

Agenda

Advancing economics in business

Meeting the financeability challenge in energy networks

How can the considerable investment required in energy networks be delivered at an efficient cost to current and future consumers? This article, based on Oxera research for the Energy Networks Association, considers the financing of this investment—specifically the reforms of the financeability framework proposed by Ofgem, the GB energy regulator

Ofgem's review

The challenges of mitigating the effects of climate change, addressing security of supply, and renovating ageing infrastructure mean that UK energy networks are entering a period of sustained high capital expenditure (CAPEX). This investment programme raises two key issues: what is it going to cost, and who is going to pay for it?

Ultimately, the costs will be borne by consumers—the issue is the proportion borne by current relative to future generations of consumers. The approach to financing the investment programme determines how efficiently this transfer is executed. Financeability refers to the duty placed on regulators to ensure that a utility is able to finance its functions. This duty has two components:

- enabling the company to earn a return on its regulatory asset base that is at least equal to its cost of capital;
- enabling the company to raise finance from capital markets readily and on reasonable terms.

Traditionally, UK regulators have tested the second component by modelling the company's expected cash flows over the next price control period, and calculating levels of the key financial ratios used by credit rating agencies for assessing regulated utilities. Breaches of the thresholds consistent with a 'solid investment-grade' rating—usually defined as either A– or BBB+—have been addressed in various ways, at the discretion of the regulator, including: net present value (NPV)-positive revenue uplifts (eg, Ofwat, the water industry regulator in England and Wales, in the 2004 periodic review¹); NPV-neutral revenue re-profiling (eg, accelerated depreciation for energy networks—see the box below); and 'market-based' solutions (eg, increasing the proportion of new debt raised that is assumed to be index-linked).

RPI – X@20, Ofgem's ongoing review of the regulatory regime for energy networks in the UK, includes a review of its approach to financeability.² Ofgem's overall position is that energy networks should remain financeable provided that the allowed return (the weighted average cost of capital, WACC) and depreciation have been correctly determined.

Accelerated depreciation in previous Ofgem price controls

In previous electricity distribution and transmission price control reviews, some companies faced large falls in cash flows as assets held at the time of privatisation became fully depreciated at the same time, leading to a large drop in the regulatory depreciation allowance—termed the 'cliff-face' problem.

Since this problem would have presented some companies with financeability issues, the reduction in cash flow was smoothed over a number of years. This was achieved by shortening the regulatory asset life of

assets acquired post-privatisation and accelerating the depreciation of these assets. This switch was designed to be NPV-neutral.

A different form of accelerated depreciation was used to address financeability issues created by the requirements of the Health and Safety Executive for extensive replacement of gas mains—50% of this expenditure is treated as operating expenditure (OPEX), with the balance being added to the regulatory asset value and depreciated over 45 years.

Source: Ofgem (2004), 'Electricity Distribution Price Control Review: Final Proposals', November; Ofgem (2006), 'Transmission Price Control Review: Final Proposals', December 4th; Ofgem (2007), 'Gas Distribution Price Control Review—Updated Proposals Document', September 24th.

This article is based on the Oxera report 'What is the Impact of Financeability on the Cost of Capital and Gearing Capacity?', prepared for the Energy Networks Association, June 2010. Available at www.oxera.com.

Essentially, its proposal to 'embed' financeability in the regulatory framework would imply the following.

- **Long-term focus.** Ofgem proposes to give financeability a longer-term focus, which would be reinforced by regulatory commitment. While the regulator would continue to monitor the financial health of networks, it would move away from traditional short-term financial ratios, perhaps towards a set of ratios that 'more accurately captures the particular features of energy networks', and consider a period of more than five years.³
- **Alignment of regulatory asset lives with expected useful lives.** This would lead to lengthening the regulatory asset lives for electricity networks (to offset the adjustments made for financeability purposes in previous reviews), and shortening the asset lives for gas networks (to reflect the uncertainty about the future use of gas for domestic heating).
- **Differentiating the cost of capital.** Ofgem also proposes to differentiate the rate of return between companies to reflect risk differentials within the industry, perhaps by allowing notional gearing to vary according to companies' risk exposure. Such risk differentials may reflect the companies' CAPEX intensity, their scale, or their regulatory settlement (eg, companies that have established a good reputation may be exposed to stronger incentives).

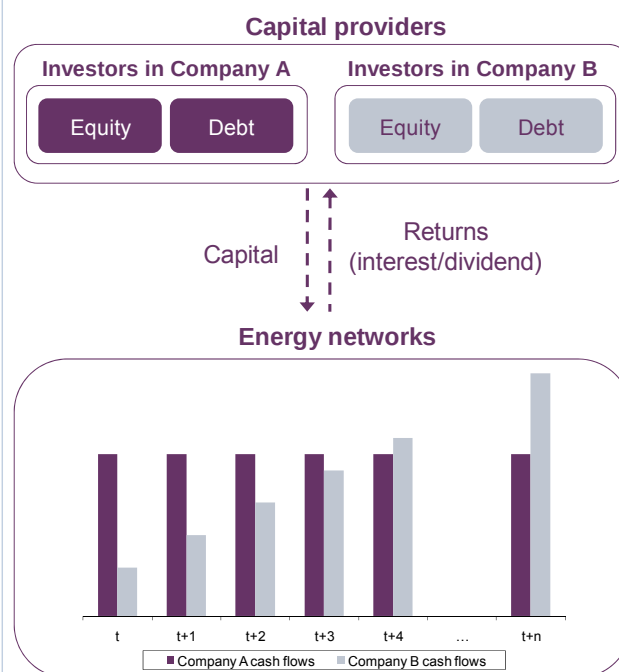
Importantly, while Ofgem would aim to calibrate the rate of return to capture the balance of risks and rewards embedded in each price control settlement, its proposed 'strawman' (ie, the model it suggested as a stimulus for discussion) would imply that it would not adjust revenues to ease financeability pressures as it did in the past, stressing that there would be 'an onus on companies to manage short-term requirements and to provide equity where necessary'.⁴

This article examines Ofgem's presumption that a company should be 'notionally' financeable provided that allowed return and depreciation are determined correctly, from the point of view of capital providers.⁵

Setting the scene

Ofgem's strawman would have implications for the profile of future cash flows generated by a notional efficiently operated and financed energy network. A network experiencing short-term reductions in cash flows would be expected to sustain those cash flows until they recover, if necessary by reducing dividend payments or raising new equity. As a result of Ofgem's intention not to advance additional cash flows in the face of financeability issues, this would imply that the company's cash flows are delayed compared with a counterfactual scenario where a financeability remedy

Figure 1 Cash-flow duration and investment in energy network



Source: Oxera.

is allowed. In other words, the duration of cash flows is longer without financeability remedies.

Figure 1 illustrates the cash-flow profile for two energy networks. Both cash-flow streams have the same present value. In the illustration, Company A generates cash flows faster than Company B—its cash-flow duration is shorter. Central to Ofgem's proposals is the assumption that capital providers in both companies would require the same compensation for their investment—ie, that the increased duration in cash flows implicit in Ofgem's financeability proposals would have no effect on the cost of capital. This question is addressed below.

What might happen to the WACC?

In principle, it is correct for companies to employ a mix of debt and equity in their long-term capital structures and to adjust this mix according to CAPEX requirements. A consequence of Ofgem's strawman may therefore be a decline in dividend payout ratios and/or equity injections.

Empirical evidence on the cost of new equity for a regulated utility is sparse. The recent £3.2 billion rights issue by National Grid to raise funds for investment in its UK energy networks provided a rare indication of how the equity injections that may occur under the strawman might be received by investors.⁶ On the announcement day of May 20th, National Grid's share price closed 7% down on the previous day's closing

price, and the closing price five days after the announcement (first day of trading in fully paid shares) was at a 7.5% discount compared with the theoretical ex rights price.⁷ This suggests that the costs of equity issuance may be materially greater than currently assumed in regulatory practice.

The critical assumption in the strawman is that, in theory, there is no reason to believe that the cost of capital would change as a result of the proposed changes to the financeability framework.

More generally, the strawman makes a number of implicit assumptions about financing costs:

- the increase in the duration of cash flows does not increase the cost of capital;
- nor does it increase the risk of the 'regulatory contract';
- the cost of capital is measured correctly and with certainty;
- the strawman does not change the efficient capital structure of the notional company;
- there is a class of investor willing and able to finance the longer-duration cash-flow profiles at no additional cost.

However, there are good reasons to doubt that these assumptions hold in practice.⁸

Duration and asset prices

According to the capital asset pricing model (CAPM), securities are priced according to their exposure to market risk (represented by beta)—cash-flow duration does not appear in the expected return equation. But in practice, investors do give consideration to the expected timing of cash flows when assessing the risk–return trade-off of an investment. Does this mean that investors behave irrationally?

No. The CAPM is a single-period pricing model that assumes that parameters such as the risk-free rate and the equity risk premium (ERP) are fixed. This assumption can be relaxed to allow these parameters to vary over time by using models such as the intertemporal CAPM (ICAPM). The additional sources of uncertainty in these models are risk factors from the perspective of the investor, which affect the level of required returns.

One model (Brennan and Xia, 2006) suggests that the risk premium required by investors for exposure to: a) changes in the risk-free rate, and b) the ERP, is affected by the duration of cash flows for a particular asset.⁹ The first effect can be expressed as the term premium—even for risk-free securities, such as government bonds, the rate used to discount cash flows generally increases with maturity (ie, an upward-sloping yield curve). The second effect can be

understood as the element of the cost of capital that compensates for the sensitivity of the present value of future risky cash flows to changes in the price of risk (the ERP), and may decrease for some assets as the duration of cash flows increases.

The two effects on the cost of capital from increasing the duration of cash flows may therefore act in opposing directions. The Brennan and Xia framework demonstrates that the net impact is determined by the cash-flow beta of the asset—the sensitivity of current period cash flows to market returns. Applying this framework to regulated utilities, where cash-flow betas would be expected to be low relative to the average company, an increase in cash-flow duration is likely to result in an increased cost of equity as the term-premium effect dominates. Referring back to Figure 1, this suggests that investors in Company B would require a higher cost of capital than investors in Company A as a result of the longer duration of its cash flows (holding all other factors constant).

The time-inconsistency problem

Regulators are unable to bind completely the actions of their successors and can be subject to opposing pressures at different stages of the investment cycle. At an early stage they seek to encourage sufficient investment, while at a later stage (once the investment is sunk) they may be subject to increasing pressures to reduce prices paid by consumers. This is sometimes referred to as the 'time-inconsistency' problem.

Subtle differences in the source of time-inconsistency problems have implications for the potential for introducing mechanisms to increase Ofgem's commitment. For example, codifying regulatory approaches to certain price control issues might reduce time inconsistency given the current regulatory framework, but would be ineffective in addressing events not catered for by the current framework.

As a result of time-inconsistency problems, investors may perceive increased risk from extending the duration of cash flows unless regulators are able to commit to the 'regulatory contract' over the life of the asset. For example, will investors in Company B expect to receive the higher promised cash flows for the five years ending in $t=n$, or will they make a downward adjustment to value based on an assessment that the probability of a negative shock exceeds that of a positive shock?

The impact of the time-inconsistency problem on required returns would be expected to increase with the duration of the cash-flow profile, as the longer time period entails an increased probability of negative shocks that prevent the required level of return being earned on investments.

Uncertainty in the WACC estimation

A company's cost of capital is, by its nature, unobservable, and therefore WACC estimates are always surrounded by a degree of uncertainty. Regulators often consider that the costs of setting the wrong WACC (either too low or too high) are asymmetric—ie, the cost of delaying investment exceeds the cost of setting prices higher than necessary to cover efficient costs.¹⁰ For this reason, regulators tend to allow some headroom in excess of the uncertain point estimate for the WACC. For example, the Competition Commission considered the 'risks and costs in setting an incorrect WACC' when selecting a point estimate for Stansted Airport's WACC in its fifth price control review—the selected WACC point estimate was considerably above the midpoint of the Commission's range (81st percentile).¹¹

The uncertainty in estimating the cost of capital—particularly the cost of equity—for UK regulated utilities is compounded by the lack of recent capital market evidence on the risk exposure of these companies.¹² Financeability tests therefore have a role as a cross-check on the allowed return, and may mitigate the probability of setting the cost of capital too low.

Notional capital structure

Under the strawman, projected shortfalls in cash flows would not result in the advancement of cash flows to mitigate financeability pressures. As a result, in the face of lower cash flows (even in the short term), a network's credit metrics could suffer as there would be less headroom to cover interest payments. Unless credit rating agencies consistently apply approaches to rating utilities on the basis of long-term credit metrics, this could result in credit rating downgrades, which would put upward pressure on the cost of raising new debt—this is potentially inconsistent with the assumption that the notional company is efficiently financed.

If there is a worsening of credit metrics at the level of gearing currently assumed for the notional company, in order to maintain an investment-grade credit rating the company will have to reduce its long-run level of gearing. In the short run, the impact of increasing the proportion of relatively expensive equity finance could be an increase in the cost of capital, although the Modigliani–Miller capital structure 'irrelevance proposition' suggests that there will be no impact on the WACC.¹³

Investor base

Ofgem's proposals include the assumption that there is a class of investor that is prepared to invest under the conditions implied by the strawman without expecting any additional return. To assess this assumption, it is helpful to consider some key characteristics of investors with a preference for the cash-flow profile as implied by the strawman:

- an ability and willingness to tolerate prolonged periods of lower cash flows in exchange for increased cash flows in the future;
- a willingness to invest given the perceived risk of time-inconsistency and the reliance on regulatory commitment to sustain future increases in cash flows.

The first characteristic would eliminate from the investor base any investor that relies on short-term cash flows. For example, this could include investment funds with a strategy that relies on short-term returns, or a mature pension fund where the obligation to scheme members is of low duration. In addition, this characteristic would require an investor to be prepared to commit to further equity injections, which may be required to cover cash-flow shortfalls in the future. It is far from certain that a class of investor exists that would be ready to undertake this commitment unconditionally, and that has access to sufficient capital to support the market in regulated utility equity.

The second characteristic could have implications in relation to an investor's risk appetite and returns expectations. To the extent that investors perceive increased risks related to time inconsistency across multiple price control periods, and in the absence of additional compensation for this increase in risk, they may decide to allocate their funds to alternative assets with more favourable risk–return trade-offs.

Conclusions

Recent regulatory determinations indicate that the direction of regulatory travel is towards 'market-based' solutions to financeability problems.¹⁴ Ofgem's strawman puts even greater emphasis on market-based solutions and the role for equity, without addressing the impact on the cost of capital. Were such an approach to be implemented, how would we know whether the strawman will indeed have an impact on the cost of capital, and if so, what size would the impact be?

Historical data is not very helpful in this regard as it reflects financing costs during a period when financeability was either of less concern and/or regulators were actively taking steps to mitigate financeability problems. The current ownership structure of regulated energy networks means that there would be a shortage of immediate feedback on the strawman from public capital markets.¹⁵ Perhaps the real impact would not be revealed until a major transaction or capital-raising exercise were undertaken with the strawman arrangements in place. Nevertheless, as suggested in this article, careful consideration of the mechanisms with which the strawman proposals could affect financing costs can help identify the necessary steps to reduce the risk of this approach.

- ¹ Ofwat (2004), 'Future Water and Sewerage Charges: 2005–2010', December.
- ² Ofgem (2010), 'Emerging Thinking: Embedding Financeability in a New Regulatory Framework', January 20th; and Ofgem (2010), 'Regulating Energy Networks for the Future: RPI-X@20: Current Thinking Working Paper—Financeability', May 19th.
- ³ Ofgem (2010), 'Emerging Thinking: Embedding Financeability in a New Regulatory Framework', January 20th, para 4.18.
- ⁴ Ofgem (2010), 'Regulating Energy Networks for the Future: RPI-X@20: Current Thinking Working Paper—Financeability', May 19th, p. 4.
- ⁵ Ofgem (2010), 'Emerging Thinking: Embedding Financeability in a New Regulatory Framework', January 20th, para 5.8.
- ⁶ National Grid (2010), 'National Grid plc: 2 for 5 Rights Issue to Raise Approximately £3.2 Billion', media release, May 20th.
- ⁷ Oxera calculations based on Datastream data.
- ⁸ See Oxera (2010), 'What is the Impact of Financeability on the Cost of Capital and Gearing Capacity?', prepared for the Energy Networks Association, June. Available at www.oxera.com.
- ⁹ Brennan, M. and Xia, Y. (2006), 'Risk and Valuation under an Intertemporal Capital Asset Pricing Model', *Journal of Business*, **79**:1.
- ¹⁰ See Brealey, R. and Franks, J. (2009), 'Indexation, Investment, and Utility Prices', *Oxford Review of Economic Policy*, **25**:3, pp. 435–50.
- ¹¹ Competition Commission (2008), 'Stansted Airport Ltd Q5 Price Control Review', October 23rd, Appendix L, p. L28.
- ¹² This problem has increased over time as utilities have been de-listed, either as a result of mergers or private equity transactions.
- ¹³ Modigliani, F. and Miller, M.H. (1958), 'The Cost of Capital, Corporation Finance and the Theory of Investment', *American Economic Review*, **48**:3, June, pp. 261–97.
- ¹⁴ Ofwat (2009), 'Future Water and Sewerage Charges 2010–2015: Final Determinations'; Competition Commission (2010), 'Bristol Water plc: A Reference Under Section 12(3)(a) of the Water Industry Act 1991: Provisional Findings', June 18th.
- ¹⁵ Although some reactions might be expected in the share prices of National Grid and Scottish & Southern Energy, the UK regulated networks account for only a proportion of the assets owned by these companies.

If you have any questions regarding the issues raised in this article, please contact the editor, Dr Gunnar Niels: tel +44 (0) 1865 253 000 or email g_niels@oxera.com

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