

Impact Assessment Form

Title: RIIO-ED1 Mid-Period Review Division: Networks Team: RIIO Electricity Distribution Associated documents: Decision on the RIIO-ED1 Mid-Period Review. Coverage: Full coverage of MPR decision Price basis: 2012/13 Base Year for discounting: 2018	Impact Assessment (IA)
	Type of measure: Price control
	Type of IA: Qualified under Section 5A UA 2000
	Contact for enquires RIIO-ED Team 020 7901 7000 RIIO.ED1@ofgem.gov.uk

Summary: Intervention and Options (Rationale for intervention, objectives and options)

What is the problem under consideration? Why is Ofgem intervention necessary?

Under the RIIO¹ price control framework, the eight-year price control settlement includes a number of uncertainty mechanisms; one of these is the mid-period review (MPR) of outputs.

In setting RIIO-ED1, we recognised the potential for greater uncertainty in a longer price control period, and made provision for a potential MPR of output requirements. MPR is in place to identify potential changes to existing outputs that distribution network operators (DNOs) are expected to deliver (justified by clear changes in government policy), and/or whether any new outputs are required (due to changes in user needs).

We consulted on an MPR for RIIO-ED1, and are now issuing our decision on whether to conduct an MPR, and the corresponding scope of any review.

What are the policy objectives and intended effects including the effect on Ofgem's Strategic Outcomes

The policy objectives are to:

- Ensure that consumers only fund the outputs that are necessary and sufficient to meet the needs of consumers and other network users.
- Provide sufficient funding to ensure that the Distribution Network Operators (DNOs) are able to deliver what consumers need in a cost efficient manner.
- Identify potential changes to existing outputs (or new outputs) justified by clear changes in government policy or consumer needs.
- Retain an ex-ante, incentive-based approach to price control regulation

¹ Revenue = Innovation + Incentives + Outputs

What are the policy options that have been considered, including any alternatives to regulation? Please justify the preferred option (further details in Evidence Base)

MPR covers several issues within the six output areas of RIIO-ED1. We considered whether each issue met the criteria under MPR as currently defined, plus issues that could be included in an extended scope. Our decision document contains our assessment of each issue against the original scope of MPR. For ease of presentation, this section details our recommended option, followed by the other options we considered.

Definition of MPR Scope:

Preferred option - Option 1: retain the scope of MPR as defined. This is the base-case or Business as Usual option

To maintain the original definition of MPR scope, as defined in the RIIO-ED1 Strategy Decision.²

Continuing with the scope as originally defined maintains the stability of the regulatory regime and regulatory confidence. Long-term investment in energy networks is central to maintaining assets and network resilience, and keeping costs as low as possible. As set out in our RIIO-2 framework consultation, the stability of the regulatory regime allows companies to attract global investment and support innovation and reliability at the lowest cost. Under this stable framework, we expect that RIIO-2 can deliver lower returns for companies - which investors can plan for now - and help secure a forecast £5 billion of benefits for consumers (reducing consumer bills by £15-25 per year).

Other options considered:

Option 2: a potential small extension of scope (justified by clear changes in government policy) to cover discrete projects with clearly defined deliverables.

We considered this option due to a clear change in government policy (UK Government cancellation and/or deferral of the electrification of specific railway lines in England and Wales). This had a tangible impact on the need for Western Power Distribution (WPD) to incur significant expenditure on specified projects (diverting/moving equipment to enable the electrification of rail lines). These costs were not associated with a formal output and, therefore, addressing this issue through MPR would have required an extension of the defined scope.

Stakeholders highlighted that extending the scope to cover this project would:

- a) undermine regulatory confidence and the confidence of investors for future investment in energy networks;
- b) represent a significant diversion from the stated approach to MPR; and
- c) result in other issues needing to be considered alongside rail electrification (which would likely result in additional costs and thus the requirement for greater allowances for DNOs).

Since the initial consultation, WPD have volunteered to return the unspent capital costs associated with this project³. We consider that an extension of scope to cover other issues would likely result in additional costs for consumers, principally through requests for additional funding from DNOs to support delivery. We therefore decided not to proceed with this option.

²https://www.ofgem.gov.uk/sites/default/files/docs/2013/02/riioed1decuncertaintymechanisms_0.pdf

³https://www.westernpower.co.uk/docs/About-us/financial-information/2018/Annoucement_18-04-18.aspx

Option 3: an extension of scope to cover wider issues as raised by stakeholders

In early discussions on the approach to MPR, some stakeholders suggested that the review should look at wider issues, including network company returns and the design of incentives. Although this would be a significant diversion from the approach set out in the RIIO-ED1 Strategy Decision, we consulted on this option to garner stakeholder views on such an approach.

Most consultation responses (primarily DNOs, investors, and other network companies) were strongly opposed to this approach, expressing concern that it would reduce regulatory confidence and lead to higher investment costs for network companies under future price controls. Some stakeholders suggested that this approach would cause them to re-consider future investment in energy networks, with one respondent suggesting that the consultation has had a notable negative impact on their share prices to date. Only one consumer representative group responded, making it clear that any decision with respect to Option 3 should be dependent on Ofgem’s assessment of potential benefits and costs to consumers.

A wider extension of scope could take a number of forms, if pursued. Our assessment of potential consumer impacts included the following areas:

- incentive performance and design, including the Interruptions Incentive Scheme (IIS) and Broad Measure of Customer Satisfaction (BMCS);
- financial performance, including projected DNO underspend over the 8-year ED1 period; and
- key financial metrics, including cost of equity.

Reductions to DNOs’ allowances or the level of reward earned under incentives could result in short-term benefits to consumers in the form of lower bills. However, as for Option 2, any extension of scope could also result in additional costs, particularly from:

- reduced regulatory confidence and potentially higher risk premia faced by companies; and
- weaker incentives for network companies to outperform future regulatory settlements.

We assess these costs and benefits in detail in the sections below. In summary, the assessment shows a high degree of uncertainty, particularly around measurements of regulatory confidence and the impact this could have on the cost of capital for RIIO-2. **Note that our analysis of regulatory confidence – including any indicative impact on the cost of equity and/or cost of capital - relates specifically to the decision on the scope of the MPR.**

Our analysis shows that the impact of these risks should they materialise is sufficiently significant to outweigh any short-term consumer benefits. Accordingly, we have decided not to proceed with this option.

Preferred option - Monetised Impacts (£m)

Business Impact Target Qualifying Provision	Non-qualifying as Price Control Measure
Business Impact Target (EANDCB)	Non-qualifying as Price Control Measure
Net Benefit to Ofgem Consumer	No net benefit as this is Business as Usual

Wider Benefits/Costs for Society	Business as usual wider costs and benefits are per ED1 price control
<p>Explain how was the Net Benefit monetised, NPV or other Under this option, any variation in company under or overspend against the original RIIO-ED1 allowances will continue to be shared with customers.</p> <p>Maintaining regulatory confidence means that customers will not be at risk of higher investment costs (see “Hard-to-Monetise impacts” below).</p>	

Preferred option - Hard-to-Monetise Impacts

<p>Describe any hard-to-monetised impacts, including mid-tem strategic and long-term sustainability factors following Ofgem IA guidance This approach will preserve the original RIIO-ED1 settlement, maintaining incentives on companies to deliver their outputs at an efficient cost. Underspend in the price control is subject to the Totex Incentive Mechanism (TIM), which incentivises DNOs to be as efficient as possible, as well as other mechanisms (reopeners) which are detailed below. This is in line with our Regulatory Stances, particularly Regulatory Stance 2: <i>Driving value in monopoly activities through competition and incentive regulation</i>.</p>	
<p>Key Assumptions/sensitivities/risks In the consultation we identified eight issues (Electric Vehicles, European Clean Energy Package, National Flood Resilience Review, Resilience of Networks and Information Systems, Black Start, transition to Distribution System Operator (DSO), Smart Meters and Rail Electrification) to consider under the scope as defined when ED1 was set, but noted our view that these did not warrant an MPR. The majority of consultation responses agreed with this view; our analysis of Option 1 assumes none of these issues progress through an MPR as currently defined.</p>	
<p>Will the policy be reviewed?</p>	<p>No. The decision will stand until the end of the RIIO-ED1 price control period (31 March 2023), after which a new price control will take effect.</p>
<p>Is this proposal in scope of the Public Sector Equality Duty?</p>	<p>No</p>

Option 2 – Monetised Impacts

Business Impact Target Qualifying Provision	N/A as above
Business Impact Target (EANDCB)	N/A as above
Net Benefit to Ofgem Consumer	Net cost of ~£305m (present value)
Wider Benefits/Costs for Society	Not calculated
<p>Explain how was the Net Benefit monetised, NPV or other Given that WPD have volunteered to return the unspent capital costs associated with rail electrification work, the benefit of pursuing this option is limited. If WPD had not offered to voluntarily return this money, with no intervention, the current price control mechanisms would result in around £12 million being returned to customers through the TIM. Therefore, intervention to recover the unspent capital costs could benefit consumers by around £64 million. This equates to roughly £55m in present value terms.</p>	

In response to the consultation, a number of DNOs gave an indicative view of the scale of other issues that should be considered alongside rail electrification, should we proceed with Option 2. The figures provided in the consultation were high-level (and only provided by some companies) and highly uncertain. To quantify the impact, we have reviewed the data provided by DNOs, extrapolated this to reflect a sector-wide position and challenged the costs identified. As a result, we estimate that a decision to progress with Option 2 could result in requests for additional funding from DNOs in the order of £360m in present value terms.

An assessment of the range of costs relating to regulatory confidence and potential impacts on the cost of equity and cost of capital is set out for Option 3; any corresponding costs for Option 2 are likely to fall towards the lower end of the range presented. This assessment reflects the scope proposed under Option 2 (small, discrete extension for specific deliverables) and the increased costs for consumers arising from the additional funding sought.

Describe any hard-to-monetise impacts, including mid-tem strategic and long-term sustainability factors following Ofgem IA guidance

This option may have a negative impact on regulatory confidence (as signalled in the consultation responses) and on how companies react to incentives and the price control settlement. These impacts could serve to increase longer-term investment costs. While the materiality of this negative impact is uncertain, we expect this would fall towards the lower end of the indicative range set out in our analysis of Option 3.

Key Assumptions/sensitivities/risks

In the consultation, we only identified one issue that could be addressed under Option 2: rail electrification. Based on the available information, we assume the affected DNOs would not incur any further costs relating to rail electrification projects (either those that have been cancelled or that have been identified as potentially occurring in the future).

Responses to the consultation identified a number of other issues that stakeholders believe should be considered alongside rail electrification in the scenario of an extended scope. WPD’s response to the consultation highlighted that they may incur further rail electrification costs in South Wales, should new projects go ahead.

Will the policy be reviewed?	No. The decision will stand until the end of the RIIO-ED1 price control period (31 March 2023), after which a new price control will take effect.
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Is this proposal in scope of the Public Sector Equality Duty?	No
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Option 3 – Monetised Impacts

Business Impact Target Qualifying Provision	N/A as above
Business Impact Target (EANDCB)	N/A as above
Net Benefit to Ofgem Consumer	NPV of £322m, excluding impact of reduced regulatory confidence. We would expect net costs to consumers if impact of reduced regulatory confidence included (see summary table below)
Wider Benefits/Costs for Society	Not calculated

Explain how the Net Benefit was monetised, NPV or other

Proceeding with Option 3 would be a significant extension of scope and a clear movement away from the policy established when setting ED1 (other Ofgem decisions will reflect the approach that was both signalled and anticipated). Accordingly, there could be significant costs and benefits associated with any of the approaches detailed below. These costs and benefits relate to, among other things, regulatory confidence and the future cost of equity/cost of capital, which may affect each of the RIIO price controls rather than be restricted to RIIO-ED. Determining values for these approaches often involves uncertainty and assumptions. Where possible and appropriate, we have monetised these through NPV.

Describe any hard-to-monetise impacts, including mid-term strategic and long-term sustainability factors following Ofgem IA guidance

IA SUMMARY TABLE – OPTION 3 COSTS AND BENEFITS ASSESSMENT

OPTION 3 - SUMMARY OF BENEFITS AND COSTS

Assessment of Potential Consumer Benefits (benefits over 4-year ED1 period)^		
Area	2012/13 Prices	Present Value of Benefits (PVB)
Incentives Redesign	£564m	£518m
Underspend	£178m	£164m
Total	£743m	£682m
Assessment of Potential Consumer Costs excluding Regulatory Confidence (costs over 4-year ED1 period)		
Area	2012/13 Prices	Present Value of Costs (PVC)
At Risk Investment	£392m	£360m
Reduced Efficiencies	£0*	£0
Total		
Net Present Value Excluding Regulatory Confidence (NPV = PVB - PVC)		
PVB	PVC	NPV
£682m	£360m	£322m

*Already reflected in level of underspend as net benefit position.

Summary of Regulatory Confidence relating to MPR (5-year Period of RIIO-2)^		
Impact (Note that for anticipated decisions this impact would be expected to be zero)	Total Cost	Present Value of Costs (PVC)
Increase in cost of equity - 10 to 100 bps (0.1% - 1.0%)	£150m - £1,500m	£126m - £1,264m
Increase in cost of capital - 10 to 100 bps (0.1% - 1.0%)	£375m - £3,750m	£316m - £3,161m
Sensitivity Tests		
Increase in cost of equity to remove +NPV		~ 20 bps
Increase in cost of capital to remove +NPV		~ 9 bps
Increase in cost of equity to remove +NPV (IF "at risk investment" and "reduced efficiencies" assumed at ZERO PVC)		~ 50 bps
Increase in cost of capital to remove +NPV (IF "at risk investment" and "reduced efficiencies" assumed at ZERO PVC)		~ 20 bps

^Benefits are measured over the 4-year period to 2022/23, which is period to which any changes through an MPR would apply. Consumer benefits beyond this period would be captured in the settlement for ED2. The cost impacts from reduced regulatory confidence are assumed over a 5-year period, which is assumed for RIIO-2 for modelling purposes. The commentary below provides further information on the underlying rationale for this approach.

It is hard to monetise the costs and benefits associated with Option 3. The benefits are more tangible as they are based on assumptions around value that could be extracted from consumers

by reducing the potential rewards available under key incentive mechanisms (IIS and the BMCS), and also reducing the scope for underspend in future years. This gave a PVB of **£682m**.

The costs are much more difficult to estimate. The main short-term costs are likely to be those that the DNOs have highlighted (through their responses) would be appropriate to include if we were to undertake a MPR (additional allowances for the policy issues we had listed under Option 1 in the consultation). Based on our assessment of these costs we determined a PVC of **£360m**. On this basis – and excluding any costs from increased regulatory uncertainty – **the NPV for Option 3 would be £322m**.

This approach ignores any potential knock-on additional investment costs in RIIO-2 that may reflect the impact of reduced regulatory confidence on the cost of capital or the cost of equity. To assess the likely impact of reduced regulatory confidence on the cost of capital or cost of equity we looked at a range of plausible scenarios, the history of related events in the UK and elsewhere, and undertook a literature review and sought input from a range of academics. Taken together, these sources suggest that regulatory uncertainty can have a negative impact on the cost of capital. At the same time, they also strongly support the view that it is difficult to robustly model the size of the impact.

We approached the assessment from the perspective of what change would be required to the cost of capital and/or the cost of equity to outstrip the potential benefits of Option 3 and whether such a level of change would be likely. As set out above, the NPV before considering the costs of regulatory uncertainty would be £322m. Our analysis has shown that this would be offset by an increase in the cost of capital of greater than or equal to **9 bps**, or an increase in the cost of equity of greater than or equal to **20 bps**. Even assuming no additional costs for consumers for at risk investment, the full PVB of £682m would be offset by an increase in the cost of capital greater than or equal to **20 bps**, or an increase in the cost of equity greater than or equal to **50 bps**.

Assessing the risks from reduced regulatory confidence requires judgement. However, based on related examples in the UK and elsewhere, we believe that the level of change in the cost of capital or cost of equity required to offset any consumer benefits is not unrealistic. By way of comparison, a review of long-term government bond yields⁴ suggests that a 20bps increase in the cost of capital is around two thirds of the difference in bond yields between the German and French governments. Considering cost of equity impacts alone, a 50bps increase in the cost of equity is similar to the difference in bond yields of the French and Spanish governments.

In summary, our key conclusion is, therefore, that Option 3 is likely to have a negative NPV, with a material risk that the indirect costs of Option 3 through reduced regulatory confidence will outweigh the direct net consumer PV benefit of £322m. Accordingly, we assess that it would not be in the interests of GB energy consumers to pursue this option.

⁴ Eurostat

DETAILED SUPPORTING ANALYSIS AND INFORMATION**ASSESSMENT OF COSTS TO CONSUMERS****(1) Regulatory Confidence**

Several consultation responses highlighted that proceeding with Option 3 could result in significant costs for consumers. That is, costs to consumers from reduced regulatory confidence and the impact this has on the Weighted Average Cost of Capital (WACC)⁵ for future price controls. Our assessment, supported by a thorough review of available academic literature, shows that under certain circumstances these risks can be potentially significant, but also highly uncertain.

Regulatory confidence and the cost of equity

The cost of equity is the return on investment that is required by a company's shareholders to compensate for the risk they undertake by investing their capital. This consists both of dividends and capital gains (e.g. increases in share value), with capital investors seeking returns on their funds that are commensurate with the risk undertaken. The cost of equity for ED1 was set at 6.0% for slow-track and at 6.4% for fast-tracked companies.

Asset based pricing models, including the Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT), are widely used to estimate the impact of regulatory risk on the cost of equity for regulated utilities in the UK (see Annex A for details of our literature review). CAPM is the approach used for RIIO1, and we proposed to continue with CAPM as the basis of estimating the cost of equity for the RIIO-2 price controls.

Quantifying the risk and impact of regulatory risk is uncertain and requires a number of assumptions and some judgement. The market assessment, below, reviewed changes in share prices of utility networks following the publication of the MPR consultation document in December; we also assess whether it was possible to identify a correlation with share price movements and the cost of capital.

In the CAPM model, the cost of equity is expressed as:

$$\text{Cost of equity} = \text{Risk free rate of return} + \text{Beta} \times \text{Equity Risk Premium (ERP)}$$

We assume, based on available evidence, that the ED MPR consultation was unlikely to influence the risk free rate or ERP, with any impact likely to be limited to changes in the beta. Betas, however, are normally observed over longer time periods, so identifying any change in the measured beta coefficient pre and post regulatory announcement requires a number of simplifying assumptions, which could be inaccurate and misleading. Interpreting beta numbers must be treated with caution given the challenge of isolating specific events in one sector from what is happening elsewhere in the broader economy.

Given these challenges, we present the consumer cost arising from an increase in the cost of equity impact as a range. Given the scope set for an MPR in the ED1 Strategy Decision, any extension of scope may have been unexpected. Accordingly, for the purpose of this IA we assume that any increase could fall within an indicative range of between 10 basis points (0.1%) and 100 basis points (1.0%). The use of this range shows the relationship between an increase in the cost of equity and the potential medium term costs for consumers – illustrating the level of

⁵ This is the expected rate of return required by investors, including both the cost of debt to a firm, and the cost of equity

change that would be required to generate a negative NPV for the option assessment. **Note that, for decisions that remain in line with Ofgem published policies and strategies, we would expect this impact to be zero.**

The use of the indicative range also reflects that, whilst regulatory changes are likely to impact upon the cost of capital, there is insufficient evidence available to quantify the size of these impacts robustly. In presenting our NPV analysis, we also control for this uncertainty by including scenarios that test the sensitivity of the full value of consumer benefits from this option to changes in the increase in the cost of equity (this approach is replicated for the cost of capital assessment below, with the rationale for using the range the same as that set out above).

Measured against a cumulative Regulatory Asset Value (RAV) estimated at £75 billion, **the cost to consumers could fall in the range of £126 million to £1.264 billion in present value terms,** shown in the following table.

Increase in CoE	Annual Cost	Assumed Period	Total Cost	Present Value of Costs
10 bps (0.1%)	£30m	5 years (RIIO-2)	£150m	£126m
100 bps (1.0%)	£300m	5 years (RIIO-2)	£1,500m	£1,264m

Alternative arguments could be presented around the length of impact and if the increase would apply to the full RAV across all RIIO sectors or be restricted to RAV additions over the period in question

We have considered whether any increase in the cost of equity (or indeed the broader cost of capital in the examples below) would be transitional or enduring. For the purposes of this assessment, we assume that any impact on the cost of equity would apply over the 5-years of RIIO-2 (although noting the length of future control periods is still to be confirmed). The cumulative impact as well as the annual cost is shown in the table above. The real impact on companies could be shorter or indeed longer, particularly if there was a perception that the risk of similar regulatory decisions in the future was higher.

We also assume that the impact would apply across against the full WACC across all four RIIO price controls. For illustrative purposes, if the impact was restricted to the ED sector RAV (estimated at £24 billion) then the impact would be up to £405m in present value terms (based on an increase of 100 basis points over 5 years).

Impact on the cost of debt and cost of capital

The calculations above limit the impact to a change in the cost of equity, but some consultation responses expressed their concerns regarding the broader WACC. This leads us to reviewing impacts on the cost of debt, i.e. the assumed rate of interest that network companies are paying on their current debt.

Our assessment of the cost of debt (and accordingly, WACC) impact also requires assumptions and judgement. In particular, whether a widening of MPR scope has a negative impact on regulatory confidence and whether this translates to changes in credit rating agency assessments. Any downgrading of network companies' ratings could increase the cost of debt.

This is a qualitative assessment. However, any robust quantitative assessment is complicated further by the fact that under the CAPM approach, any impact is likely to be driven more by the

evolution of the risk free rate, which would not be impacted by the publication of our MPR consultation document alone. Given this uncertainty, we also model the consumer impact of increases in the cost of capital of between 10 and 100 basis points over a fixed five-year period (rationale for range and time period set out above).

The impact is shown in the table below, **with a cost of between £316m and £3.161 billion in present value terms.**

Increase in cost of capital	Annual Cost	Assumed Period	Total Cost	Present Value of Costs
10 bps (0.1%)	£75m	5 years (RIIO-2)	£375m	£316m
100 bps (1.0%)	£750m	5 years (RIIO-2)	£3,750m	£3,161m

The scenarios presented above are illustrative and based on a number of generalised assumptions, but show that reduced regulatory confidence could carry significant costs over the medium term. **Even at the lower end (0.1% increase in cost of capital), these risks could increase annual costs by up to £68m per year, or up to £316m over the assumed RIIO-2 price control period (both values expressed in present value terms).**

These calculations are broadly consistent with the corresponding estimations set out in the RIIO-2 Framework Consultation⁶, and RIIO-T1 and GD1 MPR decision⁷.

For illustrative purposes, if the increase in the cost of capital was restricted to the ED RAV then the cost could range from £101m (10 basis point increase) to £1,012m (100 basis points) in present value terms over the 5-year period.

Our approach under RIIO means that we provide a WACC allowance adequate for a 'notional' company and a cost of debt index based on the company rating irrespective of existing debt. We have also looked at scenarios whereby companies would experience a rise in rates when trying to raise new debt. Using actual and forecast data available for ED1, we value the RAV additions for the sector at around £11.4bn. Assuming a similar position for a 5-year ED2, an increase of 100 basis points in the cost of capital would increase costs by up to £480m in present value terms.

Share Price Movements and Impact on cost of capital

Recent Market Evidence

The assessment of cost of capital impacts takes an analytical approach to quantifying the potential impact on consumers. Where possible, we support this with an assessment of available market information, particularly movements in the share prices of key utility stocks pre and post the publication of the MPR consultation document.

In doing this it is important to understand that share price impacts can arise for two primary reasons:

- Investor perceptions that price controls are becoming more or less generous, and future returns may be affected; and
- Investor perceptions that the regulatory regime is becoming more or less uncertain, which increases regulatory uncertainty and potentially the future cost of capital.

⁶ https://www.ofgem.gov.uk/system/files/docs/2018/03/riio2_march_consultation_document_final_v1.pdf

⁷ https://www.ofgem.gov.uk/system/files/docs/2016/05/mpr_decision_document_final.pdf

There is some evidence around negative market impacts for some companies following the ED MPR consultation launch, but the impact was limited across network companies and the key drivers are speculative.

Following the publication of the ED MPR consultation document in December, there is evidence of a loss in market capitalisation for the PPL Corporation (US energy company owning group of WPD), with their performance against the bond appeared marked, particularly when compared against National Grid over the same period.

Share price movements for other electricity distribution owning groups (for example, Iberdrola, CKI, Scottish and Southern Energy, Berkshire Hathaway) over this same period are less marked, with no observable impact from the MPR consultation. This likely reflects the broader diversification of these groups and their relative exposure to UK distribution markets compared to PPL.

Evidence from other jurisdictions

We identified three political or regulatory events, all subject to their own academic review, that are worthy of review:

- the 1997 budget windfall tax on privatised utilities;
- Stephen Littlechild's second review of price controls in March 1995; and
- Spanish Government reforms from the mid-2000s to reduce a significant electricity tariff deficit stemming from generous renewable subsidies.

These events and their impacts are summarised below. The key conclusion is that share prices are affected by significant political or regulatory interventions. Drawing specific conclusions on the impact of regulatory confidence and any changes to the cost of capital has not been possible.

1997 Budget windfall tax on privatised utilities

Introduced in the 1997 Labour Government budget, this tax applied to regulated companies privatised by flotation.

The prospect of windfall tax was well trailed in the Labour manifesto of 1997. A review of share prices of companies affected by the tax shows a pattern of commonality, with share prices dropping ahead of the election, recovering, but then falling again ahead of the budget, before another rebound.

Littlechild

In March 1995, Stephen Littlechild, the Director General of Electricity Supply and Head of OFFER, announced a second review of the price controls that had been set the previous year (further detail in literature review). Following this announcement – unexpected by Regional Electricity Companies (RECs) or investors at that time – share prices fell by almost a quarter, removing around £4bn in value.

Measuring the impact on regulatory confidence is difficult, not least because of the relationship between the reduction in value and the high returns that were reported by the RECs in 1994 and indeed the takeover activity that resumed across the sector at the beginning of 1995. Most econometric studies have concluded that the decline came from at least two effects: a reduction in future revenue streams and changes in the cost of capital.

Evidence from Spain

From the mid-2000s, the Spanish Government granted generous subsidies to producers of renewables, primarily solar and wind, which supported a massive investment in these sectors. The costs to support this increased dramatically, creating a significant electricity tariff deficit.

Faced by significant risks around financial sustainability, the Spanish Government introduced a number of reforms between 2012 and 2014 to reduce this deficit. Multiple measures reduced the economic incentives for renewable energy, created uncertainty in the electricity system in Spain, and weakened the financial performance of companies operating in the sector.

There were periods of meaningful declines in Iberian stocks in the run-up to these reforms being announced, particularly for Iberdrola, RED, EDP and Endesa at periods between December 2010 and 2013. Whilst political and regulatory intervention may have influenced each company's systematic risk, these impacts are volatile and uncertain. Once the measures were confirmed in 2013, the stocks rebounded strongly.

(2) Costs associated with widening the price control*Impact on investment*

Real Options Effect theory predicts that firms respond to increased uncertainty by reducing capital investment, after controlling for investment opportunities and availability of funds; this has been shown through empirical studies. Real Options Effect is more pronounced for firms with fewer financing constraints, larger size, and greater investment opportunities.⁸

Consumers benefit from investments made by the network companies. To the extent that network companies have discretion over the level of investment they carry out, increased uncertainty might be expected to reduce their investment rates. Unless companies receive higher expected returns, any reductions to investment rates could result in a cost to consumers.

Quantifying foregone investments and associated costs with certainty is difficult due to the many complex interdependencies involved. For example, reduced short-term investment by DNOs in preparation for the anticipated uptake of Electric Vehicles (EVs) may not have an immediate impact on outputs, but could increase the future cost to society overall. A similar argument exists for the decarbonisation of the heat networks, and the move towards becoming a Distribution System Operator.

Additional issues identified by DNOs

There are potential costs associated with a number of other issues that we identified in the consultation.⁹ We noted that there is insufficient certainty around the changes required to outputs to warrant an MPR as currently defined; however, if we pursue Option 3, we will need to consider at least some of these issues.

Some consultation responses attempted to assign a value to these issues. We used the information presented, extrapolated this to reflect a sector-wide position, and challenged the costs identified, particularly where linked to existing licence commitments.

⁸ [Managerial Flexibility, Uncertainty, and Corporate Investment: The Real Options Effect](#)

⁹ EU Clean Energy Package, Black Start, DSO Transition, Smart Meters

Our assessment is shown in the following table. A decision to progress with Option 3 could mean DNOs requesting additional funding in the order of £360m in present value terms. This is not an aggregate assessment of whether such claims would be valid under Option 3 or whether associated costs are reasonable or indicative of what Ofgem would allow.

Areas	Assessment (£m, Present Value)
Driving whole-system/DSO transition, Electric Vehicles, Network Resilience Measures, Environmental Obligations, Smart Meter Roll-Out	360

Reduced drive to deliver efficiencies

A central part of the ED1 price control is the Totex Incentive Mechanism (TIM). By allowing DNOs to keep a proportion of any cost savings (with the remainder going to consumers by way of reduced bills), the interests of company shareholders and consumers are aligned. The TIM encourages DNOs to try to find the most efficient ways to deliver their RIIO-ED1 outputs.

Proceeding with Option 3 could mean the companies have a reduced incentive to deliver efficiencies that will be shared with consumers via the TIM. This could result in DNOs moving away from a Totex approach to investment (i.e. finding the most efficient approach, either opex- or capex-based), back to a capex approach to investment. For example, Option 3 may reduce the DNOs’ drive to invest in new, innovative strategies that have high upfront costs but deliver long-term benefits, as there is a possibility that they (and consumers) will not retain the benefits.

As with Real Options Effect, assigning a monetary value to this potential change in approach is challenging, not least because it brings a key element of the regulatory framework into question. As noted above, DNOs’ latest forecasts show an expected underspend of roughly £1bn (4%) over ED1, of which £382m is attributable to the last four years of RIIO-ED1. The TIM would return roughly £119m of this to customers (after accounting for costs recovered through existing reopener mechanisms, worth around £85m); the remainder would go back to DNOs. Proceeding with Option 3 is likely to eliminate a proportion (if not all) of these benefits. It could also affect future price controls through a missed opportunity to learn from efficient business processes, which can be factored into our assessment of future business plans.

We note that the costs associated with the Real Options Effect are the mirror image of the benefits we have calculated for underspend above i.e. the underspend was already adjusted to remove the component which automatically goes back to consumers through TIM. Therefore, to avoid double counting the delivery efficiencies are calculated as net £0m.

Impact on future cost recovery via existing mechanisms

The TIM is one of the mechanisms within RIIO-ED1 that recovers a proportion of DNO underspend for consumers. We also have specific uncertainty mechanisms in place that we can use to address any windfall and/or inefficient gains by the DNOs in certain areas of the price control. The load related expenditure and high value projects reopeners, along with the opportunity to close out specific elements at the end of the price control, are well-established, and have been used effectively in the past. In closing out the last price control (DPCR5), we were able to recover roughly £200m (allowances). Based on two years of actual expenditure and six years of forecast expenditure, we expect to recover around £85m in allowances under the Load and High Value Projects reopeners, in addition to any costs recovered via the TIM. This is a lower bound, and actual recovery is likely to be higher.

Similar to the TIM, we assess that proceeding with Option 3 could eliminate a proportion of these benefits, and could restrict our ability to take steps in these areas later in the price control.

ASSESSMENT OF BENEFITS TO CONSUMERS

Proceeding with Option 3 could include a number of options, including reviewing the design of incentives and steps to address financial performance (underspend).

(1) Incentive design

The IIS is, after the TIM, the main revenue source for DNOs in RIIO-ED1. DNOs have earned around £300m in RIIO-ED1 so far, and five licensees have reached the reward cap each year. These caps have reduced the amount that DNOs could have earned by £40m in the first two years alone.

We expect that the DNOs will maintain and/or improve their performance under the IIS over the remainder of the price control. Assuming that 2016-17 performance continues over the remainder of the price control, we anticipate that the DNOs could earn a further £452m over the final four years of RIIO-ED1 (on unplanned interruptions performance).¹⁰ It is worth noting that, without the reward caps in place, the total reward would be around £23m higher.

We recognise that – to date - the rewards are higher than anticipated when we set RIIO-ED1. Therefore, under Option 3 we considered two possible approaches to the IIS:

1. Leave the incentive unchanged, accepting that rewards are higher than anticipated but limited by the revenue caps; or
2. Adjust the targets for the final four years of RIIO-ED1 to reduce the reward whilst retaining some incentive for continued performance improvements.

Leaving the IIS unchanged is likely to mean DNOs continue to earn high rewards by delivering network reliability beyond the targets set. As mentioned above, we anticipate that this is worth a further £452m on unplanned interruptions over the final four years of RIIO-ED1.

Adjusting targets from the midpoint of RIIO-ED1, as suggested by one consultation response, could result in reduced revenues earned under the IIS. We now have four extra years' performance data from the DNOs (the last two years of DPCR5 and the first two years of RIIO-ED1) since we set the targets, and we could use this updated data to set new targets from the midpoint of ED1 onwards. Using this data and the original target setting methodology to produce new targets from 2019/20 onwards would reduce DNOs' total reward by around £474m, resulting in the DNOs receiving a net penalty of around £22m over the final four years. It is worth noting that, over the whole of RIIO-ED1, the DNOs would have earned around £520m net reward with these updated targets.

Therefore, reviewing the IIS could benefit consumers by around £474m over the final four years of RIIO-ED1. In present value terms, this is equivalent to £435m, or roughly £109m per year.

Option 3 could also include a review of the BMCS, which has three components: a Customer Satisfaction Survey (CSS) reward/penalty; a Complaints Metric penalty; and a Stakeholder Engagement and Consumer Vulnerability (SECV) reward. So far, the DNOs have earned roughly £39m per year of RIIO-ED1 under the BMCS.

¹⁰ Performance and targets for planned interruptions are set and assessed separately, and are not considered here.

All network companies can earn up to 0.5% of Base Revenue per year through the SECV incentive; for the DNOs, this increased from 0.2% in DPCR5. Averaging the scores awarded to date shows that, over the remainder of RIIO-ED1, the DNOs are on track to earn £58m over the last four years under the current arrangements. Reducing the maximum reward to 0.2% of Base Revenue would reduce the DNOs' expected reward by £35m (60%) to £23m. With the exception of the Consumer Vulnerability component, the remainder and largest proportion of the SECV is common across all price controls. Therefore, if any changes were to be made to the SECV then equivalent changes would need to be made to the other sectors. Reducing the maximum reward to 0.2% of Base Revenue would reduce all sectors' rewards by £73m (60%), to £49m.

In the first two years of RIIO-ED1, the majority of the DNOs' rewards under the BMCS have come from the CSS. The three elements of this have different maximum reward values, ranging from 0.2% of Base Revenue to 0.5% of Base Revenue. Averaging the scores achieved to date and rolling this forward over the rest of the price control shows that DNOs are on track to earn around £96m over the last four years under the current arrangements. Capping the maximum reward for each element at 0.2% of Base Revenue would reduce this by £18m, to £79m.

A review of the BMCS could therefore be worth up to £91m or £83m in present value terms (~£21m per year).

Therefore, reviewing the IIS and BMCS incentives for the last four years of RIIO-ED1 could benefit consumers by around £518m in present value terms, or roughly £130m per year.

(2) Underspend

The TIM is one of the main contributors to Return on Regulated Equity (RoRE) outperformance in RIIO-ED1. Based on the latest information, the DNOs are currently forecasting to underspend by over £1bn (4%) over the course of the price control, £382m of which is forecast in the last four years. The TIM and a number of scheduled downside reopeners (worth ~£86m) will reduce the amount that the DNOs will retain to around £178m – **equivalent to £164m in present value terms**. Therefore, in proceeding with Option 3 it is plausible that we could recover this revenue and return it to consumers through a one-off adjustment to allowed revenues.

Key Assumptions/sensitivities/risks

Reduced regulatory confidence will impact cost of capital for RIIO-2

Our analysis assumes that significantly broadening the scope of the MPR could have an impact on investment costs into RIIO-2. The impact of these is uncertain and we have therefore considered a broad range of impacts on both the cost of equity and cost of capital. We have assumed an equal impact across all sectors for RIIO-2, but we might expect some differences in practice.

We have not attempted to quantify the impact arising from wider implementation and/or political risks.

If we recover money now companies are less likely to trigger future downside reopeners

We are assuming that, by taking money back now, companies are less likely to meet the triggers that enable us to take back money in the future (for the load related reopener and High Value Projects). This would reduce the amount returned to customers through the ED1 Closeout process.

Recovering money now will not massively impact future performance

We have assumed that recovering incentive rewards and underspend will not have an effect on performance in the remainder of the price control i.e. on future performance under incentives.

Will the policy be reviewed?

No. The decision will stand until the end of the RIIO-ED1 price control period (31 March 2023), after which a new price control will take effect.

Is this proposal in scope of the Public Sector Equality Duty?

No

Summary table for all options

Summary of options	Main effects on Ofgem outcomes	Benefits	Costs	Key Considerations
Option 1	Maintains status quo, therefore no additional effects on Ofgem outcomes	No additional net benefit.	No additional costs identified as option implies standard monitoring and implementation of the price control.	Approach clearly in line with RIIO-ED1 Strategy Decision, maintaining regulatory certainty of the current and future price controls.
Option 2	Lower bills in the short term potentially offset by higher bills due to increased investment costs in longer term	No additional net benefit.	Unclear at this stage, but suggestions from stakeholders indicate addressing other issues under this option could add around £360m through requests for additional allowances.	Affected DNOs unlikely incur further expenditure on diversion activity on the cancelled rail electrification projects, but may incur additional costs on newly identified projects.
Option 3	Lower bills in the short term potentially offset by higher bills due to increased investment costs in longer term	Short-term benefits could be up to roughly £682m in present value terms.	If we progress with an MPR then DNOs may seek additional costs of around £360m. Costs from reduced regulatory confidence could be significant, affecting all network companies (not just the DNOs). Incentives would also be weakened.	High risk to regulatory confidence and incentives. Difficult to quantify the costs and benefits to consumers at this stage.

Annex A. Literature review on the impact of regulatory uncertainty on the cost of capital

1. Introduction and context

If a regulator creates uncertainty, what happens to the cost of capital and how long will effects last? Our initial impact assessment highlighted:

- Several papers identify that regulatory inconsistency increases a regulated firm's beta.
- Literature does not tell us anything concrete about assigning a value to regulatory risk.
- Share valuations are impacted by regulatory announcements.

This literature review adds to the initial impact assessment and provides more detail on the relevant literature that can help illuminate the answer to these questions in the context of the MPR options. It also takes account of consultation responses that commented on the issue.

The estimation of the weighted average cost of capital (WACC) is a central element of existing price controls. The measurement of the cost of equity has been a longstanding and controversial issue in regulatory economics. The most recent contribution to the area (Wright *et al*, 2018) assembled a group of academics, practitioners and consultants, from a range of relevant disciplines and perspectives to review the area. On many issues, there were marked divergences of opinion.

There is an even greater challenge in this paper as the aim is not to estimate WACC (or its components such as the cost of debt that may be more easily measured) but to measure the change in WACC in response to a change in regulatory or market conditions.

For regulated electricity networks, there is relatively little evidence available with two event studies related to electricity distribution in the UK. For this reason, we expanded the literature search to papers related to water and telecoms networks and commercial and grey literature.

As part of this review, we contacted the members of the Ofgem Academic Panel and discussed some issues with Professor Derek Bunn of the London Business School and Professor Paul Grout, our Non-Executive Director. One of the main themes discussed was that the cost of debt is inherently easier to measure than WACC or the cost of equity.

The skewedness of returns is also important. This has been analysed by WPD and their analysis is available in their consultation response, published alongside this decision. WPD provide evidence that a negative skewed distribution has a significant effect on the cost of equity. It highlights that several studies have assessed the implications of risk distributions by comparing returns on portfolios characterised by the same overall expected risk, but with expected returns skewed more to the upside or downside. These studies indicate that, faced with downside risk, investors require a risk premium.

2. Literature Survey

The fact that regulatory risk increases the cost of capital is widely accepted. The literature sometimes expresses effects of this kind in terms of increases in beta in a CAPM framework (e.g. Grayburn *et al*, 2002), though the effect can, of course, have an impact in other models too.

Are there similar precedents or analogous situations to ED MPR Options? The closest precedent occurred on 7 March 1995 when Professor Stephen Littlechild, the Director General of Electricity Supply, unexpectedly released a statement saying that he intended to review again the price controls of the Regional Electricity Companies (RECs) that he had set only eight months previously (Robinson and Taylor, 1998a).

To investigate the impact of this event, Robinson and Taylor examined the conditional variances of returns with the conditioning set of information consisting of variables that explained changes in returns. Variance is a statistical measure of how widely values of a variable are scattered around a central estimate (mean). Conditional variance is a measure of this scatter holding other variables constant.

Robinson and Taylor (*op cit*), examined the volatility of stock price returns before and after the announcement. They concluded that conditional variances for most companies increased after the intervention. They observe that since 'own variance' significantly affect models such as Arbitrage Pricing Theory (APT), unexpected regulatory intervention may increase the cost of capital to the regulated firm.

In a related article, Robinson and Taylor (1998b) reached a more general conclusion on identifying the presence of regulatory risk. However, both studies do not deal with how the variance effects measured translate to specific cost of capital increases, and refer to APT rather than the more widely used Capital Asset Pricing Model (CAPM). Nor is the persistence of impact measured over a prolonged period. Finally, there were observations of counterintuitive results that required rationalisation by an understanding of detailed market circumstances.

Buckland and Fraser (2001) describe Robinson and Taylor's conclusions as partial support for the impact of regulation on the total volatility of returns. In their study, they tested beta values, which is a stronger test. They found a break in betas behaviour for all 12 RECs when the then Office of Electricity Regulation's revised, harsher proposals for the distribution review were published. Subsequently, a series of mergers and takeovers removed the capacity to obtain coherent evidence.

Buckland and Fraser (*op cit*) also conclude that if political risks and regulatory risks are compared, the former has a greater initial and persistent effect than the latter which, in turn, has tended to be transitory in nature.

3. Rating Agency Methodologies (e.g. Moody's methodology)

Rating Agencies rate a debtor's ability to pay back debt by making timely interest payments and the likelihood of default. Moody's publish their methodology (Moody's 2017) and when assessing ratings for regulated companies a 'Stability and Predictability of Regulatory Regime' weighting of 15% is given. Moody's state that the predictability and supportiveness of the regulatory framework in which a network operates – as well as the legal and political framework that underpins it - is a key credit consideration and the one that differentiates this sector from most other corporate sectors.

Appendix 4 of Moody's Outlook (18 January 2018) illustrates in Exhibit 18 the persistence of regulated water company ratings. This is in the context of a 5-year cycle of price controls in the UK

water sector. The shortest time that a rating held at the same level was 4 years, while the longest was 10 years (equivalent of two price control cycles). This example suggests that any action that has a marked effect on expectations could flow through into a persistent impact related to the price control periodicity.

4. Analogous studies where there are cost of capital considerations

Renewable Energy Sources (RES)

The removal of investment uncertainty was the primary rationale to establish a Contract for Difference (CfD) support mechanism for RES in the UK. During the development of the policy, DECC revised its assumed cost of capital reductions from CfDs.

Initial analysis for the Electricity Market Reform White Paper suggested that CfDs could reduce hurdle rates across low carbon technologies by between 30 and 150 percentage points, depending on the technology and investor class. NERA (2013) examined these estimates and, as illustrated below, provided ranges for the main RES technologies. The mid-point of each range would vary from -45bps (offshore wind) to -125 bps (onshore wind).

Table 1 NERA Assessment – Individual Risk Impact on Changes in Hurdle Rates

	Offshore Wind	Biomass Conversion	Onshore Wind
Total Change (excl. Novelty premium)	-90 to 0bps	-120 to -35bps	-170 to -85bps

Newbery (2016) examines the move from administratively set CfDs to competitive allocation from funding pots. Although both involved 15-year contracts, the first were conducted in parallel with the operation of the Renewable Obligations (ROCs) system, and companies could use projects constructed under this regime as their evidence for costs, and required rates of return, as indicated previously. With the move to auctions, this no longer applied; the contracts would go to those offering the best value, including lowest cost of capital, irrespective of costs under the far more volatile and uncertain ROCs system. Newbery estimates the reduction in the cost of capital in the new mechanism to be 300 bps.

Water

The number of papers for UK water regulation is limited. Buckland is a key author in this area. Through his work he found that, as in the electricity sector, there have been significant political and regulatory influences in the systematic risk faced by water utility shareholders.

Telecoms

A key paper on Telecoms is Antoniou and Pescetto (1997). This study measured impacts of regulatory announcements, which affect competition, pricing policy and the supply of services in the telecommunications industry on British Telecom's (BT) systematic risk, as measured by the beta coefficient of a market model. The authors found many individual announcements are significant, but they affect beta in opposite directions and thus no prediction can be made on the sign of their

aggregated impact. They attribute these findings to the situation when one company dominates the industry.

Country ratings

Country risk premiums could give some sense of the bounds about risk impacts. Table 2 reports some euro area long-term government bond yields and two months within the past 12 are selected, as a single month could be unrepresentative.

Table 2. Long-term government bond yields in selected countries

Country\time	Apr-17	Mar-18	Year Average* (4/17-3/18)
Germany	0.22	0.53	0.38
Ireland	0.91	1.01	0.80
Spain	1.61	1.33	1.51
France	0.88	0.84	0.79
Italy	2.26	1.97	2.05
United Kingdom	1.00	1.45	1.23

Sources: Eurostat

* Straight average of monthly figures

The difference in bond yields between the German and French governments was 66 basis points in April 2017 and 31 basis points in March 2018. Because all of the countries except the UK share the same currency, this difference is likely to be predominantly due to differences in perceived creditworthiness. The corresponding comparison for the French and Spanish governments gives a difference of 73 basis points in April 2017 and 49 basis points in March 2018.

It is emphasised that these figures are not a direct indication of the impact of regulatory uncertainty but give a sense of scale to the considerations of the main analysis.

5. Discussion

The literature on the impact of unanticipated regulatory changes on the cost of capital in electricity distribution in GB is extremely limited. Nevertheless, the studies that examined volatility of shares and betas in the sector provide reasonable evidence that the cost of capital will increase. The methodology and practice of rating agencies such as Moody's confirm this from the commercial viewpoint.

The magnitude of the change is uncertain and there are no direct empirical data from event studies.

- If a comparison is made with RES, an interpretation of the NERA results, with the -45bps (offshore wind) to -125 bps (onshore wind) mid-point range, might suggest +85bps for an equivalent increase in uncertainty, but this is extremely unrefined as an approach. Moreover, wind farms' support is for 15 years with a commercial life of 20 years or so and this means that the context is quite different to ED MPR.
- The calculation by Newbery of the change in the CfD mechanism cost of capital impact of 300bps is interesting, but in identifying the impact of an alternative allocation mechanism for CfDs, it may push analogy too far to apply directly to the MPR context.

- Rating agency results again tend towards a broad-brush result of 100 bps range. Country long-term bond rates indicate creditworthiness differences tend to be beneath 100bps unless there are significant economic issues. Again, the direct applicability to ED1 calculations is limited.

The evidence of the persistence of effects is highly ambiguous. Only Buckland and Fraser examine this and they conclude that regulatory effects may be transitory (visual inspection of their data suggests 2-3 years). In contrast, Moody sectoral ratings suggest longer-term impacts (4-5 years plus).

Overall, this more detailed study confirms the conclusions of the impact assessment, suggesting that there is likely to be a significant impact of large regulatory changes on the costs of capital, but does not provide enough evidence to quantify the size of these impacts robustly.

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