A REVIEW OF THE RAIL AND WATER SECTOR REGULATORY MODELS
LESSONS TO LEARN FOR THE ENERGY SECTOR

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A Report for Ofgem

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Cambridge Economic Policy Associates Ltd

CEPA

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SUMMARY

CEPA has considered the applicability of the regulatory models in the rail and water sectors in the UK for the British energy sector. As well as considering the applicability of the overall models, we have also considered what lessons can be learnt from the detailed aspects of the models. The assessment has focused particularly on how the rail and water regulatory models promote efficient and effective capital investment, including the setting and monitoring of the outputs to be delivered.

To provide a robust evidence base for the analysis we summarise the regulatory models in the UK rail and water sectors, and for the energy sector under a number of headings that reflect the key focus of the comparison. This builds on the summary of the rail and water sector regulatory regimes that are included in our previous report for Ofgem.[1] These headings are:

- Institutional arrangements;
- Industry structures, including the extent to which competition is promoted;
- Ownership structures;
- Investment requirements; and
- Position in the regulatory cycle.

Table S1 below brings together a summary that is set out in more detail in subsequent sections about how the rail and water sectors approach capital investment and outputs.

Table S1: A summary of the main aspects of the rail and water sector regulatory frameworks with respect to output specification and capital investment efficiency

Elements of the regulatory framework	Approach in the rail sector	Approach in the water sector
Drivers of capital investment	In overall terms it is the Government's view about what outputs are consistent with the public interest (and what taxpayers are prepared to fund). Government has a range of priorities for capital investment, including increasing capacity, improving quality, improving safety and securing environmental benefits	There are three broad drivers of capital investment in the water sector: • Resource management or achieving a supply – demand balance. • Environmental requirements, whether from EU Directives, Government guidance or other requirements from environmental regulators. • Customer related standards of service, which affect issues such as

[1] http://www.ofgem.gov.uk/Networks/rpix20/publications/CD/Documents1/CEPA%20Final%20Ofgem%20report%20270209.pdf

		unplanned interruptions to supply.
Overall approach in the regulatory framework	The regulatory framework put in place at the recently completed Periodic review has a strong focus on delivering the overall outputs in the High Level Output Specification (HLOS), although how this feeds through into allowed revenues and RAB roll forward will only be fully clear at the next Periodic Review. Some projects that are required to deliver the outputs will overlap price control periods	Ofwat has consistently adopted a project specific approach to regulating capital investment, based on assessing the need for and efficiency of individual capex projects. There has been a consistent concern that the regulatory framework in the water sector has led companies and Ofwat to focus on each five years rather than the longer term
Which organisation specifies the outputs?	As discussed in more detail below, DfT and the Scottish Executive specify the high level outputs in the HLOSs	This varies broadly with the drivers of capex: • Resource management plans are drawn up between water companies and the Environment Agency, with inputs from Defra and Ofwat. • The Government, with advice from the environmental regulators. • Ofwat is responsible for deciding the customer related standards of service.
What is the nature of the outputs?	In broad terms, DfT specifies outputs at a relatively high level, e.g. X% improvement in reliability, whereas the Scottish Executive tends also to specify the specific investment projects it expects to be undertaken	We discuss further below the detail of specific outputs, but in broad terms outputs are only specified for a five year price control period, or at least the conclusions of the next price control review are not prejudged. Outputs are predominantly input based, e.g. the amount of mains to be cleaned and the amount of customers whose water will be softened. Ofwat specifies the outputs for individual companies
The role of the company and regulator when outputs are set	Within the context of the outputs specified, Network Rail works with stakeholders to develop a business plan with specific investment projects to deliver the outputs. ORR considers the efficiency and appropriateness of this business plan to deliver the outputs efficiently, and has to confirm to	Once the outputs have been developed (or at least initial views reached) the companies develop business plans that set out the cost of achieving the outputs. Due to the need to balance the achievement of outputs with their costs, the development of business plans involves ongoing iteration

	the Government whether the outputs are affordable given the SoFAs	with the environmental regulators. Ofwat then assesses the efficiency of the plans (broadly this is based on reviewing cost benefit analyses prepared by companies for specific projects) and whether the specified outputs can be met cost effectively given its duties with regard to consumers' interests. Where Ofwat has concerns about the need for or affordability of proposed investments it can disallow these from business plans, or indicate that they would be better undertaken at a later date. If Ofgem were to disallow a proposed investment it would need to be confident that this would not undermine the achievement of its objectives and other legal requirements, e.g. compliance with EU Directives
Monitoring of outputs and investment	It is difficult to discuss how this will work in practice in the rail sector given that the new price control period is the first under the new arrangements. It is expected that Network Rail's performance against the outputs set out in ORR's decision document for the Periodic review will be closely monitored and published, and that the efficiency of capital investment to deliver these outputs will be considered	There is a very extensive and detailed set of requirements for companies to report on their performance against the outputs and specific projects included in the price control settlement. Ofwat publishes detailed information about company performance on an annual basis

The main messages from this table are that the rail and water regulatory frameworks have a relatively centralised process for making decisions about output requirements within the context of the drivers of investment. Both sectors are characterised by an extensive range of outputs that are monitored by the regulators. It is the generally for the regulators to determine through reviewing company business plans what constitutes the most efficient and effective way of delivering the outputs.

We do not consider that the regulatory model in either the rail or water sectors could be applied wholly to the energy sector without any adaptation. This is primarily because the regulatory models in the rail and water sector are designed for and work effectively within an industry structure where there is limited competition between network users, in contrast to the energy sector, where there is substantial competition between network users, including suppliers, shippers, generators and traders. To adopt the rail or water sector models in the energy sector would require careful consideration of the impacts of

implementing the model for specifying network outputs on competition between network users.

Centrally set targets will not necessarily materially distort competition between network users, but they have the potential to do so, and it is this that would need to be carefully considered, in a way that is not so clearly required in water or rail because of the limited competition in both sectors between network users. The process for determining investments and outputs could be important. For example, if a central body determined relatively high level outputs within which industry players based on market signals determined the investments to meet the high level targets then some of the difficulties could potentially be overcome. However, such an approach may raise other issues regarding the interaction between the targets and market signals.

The other obvious weakness of the rail and water sector models compared to the energy sector (and particularly transmission networks) is the relatively limited role that individual customers (even large ones) can play in determining the outputs and investments that are required. While both institutional models include organisations that represent consumers' interests (Passenger Focus and CCWater) many of the decisions about required outputs and investments are made by Government or environmental regulators, whose primary objective may not be the furthering of consumers' interests, which is Ofgem's primary duty. To some degree the position in water is closer to that in energy than for rail because of Ofwat's similar duties to Ofgem's regarding the focus on consumers, but nevertheless Ofwat has to work within decisions from Government and environmental regulators. In the rail sector the Government will be primarily focused on protecting taxpayers' interests. These comments are not intended to criticise or ignore the attempts made by Government, environmental regulators, companies, Network Rail, ORR and Ofwat to engage with consumers and stakeholders, but to note that compared to the energy sector, and particularly transmission networks, the ability of end consumers to directly influence the outputs to be delivered and the investments undertaken to deliver those outputs is quite limited given the statutory frameworks that are in place. The contrast is greatest with elements of the energy sector, such as gas entry capacity auctions, where final and intermediate customers can ensure certain investments occur providing they make financial commitments.

The differences with regard to customers' roles is probably greatest between the rail and water sectors and the transmission rather than distribution parts of the energy sector. While Ofgem seeks to involve customer representatives and suppliers in the price control review process, in practice there is a much more centralised decision making process of outputs and investment requirements, which is closer to the rail and water sector models.

Nevertheless, we consider that there are a number of lessons that can be learnt or ideas that can be considered in the energy sector as a result of reviewing the rail and water sector regulatory models. These are:

- The presence of a "guiding mind" – Particularly in the rail sector, but to some degree in the water sector, there is a clear organisation (the Government) responsible for decisions about the overall high-level outputs that the network operator is required to deliver. In the rail sector this body has responsibility for

funding a substantial part of the requirements. This contrasts with some of the current debates in the energy sector about how energy networks will develop, e.g. the need for more active distribution networks to facilitate distributed generation, where there is no overarching body deciding the future role of networks.[2]

- Clarity of requirements with regard to environmental obligations – The water and to an extent the rail sector regulatory models require the Government or appropriate regulators to specify the environmental requirements they would like customers to fund, although the regulator makes the final decision about the precise way in which outputs are delivered, i.e. the types of investments that should be included in price control revenues and Regulated Asset Bases (RABs) for companies. In the rail and water sector there is limited scope for Government or environmental regulators to change their minds part way through a price control about the outputs they require or in the case of rail they are prepared to fund.[3] This contrasts with the energy sector where the Government specifies environmental requirements at a relatively high level and allows a combination of the market and Ofgem to take control of implementation. The Renewables Obligation is an example of this, where it is for generators and suppliers to develop the capacity and Ofgem working with the network company to develop the processes to ensure network capacity investment occurs. While there is statutory force to the measures in the energy sector they are not linked to price control reviews and can therefore be changed during price control reviews, which may affect investment incentives and decisions.

- Establishing and monitoring outputs – Although not precisely the same, the rail and water sector regulatory models both now include relatively detailed specifications of the outputs that the regulated companies are required to deliver, and against which their performance can be monitored. In the rail sector it is too early to be sure how effective the monitoring of the outputs will be.

Therefore, for Ofgem's RPI-X@20 review we would consider that the rail and water sector regulatory models provide interesting lessons to learn, but applying them in large parts to the energy sector would raise significant challenges, particularly with regard to potential distortions of competition amongst network users and the role of consumers.

[2] We are not advocating that a central body necessarily does decide the future role of networks, but it is notable that work such as Ofgem's LENS project illustrates the very different networks that may emerge in the future, and very different investments would be required for different types of networks.

[3] There is greater scope in the water sector than the rail sector, which partly explains the more extensive provisions to re-open the price control, particularly through IDOKs, and the use of logging-up to assess unexpected capex requirements at the next price control review.

1. INTRODUCTION

CEPA has been commissioned by Ofgem to consider whether the regulatory models as a whole or some element(s) of them in the UK rail and water sectors could work effectively if adopted in the energy sector. This paper is part of the RPI-X@20 review being undertaken by Ofgem.

Ofgem has particularly asked us to consider the lessons to be learnt from the rail and water sector models for the energy sector. Ofgem is particularly interested to understand the evidence about how well outputs are delivered under each regulatory model and how efficient and effective investment is ensured in each sector. Ofgem has particularly focused on the lessons to be learnt from the rail and water sector models as it had been suggested at the workshops held by Ofgem so far during the review that there are useful lessons to learn from these regulatory models.[4] Furthermore, these two sectors involve regulation of network industries, whereas other sectors subject to economic regulation in the UK, including airports and postal services, involve regulation in potentially or actually competitive markets.

We have focused on considering the applicability of the rail and water models to the energy sector, and the lessons to learn, separately, rather than comparing their relative applicability, but inevitably we have to some degree considered their relative applicability. We have also been mindful that there are differences between the gas and electricity sectors, which may mean that the regulatory models from the rail or water sectors are more applicable, or the lessons to be learnt more relevant, to gas or electricity, and/ or transmission or distribution.

There are many aspects to the regulatory models in the rail and water sectors that we could compare in the paper, but as noted above, Ofgem has asked us to focus particularly on the issues affecting decisions about the need for and efficiency of capital expenditure, and the outputs delivered to customers. This recognises the increasing challenge in the energy sectors of securing sufficient investment in network assets to ensure security of supply and to meet the Government's environmental objectives. It also reflects the priority that Ofgem has attached to developing more effective output measures for transmission and distribution companies to provide more accountability for the capital expenditure they undertake. Although we have focused on issues affecting capital expenditure and outputs, we have also noted other relevant issues for comparison.

To provide a robust evidence base for the analysis we have summarised the regulatory models in the UK rail and water sectors, and for the energy sector under a number of headings that reflect the overall structures and issues that affect the specification of outputs and the efficiency of investment. This builds on the summary of the rail and

[4] See notes of the workshops at http://www.ofgem.gov.uk/Networks/rpix20/publications/Presentations/Pages/Presentations.aspx

water sector regulatory regimes that are included in our previous report for Ofgem.[5] These headings are:

- Institutional arrangements;
- Industry structures, including the extent to which competition is promoted;
- Ownership structures;
- Investment requirements; and
- Position in the regulatory cycle.

These five headings focus on the overall statutory, regulatory and institutional framework, and while they draw in many of the detailed aspects of output and investment regulation in the rail and water sectors, we have supplemented the discussions under these headings in each section with a summary of the key detailed aspects of output and investment regulation in each sector.

We have then explored the comparability of the models in more detail.

For each of the regulatory models we have also set out the historical background where this is interesting and relevant, and summarised current major developments that are expected to affect the regulatory model.

The remainder of the paper has the following sections:

- Section 2 assesses the regulatory model in the UK rail sector and the lessons that can be learnt, having regard to the key features of the energy sector. This section includes consideration of why the regulatory model in the rail sector has evolved in the way that it has, and current major reviews that might affect the regulatory model in the future.
- Section 3 covers the same issues for the UK water sector as Section 2 does for the UK rail sector.
- Section 4 compares the key features of the rail and water models to the energy sector, and reaches conclusions about their potential applicability and the lessons to learn.

Annex 1 includes detailed tables that summarise the rail, water and energy regulatory models under the headings set out above.

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5 http://www.ofgem.gov.uk/Networks/rpix20/publications/CD/Documents1/CEPA%20Final%20Ofgem%20report%20270209.pdf

2. THE RAIL SECTOR REGULATORY MODEL

2.1. Introduction

This section summarises the key features of the rail sector regulatory model as used in the UK. We identify the key features with regard to capital expenditure and outputs that affect the applicability of the model to the UK energy sector, and the lessons that can be learnt. We also consider evidence about historical developments in the rail sector and the lessons that can be learnt about how and why the model has evolved in the way it has. Finally, we also consider current developments in the sector that might affect the regulatory model in the future.

2.2. Overview of the structure of the industry and the regulatory framework

The regulatory model in the UK rail sector has evolved and developed primarily as the industry structure and ownership has changed. The role of the independent economic regulator the Office of Rail Regulation (formerly Office of the Rail Regulator) (ORR) has arguably not changed that significantly with regard to its economic regulation functions (it has acquired safety regulation functions[6])[7], but the other organisations involved in the sector have seen their roles change.[8] We recognise that formally the role of ORR has changed with regard to its interaction with Government about the high level outputs to be delivered and their affordability (discussed further below), but it is still required primarily to ensure that outputs are delivered at best value for money, having regard to all its statutory duties.

The network operator Network Rail differs significantly in structure from its predecessor Railtrack. Railtrack was a publicly limited company quoted on the London Stock Exchange whereas Network Rail is a company limited by a guarantee from the Government. It is wholly debt funded and owned by members who do not take a direct financial interest in the company.

The functions of the original Office for Passenger Rail Franchising (OPRAF)[9] were initially moved into the Strategic Rail Authority (SRA)[10]. Whereas OPRAF's role was primarily focused on tendering for train operators to run franchises and monitoring their performance, the SRA had a wider role regarding network wide co-ordination with the intention of contributing to increasingly cost effective use of the network and to help determine investment requirements. The franchising role of the SRA (along with some other functions) is now carried out by the Department for Transport (DfT) and the Scottish Executive, albeit in a somewhat modified form. Part of the SRA's role with regard to network planning and maximising cost effective use of the network was largely

[6] The ORR gained its safety regulation functions from 1 April 2006.

[7] ORR was created by the Railways Act 1993.

[8] Perhaps the most significant other change in ORR's functions since it was established in 1993 is the loss of most of its customer facing functions in 2000 when the SRA was established. These functions have subsequently passed to the DfT.

[9] Like ORR, OPRAF was created by the Railways Act 1993.

[10] The SRA was established by the Transport Act 2000.

transferred to Network Rail in consultation with other industry parties. An example of this is the development of the route utilisation strategies which Network Rail manages but with industry involvement, and which supports long-term planning of the network.[11]

In very broad terms the regulatory model in the rail sector with regard to capital investment can be described as one where the definition of outputs at a high level and the financial input from the Government is specified by the DfT[12] and the Scottish Executive[13], while the regulator assesses Network Rail's plans (following consultation) as to how best to achieve the outputs and ensures that they are likely to be achieved at an efficient cost.[14] There are two main elements to the input provided by the DfT and the Scottish Executive – the HLOS[15] and the Statement of Funds Available (SoFA). On the basis of these Network Rail develops a business plan in consultation with industry and other stakeholders, and then submits the plan to ORR setting out how it considers it will achieve the requirements of the DfT and the Scottish Executive and its view of how much this will cost. ORR then reviews Network Rail's business plan to consider its efficiency, whether elements of the plan, e.g. capital investment schemes, are necessary to deliver the Government's high level outputs specification and whether all the outputs specified by the DfT and the Scottish Executive can be delivered given the SoFA. ORR consults on its assessment of Network Rail's business plan. There is no provision for a new Government to change the HLOS during a price control period (unless the conditions for an interim review are met), but as discussed below some additional investments can be approved that were not originally required by the HLOS, through "logging up".

It can be argued that a key virtue of this model is clarity for the regulator about the outputs that are valued. However, it is perhaps less clear that the outputs directly reflect consumers' preferences. While to varying degrees and in different ways, Government, Network Rail and ORR consult about the outputs being delivered[16], the final decision on the high level outputs is generally with the Government based on its view of what is in taxpayers' interests, and taking account of consumers' preferences. Furthermore, it is effectively taxpayers who pay for or benefit from any ability on the part of Network Rail to deliver the outputs at higher or lower cost than forecast.

Perhaps the biggest differences between the overall rail sector model and the energy sector model is the much stronger Government role in specifying the outputs to be delivered as part of the Periodic review process, but also its provision of a significant part of the funding to deliver the outputs. The Government does not provide any funding

[11] http://www.networkrail.co.uk/aspx/4449.aspx

[12] The Government's High Level Outputs Specification and Statement of Funds Available for England and Wales is set out at this link http://www.dft.gov.uk/about/strategy/whitepapers/whitepapercm7176/

[13] The Scottish Executive's High Level Outputs Specification and Statement of Funds Available is set out at http://www.transportscotland.gov.uk/files/documents/rail/HLOS-July-2007.pdf

[14] "Determination of Network Rail's outputs and funding for 2009-14", ORR, October 2008.

[15] We discuss the differences between the HLOS's produced by DfT and the Scottish Executive in subsequent sections.

[16] While there is consultation about the outputs to be delivered, market signals of the outputs that are valued by customers are not directly sought, in for example the way that market signals are sought from shippers in gas entry capacity long term auctions.

for major investments in the gas and electricity sectors, and does not in general have any direct role in specifying the outputs from capital expenditure.[17] Indirectly Government policy, particularly with regard to environmental obligations will affect the outputs to be provided, e.g. the 20% target for renewable generation by 2020 will require substantial investment in extending and reinforcing the electricity transmission and distribution networks.

Many aspects of ORR's role are shared by Ofgem, including assessments of whether proposed expenditure is efficient. However, Ofgem has a much greater role in determining the overall outputs to be delivered than ORR, although ORR has an important role in assessing whether Network Rail's plan is likely to deliver the Government's high level output specification. We discuss further below the main differences in the way ORR and Ofgem give effect to their similar roles.

Before we discuss the main aspects of the rail sector regulatory model under the five headings discussed in the previous section, we have set out in Table 2.1 the main aspects of output and capital investment regulation in the rail sector, which provide a summary and context for the subsequent discussion.

[17] Probably the clearest example of the Government (or one of its agencies) specifying investment requirements for network companies in the energy sector is the programme to replace gas mains. This has been undertaken on the basis of requirements specified by the HSE.

Table 2.1: A summary of the main aspects of the rail sector regulatory framework with respect to output specification and capital investment efficiency

Elements of the regulatory framework	Approach in the rail sector
Drivers of capital investment	In overall terms it is the Government's view about what outputs are consistent with the public interest (and what taxpayers are prepared to fund) that underpins the capital investment to be undertaken. Government has a range of priorities for capital investment, including increasing capacity, improving quality, improving safety and securing environmental benefits. As discussed below Network Rail in consultation with other stakeholders translate these overall drivers of capital investment into specific investment projects which are then assessed by ORR to see whether they are likely to be needed to deliver the HLOS and are efficient.
Overall approach in the regulatory framework	The regulatory framework put in place at the recently completed periodic review has a strong focus on delivering the overall outputs in the HLOS, although how this feeds through into allowed revenues and regulatory asset base (RAB) roll forward will only be fully clear at the next Periodic Review. Although there is a focus on outputs, ORR has been involved in considering Network Rail's specific schemes to deliver the outputs and their efficiency as a necessary part of assessing the affordability of the Government's high level outputs[18]. Some projects that are required to deliver the outputs will overlap price control periods
Which organisation specifies the outputs?	As discussed in more detail below, DfT and the Scottish Executive specify the high level outputs in the HLOSs
What is the nature of the outputs?	As discussed in more detail below, the precise specification of outputs varies between DfT and the Scottish Executive. In broad terms, DfT specifies outputs at a relatively high level, e.g. X% improvement in reliability, whereas the Scottish Executive tends also to specify the specific investment projects it expects to be undertaken
The role of the company and regulator when outputs are set	Within the context of the outputs specified, Network Rail works with stakeholders to develop a business plan with specific investment projects to deliver the outputs. ORR considers the efficiency and appropriateness of this business plan to deliver the outputs efficiently, and has to confirm to the Government whether the outputs are affordable given the SoFAs
Monitoring of outputs and investment	It is difficult to discuss how this will work in practice in the rail sector given that the new price control period is the first under the new arrangements. It is expected that Network Rail's performance against the outputs set out in ORR's decision document for the Periodic review will be closely monitored and published, and that the efficiency of capital investment to deliver these outputs will be considered. Precisely how ORR handles the differences in the detail of outputs specified by the DfT and Scottish Executive, for example, will only be known towards the

[18] Some of the issues in recent years with overrunning engineering works on the West Coast mainline upgrade show that ORR will struggle to avoid being drawn into these issues.

	end of the Periodic review

Much has been written about the history of rail regulation in the UK since 1993, and there has been much debate about the causes and merits of different changes to the institutional structure and regulatory framework that has been adopted. A short paper of this nature is not an appropriate place to revisit and review all these debates. However, some high level points can be made with regard to the impact of the developments on regulation:

- The initial ownership and institutional structures do not appear to have created an appropriate balance in the risks, rewards and incentives between profit maximising (including efficiency) incentives and safety considerations. This ultimately culminated in the safety concerns (arising in part from lack of asset knowledge) highlighted by the Hatfield derailment.
- While the current institutional and regulatory structures appear to have addressed many of the safety concerns, it is less clear that the current ownership structure of Network Rail is conducive to maximising efficiency (we discuss this further below).
- There have been consistent difficulties in finding a structure that gives a voice to passengers' requirements while the Government pays a substantial proportion of the costs on behalf of taxpayers, particularly if passengers' views diverge from those of the Government. The lack of on rail competition has exacerbated these difficulties as there are no direct market signals about the requirements for investment and outputs. Ultimately this has been resolved by giving Government the role of determining what passengers want.[19]
- The railways have been a considerable success since privatisation with record levels of passengers (until the recent economic downturn). However, the funds for investment from taxpayers or passengers have struggled to keep pace with this expansion.

2.3. Institutional arrangements

We have described above the key institutional arrangements in the rail sector. Table 2.2 summarises the key differences under a number of categories.

Table 2.2: Comparing the institutional arrangements for capex in the rail and energy sectors

	Rail	**Energy**
Government	Determines the high level outputs it believes should be provided by the network, consistent with the	Sets the high level policy framework Sets environmental policy and targets, including the renewables obligation

[19] ORR has some duties relating to the interests of users and growing the number of passengers using the network, but the focus on consumers' interests in the duties of Ofgem is much clearer.

	franchises it contracts for with train operators (the main contents of the HLOS's are set out below). This is through the HLOS Specifies the amount of public money currently available to fund the delivery of the outputs. This is through the SoFA The Government can also issue additional guidance to ORR about factors it should have regard to, but given the nature of the HLOSs, this is less directly important than might be the case in other sectors	Provides Ofgem with guidance on social and environmental issues No role in specifying precise network investments (see indirect exception discussed above of gas mains replacement programme required by the HSE)
Regulated company role	Consider and assess the most cost effective schemes to achieve the outputs determined by the Government. This is partly undertaken through the Route Utilisation Strategy (RUS) process which will for future periodic reviews involve completed strategies for the whole network and for freight Deliver the high level outputs specified by the Government, and determined by the regulator following review of its plans	Propose investments and expenditure that meets their licence obligation to develop an economic and efficient network Deliver investments consistent with their licence obligation and the price control requirements
Network users	Train operators, freight users and passengers have no formal role in specifying the outputs to be delivered by Network Rail[20]. There is consultation on the HLOS and ORR price control reviews. Train operators and freight users can also get involved in the RUS process The franchise contracts agreed with the Government inform the outputs to be delivered Train operators and freight users have access contracts with Network Rail specifying their rights and obligations, and underpinning their obligation to pay network access charges	Users of the gas and electricity transmission systems signal their need for additional capacity through various mechanisms that require them to make financial commitments regarding the use of assets Users of the distribution networks have no formal role in specifying the outputs to be delivered by the regulated companies
Regulator	Assess Network Rail's view of the most effective way to achieve the Government's high level outputs and for efficiency. If the final plan once reviewed would cost more than	Within its own statutory duties consider what represents the most appropriate outputs to be delivered Assess and monitor whether the regulated companies are performing

[20] The supporting documents produced by the DfT for its 2007 High Level Outputs Statement includes assessment of passenger requirements. See http://www.dft.gov.uk/about/strategy/whitepapers/whitepapercm7176/railwhitepaperresearch/pdfevidencepack.pdf

	Government has said is available, then ORR would discuss this with Government. However, it does eventually have the formal role that enables it to determine which bit of the Government's high level output specification cannot be delivered. Assess and monitor whether Network Rail's proposals are cost efficient	effectively and efficiently

The main difference between the institutional structures in the two sectors is the role of the Government in specifying outputs. This also means that the most important determinant of the extent of investment in the rail network is the Government's judgement of the high level outputs that would be in taxpayer's interests. Compared to the energy sector this takes some of the focus away from the interests of the consumer.[21]

In the rail sector the Government specifies the high level outputs (although the degree of specification varies between the DfT and the Scottish Executive), whereas in the energy sector the outputs the Government wants to achieve are specified at a higher level, e.g. duties to ensure security of supply, or indirectly affect investment decisions, e.g. environmental targets. It is notable within the rail sector that there is a difference between the degree of specificity of outputs by the UK Government for England and Wales, and the Scottish Executive. In particular, the Scottish Executive specifies outputs through indicating support for specific projects at very specific times, whereas the UK Government tends to indicate higher level outputs. Boxes 2.1 and 2.2 below illustrate the different approaches adopted to the HLOSs.

Box 2.1: England and Wales HLOS

The summary of the DfT's HLOS provides a good indication of the overall approach that has been adopted. Amongst the key points set out in the summary were:

- A further three per cent reduction in the risk of death or injury on the railways by 2014.
- An improvement in reliability from 88 to 92.6 per cent by 2014.
- A 25 per cent reduction in delays of more than 30 minutes.
- Investments in new and improved infrastructure, such as Thameslink upgrades and projects to improve Reading and Birmingham New Street stations. Investment in an strategic freight network.
- £150m to improve medium sized stations.

[21] While there will be significant overlap between people who are taxpayers and passengers, there will be many taxpayers who are not passengers (or very irregularly passengers).

Box 2.2: Scottish HLOS

There are some similarities with the England and Wales HLOS, including specification of high level outputs such as asset and station condition. These along with requirements regarding cross-border services are described as Tier 1 outputs.

Tier 2 outputs are three specific projects, which are the Glasgow airport raillink, Airdrie- Bathgate and Borders railway. Similar types of very specific projects are specified in the Tier 3 outputs, although these are acknowledged as more aspirational.

The difference in approach may reflect that the Scottish Executive is focusing on a much smaller rail network, so feels more able to specify detailed projects, but also may reflect its view that as the democratically accountable organisation it should specify its outputs to a reasonable degree of detail. The difference in approach shows that the statutory framework contains a degree of flexibility for how the Government and Scottish Executive can fulfil their roles, and hence the subsequent role of ORR. Given that the recently completed Periodic Review to set access charges from April 2009 is the first full review using the HLOS and SoFA requirements it is difficult to assess the impact of the different approaches, and how they will affect ORR's monitoring of how outputs are achieved. Furthermore, it was not immediately clear from ORR's consultations and determinations during the review whether it had any views about which approach was better. Although beyond the timescales of Ofgem's RPI-X@20 review it will be interesting to monitor the impact of the different approaches between England and Wales, and Scotland, to see if the different approaches lead to obviously better or worse outcomes.

There are limited but important exceptions to these overall arrangements. Some major developments in the rail sector, including Crossrail and the Thameslink upgrade have been handled outside of the institutional structure described above. This partly reflects more specific funding arrangements, e.g. Crossrail includes funding from business organisations in the City of London, and the Government's role in granting planning permission for the developments. There is also provision within Network Rail's price control to "log up" unanticipated investments during the price control period for inclusion in the Regulated Asset Base (RAB) at the next review. However, such investments are only undertaken when there is an understanding that the DfT or Scottish Executive regard the investments as appropriate and affordable.

If the energy sector was to adopt the rail sector model it would probably imply an increase in the detail of the outputs specified by the Government, even to be consistent only with the UK Government rather than Scottish Executive approach.[22] The relatively detailed specification of outputs in the rail sector does not generally raise significant concerns about distorting competition amongst users of the network. This is because the

[22] For example, the Government might want to specify the degree of risk of interruption to gas or electricity supply that should be targeted or even some of the specific security standards, which generally currently fall within the responsibility of Ofgem, following consultation, to determine.

franchise model for train operators means that in most cases there is only limited on rail competition.[23] Therefore, Government decisions about which outputs to favour will not substantially distort on rail competition, although they will affect competition between rail and other modes of transport. The limited potential distortions to competition from the relatively detailed specification of outputs in the rail sector can be contrasted with the potential for such distortions in the energy sector. For example, if the Government was to specify outputs for network operators in the energy sector it could affect materially the development of competition for power generation or gas shipping, i.e. the users of the networks.[24] However, the potential for distortion does depend on the types of outputs that are specified and how they are specified. The mere fact that the Government or another organisation specifies outputs for networks centrally does not mean that competition between network users would be substantially distorted, but the possibility would be there, and would need to be carefully considered.[25] The contrast with gas and electricity transmission is between a planning approach to investment decisions and an approach based on using information about market signals.

Adopting the rail sector model in the energy sector would change the role of customers. Increasingly, and particularly for gas and electricity transmission networks, Ofgem has encouraged customers to get more involved in determining the investments that are required. In the rail sector the Government effectively takes the role of deciding what passengers require within what it judges taxpayers can reasonably afford. There are passenger representatives, such as Passenger Focus, that are consulted by the Government, Network Rail and ORR, but they do not have any ability formally to ensure an investment takes place in the same way that a gas shipper can with suitable financial commitments ensure that National Grid expands an entry point to the gas network. Arguably the rail model might work more easily for distribution activities where the views of customers are difficult to obtain and include within the regulatory process, but given the nature of distribution investments, these are arguably the ones for which the Government are currently least interested in specifying outputs.[26]

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[23] Probably the most substantial example of on rail competition is between freight operators. The examples for passenger operators are at the margin, and include Hull Trains and Grand Central.

[24] For example, if a shipper wishes to enter gas into the gas transmission system it can purchase capacity directly from National Grid for the relevant entry point in shorter term auctions. If the capacity available in shorter term auctions is not sufficient to meet the requirements of the shipper it can bid in longer term auctions. Providing its bid triggers the point at which National Grid would invest in new capacity it will have access to the capacity about three years from when it bid in the longer term auctions. On a strict application of the model in the rail sector the availability of capacity in this way would depend on its development being consistent with the outputs specified by the Government.

[25] An interesting example from the energy sector might be gas quality specifications. The specifications for gas quality can have a substantial impact on investments required to bring gas into the UK networks, and therefore the costs for different producers and shippers. A decision to change gas quality specifications would have the potential to affect competition.

[26] This may change in the future depending on the scale of distributed generation that develops and the role for smart metering and other demand side initiatives. However, it still appears likely that the vast majority of the new generation capacity to meet the Government's renewable energy targets will connect to the transmission system.

Finally, it is important to note that the energy sector unlike the rail sector does not include any direct Government subsidy for investment[27], so the constraint this provides in the rail sector on what can be afforded does not apply to the energy sector.

Adopting the rail sector institutional structure in the energy sector would entail a major change in the role of the Government, and raise substantial issues (although not necessarily insurmountable) about how the Government's role affected the development of competition and the expression by large customers of their preferences. This issue is likely to be more significant where there is evidence that customers' and Government's preferences do not align, which may be the case on some environmental issues.

2.4. Industry structures, including the extent to which competition is promoted

At a high level there are some important similarities between the structures of the rail and energy sectors. The key similarities include:

- A separation between the ownership of the network and the provision of potentially competitive services (albeit in the rail sector there is now very limited on rail competition other than for freight services, given the franchise system that is in place).[28] The separation is more complete than for some elements of the energy sector, and particularly the electricity sector.[29]
- Broadly competitive markets for the provision of some of the services required to provide the final service to customers, e.g. wholesale trading for gas and electricity, leasing of train rolling stock[30] and freight services.

There are also important differences. Most notably there is only one major network operator (Network Rail), while in gas and electricity there is both a split between transmission and distribution, and regional split for distribution.

Given the high level similarities between the rail and energy industry structures it can be argued that if the regulatory model can work in the rail sector it could also work in the energy sector. It is not immediately clear that the split between transmission and distribution, and between regions for distribution, would substantially frustrate the adoption of the rail model in the energy sector.[31] It would imply that the Government's decisions about which outputs to specify, and Ofgem's decision about how those outputs

[27] Although mechanisms such as the Renewables Obligation provide subsidies from customers that feed through into requirements for network investment.

[28] A franchise system is not automatically incompatible with a degree of on rail competition, as there could be overlapping franchises. However, the Government's current approach to franchising does not appear to envisage significant on rail competition for passenger services.

[29] Central Networks, EDF, Scottish Power and Scottish and Southern Energy own electricity distribution networks and supply competitive services on these networks.

[30] Although it is important to note that the Competition Commission has been investigating the rolling stock market because of concerns about the degree of competition. See documents at http://www.competition-commission.org.uk/inquiries/ref2007/roscos/index.htm

[31] While the rail network is broadly interconnected, in practice there are similarities to the split between transmission and distribution through the split between inter-city/ high speed trains and commuter and more local services.

should best be achieved might be a more complex process than occurs in rail because of the greater number of parties involved, but in principle this is no more complicated than occurs for a current price control review in the energy sector.[32] The Scottish Executive's project specific approach to its High Level Outputs Specification suggests that the rail sector model can be made to work even if it is necessary to specify detailed outputs.

As discussed above, arguably the much bigger difficulty for adopting the regulatory model from the rail sector in the energy sector is the presence of substantial production, wholesale and retail competition in the energy sector, whereas the rail sector only really has competition to supply and lease rolling stock, and for freight services. Currently new gas supply developments, such as LNG terminals, and new power stations, contract with the transmission operators to secure capacity to develop their projects. These plans can be seen as an expression of customers preferences based on price signals for wholesale gas and electricity. If the Government decided outputs that affected substantially which transmission projects should have priority (or even broadly where the new capacity should be added) it would affect the financial attractiveness of different projects, which as a minimum would make the process very resource intensive, with affected parties engaging in significant lobbying. It would also imply the Government taking effective responsibility for deciding which projects were necessary to preserve security of supply and promote competition.[33]

It is important to note that the Government already makes many decisions with respect to energy infrastructure and environmental obligations that affect the development of competition. For example, the Government gives consent for major new power stations, has an important role in approving any new nuclear power stations and is involved in the work to develop an offshore transmission network. The current Government has arguably been more active in exercising some of its powers in recent years, such as with regard to approving new large power stations. For example, it has introduced obligations with regard to Carbon Capture and Storage, as can be seen from the most recent approvals of new gas fired power stations.[34]

The high level industry structure in the rail sector has sufficient similarities to the energy sector that the differences would not be a barrier to adopting the rail sector model in the energy sector. The more important constraint would be the potential that adopting the rail model in the energy sector could substantially distort competition between network users. Although it is important to note that

[32] There are transaction costs to the current process for determining investment requirements in the energy sector, whether this be the resources devoted to price control reviews or the resources involved in long term entry capacity auctions in the gas sector.

[33] The Government would probably want to consider quite carefully the degree of responsibility it wanted to take with regard to deciding when and where investment in new capacity should take place on the gas and electricity networks. Whereas the consequences of a delay in necessary investment on the rail network might be additional overcrowding and a need for other rationing measures, the consequences of a delay in necessary investment in the energy networks could be more serious if it led to customers' supplies being cut off.

[34] See http://nds.coi.gov.uk/environment/fullDetail.asp?ReleaseID=391984&NewsAreaID=2&NavigatedFromDepartment=False

a range of Government decisions already affect competition on the energy network.

2.5. Ownership structures

Network ownership is one of the biggest differences between the rail and energy sectors. All the energy networks are owned by "private" companies, whether they are stock market quoted or infrastructure funds. Network Rail is a private company limited by Government guarantee. It is wholly debt funded with no shareholders. While it is clear that the energy networks have an incentive based on their Directors fiduciary duties to maximise the value of the company through maximising the future stream of profits, it is less clear that Network Rail has such an incentive.[35] ORR appears to consider that there remain a range of incentives on the management of Network Rail to achieve outputs valued by passengers and other stakeholders, but has recognised some limitations on the incentives compared to for example a stock market quoted company. Furthermore, the history of the company, and its key role in the rail network mean that the management face strong reputational incentives for good performance.[36]

While the differences could be exaggerated, at the margin the differences in incentives may mean that compared to private companies Network Rail would be more prepared to accept Government specified outputs with a "social" goal, where the commercial case was weak. An alternative way of making the same point is that private companies might want the regulator to provide stronger protection against the future stranding of assets associated with achieving Government specified objectives, particularly where these conflicted with customers' preferences or where there was uncertainty about whether other political parties would support the same objectives if they entered Government. This could be an increasingly important issue if Government determined environmental objectives differ from the preferences customers express in their actions in markets. However, as noted above ORR seeks to apply incentive based regulation to Network Rail in a very similar way to Ofgem's approach for energy networks despite the differences in ownership structures.

It may be more difficult to be sure what impact the different ownership structure and incentives may have on Network Rail's approach to achieving its key outputs than energy companies. To the extent that its reputation (and that of its senior management) depends substantially on achieving outputs rather than making a profit or financial surplus, its focus may be more clearly on the achievement of outputs. This could have negative consequences for the achievement of efficiency. The outcomes during the new price control period may help to understand how Network Rail interprets the relative balance of its incentives.

It is difficult to definitively determine the impact ownership differences may have on outcomes between the rail and energy sector. However, while the value maximising incentive of companies operating energy networks is relatively clear,

[35] The activities of Network Rail are overseen by a group of members who receive no remuneration.

[36] The media publicity after the difficulties with aspects of maintenance and upgrade work on the West Coast mainline, including overrunning engineering works, in recent years, illustrate this point.

it is less clear precisely what the overriding incentives for Network Rail's management are. This could affect the willingness of the company to accept certain investments that the Government considers necessary, but which a value maximising company may not consent to. Conversely Network Rail may have a stronger incentive to focus on outputs.

2.6. Investment requirements

Although the precise quantums differ between the sectors[37], both sectors are undertaking particularly large and increasing capex programmes. It is important to note that the economic downturn may to some degree affect the scale and timing of some infrastructure projects (lower economic growth would be expected to lead to lower demand for gas and electricity, so there would be a reduced need for network expansion). The drivers for investment also differ somewhat between the sectors. Until the impact of the economic downturn part of the investment in the rail sector was to meet record increases in passenger demand and to improve the quality (meaning speed and frequency of journeys). In a similar way to energy investments, economic growth will have an impact on requirements for investment in the rail network to the extent that it impacts passenger growth, particularly on commuter routes. While any displacement of road or air transport to the rail sector would have environmental benefits arguably this has not been the prime driver of investment.[38] While energy demand has continued to grow up to the economic downturn, as GDP grew, its pace was not such that it necessitated large investments. Instead the investments in the energy networks are being driven by new sources of supply, e.g. LNG, environmental obligations, e.g. renewable energy, and the replacement of ageing networks (which will also be an issue for some parts of the rail network).

Both sectors grapple with the fundamental problem of how to decide, particularly for investment that increases capacity and improves quality, which investments should be built and when. The regulatory model in the rail sector does this through a centralised Government decision about high level outputs followed by a centrally planned approach led by Network Rail (albeit involving substantial consultation with stakeholders), whereas the energy sector is increasingly moving to a disaggregated process based on market signals about investment requirements, particularly at the transmission level, for making these decisions. The disaggregated approach is based on large customers or intermediaries stating their requirements and supporting them with financial commitments to pay future charges. As discussed in the previous section, while the rail sector can handle large investment requirements, its centralised approach is fundamentally different from the energy sector at the transmission level for making the

[37] ORR's Periodic Review has allowed Network Rail £18.1bn for maintenance and renewals and £7.6bn for enhancement for the five year period from April 2009. It is difficult to do a direct time period comparison for energy because of the differences in timing for price control reviews, but Ofgem's transmission price controls for gas and electricity allowed £5.1bn for capex, the gas distribution price control review allowed over £5bn for capex and the electricity distribution price control review allowed £5.7bn for capex.

[38] Environmental impact is one of the four objectives set out in the summary of the DfT's White Paper at http://www.dft.gov.uk/about/strategy/whitepapers/whitepapercm7176/whitepapersummarybooklet.pdf

trade-offs between different investments. There are probably greater similarities with the distribution networks for energy where the direct role of consumers or intermediaries in influencing investment decisions is more limited than for transmission.

Furthermore, the rail sector, to some degree in a similar way to the water sector, involves much more analysis of individual projects by the regulator than the energy sector, particularly for the distribution networks. This partly reflects the relative scale of projects, with many distribution projects being quite small in size. It may also reflect different historical approaches, where the energy sector has generally sought to avoid project specific regulation of investment. ORR also has to take a view on the affordability of the Government's outputs, which requires a degree of detail in its scrutiny of Network Rail's business plan.

Both regulatory models have shown themselves capable of delivering large capex programmes, but the trade-offs and decisions about which projects to pursue are made in very different ways. The regulatory assessment of projects is also made at a different level of granularity.

2.7. Position in the regulatory cycle

Although the rail sector has undergone substantial change in the last decade, it is important to remember that it has been subject to economic regulation for a shorter period of time than the energy sector. Arguably and to some degree supported by the price control proposals made by ORR, this means that an important focus for ORR is on achieving cost efficiency.[39] While for Ofgem cost efficiency remains important, there is more evidence that companies may be beginning to exhaust the post-privatisation efficiency savings[40], even if there often remain substantial differences in the relative performance of companies. So while capex is a key element of the price control review in both sectors, the achievement of substantial catch-up efficiency savings may be more important in the rail sector than the energy sector, suggesting a more mature regulatory regime.

In other respects the rail sector regulatory model is also settling down as the Periodic Review that has just been completed is the first full review to be conducted with the current institutional arrangements. This may provide an opportunity for all parties to step back and review the effectiveness of the arrangements before the next review.

While the rail and energy sectors are both characterised by large capex programmes, the rail sectors' focus on catch-up efficiency savings is greater than the energy sector.

[39] The Chief Executive's foreword to ORR's determination of Network Rail's access charges states that, "The strong evidence we have collected shows clearly that there remains a very large potential for Network Rail to improve its efficiency."

[40] DNOs are currently overspending on average compared to their operating expenditure allowances under the current price control.

2.8. The recent Periodic Review

We have discussed above a range of aspects of the recently completed Periodic Review. There is significant continuity in the basic regulatory framework from the previous Periodic Reviews, but some changes have been made, including:

- Stronger incentives to out perform the determination through the retention of savings. Train operators (passengers not guaranteed to get any benefit passed on) will receive 25% of any out performance providing outputs are delivered. A rolling capex incentive has also been introduced to equalise the incentive to make efficiency savings across the whole period of the review.
- Capping of the financial indemnity that the Government provides for Network Rail's debt accompanied by a commitment from Network Rail to issue non-Government guaranteed debt. The impact of this arrangement has not yet been tested.

As discussed above, the most significant changes at this Periodic Review are the new processes for determining outputs and the role of Government in this. Although beyond the timescale of Ofgem's RPI-X@20 review, it will be interesting in due course to assess the effectiveness of the new arrangements.

2.9. Conclusions

There are many similarities between the rail and energy sector regulatory models, including the basic form of the price control, the use of incentives and the approach to setting the cost of capital and considering financeability. However, the institutional structure is very different, and in particular, the role of Government in determining high level outputs and being a major funder of investments is much greater in rail than energy, the incentives of the network owners in energy are clearly to profit and value maximise, while this is not so clearly the case for Network Rail, and rail is characterised by very limited on rail competition (except for freight), while there is extensive competition between the users of energy networks. The difficulties of a competitive market as we currently have for energy wholesale and retail activities, co-existing with an institutional structure of the type we have in the rail network leads us to have substantial doubts about how easy it would be to transfer the model to the energy sector, without some adaptation. As a very minimum substantial care would need to be taken to consider what impact the specification of outputs (even at a high level) by the Government would have on competition between network users, in a way that is not so clearly required or done in the rail sector, given the limited nature of on rail competition.

While we have doubts about the ability of the rail model to be transferred wholly to the energy sector, the model does raise a key question for the energy sector. Are there some aspects of Government's environmental objectives as they relate to network investment, where Ofgem, customers and the industry would benefit from a much clearer set of outputs from Government or some other body (perhaps combining Government, Ofgem and industry) in the form of the HLOS in the rail sector? This might help

overcome some of the uncertainty about how networks should develop to meet the Government's very high level environmental objectives, and avoid the need for very complex price controls that allow for a wide range of possible outcomes.

Under the current energy sector model Ofgem ultimately has to try to balance a range of competing objectives and desires (albeit with a clear primary duty to protect customers), which is getting more difficult as environmental, security of supply and social considerations become more important. The rail sector model makes ORR's job somewhat easier with regard to the outputs to be achieved (although detailed schemes still have to be considered) because the Government makes many of these trade-offs and is therefore responsible for the outcomes. This allows ORR to focus on the cost efficiency to achieve the objectives.

As we are just at the end of the first Periodic Review with the current institutional arrangements in the rail sector it is very difficult to assess their effectiveness, and in particular, how cost effectively the required outputs are delivered. ORR has extensive plans to monitor outputs, but this approach has yet to be fully tested. It will also be interesting to assess whether the different approaches to the detail in the HLOSs between the UK Government and the Scottish Executive lead to materially different outcomes.

3. THE WATER SECTOR REGULATORY MODEL

3.1. Introduction

This section summarises the key features of the water sector regulatory model as used in the UK. We identify the key features with regard to capital expenditure and outputs that affect the applicability of the model to the UK energy sector. We also consider current developments in the sector that might affect the regulatory model in the future.

3.2. Overview

The regulatory model in the UK water sector is different between England and Wales, Scotland and Northern Ireland. England and Wales has 10 large water and sewerage companies and 14 smaller water only companies. All the companies are vertically integrated (responsible for all functions from managing reservoirs to billing customers) and largely local monopolies.[41] Ofwat has regulated the companies through setting price caps since privatisation. The current price control review (PR09) is the fourth price control review by Ofwat since privatisation. We discuss further below some of the main developments during the current price control review.

Professor Martin Cave of Warwick Business School was asked by the Secretary of State for the Environment, Food and Rural Affairs, the Chancellor of the Exchequer and the Welsh First Minister to consider the potential for more competition and innovation in the water industry. The final report of the review is due to be published shortly. An initial report was published last year.[42] Part of the motivation for the review was concern that the current arrangements in the water sector for facilitating competition for some very large customers (inset appointments, which are discussed further below) were not working effectively.

Scotland and Northern Ireland continue to have publicly owned water companies. Scotland has an independent economic regulator (the Water Industry Commission). While Scottish Water is subject to traditional RPI-X regulation for its network assets, its customer facing activities for business customers are open to competition. Although in its early stages, the regulator is already reporting significant benefits for business customers from the introduction of competition.[43] Until recently Northern Ireland's water services were provided through the Government. The Northern Ireland Water Service has now been established as a publicly limited company, and the Northern Ireland Authority for Utility Regulation (NIAUR) is responsible for economic regulation – this is the expanded Northern Ireland energy regulator. It is in the process of a review to set a new price control from 2010 (PR10). It is notable that there is currently no

[41] As we discuss further below, the only substantial competition in the water sector in England and Wales is through inset appointments, which allow the supply of water in areas that are otherwise local monopolies.

[42] "Independent Review: of competition and innovation in Water Markets", November 2008.

[43] http://www.watercommission.co.uk/view_Press_Releases_2009.aspx?ArticleId=82

separate water charging for residential customers in Scotland or Northern Ireland, with costs paid through local authority rates and general taxation respectively.

More so than any of the other regulated sectors in the UK, the water sector has been characterised by a consistent focus on improving the quality of service for customers and the wider community since privatisation. This has largely been driven by provisions at a European level affecting issues such as drinking water quality, environmental habitats, the quality of beaches, etc.[44] This has created a very important role for Government, environmental and drinking water regulators in determining the outputs to be provided by companies, which feed into the price controls set by regulators. Ofwat has the ultimate responsibility for determining what is cost effective for customers to fund within the constraint of its statutory duties and legal requirements such as compliance with EU Directives.

The Water Framework Directive (WFD) is a relatively recent EU Directive that seeks to ensure more effective resource management plans for the water sector. The role of the WFD has become more important with the need to address the consequences of climate change. We discuss further below how the implications of these provisions for the industry.

Before we discuss the main aspects of the water sector regulatory model under the five headings discussed in the previous section, we have set out in Table 3.1 the main aspects of output and capital investment regulation in the water sector, which provide a summary and context for the subsequent discussion.

[44] See the list of directives at http://www.water.org.uk/home/policy/positions/european-directives

Table 3.1: A summary of the main aspects of the water sector regulatory framework with respect to output specification and capital investment efficiency

Elements of the regulatory framework	Approach in the water sector
Drivers of capital investment	There are three broad drivers of capital investment in the water sector: • Resource management or achieving a supply – demand balance. This has historically been a relatively small component of investment requirements, but water shortages, particularly in Southern England, are beginning to change the importance of this driver. • Environmental requirements, whether from EU Directives, Government guidance or other requirements from environmental regulators. This has been the major driver of capital investment since privatisation. • Customer related standards of service, which affect issues such as unplanned interruptions to supply. Standards are specified, which can be changed as appropriate.
Overall approach in the regulatory framework	Ofwat has consistently adopted a project specific approach to regulating capital investment, based on assessing the need for and efficiency of individual capex projects. This also provides a basis for disallowing specific expenditure that has not been undertaken at the next price control review, but arguably takes the focus away from the achievement of overall outputs that are desirable for consumers in the most cost effective manner as companies may be reluctant to deviate from the projects "agreed" with Ofwat in the price control review There has been a consistent concern that the regulatory framework in the water sector has led companies and Ofwat to focus on each five years rather than the longer term. The introduction of Strategic Direction Statements for PR09, which require plans for a 25 year period, is intended to help change this focus amongst companies
Which organisation specifies the outputs?	This varies broadly with the drivers of capex: • Resource management plans are drawn up between water companies and the Environment Agency, with inputs from Defra and Ofwat. • The Government, with advice from the environmental regulators specifies requirements regarding environmental outputs and drinking water quality, and are often heavily affected by the EU Directives. The quadripartite arrangements (discussed further below) provide the forum in which the projects to meet these requirements are discussed and agreed. • Ofwat is responsible for deciding the customer related standards of service, and these are informed by surveys of what customers' value and are willing to pay for. CC Water work with the companies to undertake these surveys.

What is the nature of the outputs?	It is difficult to specify what the outputs look like generically. We discuss further below the detail of specific outputs, but in broad terms outputs are only specified for a five year price control period, or at least the conclusions of the next price control review are not prejudged. The Government tends to specify its outputs at a relatively high level, and to some degree a more national level, leaving it to the environmental regulators to translate these into company specific outputs. Given the project specific nature of capex considerations in the water sector, outputs often relate to the delivery of very specific projects, although customer related quality of service improvements are specified in a more generic manner
The role of the company and regulator when outputs are set	Once the outputs have been developed (or at least initial views reached) the companies develop business plans that set out the cost of achieving the outputs. Due to the need to balance the achievement of outputs with their costs, the development of business plans involves ongoing iteration with the environmental regulators. Water companies are required to employ an independent reporter to comment on their plans. Ofwat then assesses the efficiency of the plans (broadly this is based on reviewing cost benefit analyses prepared by companies for specific projects) and whether the specified outputs can be met cost effectively given its duties with regard to consumers' interests. This process involves substantial interaction between Ofwat, the environmental regulators, Government and companies to determine what is required to deliver outputs and what is affordable. Where Ofwat has concerns about the need for or affordability of proposed investments it can disallow these from business plans, or indicate that they would be better undertaken at a later date. The conclusion of this process, and assuming that companies accept the price control proposals, results in an implicit contract between Ofwat and the companies regarding the outputs to be delivered and the revenue that can be recovered to fund the delivery of the outputs.
Monitoring of outputs and investment	There is a very extensive and detailed set of requirements for companies to report on their performance against the outputs and specific projects included in the price control settlement. Ofwat publishes detailed information about company performance on an annual basis. This information forms the basis for any decisions by Ofwat to disallow expenditure from the RAB or take action against companies' for a failure to achieve certain outputs Unlike for the rail sector there is no specific prohibition on the Government or other environmental regulators from changing their requirements or guidance during price control reviews. However, Ofwat has mechanisms such as interim reviews for specific items (IDOKs) or logging-up to handle such changes in circumstances

3.3. Institutional arrangements

The institutional structure of the water sector regulatory model in England and Wales is more complicated than for the rail sector. This is primarily because there are effectively four main organisations (hence the description "quadripartite" arrangements) that have statutory roles that affect the final price control settlement developed for the water industry. These are the Government (through Defra), the Environment Agency, the Drinking Water Inspectorate and Ofwat. The arrangements are broadly mirrored in Scotland and Northern Ireland.

The Government takes overall responsibility for setting the priorities for the development of the water sector. In 2008 Defra published its water strategy to provide the overall direction for the industry.[45] Within that context the Environment Agency has three main roles to:

- Offer advice to Ministers on the impact of European Directives on the water industry as they affect environmental obligations.
- To produce a National Environment Programme to inform PR09 setting out the environmental schemes required to meet European Directives. This plan forms part of companies Asset Management Plans (AMPs).[46]
- Comment on companies' Water Resource Management Plans, which they have to produce as part of their AMPs.

The Drinking Water Inspectorate has a narrower but similar role to the Environment Agency with regard to drinking water quality.

It is ultimately Government (within the context of the EU Directive requirements) and then Ofwat that balance the benefits and affordability of the environmental obligations. However, all the organisations in the quadripartite arrangement will be bound by general requirements to undertake Cost Benefit Analyses of their proposals and requirements. Although to the extent that a regulator is implementing EU Directive requirements then a further Cost Benefit Analysis would not be required for the overarching legal requirements. We discuss further below the specific requirements that Ofwat has introduced for companies to provide cost benefit analysis for projects they are including in their business plans.

The statutory framework in the water sector appears to allow this apparently quite complicated institutional structure to work relatively effectively. The roles of the different parties appear to be relatively well specified and understood.[47] However, it is arguable that it is in practice difficult for external stakeholders to understand and follow the process, and in particular how the decisions and discussions at different parts of the

[45] "Future Water, The Government's water strategy for England", Defra, February 2008.

[46] http://www.environment-agency.gov.uk/business/sectors/33071.aspx

[47] This appears to partly be a legacy of the difficulties experienced during the initial periodic review leading up to 1994, which led to the development of a clearer common understanding of each organisation's respective roles and responsibilities.

process come together to form final decisions. For example, while all the organisations in the quadripartite arrangement explained their processes for participating in PR09, we did not find a single explanation or source of information about the overall process that would be followed. Ofwat's high level timetable for the review process appeared to be somewhat incomplete about the role of other regulators and the Government.

We consider that in reality the process is relatively well understood by all the parties involved given that it has been used in a broadly similar form for a number of price control reviews. The lack of an overall detailed specification of the approach taken probably also reflects that in practice the process is very iterative and a lot of "informal" discussion and interaction occurs between the parties. For example, companies will work closely with the Environment Agency at a local level when developing their business plans to meet resource management plans, and much of this will occur through bilateral meetings and other interactions. It may therefore be that the history of the processes has allowed them to evolve to work more effectively because of the informal nature of much of the process within a well understood set of overall statutory parameters.

Also, while the Government, Environment Agency and Drinking Water Inspectorate undertake consultations as part of their processes to define obligations for companies, it is not immediately clear how and whether their priorities align with those of customers, or are consistent with customers' willingness to pay. It would appear to be reasonable to say that it ultimately falls to Ofwat, within the framework of its statutory duties, to consider consumer requirements and preferences. Ofwat undertakes this role by assessing Cost Benefit Analysis produced by companies for each of their individual projects.[48] However, the quadripartite nature of the arrangements means that all the parties have to recognise Ofwat's ultimate responsibilities to consumers' and consider that in reaching views about what outputs they would like.

Ofwat's final determination (Chapter 8)[49] for the last price control review provides a statement of the types of outputs that are specified in the water sector for the different drivers of capex. Amongst the notable aspects are:

- Outputs are specified separately for water resource management, environmental and quality improvements and customer service standards.
- Water resource management outputs tend to be expressed in terms of inputs, e.g. number of meters to be installed or level of leakage reduction. However, some outputs, such as the number of new homes to be supplied are described more generically, but underpinned by specific projects.
- The environmental and quality improvements are also expressed often in terms of inputs, such as the amount of distribution mains that are cleaned or the number of sewage works to be upgraded. Although all outputs ultimately flow

[48] Ofwat issues detailed guidance about what it expects companies' to provide as part of their Cost Benefit Analysis. These requirements are substantially more onerous than the requirements Ofgem places on regulated network operators to justify their proposed investments. See http://www.ofwat.gov.uk/pricereview/pr09phase1/pap_con_bpr09inforeq.zip.

[49] http://www.ofwat.gov.uk/pricereview/pr04/det_pr_fd04.pdf

down to individual companies, Ofwat does choose to specify some of the company specific outputs, e.g. reducing hardness of water for Severn Trent customers.

- Ofwat published summarises in its final determination of the outputs be delivered by each company.

Arguably to the energy sector Ofwat's specification of outputs (some in the form of inputs) provides more clarity about what the companies' should deliver, but perhaps less flexibility about how that should be delivered.

Compared to the energy sector this set of institutional arrangements provides a greater degree of clarity about how environmental obligations should be taken into account when setting price controls. In this way it provides a model that the energy sector could consider. Although it may be that part of the effectiveness of the model in the water sector reflects its long history and therefore well understood roles for each organisation. However, the operation of the model in the water sector does not need to resolve how these obligations interact with competitive wholesale and retail markets, or how customers' preferences interact with environmental obligations. These are both arguably important issues for the energy sector.

The water sector provides an example of a model that relatively effectively integrates environmental obligations into a price control review process in a more complex way than the rail sector. We discuss below some of the issues with adopting this model in an energy sector characterised by competitive retail and wholesale markets.[50]

3.4. Industry structures, including the extent to which competition is promoted

The water industry structure parallels to some degree the structure of the electricity and now gas distribution parts of the energy sector, in that it is composed of regional monopolies, albeit in the water sector they perform some customer facing functions that are in the competitive part of the energy sector. While there are a relatively small number of sewerage companies with large regional areas, similar in number to the separate gas distribution regions, there are far more, smaller water companies, often covering very small geographic areas. To preserve a sufficient number of separate companies for the purposes of regulatory comparisons, there are limitations on the ability of water companies to merge.[51]

There is no equivalent of the national transmission system in gas and electricity in the water sector. While there is some transferring of water between regions, generally each

[50] So far competition in the water sector has been limited to a small number of inset appointments for very large customers, with the exception of retail competition in Scotland for business customers.

[51] The Water Industry Act 1991 put in place a special merger regime for mergers between companies. Under section 32 of Water Industry Act 1991 (subsequently amended by the Enterprise Act 2002 (EA02) and Water Act 2003), the Office of Fair Trading (OFT) must refer to the Competition Commission a merger of two or more companies in England and Wales where the turnover of each is £10 million or more. Dependent upon the outcome of the Competition Commission's judgement, Ofwat may make amendments to the water company's licence through Section 13 of the Water Industry Act 1991.

regional company is responsible for sourcing its own supplies and there is limited sharing of water between companies. This aspect of the water sector is noted in the Cave review as a probable inefficiency because companies may spend substantial sums of money to obtain supplies in their own area when it could be cheaper to build a pipeline to transfer water from another region. The gas and electricity transmission networks facilitate the transfer of large amounts of gas and electricity that are produced or generated a long way from areas of high demand. For example, gas production predominantly comes into the UK on its east coast, while there are substantial centres of demand in central and western England.

The other major difference between the industry structure in water and energy is the almost total absence of any competition in the water supply chain. The only material competition in the water supply chain in England and Wales is through inset appointments[52], but these are relatively small in number and apply only to very large industrial customers or major new housing developments.[53] As noted above, competition for customer facing activities has been introduced into the Scottish water sector. The energy sector in the UK is characterised by relatively vigorous competition for wholesale and retail activities.

Whereas we set out concerns that the institutional structure in the rail sector might not be compatible with the competitive nature of parts of the energy sector, it is less clear that the same issue applies with regard to the institutional structure in the water sector. In particular, the type of investments that are required to meet environmental obligations in the water sector may be less likely to distort competition. For example, a uniform requirement for a certain standard of drinking water does not obviously distort competition because it is applied equally, and might be expected to have similar impacts in terms of required investment.[54] However, decisions about the types of outputs that are included in the HLOS in the rail sector could have the potential to distort competition. This suggests that whether the water or rail sector models could work in the energy sector would partly depend on the types of investments and outputs that Government or other regulators specified, and their potential to distort competition. In other words, the potential for a substantial distortion to competition from centrally developed output requirements will depend on the nature of the requirements specified and probably the process followed to specify the outputs. It appears that this would be a risk in the energy sector given that the Government's environmental obligations, such as the renewables targets involve decisions that will affect some companies more than others.

Finally, the water sector is vertically integrated, which can make it easier to deliver some of the environmental obligations because companies can internalise the co-ordination

[52] Ofwat's website provides an explanation of inset appointments at http://www.ofwat.gov.uk/competition/inset/

[53] There are alternative options for introducing competition, such as access arrangements or common carriage, but these have not been pursued to date in England and Wales.

[54] Although as noted above, specifications of gas quality can have material impacts on investment requirements, so it could be the case that drinking water standards could affect competition, if there was wholesale competition in the water sector.

issues associated with achieving targets that affect the whole of the supply chain. The renewable generation target is an example of an energy sector target that affects a number of different parts of the supply chain and requires co-ordination between at least network operators and generators. The vertical integration and lack of competition may mean that co-ordination is achieved at a higher cost than in a sector subject to competitive pressures, but it may ensure that the co-ordination happens.

There are quite strong parallels between the industry structures with regard to network regulation in the water and energy sectors, given the regional split of water, gas and electricity distribution companies. The types of investments that are generally required in the water sector have less potential to distort competition than might be the case in the rail sector, suggesting that the applicability of the models to the energy sector may depend on the types of investments and outputs that Government or other regulators would seek to specify.

3.5. Ownership structures

Whereas the rail sector through Network Rail had a very different ownership structure to the network companies in the energy sector, there are much greater similarities between the energy and water sectors (at least in England and Wales). With the exception of Dwr Cymru, which is very similar in structure to Network Rail, all the water companies are private companies either stock market quoted or owned by investment funds. The ability of privately owned companies to accept and work with the requirements specified by Government and environmental regulators indicates that private company ownership is not a barrier to this type of institutional structure operating effectively. However, the monopoly nature of the water sector to date means that arguably some of the issues that could arise from Government or environmental regulators specifying requirements, such as concerns about stranded assets are less important. Customers in the water sector do not have an ability to signal through choices in a competitive market that certain investment decisions were inappropriate. Furthermore, as Ofwat subjects all companies' capex plans to a high degree of scrutiny before they are included in the Regulated Asset Base (RAB)[55] any risks of stranding due to differences of view between Ofwat, Government and environmental regulators are largely eliminated.

As the ownership structures are similar in the water and energy sectors this is not a reason why the water sector model could not work in the energy sector. Furthermore the results in the water sector suggest that a relatively strong role for Government and environmental regulators can work effectively with a largely privately owned industry.

[55] We referenced above the detailed guidance that Ofwat issues to companies for the cost benefit analyses they are required to provide to support their investment proposals. Ofwat also undertakes comparative efficiency benchmarking for opex and capex to ensure that the proposed revenue allowances reflects an efficient level of costs.

3.6. Investment requirements

We noted in a footnote in the previous section the scope of investment allowed by Ofgem in the current network price controls in the energy sector. The water sector is in the later stages of PR09, and companies have not yet submitted their final business plans, so it is hard to indicate precisely the scale of investment that will be allowed over the next five years. There also appears to have been quite a large disagreement between the companies and Ofwat about investment requirements following analysis of companies' initial business plans. The water companies proposed £27bn of investment over the price control period, while Ofwat has indicated in broad terms that it considers this to be about 20 to 25% more than was justified.[56]

This, and the track record of the water sector delivering very substantial capex programmes suggests that the model is well suited to delivering a large capex programme driven by environmental requirements.[57] However, it is notable that a large driver for much of this investment are the European Directives, for which it is often not clear whether these reflected customers' views of the priorities for investment, or indeed the degree of willingness to pay for the investment, despite Ofwat's scrutiny of investments. Where the investments relate to network assets that do not affect the development of competition, the water sector model could work in the energy sector. However, to the extent the environmental obligations have the potential to distort competition then it would raise more challenges for the energy sector.

In addition to the environmental requirements, which have been the key driver of investment in the water sector since privatisation, investment is also driven by the need to manage resources and achieve an appropriate supply demand balance, and any improvements in customer quality standards that Ofwat considers to be appropriate. Historically these have been less important drivers of investment, but the increasing shortage of water in Southern England has increased the importance of achieving a supply- demand balance as a driver of investment. It might be reasonable to say that historically investment to address these issues has often arisen in reaction to specific difficulties, such as droughts or concerns about customer service, rather than being a pro-active focus for investment, which it is now with regard to the supply demand balance in Southern England. It is difficult to generalise, but there probably is a limit to the scope of available management and regulators time that means that the legally required environmental investments may have received greater focus than longer term requirements. The introduction of SDS's may help to address this issue.

The water sector regulatory model has shown itself capable of delivering a very large investment programme driven substantially by environmental and other quality requirements. While many of these investments appear unlikely to have the risk of distorting competition, this potential in the energy sector may make it more difficult to transfer the model across to the energy sector.

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[56] "Capital expenditure for 2010-15: Ofwat's view on companies' draft business plans", Ofwat, December 2008.

[57] Water UK quotes £60bn as the total investment by the water sector since privatisation in 1989.

3.7. Position in the regulatory cycle

Although British Gas was privatised three years before the water companies (1986 compared to 1989), the electricity companies were privatised at broadly the same time. Therefore, both sectors can be considered relatively mature in regulatory terms. For example, both the electricity distribution sector and the water sectors are going through their fourth full price review by a regulator. The comparison in terms of the number of reviews is less clear with gas because of the recent changes in industry structure when National Grid sold four of its distribution networks.

Given the maturity of the regulatory regimes there is now a greater focus in both sectors on the types of capex to be undertaken rather than the unit cost efficiency of capex and opex. This is not to say that unit cost efficiency is no longer considered (Ofwat still undertakes extensive comparative efficiency analysis and Ofgem is undertaking extensive benchmarking for EDPCR5), but the big initial catch-up unit cost efficiency gains obtained after privatisation appear to be reducing in quantity in both sectors.

Although both sectors have relatively mature regulatory regimes there are notable differences in the detail of how regulation is undertaken in both sectors. In particular:

- Ofwat has always taken a more project specific and in depth bottom-up approach to reviewing companies' capex proposals, whereas Ofgem has tended to review capex projections at a more overall level. Ofgem has taken a more project specific approach to developing revenue drivers in the gas and electricity transmission sectors, but not for distribution. Arguably this difference of approach is as much cultural as driven by any inherent features of the two sectors.

- While Ofgem has utilised comparative efficiency assessments, particularly for electricity distribution companies, Ofwat has made much greater use of such techniques to set price controls, including explicit incentives for poorly performing companies to catch-up to the performance of the best companies. The use of this approach is reinforced by the restrictions on mergers discussed above.

- While the water sector has a relatively strong customer representative in CC Water, the role of individual customers (or intermediaries such as suppliers) in determining price controls and the regulatory arrangements is much less than in the energy sector. Perhaps the most high profile element of consumer influence on the price control settlement in the water sector is the willingness to pay studies undertaken by water companies in conjunction with CC Water to inform their investment and expenditure proposals.

- The challenge in the water sector has been to fund non-load related investments, i.e. investments driven by environmental requirements, whereas up until recently that has not been such an important issue in the energy sector (although there are some exceptions such as the gas mains replacement programme). The techniques to assess the appropriateness of these two types of investments may be different,

particularly as load related investment can more clearly be linked to customers' requirements and willingness to pay.

The energy and to some degree the water sectors are facing the increasing challenge of focusing on how to incentivise appropriate and timely investment to meet environmental (which has historically been more of an issue for the water sector) and customer needs, whereas the focus on unit cost efficiency has been somewhat reduced given the progress since privatisation.

3.8. Future developments

There are two major ongoing reviews that will affect the regulatory model in the UK water sector, which are PR09 and the Cave review. We discuss each of these in turn below.

3.8.1. PR09

Ofwat will make its initial proposals for the price limits to apply to the water only, and water and sewerage companies in England and Wales for the next five years in the Summer. Given that the regulatory model for the England and Wales water sector is relatively mature this review will include primarily incremental changes, but there are a couple of quite significant changes that are being introduced by the review that affect particularly capital investment. These changes indicate that despite the intensive and detailed work that Ofwat undertakes to assess capex requirements the current arrangements have not been wholly successful in meeting Ofwat's objectives and promoting consumers' interests.

Firstly, Ofwat has proposed to adopt Ofgem's menu regulation (called the Capital Incentive Scheme by Ofwat) for the setting of capex allowances for the companies. This decision appears to reflect an ongoing concern that water companies have a strong incentive to submit relatively high initial business plans rather than reveal what they really need. Second, Ofwat has introduced a two stage Cost Benefit Analysis to assess the need for capex projects, which combine a commercial and social payback. The two stage Cost Benefit Analysis seeks to take account, at different discount rates of the commercial and social aspects of the project. This could be an approach Ofgem would like to consider for investments with a significant environmental role.

Another and more overriding change the Ofwat has introduced as part of PR09 is the requirement for companies to produce a Strategic Direction Statement, which sets out their plans to develop their network and businesses over the next 25 years. These statements appear generally to have been well received as a means to encourage companies to adopt a longer term focus to the running of their businesses. However, the value of these statements is likely to be better understand at future price control reviews when the durability of the plans is better understood.

3.8.2. The Cave review

Professor Martin Cave of Warwick Business School was asked by the Secretary of State for the Environment, Food and Rural Affairs, the Chancellor of the Exchequer and the Welsh First Minister to consider the potential for more competition and innovation in the water industry. The final report of the review is due to be published shortly. An initial report was published last year.[58] As it was not a final report it did not include too many firm recommendations and specifically did not include recommendations on innovation and wholesale competition, which will be more fully addressed in the final report. However, the report did signal strong support for developing retail competition in England and Wales, starting with larger industrial customers, and gradually reducing the threshold. The draft report did not propose the introduction of retail competition for domestic customers, but instead that this should be considered after the impact of retail competition for industrial customers is better understood. It also signalled the importance of getting clarity of regulatory accounts and costing information between monopoly and potentially competitive activities.

3.9. Conclusions

The water sector provides an example of a regulatory model that has delivered substantial investment over a sustained period of time in response to environmental and other external requirements aimed at improving quality, e.g. drinking water. This suggests that the model can therefore work effectively to deliver large capex programmes driven by environmental factors, although changes proposed by Ofwat for PR09 suggest that issues remain to ensure the efficient and effective delivery of capex programmes. However, some caution needs to be exercised before assuming that the model could be adopted in whole by the energy sector because:

- There is very little wholesale or retail competition in the water sector which means that concerns about environmental requirements distorting competition do not arise in the way they do in the energy sector. Some of the investments required in the water sector may not obviously distort competition, e.g. drinking water quality standards, but others affecting for example abstraction could affect upstream competition.
- It is unclear whether customers' support much of the environmentally driven investment that has taken place in the water sector. The difficulty of this model for Ofgem would be how it reconciled what customer's were prepared to pay for with the demands of environmental regulators or Government.
- The vertically integrated nature of the water industry also means that it can be easier to co-ordinate across the supply chain to achieve some of the environmental requirements, in a way that may not be so easily possible in the energy sector.

[58] "Independent Review: of competition and innovation in Water Markets", November 2008.

There are probably a range of reasons why the water sector regulatory model appears to be more intrusive when evaluating capex plans, but potential concerns on the part of Ofwat about the cost effectiveness of some of the environmental regulations may be a factor. Therefore, adopting the water sector regulatory model could mean that Ofgem is encouraged to adopt a more project specific approach to evaluating the specific company plans. Concerns about the burden of regulation in the water sector also means that Ofgem may want to be cautious about how much of the regulatory model it would want to adopt.

4. CONCLUSIONS

This section draws together the analysis in the previous two sections to reach some overall conclusions about whether the regulatory models in the rail and water sector could be applied to the energy sector.

We do not consider that the regulatory model in either the rail or water sectors could be applied wholly to the energy sector without any adaptation. This is primarily because the regulatory models in the rail and water sector are designed for and work effectively within an industry structure where there is limited competition between network users, in contrast to the energy sector, where there is substantial competition between network users, including suppliers, shippers, generators and traders. The rail and water sector regulatory models are characterised by a relatively large amount of centralised decision-making about the appropriate outputs and investments to meet targets developed by the Government or other regulatory agencies, e.g. environmental regulators in the water sector. Centralised decision-making of this type in the energy sector, with competition between network users, could lead to distortions in the outcome of competition, and as a minimum, quite extensive lobbying by parties to influence the centralised decisions. It is not necessarily impossible to apply the approach in the energy sector, but careful consideration would need to be given to how the specification of outputs interacted with and affected the development of competition.

The other obvious weakness of the rail and water sector models compared to the energy sector (and particularly the transmission network) is the relatively limited role that individual customers (even large ones) can play in determining the outputs and investments that are required. While both institutional models include organisations that represent consumers' interests (Passenger Focus and CCWater) many of the decisions about required outputs and investments are made by Government or environmental regulators, whose primary objective may not be the furthering of consumers' interests, which is Ofgem's primary duty. In particular, in the rail sector the Government will be primarily focused on protecting taxpayers' interests, while many of the environmental obligations in the water sector arise from directives agreed within EU processes. The limited nature of the consumer role in deciding which outputs and investments are required contrasts with elements of the energy sector, such as gas entry capacity auctions, where final and intermediate customers can ensure certain investments occur providing they make financial commitments. There may be some argument that the difference in the role of consumers arises partly from the role that environment requirements have in determining investment in the water sector rather than investments being largely driven by customer demands, which is the case in the energy sector.

Nevertheless, we consider that there are a number of lessons that can be learnt or ideas that can be considered in the energy sector as a result of reviewing the rail and water sector regulatory models. These are:

- The presence of a "guiding mind" – Particularly in the rail sector, but to some degree in the water sector, there is a clear organisation (the Government)

responsible for decisions about the overall high-level outputs that the network operator is required to deliver. In the rail sector this body has responsibility for funding a substantial part of the requirements. This contrasts with some of the current debates in the energy sector about how energy networks will develop, e.g. the need for more active distribution networks to facilitate distributed generation, where there is no overarching body deciding the future role of networks.[59]

- Clarity of requirements with regard to environmental obligations – The water and to an extent the rail sector regulatory models require the Government or appropriate regulators to specify the environmental requirements they would like customers to fund, although the regulator makes the final decision about the precise way in which outputs are delivered, i.e. the types of investments that should be included in price control revenues and Regulated Asset Bases (RABs) for companies. In the rail and water sector there is limited scope for Government or environmental regulators to change their minds part way through a price control about the outputs they require or in the case of rail they are prepared to fund. This contrasts with the energy sector where the Government specifies environmental requirements at a relatively high level and allows a combination of the market and Ofgem to take control of implementation. The Renewables Obligation is an example of this, where it is for generators and suppliers to develop the capacity and Ofgem working with the network company to develop the processes to ensure network capacity investment occurs. While there is statutory force to the measures in the energy sector they are not linked to price control reviews and can therefore be changed during price control reviews, which may affect investment incentives and decisions.

- Establishing and monitoring outputs – Although not precisely the same, the rail and water sector regulatory models both now include relatively detailed specifications of the outputs that the regulated companies are required to deliver, and against which their performance can be monitored. In the rail sector it is too early to be sure how effective the monitoring of the outputs will be.

Therefore, for Ofgem's RPI-X@20 review we would consider that the rail and water sector regulatory models provide interesting lessons to learn, but applying them in large parts to the energy sector would raise significant challenges, particularly with regard to potential distortions of competition amongst network users and the role of consumers.

[59] We are not advocating that a central body necessarily does decide the future role of networks, but it is notable that work such as Ofgem's LENS project illustrates the very different networks that may emerge in the future, and very different investments would be required for different types of networks.

ANNEX 1: A SUMMARY OF THE CHARACTERISTICS OF EACH SECTOR

Tables A1.1 to 1.3 set out the main characteristics of the rail, water and energy sectors.

Table A1.1: Summary of Characteristics of the Rail Sector

Characteristics	Description
Institutional arrangements	**Regulator:** • Office of Rail Regulation (Office of the Rail Regulator from 1993 until July 2004) (ORR): The ORR was set up in 1993 to provide economic regulation for GB's railways. This was supplemented in 2005 with responsibility for safety regulation. **Government:** • The Department for Transport (DfT)/Secretary of State is responsible for developing the Government's long-term strategy for railways. This includes specifying funding for the rail industry based on assessments of the appropriate level of passenger services and the size and shape of the network in England and Wales. The DfT assumed these responsibilities from the SRA, which had undertaken the dual roles of strategic planning for network development and letting franchises to train operators. • Transport Scotland has responsibility for planning, letting, managing and funding the contract for services operating under the ScotRail passenger rail franchise and other franchise that applies only in Scotland. Transport Scotland pays for work on the Scottish Rail network and has the power to provide financial help for providing, improving or developing rail facilities. • The Welsh Assembly Government was given powers in the Railways Act 2005 to take on more responsibility for passenger services in Wales. • The Department for Regional Development, Northern Ireland (DRDNI) provides a capital grant to Translink for Northern Ireland Railways to operate rail services. DRDNI has responsibilities for transport strategy in Northern Ireland. • Transport for London (TfL) was recently given authority to award contracts for operating certain passenger services in London. TfL is responsible for planning, letting, managing and funding the contract for these services. • Passenger Transport Executives (PTEs) are regional agencies that initiate transport policy and public transport spending plans in specific regions. PTEs can contract for passenger rail services in their areas and can provide investment to refurbish and update all aspects of the local transport system. Outside London, there are six PTEs funded by local councils. **International:** • The European Railway Agency (ERA) was set up to develop procedures within the framework of railway safety and interoperability. It has responsibility for contributing to the implementation of European Community legislation which is intended to support a competitive, open market for rail. ERA issues recommendations and opinions to the European Commission and to Member States.
	Source: ORR (2008) "Starting mainline rail operations: A guide to the regulatory framework", accessed at http://www.rail-reg.gov.uk/upload/pdf/387_cm.pdf ; ORR (2008) "About the rail industry", accessed at http://www.rail-reg.gov.uk/server/show/nav.114
Industry structures	**Network**

Characteristics	Description
	• Network Rail is the owner, operator and infrastructure manager of Britain's main railway network. It runs, maintains and develops the core physical infrastructure of the network and has to ensure efficient management of the assets. While managing the existing network, its role is also to support, co-ordinate and oversee investment. **Train Operating Companies** • Train Operating Companies (TOCs) run rail passenger services and lease and manage stations from Network Rail. TOCs generally apply to the Department for Transport for franchises to run specific routes. TOCs normally lease trains from rolling stock companies. **Rolling Stock Companies** • Rolling stock companies (ROSCOs) own the trains. ROSCOs also have some responsibility to improve services by phasing out old rolling stock. ROSCOs either lease stock to train operating or train building companies. • The majority of passenger rolling stock is owned by three rolling stock leasing companies: Angel, Porterbrook and HSBC
	Source: ORR (2008) "About the rail industry", accessed at http://www.rail-reg.gov.uk/server/show/nav.114; Competition Commission (2007) "Rolling Stock Leasing Market Investigation: Industry background Working Paper", accessed at http://www.competition-commission.org.uk/inquiries/ref2007/roscos/pdf/working_paper_industry_background.pdf
Ownership structures	**Network** • Network Rail was established in March 2002 and is a company limited by guarantee. It is a private company with a board of directors, but does not have shareholders. Members are drawn from the rail industry and the public. • It is funded through a mixture of access revenue paid to it by the train operating companies and government grants. • Government support (including PTE grants) to the rail industry was £4.6 billion in 2005/06. **Train Operating Companies** • The majority of TOCs hold franchises which are let by the DfT through a competitive tender process. The franchises allow the TOCs to operate services on certain routes for a specified duration. There are also a small number of operators who provide passenger train services on the national rail network outside the franchising system. The majority of these are open access operators (OAOs), which hold licences to provide supplementary train passenger services on chosen routes. These operators can run services for the duration of the licence. **Rolling Stock Companies** • In 1996 the ROSCOs were sold to the private sector with their initial leases in place. • The decision was taken to divide British Rail's rolling stock fleet between three new companies. This was considered to be the minimum number of substantial players deemed necessary to liberalize the market and create competition. • All three of the ROSCOs have changed ownership since their original sale. Porterbrook was first acquired by Stagecoach in August 1996 and then

Characteristics	Description
	subsequently by Abbey National (Abbey) in April 2000.12 In February 1997, HSBC Bank bought Eversholt and it was renamed HSBC Rail (UK) (HSBC). In December 1997, Royal Bank of Scotland Group (RBS) bought Angel.
	Source: ORR (2008) "About the rail industry", accessed at http://www.rail-reg.gov.uk/server/show/nav.114; Competition Commission (2007) "Rolling Stock Leasing Market Investigation: Industry background Working Paper", accessed at http://www.competition-commission.org.uk/inquiries/ref2007/roscos/pdf/working_paper_industry_background.pdf
Investment requirements	• The Government issued a White Paper titled 'Delivering a Sustainable Railway' in July 2007. This included a 'High Level Output Specification' statement about the future requirements of the rail industry. • The required improvements in the service of the rail industry included: o a 3 per cent reduction in the risk relating to death or injuries to rail workers and to passengers from accidents on the railway from the end of CP3 to the end of CP4; o improvement in reliability in CP4 across the whole of the franchised passenger railway in England and Wales. This includes an improvement to 92 per cent on long-distance (inter-urban, including cross-border) services; 93 per cent on London & South East services; and 92 per cent on regional services. o as a priority for investment, the Secretary of State wanted to secure an increase in the carrying capacity of the franchised passenger railway to reflect the growth in demand and to relieve crowding. • Other specific investment projects were also listed in the High Level Output Specification.
	Source: DfT (2007) "Delivering a Sustainable Railway – White Paper", accessed at http://www.dft.gov.uk/about/strategy/whitepapers/whitepapercm7176/multideliversustainrailway
Position in the regulatory cycle	• The ORR was set up with the Railways Act 1993. • Following the collapse of Railtrack and the creation of Network Rail, the Secretary of State for Transport undertook a fundamental review of the rail industry. The conclusions of the review were published as part of the Railways Act 2005. Some high level changes arising from the review included: o the Government taking on the role of setting the strategy for the railways; o Network Rail being given clear responsibility for operating the network and for its performance; o Track and train companies being required to work more closely together; o Giving the Scottish Executive, the Welsh Assembly Government and the London Mayor, and local-decision makers a greater role; and o ORR being required to cover safety, performance and cost.
	Source: DfT (2004) "The Future of Rail – White Paper", accessed at http://www.dft.gov.uk/about/strategy/whitepapers/previous/rail/thefutureofrailwhitepapercm6233

Table A1.2: Summary of Characteristics of the Water Sector

Characteristics	Description
Institutional arrangements	**Regulator:** *Economic regulator:* • Ofwat: In England and Wales, the economic regulator of the water and sewerage industry is Ofwat. Ofwat's main duties are to protect the interests of consumers, where possible by promoting competition; to secure that the functions of each undertaker are properly carried out and that they are able to finance their functions; and to secure that companies properly carry out their functions. Further detail on Ofwat's role is set out below: o Ofwat undertakes price reviews every five years and sets annual price limits for each company. Prices are set to allow companies to finance their functions. o The price limits sets by Ofwat are also intended to promote economy and efficiency and to promote certain environmental considerations, such as furthering the conservation of flora, fauna and geological or physiographical features of special interest. o Ofwat also monitors the Guaranteed Standards Scheme. Where a company fails to meet any of the guaranteed standards, customers can seek compensation. Ofwat publishes the number of payments made under the scheme. • Water Industry Commission for Scotland (WICS): WICS was established by the Water Services (Scotland) Act (2005). The Water Industry Commission has been given the role of setting price limits. Price limits are to be set in a way that allows Scottish Water to perform its core functions. • Northern Ireland Authority for Utility Regulation (NIAUR): The Utility Regulator's Water Directorate was established on 1 April 2007 under statutory duties set out in the Water and Sewerage Services (Northern Ireland) Order 2006. The aim of the Water Directorate is to regulate the water and sewerage industry in Northern Ireland in a way that achieves the highest possible service for customers. The Price Control process in Northern Ireland is closely aligned to the Price Review processes in GB. *Environmental regulators:* • Environment Agency (EA) and Drinking Water Inspectorate (DWI) have a range of roles to set standards and advise Government on overall standards. The EA is responsible for maintaining or improving the quality of fresh, marine, surface and underground water in England and Wales. The DWI checks that water companies in England and Wales supply water that is safe to drink and meets the standards set out in the Water Quality Regulations. **Government:** • Sets the overall framework and requirements, including with regard to environmental regulation. Under Section 27 of the amended Water Industry Act 1991, the Secretary of State can also give general directions to Ofwat. These directions may encompass considerations to which Ofwat should have particular regard in determining the priority in which matters are to be reviews and considerations to which the regulator is to have particular regard. **International:** • There are a number of EU directives which have an impact on the water industry in the UK. These directives largely relate to environmental issues and matters covered include:

Characteristics	Description
	○ Water Framework Directive 2000 ○ Drinking Water Directive 1998 ○ Environmental Liability Directive 2004 ○ Waste Framework Directive 2006 ○ Ground Water Directive 2006 ○ Marine Strategy Directive 2008 ○ Soil Framework Directive (proposal) 2006 ○ Bathing Water Directive 2006 ○ Pesticides Directive 2005 ○ Quality Standards in Water Policy Directive 2000 ○ Sewage Sludge Directive 1986 ○ Integrated Pollution Prevention and Control (IPPC) Directive (2008)
	Source: Ofwat (2009) "Fact sheet – Regulating the companies: Ofwat's role", accessed at http://www.ofwat.gov.uk/regulating/prs_inf_rolereg; Ofwat (2008) "The guaranteed standards scheme (GSS)", accessed at http://www.ofwat.gov.uk/consumerissues/rightsresponsibilities/standards/gud_pro_gss08.pdf; Water Services etc. (Scotland) Act 2005; NIAUR "Water and Sewerage", accessed at http://www.niaur.gov.uk/water_sewerage/ ; Environment Agency (2009) "Water", accessed at http://www.environment-agency.gov.uk/research/policy/40125.aspx; DWI "What do the Drinking Water Inspectorate do?", accessed at http://www.dwi.gov.uk/consumer/faq/dwi2.htm; Water Industry Act 1991; Water UK (2009) "European Directives", accessed at http://www.water.org.uk/home/policy/positions/european-directives; EU website, http://europa.eu/scadplus/leg/en/s15005.htm
Industry structures	• Water and sewerage companies are vertically integrated regional and local monopoly service providers. This industry structure emerged when the regional and local water boards were privatised in 1989. • Following the Ofwat review in 1999, there were major changes in both ownership and financial structures. Some of these changes were the result of financial failures of parent companies, including Glas Cymru and Wessex. • Since the end of the price control review in 2004, there have been a number of further changes with four water-only companies and two water and sewage companies. • Significant parts of the industry are considered to have natural monopoly characteristics, in particular the water or sewerage network. • Ofwat considers that there are other parts of the industry could be opened to competitive entry or be subject to competitive entry. However, even with the Water Supply Licensing (WSL) regime introduced in December 2005, there has been very little entry. An Ofwat review in 2007 indicated that seven licences had been granted – two to new entrants and five to companies associated with existing water companies.
	Source: Smith, J. (2007) "Water Regulation", contained in Centre for the study of Regulated Industries (CRI) (2007) "Regulatory Review 2006/2007 - 10th Anniversary Edition", accessed at http://www.bath.ac.uk/cri/pubpdf/regulatory_reviews/2006-2007.pdf , Ofwat (2007) "Outcomes of Ofwat's internal review of market competition in the water sector", accessed at http://www.ofwat.gov.uk/competition/wsl/pap_rsh_intreviewmrkcomp070404.

Characteristics	Description
	pdf
Ownership structures	• The industry is made up of 10 water and sewerage service providers and 11 water suppliers. • In England and Wales, the companies are private, and several companies are subsidiaries of international enterprises. • Welsh Water, which supplies services in Wales, is a not-for-profit company. • Scotland and Northern Ireland each have a single water and sewage service provider (Scottish Water and Northern Ireland Water) that are in public ownership but rely upon private companies for delivery of many of their services.
	Source: Water UK (2009) "Waterfacts: The Water Industry Today", accessed at http://www.water.org.uk/home/resources-and-links/waterfacts/waterindustry ; Ofwat (2009) "Regulating the Industry", accessed at http://www.ofwat.gov.uk/regulating/
Investment requirements	• As part of the price setting process for 2010 to 2015, companies have put forward proposals for a major programme of capital investment. Totalling more than £27 billion over the price review period. The companies are proposing their biggest ever capital programme, 40% higher than that included in the 2004 price review. These figures may be subject to change throughout the price control process, however, a detailed list of investment plans is contained in companies' draft business plans.
	Source: Ofwat (2008) "Setting Price Limits for 2010-15: Overview of Companies' Draft Business Plans", accessed at http://www.ofwat.gov.uk/pricereview/pr09phase2/pr09phase2pubs/sub_bpd_pr09.pdf
Position in the regulatory cycle	• Ofwat is currently conducting Price Review 2009 (PR09) to set charges for the period 2010 to 2015. • A review was conducted following the Price Review 2004 (PR04). The review was undertaken by an independent steering group headed by John Baker and involved looking at the conduct in PR04 and drawing lessons for the future. • A particular issue was the co-ordination of the players within the water industry, including government, quality regulators and customer bodies. PR04 was viewed by the review team as being a major improvement on what had gone before, with Ofwat being more open to discussion. • The main recommendations coming out of the review related to ensuring clarity of roles and developing a longer term investment planning framework. • The issue of clarity of roles was seen as particularly important in relation to environmental issues. PR04 made much more use of economic appraisal techniques to assess different options, however, there were still differences between Ofwat, DEFRA and the Environment Agency on the appropriate decision criteria. In the future, more use of cost-benefit analysis was seen as being helpful. • In relation to investment, there were concerns that a five year planning cycle failed to encourage longer term planning by companies, particularly for major investment schemes. • Ofwat accepted many of the recommendations and in particular, committed to a longer term investment planning framework; greater use of cost-benefit tools; and the initiation of some joint reviews of methodology.

Characteristics	Description
	Source: Smith, J. (2007) "Water Regulation", contained in Centre for the study of Regulated Industries (CRI) (2007) "Regulatory Review 2006/2007 - 10th Anniversary Edition", accessed at http://www.bath.ac.uk/cri/pubpdf/regulatory_reviews/2006-2007.pdf

Table A1.3: Summary of Characteristics of the Electricity and Gas Sectors

Characteristics	Electricity	Gas
Institutional arrangements	• The Electricity Act 1989 established the Office of Electricity Regulation (Offer). • Under the Utilities Act 2000 a single energy regulatory authority was created. This was the Gas and Electricity Markets Authority (GEMA) and its office (Ofgem). • There are a number of other regulatory agencies with responsibility for regulating energy companies. For example, the Health and Safety Executive has responsibility for safety on the networks and the Environment Agency is responsible for the regulation of aspects of the environmental impact of the sector, e.g. emissions permits. • The Government plays a role in setting the legislative framework and establishing duties for Ofgem. In addition, the relevant Secretary of State can issue guidance about Ofgem's contribution towards the attainment of any social or environmental policies set out in the guidance.	• The Gas Act 1986 created Ofgas to regulate the gas industry. • Under the Utilities Act 2000 a single energy regulatory authority was created. This was the Gas and Electricity Markets Authority (GEMA) and its office (Ofgem). • There are a number of other regulatory agencies with responsibility for regulating energy companies. For example, the Health and Safety Executive has responsibility for safety on the networks and the Environment Agency is responsible for the regulation of aspects of the environmental impact of the sector. • The Government plays a role in setting the legislative framework and establishing duties for Ofgem. In addition, the relevant Secretary of State can issue guidance about Ofgem's contribution towards the attainment of any social or environmental policies set out in the guidance.
Industry structures	• The Electricity Act 1989 established the structure of the industry. • The Act separated the vertically integrated industry in England and Wales. • In Scotland, two vertically integrated companies were established – Hydro-Electric and Scottish Power. **Generation** • In 1990, two generators for England and Wales were created – National Power and PowerGen. The Scottish companies were also involved in generation. Nuclear generation was undertaken by Nuclear Electric (England and Wales) and Scottish Nuclear (Scotland), both publicly owned. **Wholesale market**	• The Gas Act 1986 privatised British Gas as a vertically integrated national monopoly. • The Gas Act 1995 introduced a new industry structure that was intended to facilitate the introduction of domestic competition. • British Gas operated with a regional local distribution structure. In 1994, 5 separate business units were established. • There are currently 8 gas distribution networks and a range of smaller independent gas transporters.

Characteristics	Electricity	Gas
	• From 1 April 2005, the British Electricity Trading and Transmission Arrangements (BETTA) were established. BETTA operates across Great Britain. **System operator** • National Grid is the system operator for the whole of Great Britain. **Transmission network** • There are two separate National Grid businesses – National Grid Gas and National Grid Electricty Transmission. There are also the vertically integrated Scottish companies. **Distribution and supply** • Distribution and supply businesses were formally separated through the Utilities Act 2000. • There are now six major energy supply companies. • There are fourteen electricity distribution network operators. There are also six independent distribution network operators.	
Ownership structures	**Generation** • National Power and PowerGen were privatised in March 1991, however, the Government retained a golden share until 2000. • The vertically integrated Scottish companies were privatised in 1990. • Since privatisation there have been a number of takeovers and mergers. **Transmission network** • The Scottish companies were privatised in 1990. National Grid was floated on the stock exchange in December 1995. The Government retained a golden share in National Grid until 2004. • Transmission companies are subject to price control. **Distribution and supply**	• There are now a number of private companies competing to supply gas. • In June 2005, National Grid sold four of the gas distribution networks to three new owners. The four others were retained by National Grid Gas.

Characteristics	Electricity	Gas
	• The twelve Regional Electricity Companies (RECs) were privatised in December 1990. In June 1991, the vertically integrated Scottish companies were part-privatised (60%). • All of the RECs went through at least one takeover between 1995 and 2000. • There was some vertical integration through common ownership of generation, supply and network businesses. • The fourteen distribution network operators are now owned by seven companies. • All of the six major energy supply companies, apart from Centrica, are part of a group that owns network businesses.	
Investment requirements	Ofgem's transmission price controls for gas and electricity allowed £5.1bn for capex. This primarily reflects load growth, but also some asset replacement. The electricity distribution price control review allowed £5.7bn for capex. This reflects a combination of load related expenditure and the replacement of ageing assets.	The gas distribution price control review allowed over £5bn for capex. This was for a combination of load related expenditure and substantial expenditure to replace mains in accordance with the HSE's requirements.
Position in the regulatory cycle	Regulation has been in place since 1990 following the Electricity Act 1989. The transmission and distribution companies are now in their fourth full price control period. Therefore, the regulatory cycle can be described as very mature.	Regulation has been in place since 1986 following the Gas Act 1986. While there has been price control regulation of network activities since that date, there have only been separate network price controls since 1997 and fully separate transmission and distribution price controls since the most recent reviews. Therefore, while in broad terms the regulatory cycle is very mature, price controls for the current industry structure have only been applied for a limited number of years.

Source: Ofgem (2009) "Regulating energy networks for the future: RPI-X@20 Context of energy regulation since privatisation", accessed at http://www.ofgem.gov.uk/Networks/rpix20/publications/CD/Documents1/Context%20paper%20final%20version.pdf; Ofgem (2008) "RPI-X@20 review", accessed at http://www.ofgem.gov.uk/Networks/rpix20/Pages/RPIX20.aspx