficult for environmental outputs the RIIO model as a whole is designed to encourage change by putting more responsibility on companies and their stakeholders to identify what needs to be done and to identify the best way of moving forward. The idea is that companies manage the uncertainty they face by being open to new ideas and innovating. The regulatory framework needs to support this by creating the right conditions to encourage decisions consistent with playing a full role in delivery of a sustainable energy sector.

Such change is difficult for any organisation, and potentially more difficult for licensed monopoly network companies than others. Given the difficulties of calibrating environmental output incentives the encouragement to innovate and to focus on the sustainable energy sector is reinforced by a number of other aspects of the RIIO model.

- Ofgem have signalled that they would encourage network companies to include innovative ideas in their business plans and that they would not penalise companies for innovations that ‘fail’ even where the costs associated with the innovation are included in the price control.
- If the cost reduction incentive rate is sufficiently strong and if incentives to focus on the long-term work companies will recognise that over time the benefits of innovation and developing new product and charging offers will accrue to them.
- Companies are incentivised to make decisions about how best to delivery outputs using the best available information. Specific technologies are unlikely to be incentivised, reducing the risk of Ofgem getting it wrong. Similarly, there is recognition that companies are not expected to stick to the original ‘plan’ where they identify a better way of delivering or identify that something different needs to be delivered. The onus is on companies and wider stakeholders to respond to learning during the price control period.
- There is explicit recognition of the need to offer potential rewards, in addition to cost efficiency incentives, for companies that develop new charging regimes or other service offerings related to delivery of a sustainable energy sector at long-term value for money.
- The innovation stimulus package is specifically designed to encourage innovation linked to delivery of a sustainable energy sector and recognises that there are innovations that companies will not consider, at least at the required scale or in required timescales, without upfront funding support.

RIIO is underpinned by a bold objective of encouraging network companies to play a full role in delivery of a sustainable energy sector. This requires the model to include incentives that make delivering the ‘greater good’ consistent with the good of the company and its shareholders. The effectiveness of the incentives will depend on how strong they are. Output definition and the calibration of rewards and penalties will be difficult. There are also issues relating to the culture and skills of the existing network companies that may take time to change. But the package of incentives in RIIO is likely to go further than RPI-X in this area. Whether it goes far enough remains to be seen.

6. Concluding thoughts

The RIIO model was designed with the intention of being consistent with the three economic principles set out in this paper. Consistency in design is a necessary but not sufficient condition for the desired outcomes to be delivered. How the model is implemented at price control reviews, and how the regulator and the company behave during regulatory periods, will determine the actual effectiveness of the model. Ofgem must work to ensure that the credibility of the model is developed and protected. This is particularly important give the focus on encouraging network companies to deliver outputs, innovation and associated efficiency savings over the long-term.

Commitment to the principles and vision of the model is needed if Ofgem, the companies and other stakeholders are to invest time and effort into developing new outputs, undertake more and better

engagement, and take risks with innovative delivery solutions and charging arrangements. Effective incentives also require regulatory commitment. Over time Ofgem must be seen to be allowing companies that deliver to earn above normal returns and to face less scrutiny at future price controls. Ofgem must also be firm with companies that don't deliver, imposing penalties and other available punishments, including giving third parties a greater role in delivery, for persistent non-delivery of outputs.

Remaining committed to the vision of the 2010 RIIO model does not mean that Ofgem should bullishly implement all aspects of the models without regard to lessons learned as it is implemented. This is a new model that has been developed on paper and is yet to be tried and tested. As the principles are implemented there will no doubt be lessons to learn, for both Ofgem and the network companies. Different aspects of the model may need to be refined over time. Adaptation can be consistent with commitment where Ofgem sets out clearly what is being changed and why. What is important is that any changes made are consistent with the overriding objectives of the model and the economic principles set out here. Ofgem must also ensure that changes in one area of the model are consistent with the rest of the model enabling the package to work effectively.

Transparency and accountability are important for credibility. Ofgem will need to continue to publish transparent consultation papers and decisions. The increased focus on stakeholders means that a wider group of organisations will need to understand what is being done and why. In this context Ofgem should not fear a referral to the Competition Commission. Where it is confident that the model and the analysis underlying specific price controls is robust, based on sound economic principles and consistent with its legal duties there is value in having a third party review its approach. Indeed a referral once and a while may be just the thing to highlight where adaptation is needed and to give credibility to the model.