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DEVELOPING UPSTREAM COMPETITION IN THE ENGLAND AND  
WALES WATER SUPPLY INDUSTRY: A NEW APPROACH

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# **DEVELOPING UPSTREAM COMPETITION IN THE ENGLAND AND WALES WATER SUPPLY INDUSTRY: A NEW APPROACH**

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## **Abstract**

This paper sets out the main reasons for introducing upstream competition in the water supply industry of England & Wales i.e. competition in the supply of raw and potable water to retailers and large users as well as some competition options. The paper discusses the possibilities for trade both in abstraction rights and in bulk water. The paper covers the issues that would need to be resolved for such competition to be effective, including rents, stranded assets and the concentration of water rights ownership. A lot of attention is given to transitional issues drawing on the lessons learned in UK natural gas industry liberalization and EU energy sector reforms over the last 15 years.

# Developing Upstream Competition in the England and Wales Water Supply Industry: A New Approach

## 1. Introduction, Context and Scope of Paper<sup>1</sup>

This paper is intended as a contribution to the discussion of introducing competition to the England and Wales water market in the light of the recent Cave Review. It concentrates on upstream competition i.e. competition in the supply of raw and potable water to retailers and large users<sup>2</sup>. In particular, it tries to identify an approach that would enable substantive progress to be made over the next 5 years or so.

The paper only discusses water supply issues and does not address waste water implications.

### 1.1 Introduction

This paper is about how one might encourage the development of upstream competition in the England and Wales water supply industry. The approach proposed suggests using conditions applied to a continuing household monopoly franchise as a way of imposing bulk water trading obligations on incumbent water supply companies. Bulk water trading is defined as imports and exports of water between companies, including both physical water trade and abstraction trading.

There are two main reasons why such changes have major attractions. The first is to improve incentives for efficiency and innovation in the water supply industry. The second, and arguably the more important, is to help address climate change issues which, given the pattern of water surpluses and deficits in England and Wales, significantly increases the potential benefits of introducing bulk water trading.

These issues were discussed in the Final Report of the 2007-09 Cave Review<sup>3</sup> and, to a lesser extent, in Stern (2009). The Cave Review recommended against the introduction of bilateral trading because of its potential costs, not least from the need to unbundle the RCV (regulatory capital value) of the incumbent water companies. This paper has been written to establish whether there is a potential approach that would encourage the development of upstream competition in water without requiring in advance either (a) far-reaching water company unbundling or (b) unbundling of the RCV. We find that there is a potential candidate and set out its characteristics and implications. We also draw attention to various issues that would have to be addressed if implemented and to the regulatory implications for Ofwat and other agencies.

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<sup>1</sup> This paper has been written with financial support from Ofwat. I am grateful for a number of very helpful comments on draft versions of the paper from Jon Ashley, Simon Less and Ronan Palmer. Nevertheless, the analysis and views expressed in the paper are solely my responsibility and do not necessarily reflect the views of Ofwat or of any of its staff.

<sup>2</sup> For simplicity, the discussion in this paper refers only to raw and potable water. The analysis can readily be generalised to cover the non-potable (treated, but not to potable standard) supplies that are provided to customers by four water companies.

<sup>3</sup> Cave Review Final Report, April 2009. Downloadable from <http://www.defra.gov.uk/environment/quality/water/industry/cavereview/documents/cavereview-finalreport.pdf>

The concept behind the option has been heavily influenced, firstly, by the unbundling of British Gas in the mid 1990s following a series of regulatory interventions by Ofgas and the MMC; and, secondly, by the EU gas and electricity reforms based on the successive Directives since 1996. There are also lessons from US electricity and gas liberalization and we draw on some water trading experience in Australia, Germany, California and elsewhere.

It should be emphasized that the paper is intended to present an approach and not a blueprint. If pursued, it would make a lot of sense to progress cautiously, not least because there will inevitably be unforeseeable and unintended consequences, good and bad.

## 1.2 Economic Context for Upstream Competition in Water

Experience over the last 20 years in Britain and elsewhere has clearly demonstrated that *upstream* (i.e. producer supply) competition is essential to support effective downstream (i.e retail) competition in infrastructure industries. Typically, both for telecoms and for electricity and gas, effective competition requires at least 3 if not 5 sizeable upstream competitors. This result is well-established across a wide range of OECD and middle income countries. However, upstream competition in the water industry is relatively rare, although (as discussed in Section 2 below) not unknown.

The theory and practice of utility privatization unambiguously shows that, if possible, the structure of the industry should be settled *before* privatization. Nevertheless, because of the considerable amount of time typically required for restructuring (3-5 years or more), utility industry unbundling more often than not takes place after privatization. This is in spite of the fact that restructuring *after* privatization is harder and risks adverse shocks to company valuations and the cost of capital, as well as typically leading to the creation of unnecessary economic rents and/or stranded assets.

In the UK, only electricity and railways were unbundled pre-privatization. The unbundling of natural gas and the creation of effective upstream (and downstream) competition took place almost 10 years after privatization while the functional separation of BT was over 20 years after privatization.

The focus of infrastructure industry unbundling is usually *vertical* unbundling to separate networks from services and, to a lesser extent, different types of service from one another. However, sometimes - as with UK electricity generation - *horizontal* unbundling may also be required to prevent single or collective dominance and competitive abuse in one market segment.

The unbundling of both BG and BT took place only as a result of intensive regulatory intervention, with explicit government support. The same is true of the unbundling of the EU energy industries where it has taken three EU Directives enacted over 13 years to provide for retail competition and a significant (but rather less than 100%) unbundling of natural gas and electricity in the Member States. Upstream competition has grown significantly within and between countries but the continuing limitations on it (particularly in gas) were graphically demonstrated in the 2005-07 DG COMP Inquiry into the Energy Sector.

Turning to England & Wales (E&W) water, the industry was privatized in 1989, when the Government reconstituted the 10 regional water and sewerage authorities as limited companies

and sold shares in them. There were also a number of smaller statutory water supply only companies that were already privately owned. This process has led to the current position where there are 21 fully privatized, vertically integrated, de facto local water and sewage or water only monopoly companies (10 water and sewerage and 11 water only companies) with very limited interconnection between them.

There was no vertical unbundling of the water companies before privatization – not even accounting separation which is only now being introduced. Hence, not surprisingly, upstream competition is virtually non-existent and the relatively weak attempts to promote it have been singularly unsuccessful. The Cave Review discussed some possibilities for development of upstream competition but the proposals in that area were more early thoughts and very broad options rather than any clear-cut proposals. The Cave Review focused rather more on *retail* competition, initially for larger users but with firm proposals for extension to all non-household customers, drawing on Scottish experience<sup>4</sup>.

The Ofwat review of market competition started in 2007 and has looked at competition issues in all segments of the industry, including joint work with the Environment Agency (EA) on water abstraction issues. Given the problems of repeat regulation of vertically integrated monopolies, Ofwat have, in recent years, made it a priority to introduce competition where possible and are introducing accounting separation as soon as practicable. In addition, the Environment Agency has in recent years become increasingly interested in developing effective economic instruments for managing short and long-term abstraction issues (including abstraction trading) rather than relying on command-and-control planning methods<sup>5</sup>.

As one might expect, the current fully vertically integrated structure of the E&W water companies makes the introduction of competition and trading very difficult – particularly for upstream competition. The key point is that the water companies have a single RCV (regulatory capital value) for all functions and one licence issued by Ofwat to cover all sales and network functions<sup>6</sup>. Hence, it seems that any significant introduction of competition - particularly upstream – competition would appear to require unbundling both the RCV and, probably, the licence. However, as the Cave Review discusses, such unbundling – particularly of the RCV – is very unattractive.

There are clearly risks that unbundling the RCV would lead to increase in the perceived cost of capital that would *either* significantly raise costs to consumers *and/or* threaten the financeability of investment programmes. Indeed, the potential resource costs from a sharp increase in the cost of capital was the key reason given by the Cave Review for its rejection of bilateral upstream trading – its (guesstimated) expected net costs from the higher cost of capital swamped the sizeable (guesstimated) potential benefits in the Cave Review cost-benefit appraisal of bilateral trading.<sup>7</sup>

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<sup>4</sup> Neither WICS nor the Scottish Executive have yet made any proposals for upstream competition in bulk water and Scottish Water retains a monopoly on water supplies other than self-supply.

<sup>5</sup> See, for instance, “Alternative ways to allocate water”, Environment Agency, 2009.

<sup>6</sup> Plus abstraction licences issued by the EA.

<sup>7</sup> It is not necessary to accept the Cave estimates in this area to share the Review’s concerns. The problem is that there are just huge uncertainties so that reforms which do not take account of the potential effect on the cost of capital are particularly risky for the water industry given its investment needs and the very long life of many water industry fixed assets. We return to this issue below.

### 1.3 Reasons for Pursuing Upstream Competition in England and Wales Water Supply Industry

Before embarking on the substantive discussion of upstream competition and how it might work, it is worth stopping for a moment to consider the *purpose* behind the introduction of upstream competition in water in general and the approach of this paper in particular. There are three main considerations.

The first consideration is that in water, as in other network infrastructure industries, repeated regulation of an integrated monopoly company becomes increasingly difficult. Price reviews become a strategic game between regulator and regulated company where, on the one hand, the company holds a large information advantage; but, on the other hand, it is heavily dependent on the regulator for its commercial viability. The regulatory policy response in other infrastructure industries (e.g. electricity and gas) has been to separate monopoly networks from potentially competitive upstream and downstream markets, to develop wholesale and retail competition and focus *ex ante* regulation on the networks. Given the need for real upstream competition for effective downstream (retail) competition, that tends to drive regulators to a policy of deliberately creating and/or enhancing upstream competition. This happened in fixed line telecoms as well as both electricity and gas.

In consequence, second generation regulatory reform has the purpose of replacing *ex ante* regulation by competition where possible and advantageous. This implies a much more competition-oriented approach other than for monopoly networks and for any monopoly retail franchise (e.g. household sales). The Cave Review and the Ofwat market review are classic examples of second generation regulatory reform. This paper is intended to supplement that work by focusing on upstream competition – something uncommon in water industries around the world.

*The issues discussed above lead to the first major reason for introducing upstream competition which is to bring to the water industry the static and dynamic efficiency benefits that arise from vertically unbundling the industry, i.e. separating networks from services and introducing effective competition both upstream and in downstream retail competition.*

The second consideration is environmental pressures. Abstraction licences in E&W are regulated by the Environment Agency via abstraction licences. However, there is already significant over-licensing and over-abstraction of water resources, particularly in high population density and growing southern and eastern parts of the country. In addition, assuming currently predicted climate change impacts were to occur, this would become very much worse over the next 25-50 years. The effect would be considerably to increase expected water deficits in the south and east of the country but also to maintain or even increase surpluses in the north and west<sup>8</sup>.

The pattern above suggests that an increase in bulk water trade could significantly ease the problems and lower the costs of meeting expected and potential environmental pressures on water supplies. This was discussed at some length in Stern (2009). Indeed, it seems clear that for water, the potential impact of climate change clearly and significantly *increases* the arguments in favour of the development of explicit upstream markets and bulk water trading alongside retail

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<sup>8</sup> See Environment Agency water resources report, December 2008.

competition. (Note that Ofwat has responsibilities in this area via its obligations concerning environmental sustainability that complement those of the Environment Agency.)

*The environmental issues above lead to the second major reason for introducing upstream competition which is to maximize the efficiency and minimize the costs of maintaining environmental obligations on rivers and other water supplies while meeting consumer demands across the whole country, including water scarce areas.*

Neither of these points is new. Indeed, the Cave Review considered them and came to the conclusion that upstream competition via bilateral trading had substantial benefits but that these were much more than offset by the potential increase in the cost of capital from unbundling the RCV with an expected discounted net additional costs relative to the status quo of £12 billion in 2009 prices over the next 30 years<sup>9</sup>.

*This gives the third major reason for the proposals set out in this paper which is to provide a framework for developing upstream competition which does not necessarily require prior unbundling of the existing water supply businesses and licences or the RCV. The intention is to provide a framework which minimizes the actual and perceived effect on both the RCV and the cost of capital.*

These issues are discussed in more detail in Section 3 which also sets out a set of more specific objectives derived from the three points above.

#### **1.4 Scope and Structure of the Paper**

In what follows, Section 2 provides a short discussion of alternative types of water trading, their incidence in the UK and elsewhere as well as some major requirements. Section 3 outlines the proposed new approach. Section 4 discusses its feasibility and economic viability and identifies some issues that are likely to arise as well as potential solutions. Section 5 discusses regulatory implications for Ofwat and, to a lesser extent for other agencies. Section 6 provides some concluding comments.

Sections 4 and 5 discuss some major implications of the proposals that would need to be resolved in any substantive liberalization. They raise issues which have had to be addressed – and have been broadly resolved - in the liberalization of the electricity and gas industries, in the UK, the EU and elsewhere.

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<sup>9</sup> See Cave Review Final Report Annex A. Low and high risk cases gave estimates of additional costs of £1.1 billion (under 1%) of existing costs and £23 billion (14%) respectively.

## **2. Water Trading and its Requirements**

There are various types of water trading. These include:

### **(i) Water Abstraction Trading**

which covers:

- (a) use of market methods for abstraction licence allocation (including the use of auctions to allocate or reallocate licences);
- (b) trading of existing abstraction licences between current users and to new entrant users; and
- (c) abstraction right leases (e.g. annual water right sales)

Levels of licence trading are currently very low in E&W and are very largely confined to river catchment areas. Abstraction trading has developed to some extent in some other countries including Australia and the Western US, particularly California.

### **(ii) Bulk Trade in Raw Water**

In the UK, there are some bulk water trading and transfer schemes, many of which are continuations of schemes instituted pre-privatisation. They vary between long-distance water transfers (e.g. the Elan Aqueduct and the Ely-Ouse to Essex Transfer scheme) to the use of river water transfers to manage seasonal fluctuations.

### **(iii) Bulk Trade in Treated Water**

Thus far, although there has been significant *intra-company* integration of distribution networks between water resource zones, there appears to be relatively little *inter-company* trade in treated water in E&W.

The importance of distinguishing between trade in raw water and in potable water is that only the latter can flow directly through distribution networks to final customers. Traded raw water has to go via treatment works before it can enter the distribution network of another company or a final customer - unless it is being sold directly to a customer who can use non-potable water via a non-network pipe connection.

### **(iv) Data on Trade in Raw and Treated Water**

Data assembled by Ofwat for 2008 suggests that only around 22% of inter-company water flows are of potable (treated) water. This accounts for just over 1% of total delivered water. The remaining 78% of flows are of raw water and these are dominated by a few large relatively long-distance flows e.g. Elan Valley to Birmingham, Derwent Valley to Yorkshire. However, in the South East, the area of greatest relative water scarcity, around two-thirds of the water traded is



potable treated water. (This includes sales into the region, inter company sales and small potable water transfers). This trade accounts for around 8% of total delivered water in the South East.

Major, long-distance raw water transfer schemes are very expensive. The NAO in its 2005 Report on Ofwat recommended joining up (treated water) networks within or between companies along with leak reduction and encouraging efficiency rather than major new raw water transfer investments<sup>10</sup>. Latest information suggests that very long pipelines as considered in the NAO Report are uneconomic but that there can be significant positive net benefits from medium size pipelines (e.g. with capacities in the 10 – 40 Ml/d range) over moderate distances (e.g. around 10 – 40 kilometres in length). The evidence on positive net benefits applies to both raw water and potable water pipelines<sup>11</sup>.

In other countries, where water trading exists, abstraction trading appears to dominate (viz. Australia and California). However, there does seem to be substantial bulk water trade in Germany. That trade is primarily wholesale trade in *treated* water by inter-regional providers who typically sell water to small local distribution companies. Indeed, sales of potable water by inter-regional German water companies on medium to long term contracts appear to account for around 25% of total delivered water. Not only are there some very large wholesale sellers but, in addition, there seems to be competition between sellers (e.g. from sellers on two different river basins to municipalities that are sufficiently close to both)<sup>12</sup>. France appears to have small amounts of bulk water trade, primarily in raw water among companies and municipalities, but no data is readily available on quantities.

From the discussion above, the following points arise for any major development of upstream water trading in England and Wales:

- (i) **Regulated access to networks (primarily distribution networks) with regulated cost-based access prices will almost certainly be necessary to develop upstream water competition.**

This condition is likely to be important for long-contract trade as well as for market-based trading.

- (ii) **Upstream competition requires significantly more wire/pipe transmission and interconnector capacity (as well as more gas storage) relative to national/regional monopolies.**

This has also been shown clearly in gas and electricity. (See Section 4.3 for further discussion.)

- (iii) **More water storage capacity will almost certainly be necessary to develop upstream water competition.**

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<sup>10</sup> See NAO (2007), paras 3.9-3.10, p.16

<sup>11</sup> Source Ofwat forthcoming.

<sup>12</sup> See Von Hirschhausen et al , CCRP July 09. I am also grateful to Mark Oelmann of WIK for additional information.

A major reason why more storage is likely to be important is to cover seasonal and more short-term variations in supply and demand in a more integrated system (viz. the discussions about UK gas storage levels over the last decade.)

- (iv) **Fair access to treatment plants is crucial for developing upstream competition.**

Treatment plants may need to be considered as ‘essential facilities’ e.g. with regulated access and pricing (viz. gas storage)<sup>13</sup>.

- (v) **Development of abstraction trading (short and long-term) based on explicit, economically determined abstraction prices is likely to be a necessary accompaniment of developing markets for bulk water trade that reflect environmental constraints.**

Current law prohibits the EA from charging abstraction prices related to demand and supply. It does not prohibit abstraction licence trades or even management contracts for the use of other abstractors’ water – subject to agreement with EA on change of use and environmental obligations – but leasing may be problematic. These are significant impediments on the development of effective upstream competition in water.

- (vi) **The current position regarding abstraction licence concentration and duration may well provide barriers to the development of upstream competition.**

The concentration of water ownership rights and the current position of indefinite duration licences<sup>14</sup> seems difficult to reconcile with effective upstream competition, although the EA is currently discussing options for time-limiting abstraction licences. Unless otherwise handled, the more that existing water companies can dominate the ownership of regional and catchment area water rights, the greater the potential for (a) discrimination against new entry and (b) monopoly rents from the introduction of upstream competition. (See Section 4.2 for further discussion.)

In the next section, a proposal is developed that incorporates these requirements. This is the main topic of the rest of the paper. However, a potential ‘starter’ option is also identified that might be worth considering if abstraction licensing reform and the introduction of demand and supply based abstraction prices were expected to take a long time.

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<sup>13</sup> The ‘essential facilities’ doctrine originated in the US but is now an integral part of competition law in the UK and the EU. It applies when (a) there is an essential facility controlled by a monopolist; (b) the competitor cannot practically or reasonably duplicate the facility; (c) access to the facility is needed to compete in the market; and (d) it is feasible to provide access to the facility to the competitor. These are all clearly highly relevant to the likely position of water treatment plants in a newly created upstream water market.

<sup>14</sup> The EA has been conducting consultations on time-limiting licences, but, under current legislation, these can only be adopted by voluntary agreement and cannot be imposed on companies.

### 3. Using Obligations on the the Household Monopoly Supply Franchise to Develop Upstream Competition in the England & Wales Water Supply Industry

As discussed above, the approach proposed below has three main purposes:

- introducing upstream competition so as to bring to the water industry the static and dynamic efficiency benefits from unbundling and replacing regulation by competition where likely to be beneficial to consumers;
- maximising the efficiency and minimising the costs of maintaining environmental obligations on rivers and other water supplies while meeting consumer demands across the whole country including water scarce areas; and
- developing upstream competition in a way that minimizes the actual and perceived effect on both the RCV and the cost of capital of the water companies.

It is worth specifying more fully the potential benefits of developing upstream competition – and of the approach suggested below. The main potential benefits are set out below and they are the *main specific objectives* of the proposed approach.

- (i) It should directly promote efficiency at all levels of the water value chain. This should then encourage innovation and reduce the apparently growing problems that arise with repeat regulation of monopolies (which is inevitably largely based on inter-company benchmarking).
- (ii) The development of upstream competition and trade in bulk water combined with improved abstraction trade and explicit abstraction prices should help establish the value of upstream raw water, including the impact of current and expected environmental constraints. Currently, water bills make no allowance for the value of abstracted water.

As the Walker Review Report points out, ignorance of the scarcity value of raw water and its impact on the “full value” of water makes it extremely difficult to set rationally defined policies on water affordability between regions and areas as well as between households and families<sup>15</sup>. This issue will become progressively more important in a world where E&W summer water supplies can be expected to fall by one-third or more by 2040 because of climate change.

(See Appendix to Section 3 below for more information on the appropriate definition of the ‘value of water’ and its relationship to environmental constraints.)

- (iii) By creating market opportunities and prices for traded bulk water, the value of surplus water held by water companies in water surplus areas is monetized and this creates the potential for realizing the benefits of competition and trade across the country.

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<sup>15</sup> See <http://www.defra.gov.uk/environment/quality/water/industry/walkerreview/final-report.htm> Dec 2009.

- (iv) The development of upstream competition should foster new entry into the bulk water supply market from, among others:
  - a. companies who can bring together and market unutilized and under-utilised raw water;
  - b. companies who can sell reprocessed water from industrial uses or industrial companies with a supply that they no longer need for their production purposes (industrial use and maybe potable water);
  - c. agricultural users who find that the profits arising from the water that they can sell (or whose abstraction rights they can lease) is greater than the profits that they can earn from maintaining their output, particularly of lower value crops; and
  - d. water trading intermediaries.
  
- (v) The development of upstream competition should encourage both greater use of existing interconnection and the construction of new interconnection in raw water and processed water pipe networks. This can be expected to expand both the breadth and depth of upstream water markets and act to equalize wholesale prices substantially across the country at the level corresponding to the costs of the most efficient supplier.

New interconnection is necessary (a) for significant increases in bulk water trading and upstream competition and (b) to help support a higher level of trade. This raises a number of challenging issues that are discussed in Section 4, drawing on experience in the electricity and gas industries.

- (vi) The development of upstream competition is crucial to minimize the cost to customers of the decline in available raw water as a result of any substantial effects from climate change. This primarily affects customers in the South and East of England plus some in the Midlands and major conurbations where water supplies are already over-abstracted.
  
- (vii) The Cave Review pointed to the low level of research and innovation in the industry. Introducing more upstream competition should help foster more innovation as there will be a wider set of commercial opportunities for companies involved in the industry. As with electricity and gas, such innovations can be expected to include new developments in marketing, contracting, leasing, financial risk management, etc as well as in engineering and physical supply and delivery.

The method proposed for achieving these objectives is to attach regulatory conditions on the monopoly household retail sales franchise held by existing water companies. In particular, existing water companies would be assigned regulatory obligations that, firstly, oblige them to buy some percentage of their water to meet their own household customers from some entity other than their own upstream arm; and, secondly, oblige them to sell some of their upstream water to other water wholesaler.

### 3.1 The Core Idea

The core idea is to propose that we take the current monopoly service responsibility that water companies have for households and convert that into a single retail sales unit for each E&W (or at least English) water company. It is assumed, following the Cave Review recommendations and current Scottish practice, that water companies would not retain a monopoly on sales to non-domestic customers beyond the medium-term. Hence, for household customers, each water company would have a retail monopoly water sales arm which would be the monopoly licensed retail supplier for those customers in the relevant area.

In principle, a *separate* retail water sales business for household customers would be preferable. However, it may be possible, at least initially, to operate with a semi-separate water supply *division* within a company-wide retail supply business for household and non-household consumers (subject to sufficient ‘Chinese walls’ and regulatory protection on commercial information transfer). The latter would be consistent with the recommendations in the Cave Review Final Report.

So far, so straightforward and conventional. *The added (and novel) element in this proposal is that, as a condition of the monopoly household retail supply license, the water companies would have to buy at least a designated proportion (x%) of the water with which to supply those customers from some entity other than its own upstream arm. In addition, upstream water company segments (i.e. any wholesale supply or sales entity) would be obliged to sell at least a designated proportion (y%) of their output to some company other than its own downstream retail supplier. The proportions would be largely set by the availability of water resources in each area.*

Note:

- (i) x and y can, in principle, take any value between zero and 1 and, for any company, are very likely to differ from one another.
- (ii) In general, one would expect water stressed areas to have a higher x value and a relatively low value for y – and conversely for water-plenty areas, particularly those with unused abstraction licences.
- (iii) A cautious approach would be initially set x and y at low rates but with a possibly pre-announced indicative path on how they might be raised.

As with full bilateral bulk water trading, this proposal provides a strong incentive for encouraging inter-company trade in bulk water. Via netback pricing, it also provides incentives for the construction of interconnector pipes to relieve bottlenecks and improve inter-company transit where this would help develop profitable trading.

An incremental process would initially set x and y at levels of (say) 10-15% or less. If evaluation after 1-2 years showed that the initial results were beneficial, the levels of x and y could be increased. It is very unclear what the maximum levels of x and y should be for a continuing vertically integrated company. This would emerge from experience. However, the higher the values imposed, the greater the incentive for the companies to move to legal or even ownership unbundling – as happened with British Gas.

The key point about this proposed mechanism is that it uses existing Ofwat regulatory powers not just to kick-start upstream water trade and competition (with consequential benefits for new entry, static and dynamic efficiency, etc); but it does so in a way that is targeted to achieve environmental goals in a cost efficient way.

### 3.2 Elaboration and Comments

The most obvious difference of this proposal relative to the bilateral trading model considered in the Cave Review is that it would almost certainly require much less in the way of at least initial company unbundling. There are, however, some prior requirements to enable this approach to commence. These include:

- (i) Water company accounting separation as an absolutely essential first step, not least to develop cost based network (and maybe treatment) access prices. Management separation is also probably necessary. Business separation would be preferable but is probably not essential, at least initially.
- (ii) Licence separation by function (for incumbent as well as new entrant companies) would be preferable. However, at least initially, it might be possible to start by having clearly separate licence *sections* for each main function.
- (iii) Some further development of straightforward and low cost change of use options for abstraction licences (including management contract and leasing options) seems essential. In addition, abstraction pricing based on scarcity cost principles would be highly desirable, although it might be argued that setting x and y on the basis of relative water scarcity in company areas might act as a first approximation to quantity-based abstraction prices.
- (iv) Active regulatory oversight of the concentration of *both* abstraction licences *and* regional wholesale and retail water market shares by companies would be crucial. The problems with developing competition in electricity and gas wholesale and retail markets demonstrates the potential for anti-competitive behaviour by individual companies or groups of companies that could arise in water.
- (v) A clear demarcation of the scope of abstraction licences from other upstream licence sections or licences (including trading) is clearly essential.
- (vi) Adequate network access arrangements together with separate cost-based network prices are essential<sup>16</sup>.
- (vii) Similar access and perhaps pricing arrangements for water treatment plants are likely to be required; and

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<sup>16</sup> Inter-company network price negotiations with Ofwat acting as arbitrator in cases of non-agreement (as with Ofcom and telecom interconnection) may be useful as a very first step but they have major disadvantages relative to cost-based network prices.

- (viii) A (possibly regulated) wholesale bulk supply tariff may be helpful as an initial step (as in Scotland);

It is likely (and desirable) that secondary markets for water abstraction and abstraction licences would develop as well as secondary bulk water supply markets, including financial futures and other markets, etc. These would need appropriate regulation, on the lines of the equivalents for electricity and gas.

The implication is that this framework might well enable the development of a growing amount of upstream water competition without having first to unbundle the RCV or incumbent licences – at least for some medium-term initial period. It would also, crucially, provide a framework within which different water companies could specialize in different aspects of the water supply business – upstream supply or networks or retail supply – as has happened with the electricity and gas companies. Companies could then decide for themselves whether or not there were potential gains from unbundling themselves, as has also happened in the electricity and gas industries. In the longer term, significant voluntary legal and/or ownership unbundling by the companies would allow a more relaxed attitude to horizontal mergers by function

### **3.3 Upstream Trade in Water: What Types of Trade Should Count Towards the Proposed Purchase and Sales Obligations?**

Stern (2009) primarily discussed growth in inter (and intra-) company bulk supplies of *treated* (potable) water. The postulated view was that growth in relatively small-scale inter-connection between distribution networks would allow for substantial ‘swaps-based’ trade in treated bulk water on the lines of the EU gas market. However, the key question with that perspective is whether (a) there exists sufficient existing interconnection and (b) whether price differentials between regions and companies would be sufficient to induce enough new interconnection. (See Sections 4.2 and 4.3 for more on interconnection.)

The main question regarding the scope of the core proposal discussed above is whether the x and y parameters should (a) allow for trade only in treated; (b) only for trade in raw water; and (c) whether or not they trades in abstraction rights (particularly leases) should also be included.

Trade in abstraction rights, long-term or short term-leases, at first sight looks very different from trade in bulk water . However, it can reasonably be argued that a contract for a 6-month or 1-year lease on a water right is equivalent to a contract for a water sales contract. This is how some Californian and Australian water licence trades appear to work.

On (a) and (b), there seems to be no obvious reason why discrimination should be introduced in favour of one type of water trade over the other. Hence, I would recommend allowing for trade in either raw or treated water as counting towards the trade obligations. My expectation is still that most trade would be in treated water (viz. the Severn Trent proposals<sup>17</sup>) but, at this stage, this could and should be left open.

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<sup>17</sup> See the annexes to Severn Trent Water's response to the Government's consultation on the Cave Review, 17 December 2010, at: [http://www.stwater.co.uk/upload/pdf/Annex\\_1.pdf](http://www.stwater.co.uk/upload/pdf/Annex_1.pdf) and [http://www.stwater.co.uk/upload/pdf/Annex\\_2.pdf](http://www.stwater.co.uk/upload/pdf/Annex_2.pdf)

On allowing trade in water rights to count towards the trade obligations, I recommend caution. This is, firstly, because changes to the abstraction licensing regime would require major change. Some (e.g. time limited licences) do not appear to require new legislation, but the introduction of explicit scarcity related abstraction prices would require primary legislation – even the rough-and-ready approximations recommended in the Cave and Walker Review Reports. This process is likely to take some years to implement and become established. Secondly, there is also the possibility that water companies might have an incentive to make temporary or permanent water abstraction leasing or ownership sales contracts with the objective of meeting the purchase and sales objectives on paper while avoiding the pro-competition pressures. Such deals appeared to be in place during the semi-divestment of electricity generation by National Power and Powergen pre-1998 and have been alleged in both US and EU energy reforms.

Finally, there is the question as to whether purchases from intermediaries should count towards the trade obligations. One might expect pure trading intermediaries to emerge as ‘wholesale water brokers’. In general, such traders (and trades) should be allowed unless they appeared to be anti-competitive. For instance, care would have to be taken to prevent the use of avoidance methods covering up self-dealing e.g. companies selling water to an intermediary and then buying it back (in either simple or complex ways). Competition oversight and enforcement methods may well need to be developed to deal with this, if necessary by regulatory methods (e.g. market abuse licence clauses)<sup>18</sup>.

### 3.4 A Less Ambitious Starting Model

The main proposal presented above would require prior substantive reform to the water abstraction licensing regime that would need primary legislation if it were to include explicit abstraction prices. Since that might take some years to happen, it seems sensible at least to consider the possibility of a less ambitious ‘starter’ variant which might be developed while the abstraction regime were being reformed to provide a tradable market in abstraction and abstraction licences with abstraction prices that reflected the value of the upstream water, including environmental costs.

The main question is whether it would be possible to impose bulk water purchase and sales obligations attached to the monopoly household franchise but without involving major prior changes to the abstraction regime. The answer is probably Yes – but, at a cost.

The most obvious way of trying to do this is to apply the x and y mechanism *but just to the water abstraction rights currently held by the existing water companies licensed by Ofwat*. That would make a lot of difference to the sales obligation (y) but probably less to the purchase obligation (x).

This proposal would essentially create a trading pool in the water (raw and treated) available to the existing licensed companies. Hence, it is a lot less favourable to new entry, particularly of

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<sup>18</sup> Ofgem tried to introduce a general ‘good behaviour’ clause on generating companies in 1999. It was, however, struck down by the Competition Commission in 2000. However, the issue has not gone away and Ofgem have proposed recently to tighten up their market abuse clauses. (See Minutes of GEMA, 17 September 2009.)



new entry via leased trading rights. In addition, any interconnection built would favour incumbents and might be inimical to later new entry. More seriously, long-term water supply contracts negotiated between the limited number of participants in the market are likely to raise barriers against later new entrants (cf. problems of transitioning out of a single buyer model).

Most obviously, this proposal would have much less of the environmental targeting of the main proposal; in particular, there would be no scarcity-based abstraction prices. It may well be that the purchase and sales obligations could to some extent reflect environmentally determined supply constraints. However, the absence of any integration with abstraction licensing and pricing greatly reduces the likely environmental benefits (and environmental cost). Unless a lot of care were taken, it might even worsen problems in over-licensed areas.

The main advantage of this alternative option is that it allows a start to be made on introducing upstream competition without major changes to the abstraction licensing regime. It appears that it could probably be implemented by Ofwat under its existing legal powers. The main disadvantages are that it would probably produce much less in the way of environmental benefits and it might also create interconnections, supply contracts and other decisions that would hinder the development of later competition.

Utility reform is rife with examples where interim reforms have held up and impeded subsequent later reform, e.g. the BT-Mercury fixed line duopoly, EU allowing long-run power purchase agreements in Central Europe in the early 1990s, etc. As the mid 1990s British Gas unbundling shows, these problems are not inevitable but the risks must be counted as a potential cost. Nevertheless, not only would it allow a start but it might also be useful as a piloting exercise.

## APPENDIX TO SECTION 3: VALUING WATER AS A NATURAL RESOURCE

In the context of this paper, what is important is the value of the raw material i.e. the value of the abstracted water including environmental costs, not the value of the treated product delivered to customers.

If there were no environmental externalities, this would be a standard natural resource valuation exercise as for oil or other commodities, where current and future expectations of demand and supply give a forward-looking price for the resource. However, in water there are major environmental externalities (environmental degradation, loss of habitat, etc) which need to be included in the forward looking valuation. Hence, the value of water should be a measure at the point of abstraction, net of environmental impacts, that takes account of current and expected future environmental constraints and their implications. This impact is estimated by evaluating the impact of the environmental costs and benefits depending on whether the additional water is or is not abstracted<sup>19</sup>.

### General Resource Evaluation Principles

Consider the market for oil products where the relevant underlying natural resource is crude oil which is extracted around the world in varying qualities and at a range of costs from low to very high. The same principles apply directly to coal, gold and all other finite natural resources.

The valuation process for oil is that the retail demand for oil products (current and expected) interacts with their potential supply (current and expected) to produce market clearing retail prices. The value of the crude oil extracted in the North Sea, Norway, Russia, the Middle East etc is the per unit retail price *minus* transport and distribution costs (pipeline, shipping, etc) *minus* marketing costs and *minus* all other identifiable costs (including taxes, levies, etc).

Wholesale prices rise when current or expected future retail demand rises or when available wholesale supplies fall. That increases the per unit value of the crude oil, which encourages bringing back into production higher cost fields or developing new fields. This process operates in reverse when retail demand falls or the supply of crude increases. Hence, the value of the crude in any location can be estimated as a per unit ‘netback’ price where the ‘netting back’ is from retail revenues, deducting all transport and other costs.

The same netback valuation method can be applied to developing new pipeline interconnections. If (a) the per unit expected retail revenues are known for the relevant location; and (b) all the other per unit costs are known (including the cost of extracting the crude oil), whether or not the interconnection is economically worthwhile depends on whether (a) – (b) is greater than or less

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The definition above is in contrast to the Walker Interim Report definition of the value of water which includes the operational and some capital costs from abstracting treating, transporting and distributing the water to customers. The Walker Interim Report definition does, though, include some environmental costs which are part of the definition above. Moreover, paras 4.8.5 – 4.8.9 of the Final Report of the Walker Review uses the concept of the “full value of water” (ie. including all elements of the value chain as in the Interim Report) but focuses heavily on the absence of any value (or price) of raw water at the point of abstraction. The Final Report emphasizes the importance of incorporating this element, particularly a scarcity value net of environmental costs and benefits into wholesale and retail prices. In this paper, we focus on the value of water at the point of abstraction.

than the cost of constructing and operating the interconnection. It is worth investing in the interconnection if the per unit measure of (a) – (b) is greater than the cost of constructing and operating it.

### **Resource Evaluation Principles for Water Abstraction**

The same principles apply for water *except that*:

- (i) the relevant costs include the environmental costs associated with higher (and lower) abstraction volumes;
- (ii) retail prices – at least for households – are and will almost certainly remain *regulated* prices, at least for the foreseeable future; and
- (iii) there are currently no substantive markets for abstracted water and hence no market-set price for raw water.

Taking into account the environmental costs discussed above is a relatively standard environmental economics issue. In addition, having a regulated retail price does not change anything in principle since it is per unit retail *revenues* that are crucial. However, the absence of explicit markets for abstracted water makes a great difference relative to crude oil and other natural resource pricing.

In practice in England and Wales, if for raw water there were widespread scarcity-based abstraction pricing and sufficient water trading, the value would be revealed as follows:

- 1) EA abstraction limits would set the level of available supply of water for abstraction in a water resource zone.
- 2) Abstraction trading and upstream competition would reveal the demand for water given expected retail demand.
- 3) The resulting price of raw water from 1) and 2) yields a value for raw water at each location.
- 4) Assuming that the EA uses information on the environmental costs of water abstraction to set the abstraction limits, the market price of the raw water achieved via contract and spot trades should also closely reflect the value of the water at each location.

Note that the value of the raw water and the per unit retail price will, as with oil, provide the appropriate market values against which interconnection investments can be compared using netback pricing techniques. In addition, having in place a price for wholesale and retail water that reflects the value of raw water should in general lead to more efficient investment throughout the water (and sewerage) sectors.

## 4 Feasibility and Economic Viability of the Proposed Approach

In this section and in Section 5, we identify and discuss various implications and issues that could affect the feasibility and economic viability of the proposed approach set out in the previous section. However, they are issues that would need to be resolved in *any* liberalization and unbundling of the E&W water industry; and, in addition, they are almost all issues that have arisen – and been satisfactorily tackled – in the liberalization of electricity, gas and telecoms. In what follows, we draw on the experience of those industries and, where relevant, cite useful examples which should help provide solutions.

There are a variety of potential issues that could significantly affect the likely merits and success of our core proposal.

A major potential criticism of the proposal is that it represents a process of *regulator-managed development of competition*. In principle, market development and management by the regulator is undesirable – and for some people this alone will be seen as a fundamental problem. However, the transitions from the initial privatization to the eventual market structures in UK gas also involved regulator-managed development of competition. At the time it was very heavily criticized, particularly by British Gas, but it is now recognized as beneficial not just for UK gas consumers but also for the UK gas industry and the companies that operate within it.

The same issue arose, to a lesser extent, in UK electricity and telecoms and it has been very apparent in both EU energy sector reform and US electricity reform over the last 20 years. Indeed, it appears to be inevitable when governments and regulators wish to move any regulated network industry from an initial monopoly or tightly oligopolistic framework to a more competitive one. In particular, it seems unavoidable where the objective is to increase upstream competition.

The other major difficulties that we will discuss briefly below are:

- (i) Economic rents and stranded assets;
- (ii) Enabling and financing sufficient interconnection; and
- (iii) Investment and ownership of interconnector pipes.

We will discuss these in turn, identifying potential remedies where possible. However, for all of these, information is limited so that a much fuller exploration of the problems will need to be done in any subsequent work taking account of the specific characteristics of the E&W water industry and regional/company variations.

### 4.1 Economic Rents and Stranded Assets

The main difficulty with creating competition from a previously monopoly-organised industry is, firstly, the likely creation of significant *economic rents*; and, secondly, the possible creation of *stranded assets*.

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## TEXT BOX

### Economic Rents and Stranded Assets

#### 1. Economic Rents

The Economist defines economic rents as “The difference between what any factor of production is paid and what it would need to be paid to remain in its current use”. ([www.economist.com](http://www.economist.com)) Other definitions explicitly include payments to both existing or potential new entrant suppliers over and above what would be necessary to maintain the existing supplied level of input. In perfect competition, economic rents are zero in equilibrium so that the magnitude of economic rents provides an indication of the potential monopoly power of suppliers.

In regulated industries, economic rents arise when the introduction of competition allows existing incumbents suppliers to earn super-normal profits and/or restrict competitive entry through prior ownership of particular resources or facilities (including pre-existing long contracts). Examples include (i) British Gas’s pre-1995 contractual dominance in the industrial supply market, (ii) take-or-pay contracts in electricity generation and upstream gas markets and (iii) location of specialist “must-run” electricity generation at particular transmission bottlenecks or for specialist “must-run” plant needed to supply particular ancillary services.

#### 2. Stranded Assets

The simplest definition of a stranded asset is “An asset that is worth less on the market than it is on the balance sheet due to the fact that it has become obsolete in advance of complete depreciation.” ([www.investorwords.com](http://www.investorwords.com)). That is an entirely general definition that applies to all industries. It typically arises because of technical progress (e.g. the replacement of mechanical cash registers by electronic cash registers) and just reflects normal commercial uncertainties.

In regulated industries, the discussion of stranded assets primarily refers to assets that were constructed on the assumption of continued monopoly (or other protection from competition) and which are no longer profitable once competition in the market has been introduced, counter to initial (and reasonable) expectations. In the absence of any compensation or transitional arrangements, the owners of those assets would make a sizeable loss on their investments planned and implemented under the previous monopoly and this loss would be made as a direct result of the unanticipated change in the market arrangements.

Nuclear power plants, high-cost local electricity generation and similar are the classic examples of assets becoming stranded as a result of the introduction of competition. In gas, high cost fields and their associated pipelines together with some LNG facilities have been identified as at risk of being stranded from more intensive competition. Some telecom network investments have been identified as potentially at risk but, at least so far, this has not been a problem of any magnitude.

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In the UK water supply industry, the main risks of excess economic rents from the introduction of upstream competition can be expected to arise from:

- (i) Concentration of ownership of large volume abstraction rights among the incumbent water companies (particularly of water suitable for the public water supply);
- (ii) Ownership and management of treatment works by incumbent water companies (particularly treatment works designed specifically for particular types of water and water impurities);
- (iii) Ownership and management of natural monopoly water networks, particularly treated water distribution networks; and
- (iv) Long-term commercial supply contracts, particularly where they include exclusivity and/or take-or-pay conditions.

In practice, the main risks of asset stranding in E&W water probably relate to treatment works in areas (or for companies) where the use of water imported from other areas/companies is highest. If competition were introduced after decisions had been made to construct high-cost reservoirs or similar facilities (e.g. high cost desalination), those projects might also risk becoming stranded.

Some of these issues are relatively straightforward and can be handled on well-established lines. For instance, as discussed earlier, the network issues in (iii) should largely be capable of being satisfactorily addressed by establishing clear network access rules and cost-based prices. However, even here, there is the issue that incumbent water companies may well be resistant to installing new interconnection pipes if it means that neighbouring water supply companies gain competitive advantage at the expense of the incumbent's water supply business.

The question of how best to encourage investment in infrastructure – and how to avoid anti-competitive restrictions on entry of new competitors has been an issue that has caused significant difficulties in US electricity and EU gas as well as EU electricity. The US natural gas industry seems to have handled it satisfactorily but only by very considerable legal separation of inter-state pipelines who do not take ownership of the gas at any point. For E&W water, this raises interesting and possibly difficult questions about ownership of and access to interconnector pipes, which we will discuss further in 4.3 and 4.4 below.

As regards treatment works in (ii), the anti-competitive issues are probably best dealt with by some limited form of business separation with 'essential facility' type access and pricing obligations. There is the risk of stranding of treatment facilities from bypass resulting from substitution of alternative water sources rather than the one for which treatment plants might have had their location and technical characteristics designed. However, it is far from obvious that this is likely to be a major issue given the predicted population growth in England and the predicted decline in available water resources due to climate change. If it does become important, there are well-established ways and mechanisms for handling stranded assets and methods can be designed for the E&W water industry as appropriate. The key question would be how far Ofwat were willing to compensate for stranding of these assets which are included in the RCV of water companies.

Rents from long-term supply contracts in (iv) should be much less of a problem in water than they have been in UK or EU gas or electricity. The simple reason for that is that there are

relatively few existing contracts, particularly in treated water. The main issue here is that Ofwat will need to monitor carefully any *new* contracts that will emerge.

It is likely that water companies will try to negotiate take-or-pay protection for sales contracts of any significant magnitude, particularly if the implementation of these contracts requires construction of pipe connections or other physical infrastructure. This includes contracts that we hope would emerge between exporting water companies and importing household retail arms. In practice, EU and US case law has tended to allow moderate periods of exclusivity where significant new infrastructure is required (e.g. 5 years or so) but not the 25 years that is common with many IPP (independent power producer) generation contracts or natural gas supply contracts.

This issue again raises the question of the ownership and management of interconnector facilities. In EU electricity and gas, there is no effective secondary market for unused capacity on interconnector pipes and wires and no effective ‘use-it-or-lose-it’ rules<sup>20</sup>. These would have to be developed for E&W water.

#### 4.1.1. *Rents from Water Abstraction Licences: Virtual Capacity Auctions*

The most difficult issue of those listed above is whether the existing ownership of water abstraction licences imposes a barrier on the development of upstream competition – item (i) in the list above. There seems to be no data readily available on the pattern of ownership of ownership rights either in general or by public supply water company<sup>21</sup>. However, it seems very likely that ownership of abstraction rights is heavily concentrated among incumbent water companies, not least so that they can expect to be able to fulfil their supply obligations to their retail consumers at all times<sup>22</sup>.

Although a very difficult problem, energy regulatory agencies and competition authorities have worked out a mechanism with which to handle it. That mechanism is *virtual capacity auctions*. These have developed considerably in recent years. However, the first European example was in the UK in 1992 as an early obligation on BG to open up the industrial gas market. As will be argued below, this mechanism applied to abstraction licences could potentially be very useful for the development of upstream competition in the E&W water industry<sup>23</sup>.

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<sup>20</sup> See EU DG COMP Energy Market Enquiry 2005-07 for detailed information on rents and anti-competitive behaviour. The material on natural gas is probably more directly relevant than that on electricity.

<sup>21</sup> The Environment Agency reports data on water usage by sector gross and net and Defra collects data on abstraction licence ownership by sector and region but data on ownership concentration does not appear to be currently available.

<sup>22</sup> At least, all times except where there are restrictions deliberately imposed for environmental reasons or in response to a designated emergency.

<sup>23</sup> They would certainly be relevant for the main option and could also, potentially, be useful for the ‘starter’ option set out in Section 3.4.

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TEXT BOX

Virtual Capacity Auctions

In a virtual capacity electricity auction, vertically integrated, dominant incumbents typically offer a certain level of generation capacity at a fixed energy price; these are known as VPP (Virtual Power Producer) contracts. For gas, vertically integrated dominant incumbents offer comparable Gas Release Packages of sizeable volumes of gas.

Bidders are typically offered capacity (i.e. designated quantities of power generation or bulk gas volumes) for 6 months, 1 year and, in the case of EDF, for up to 4 years. That capacity is auctioned and the buyers are free to use the purchased energy for their own retail subsidiaries or to resell it. Contracts are offered for both peak and off-peak capacity. The auction form is typically an ‘ascending clock’ auction with successive bidding rounds until demand and supply are equated. (See Ausubel and Cramton (2009) for further detail on EU electricity and gas virtual auctions.) The auctions are typically conducted by specialist consultancies.

Virtual capacity auctions have been used in the EU both for electricity and for gas since 2001.

The first (and best known) VPP auction is the EDF Generation Capacity Auction which commenced in 2001 and which is still in operation. That was imposed by DG COMP as a condition of allowing a merger between EDF and EnBW. In 2003, the Belgian competition authorities also required Electrabel to conduct VPP auctions. In natural gas, DG COMP imposed an equivalent (upstream) Gas Release auction programme in Denmark as a merger approval condition and the Federal Economics Ministry in Germany required one of EonRuhrgas as a condition of allowing EON to purchase Ruhrgas.

However, not all virtual capacity auctions have been undertaken for competition reasons. In Spain in 2007, the Ministry of Industry required Endesa and Iberdrola to implement generation auctions to help develop forward markets in generation. (Note that Endesa and Iberdrola have been active purchasers of EDF generation to help build a presence in the French retail market.) Also, EON has developed a wholesale generation product intended to provide a basis for bulk power sales to regional and municipal power companies.

In the US, New Jersey (which is a member of PJM<sup>24</sup>), the four New Jersey electricity distribution companies are required to purchase sufficient bulk electricity to supply their Basic Generation (default) Service both for household and for industrial customers. This is also done by auction but the auctions are to cover retail sales only for 1-year ahead. However, counter to the EU examples, this may involve segments of the same company being both buyers and sellers in the auction. (See [www.bges-auction.com](http://www.bges-auction.com) and Arizu et al (2006), p.30.) As such it is closer to the ‘all-in’ auctions that have been proposed for Californian water by Zetland (e.g. in Disegni and Zetland (2009) and on <http://aguanomics.com/>).

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PJM Interconnection is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 States and the District of Columbia in the Eastern USA.



Ausubel and Cramton (2009) conclude that there have been three major objectives of VPP European electricity auctions:

- (i) facilitating entry by new players into retail markets (e.g. by providing more secure supplies than would be obtainable on spot markets);
- (ii) promoting the development of and adding liquidity to wholesale markets; and
- (iii) reducing incumbent upstream producers' market power in the spot market.

They claim that European VPPs have been successful on the first and very successful on the second. They have not, at least so far, been particularly successful on the third. However, in terms of virtual auction objectives for E&W water markets, the first two criteria are much more important than the third, since spot markets are likely to be marginal in water for many years to come, if they were to exist at all.

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The virtual capacity auction approach seems very appropriate for creating an effective market in E&W water abstraction, particularly if the Environment Agency (EA) were to move to time-limited licences. In particular, long time-limited licences with interim reviews would seem very well-suited for incorporating water release capacity auctions.

This approach should directly address the problem of potential economic rents from the current (apparent) high concentration of ownership of abstraction licences. In addition, this mechanism might be useful to the EA in terms of dealing with over-licensing and over-abstraction, since environmental conditions could be attached to the auction process (and/or the companies be required to offer some capacity for environmental purposes or withdrawal).

Virtual capacity auctions have clearly been successful in other contexts – and were a major first step in the Ofgas-induced post-privatisation restructuring of British Gas. A major attraction is that, by creating upstream competition and new entry, they appear to induce incumbent monopoly supply companies to focus on core competencies and to decide on which markets to focus. There are good reasons both in theory and in practice why this might happen in the E& W water market e.g. with developments on the lines of – and advancing – the recent Severn Trent proposals<sup>25</sup>.

There are, however, significant implementation problems for water virtual capacity auctions. They would almost certainly require new primary legislation and that will take time. More fundamentally, Ofwat has (concurrent) competition powers in the water industry, not the EA. Virtual capacity auctions may well be seen as primarily a method of creating upstream water competition rather than of achieving environmental benefits. In that case, it is unclear whether or not EA could proceed in the way suggested, even if they wanted to do so. Clearly, there would be major implications both for EA and Ofwat licences. More generally, EA-Ofwat agreement on policy and objectives would be essential and close co-operation between them would be required in practice<sup>26</sup>.

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<sup>25</sup> See Severn Trent (2010) op cit.

<sup>26</sup> Assuming no reassignment of functions between the two organisations.

### 4.3 Enabling and financing sufficient interconnection

The key problem identified in Stern (2009) regarding the development of upstream water competition was whether or not there was sufficient interconnection between companies' potable water networks. It was extremely unclear whether there was sufficient interconnection to support the development of inter-company bulk water trade in the way proposed. That is still a major issue.

Essentially, there seems to be little information available on the extent of E&W inter-company interconnection. There is some information on existing links but, since companies seem to be incompletely informed on inter-area links within their own companies, it would be surprising if there were full information on inter-company links – there may well be significant amounts of pipe connections of which companies have little or no awareness. Most importantly, there seems to be very little if any information on potentially commercial new interconnection or on its costs. The optimistic view on interconnection construction is that, once bulk trade were encouraged by voluntary or compulsory programmes, sufficient inter-company interconnection to support the higher levels of swap trades could readily be constructed on commercially worthwhile terms by the companies. On the whole, this has happened in electricity and gas, so why not in water?

Stern (2009) suggested that this could happen sufficiently on a voluntary basis *provided that* the EA imposed significant penalties on abstraction licences in over-licensed areas and (even more) on over-abstracted areas. However, that seems over-optimistic not least because of the commercial disincentives to upstream trade from current security of supply obligations on companies towards the customers in their area. In consequence, one of the main reasons why this paper advocates the mandatory imposition of growing amounts of wholesale trade to supply residential customers is that it seems much more likely to generate the additional interconnector infrastructure investment required for effective upstream competition.

But, will this be enough?

Sceptics can reasonably point to the following:

- In countries/regions where water trade exists on any significant scale (e.g. Australia, California, etc), much of the interconnection infrastructure has been provided by the public sector out of general tax revenues.
- The EU Commission has consistently argued over a number of years that much more inter-country interconnection is required to support the Single Market in network industries. However, in spite of long-standing support from the TENS programme and EIB finance, electricity and gas interconnection has developed only slowly and insufficiencies of interconnection remains as an impediment to upstream competition, particularly in gas<sup>27</sup>.
- In the US, inter-state electricity transmission connections have developed slowly not least because incumbents want to restrain competitive pressures from imports affecting the market for their own power generation. (This has been much less of

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<sup>27</sup> See DG COMP Energy Enquiry 2007

an issue in US natural gas, primarily because inter-State gas transporters have no title to the gas at any stage.)

The argument cannot be taken much further as regards interconnection prospects in E&W water, not least because we have so little information. I remain optimistic but, without any question, it may require significant intervention under regulatory powers for Ofwat (and/or Defra) - and maybe collective finance - to help provide sufficient interconnector investment (e.g. consumer levies, guarantees or other investment support).

Water currently has no central co-ordination institution. It is likely that, as discussed below, some such coordinating organization would be needed to help co-ordinate network expansion – particularly if the development of bulk water trade and upstream competition revealed a need for significantly more interconnection. One possibility would be a new company jointly owned by the existing public water companies but legally separate from them<sup>28</sup>.

The acute uncertainties over current interconnection levels and future prospects is a major reason why Stern (2009) advocated a cautious and experimental approach to developing upstream water competition. No evidence has emerged to change that judgment. It seems essential if this work is to be pursued further that much more and better quality information is collected on actual and potential inter-company network interconnections and impediments to its commercially driven construction.

#### **4.4 Investment in and Ownership of Interconnector Pipes**

The previous section covered the issue of whether and how more interconnection investment is likely to emerge without regulatory direction and/or collectively funded investment. However, there are a variety of related issues on interconnection that arise, particularly on when (and under what circumstances) it is pro-or anti-competitive. This discussion provides a short introduction to the relevant issues for developing upstream competition.

Relating to the previous section, there are major questions as to who has the responsibility to (a) plan and (b) implement new interconnection. Is this an obligation that can be placed on companies and, if so, how? As suggested above, it may well be that it will become necessary to develop a central regulatory or policy responsibility to develop more interconnection – particularly since there are strong disincentives on companies to invest voluntarily so as to allow increased imports into their area.

For E&W water, there is no national water market nor any water equivalent of the network planning process carried out by for electricity and gas by National Grid, a process in which Ofgem are heavily involved and in which DECC has at least a monitoring role. Hence, as discussed above, a central co-ordination or planning agency may well be required - not least to identify network bottlenecks to inter-company water trade and how best they might be relieved. If so, this would probably be a task either managed or at least supervised by Ofwat, but probably involving Defra at least on setting policy guidelines and possibly further.

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<sup>28</sup> The CEBG's transmission assets were owned by the 12 Regional Electricity Companies for the first years after privatization.

Other potentially problematic issues on interconnection include various competition-related issues. These include:

- (i) whether constructors are allowed control of interconnection use for a short or long period after construction (e.g. exclusion clauses);
- (ii) access mechanisms for interconnectors;
- (iii) potential monopoly abuse (particularly likely where *importing* companies have a significant stake); and
- (iv) other competition-related issues (e.g. potential for use of interconnectors for cartel or other anti-competitive behaviour).

These issues have been important in several electricity and gas regimes. Much of the recent EU Energy Review by DG COMP and its Final Report was taken up with discussing interconnection, its use and abuse – particularly in gas. Similarly, a number of Cambridge EPRG (Electricity Policy Research Group) working papers in recent years have been devoted to this topic, including several by Neuhoff and Newbery. Creating effective and fair secondary markets in interconnector capacity is still a major issue for the EU and other liberalized energy markets<sup>29</sup>.

For E&W water, it is important to be aware of these concerns but it may well be that they are likely to be less acute in practice – at least for some years. The main reasons why include the following:

- (a) As regards E&W potable water inter-company network linkages, we are for the foreseeable future discussing relatively small-scale and often marginal interconnections for water. Moreover, a focus on increasing imports into water-deficit areas does not create the conflicts of interest for companies that exist in areas with non-monetised water surpluses; and
- (b) As regards E&W raw water, probably the best analogy is with inter-state gas pipelines where solutions to the problems discussed above are readily available (*viz.* the US inter-State gas pipeline model). In addition, there do not seem to be any major pre-existing long-term raw water take-or-pay contracts which create so many of the problems of inter-connector abuse found in EU gas markets.

Nevertheless, moves towards more interconnection – and a more activist policy on interconnection - would raise major new regulatory tasks for Ofwat (and the EA). One obvious point is that it would greatly increase the degree to which Ofwat focused on competition issues, including market monitoring, anti-monopoly abuse issues, etc.

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<sup>29</sup> The September 2009 issue of NERA’s Global Energy Regulation Newsletter has a report on the spread of the “use-it-or-sell-it” principle and its implementation via daily capacity auctions in the Central-West European electricity market. This market covers Benelux, Germany and France.

## **5. Regulatory Implications**

The main regulatory implication of the proposals in this paper is that far more of Ofwat's resources would need to be devoted to competition-related activities and far less to classic regulatory monitoring and enforcement. This is the standard pattern that has been successfully achieved with energy and telecom regulators in the UK, EU and many other OECD countries.

As with other regulators, ex ante regulation would be focused primarily on (a) network regulation and (b) customer protection. With a continuing monopoly franchise for households, the latter would comprise protection of household customers and the monitoring of competition (including the new obligations) plus 'fair trading' competition issues for non-household customers. For household customers, the analytical focus would be much more on retail margins given wholesale prices rather than the retail prices that result from the aggregation of company costs.

On this basis, price reviews would be focused on network prices (and investment), retail margins and *maybe* wholesale prices. One obvious question is whether all of these need to be on a regular 5-yearly basis as now. It is not obvious that reviews of these three topics all need to follow this pattern – or indeed have the same review period. That, however, is probably an issue that is best left undecided until later.

### **5.1 Network Issues**

The much greater ex ante regulatory focus on networks means that it is here that comparative efficiency studies would need to be concentrated. However, to make upstream competition effective, Ofwat's network regulation would have to pay much more attention to access rules and (cost-based) access pricing. In addition, Ofwat would have to develop a regulatory regime to handle interconnection issues. This would need to cover interconnection on both raw water and treated water connections. The relevant issues include not only how investment in interconnectors and its financing were handled, but also the competition issues in and around interconnectors as discussed in section 4.3 above.

One particular regulatory issue is whether treatment works are considered as part of network regulation. It may be that they are better treated separately and as part of competition enforcement e.g. treatment as an essential facility but not for monopoly regulation. The same would probably apply to seasonal water storage facilities. (This is the framework that has evolved in UK natural gas.)

### **5.2 Company Wholesale Regulation**

For consumers, a major new task for Ofwat would be how regulatory issues around the new obligations on water companies regarding the purchase of water would be handled. That includes both setting the minimum import purchase obligation for water companies as well as monitoring and enforcing it.

The former is the more important and the more difficult. It requires careful analysis for each company's customers of what the relationship between retail price and the level of imported water – taking account of environmental and other considerations, particularly the availability of water resources including over-abstraction and over-licensing. But, consideration also needs to

be given as to the longer term benefits to consumers from moving more or less quickly to increased levels of wholesale trade in water and abstractions.

This raises the standard issues with single-buyer regulation but in a more complex form given that Ofwat is managing a transition. Hence, it will be important to ensure that supply contracts are not so long or so tightly drawn as to impede the move towards higher levels of trade. Auctions, review and step-in rules are likely to be important elements.

We have earlier discussed at some length the problems arising from the concentrated ownership of abstraction licences and, if these proposals were taken further, it would be essential to align the powers and duties of Ofwat and the EA. A major issue here is the interface between EA water abstraction licences and Ofwat licence provisions regarding wholesale supply.

One question that might arise is whether or not Ofwat might establish a (regulated) bulk supply tariff – at least for the earliest stages of the transition. That was a major intermediate step in electricity and has been used as an element in the Scottish introduction of retail competition to non-householders. There are arguments for and against. The main argument for is that it helps establish a benchmark for embryonic markets with limited competition. The main argument against is that, not only is it very difficult to set, but it also may inhibit the development of markets and contract variations.

### **5.3 Retail Customers and Security of Supply**

We have discussed above the need to move to regulation of retail margins for household consumers and the need to move to a more competition-oriented approach for non-householders. The need for this would be reinforced if the Government were to implement the Cave Review recommendations on the introduction of retail competition to non-householder users.

More fundamentally, there is the issue of security of supply. Current Ofwat, under current legislation, places considerable emphasis on individual companies having the core obligation for security of supply within their own area. It has been suggested that (a) the security of supply obligation on the local company concerning the service obligations to domestic customers, as part of their licence obligations acts and (b) Ofwat's implementation of this via its Security of Service Index control may as a major impediment both to exports of bulk water and even more to imports, particularly via long contracts<sup>30</sup>. (See Text Box below for more on the current security of supply obligation.)

It is unclear how much this is a real issue of legal definition and how much an issue of perception. However, it may be that, without changes to the current laws, even standardised contract templates could not deal with this issue.

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<sup>30</sup> See, for instance, NAO Report on Ofwat (2007).

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TEXT BOX

Current E&W Security of Supply Obligations

The Water Industry Act (1991) states in Clause 37 that:

(1) It shall be the duty of every water undertaker to develop and maintain an efficient and economical system of water supply within its area and to ensure that all such arrangements have been made—

- (a) for providing supplies of water to premises in that area and for making such supplies available to persons who demand them; and
- (b) for maintaining, improving and extending the water undertakers water mains and other pipes, as are necessary for securing that the undertaker is and continues to be able to meet its obligations under this Part.

In summary, there is a legal duty to 'predict and provide' all demands for water *in each supply area*.

In practice, each public water supplier:

- Establishes a planned level of service expressed as restrictions on supply eg hosepipe ban every 20 years, depending on local circumstances and consumers may be consulted about this;
- Prepares (updates as necessary) and obtains Defra's approval of a Water Resources Management Plan over 25 years (the current plan extends to 2035) to meet the planned level of service (while there is guidance, undertakers have flexibility in how they predict supply and demand); and
- Carries through the Plan.

Ofwat holds undertakers accountable for achieving the standards of service they have established via the Security of Supply Index (SoSI) which compare the actual security of supply with the planned level of service and Ofwat takes regulatory action if they fail to achieve it.

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Ultimately, it seems difficult for potential exporting companies credibly to commit to continuing to supply water if this risks compromising the security of supply to its own customers as perceived by Ofwat under current SoSI rules. Further, the incentive against trade seems to apply even more tightly for importing companies who, under the current rules, could face potentially severe penalties if their import source came under threat. Hence, the current law together with current Ofwat security of supply rules seem to reinforce other incentives for vertical supply integration and relying on own-source water. These effects act to reinforce incentives against inter-company trade from pro-capex incentives, transaction costs, current Ofwat rules on the reimbursement of inter-company infrastructure for trade, etc.

If Ofwat wished to pursue the proposals of this paper, reviewing how best to reconcile more bulk water trade with security of supply to consumers is a critical issue. It has frequently arisen in moves to greater competition in electricity and natural gas<sup>31</sup>. Hence, it is likely that models for potential solutions to the problem of reconciling security of supply with more competition for E&W water should be available from UK, EU and other regulatory approaches in energy.

Finding new and effective solutions to security of supply concerns is perhaps the single most important ‘political economy’ regulatory task for Ofwat if it wished to pursue a more competitive approach. It is typically a crucial issue in which success or failure is often the critical factor that makes or breaks liberalisation reforms. The priority is to find potential solutions that preserve reasonable expectations of security of supply for customers while encouraging rather than discouraging upstream water trade - trade both in bulk supplies and in water abstraction rights.

#### 5.4 Competition and Mergers

Moves towards greater upstream as well as retail competition will, inevitably, greatly raise the importance of Ofwat’s competition responsibilities relative to ex ante regulation and its enforcement. Ofwat would need to ensure that:

- effective market mechanisms are in place (e.g. longer term through to day-ahead markets);
- appropriate market and trading instruments are developed (e.g. contracts of various types, financial instruments, etc);
- monitoring and surveillance methods are available to detect and punish market abuse; and
- the development of market mechanisms and tools is done so that regulatory obligations from elsewhere were incorporated. (These include regulatory obligations from EA, Financial Services Authority, Health and Safety Executive, Climate Change Committee, EU bodies, etc.)

Given Ofwat’s concurrent competition responsibilities under the 1998 Competition Act, OFT are likely to have a role in the development of any new competition framework.

Looking further ahead, it has been suggested that the development of upstream competition via conditions on the monopoly household franchise could well help induce existing water companies to reconfigure themselves. Some may be tempted *voluntarily* to unbundle supply businesses or networks or upstream water activities. There may also be moves towards merchant treatment plants and/or interconnectors.<sup>32</sup> Voluntary unbundling in response to regulatory pressures has happened to a considerable extent in energy – as shown by the decision by British Gas to unbundle itself as well as UK and EU electricity company reconfigurations. However, the pressures for vertical dis-integration also meet pressures for re-integration (e.g. integration by contract) on the grounds of potential scope economies.

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<sup>31</sup> Many of the opponents of greater upstream competition have focused heavily on its potential to risk security of supply – problems that, at least so far, have not arisen to any significant degree in any liberalised market.

<sup>32</sup> In this context, ‘merchant’ treatment plants and interconnectors would be stand-alone facilities owned and operated by a company other than an incumbent water supply company.



Substantive legal and/or ownership unbundling by E&W water companies would have a radical impact on water mergers and the relevant criteria for judging such mergers. If substantive unbundling were to occur, the basis for primarily evaluating the pros and cons of mergers by their impact on the number of comparator companies would have to be replaced by other criteria based primarily on competition within the relevant market. For instance, if substantial network unbundling were to take place, it would seem strange for Ofwat to oppose all cross-region mergers of distribution network companies. However, as shown by energy debates, merger policy can be difficult with limited numbers of players operating across physical networks. Energy (and telecom) developments show that the standard competition economics presumption that vertical mergers cause relatively few problems compared to horizontal mergers often fails in network infrastructure industries.

A similar issue is what attitude Ofwat should take to contracts with infrastructure companies to contract out whole business operations to others (the Glas Cymru model). In the past, for various good reasons, Ofwat has opposed the extension of that model to other water franchises. In an unbundled water company world, it is much less obvious that such arrangements are adverse for consumers.

If substantive legal and/or ownership unbundling were to take place, it would be imperative to have a fundamental review of merger policy and criteria in the water industry. This would need to go much further than the issues discussed in the Cave Review.

## **5.5 Reducing Regulatory Obligations as Upstream Competition Develops**

It has been argued since the Littlechild Report of 1983 that the spread of competition should lead to the abolition of regulation – at least to the abolition of ex ante price cap regulation. Hence, Ofwat will need to consider how and when it can implement regulatory withdrawal (and in what areas) as competition develops.

The above may be true but caution is necessary. Experience shows that ex ante price cap regulation of monopoly networks (or similar) is virtually inevitable – at least unless one is prepared to go fully down the ‘new-Littlechild’ route of replacing ex ante price cap regulation by contracts between regulators and consumers, including household consumers<sup>33</sup>. It would be very surprising indeed if this were a politically acceptable solution for E&W water consumers and, in what follows, I assume that we retain explicit regulation of retail prices (or retail price margins) for household customers even if the role of consumer representatives is significantly increased e.g. on the lines of the Cave Review recommendations.

Experience also shows that regulation of competition over networks is significantly more complex than regulation of vertically integrated monopolies. In consequence, the introduction of competition typically leads initially to an increase in the activities of the regulator and the resources required, sometimes substantially.

Regulatory agencies have to collect, analyse and use a whole set of market data while, so long as the regulatory functions continue to be important, they also have to retain data capabilities and analysis by company for the previous regulatory functions. It is only as competition takes hold, either upstream and/or downstream, that regulators can reduce the data requirements on companies, drop comparative efficiency beyond monopoly network issues, etc. This has been

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<sup>33</sup> See, for instance, Littlechild (2007).

demonstrated clearly in the evolution of Oftel/Ofcom as well as Offer/Ofgas/Ofgem. Indeed, in spite of growing competition in the industries and the best efforts of the regulators (including a self-imposed RPI-X budget constraint on Ofgem), both Ofgem and Ofcom have had staff numbers (net of consolidation) growing at around 1% per year since 2001-02<sup>34</sup>.

Nevertheless, it seems clear that as upstream competition were to develop, it should be possible to wind down the data requirements on companies as accounting and greater separation grew along with more upstream and retail competition. Development of panel data sets for efficiency comparisons (as recommended by the Competition Commission) should further encourage the process of cutting back on the range of data collected from companies<sup>35</sup>.

When implementing upstream competition, Ofwat should, from the outset, explore how and when regulatory obligations on companies can be relaxed. This includes both substantive and data requirements.

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<sup>34</sup> See Ofgem and Ofcom Annual Reports. Of the major infrastructure regulators only the CAA and Ofwat had lower numbers of staff in 2008-09 than in 2001-02.

<sup>35</sup> See Competition Commission Final Report on Mid-Kent/South East Water Merger (2007). The use of panel data is a key element in best practice regulatory efficiency measurement. See Haney and Pollitt (2009).

## 6. Concluding Comments

An activist policy to introduce effective upstream competition has frequently been adopted in infrastructure industries because of its beneficial effects on economic incentives for producers and consumers - as well as because it enables regulation to be much more focused on unavoidable monopoly features. In electricity and gas, such a policy was accompanied by a deliberate reinterpretation of security of supply to emphasise diversity of supplies rather than (supposed) self-sufficiency. For electricity and gas, it can be argued that developing upstream competition and wholesale trade was the major focus of policy and regulatory activity in the UK, EU and some other countries from the mid-1990s, at least until recently when concerns over climate change mitigation have become more important.

Water is an industry where these issues have been largely ignored until recently. In large part, this is because largely geographically separated vertically integrated monopoly franchises have been the norm for water supply in most countries, not just the UK. The economic incentive and regulatory reasons may apply in water but they have less force in the absence of a national water grid (or significant inter-company interconnection) and given the political wariness towards full commercialisation and commoditisation of water supply.

However, for water, climate change pressures change the balance of argument in favour of more competition, particularly upstream liberalisation and trading. It is clear that trading in water abstraction rights – including short-term leases - has developed primarily in richer, high water-use but drought prone areas such as Australia and California. For England and Wales, the geographic pattern of water use relative to rainfall and river resources across the country provides a major additional reason why bulk water trade and upstream competition is likely to be advantageous. This is in contrast to electricity where climate change pressures in favour of intermittent renewables and must-run nuclear generation provide potentially serious threats to generation markets as currently constituted.

Hence, for water, upstream competition and wholesale water trading – at least in England and Wales - is at least as much about mitigation of and adaptation to climate change as it is about improving commercial incentives and improving regulation. Since an integral element would be much more environmentally determined abstraction prices, it can be argued that developing water trade via inter-company connection and upstream competition essentially amounts to a ‘cap-and-trade’ programme for water<sup>36</sup>.

There are a number of fundamental problems with developing bulk water trade in England and Wales. The Cave Review pointed to the difficulties in financing large – and very long lived – investments if existing water companies and/or their RCVs were unbundled by regulatory fiat. Hence, this paper has tried to suggest a potential approach whereby upstream competition might be developed without initially requiring such unbundling viz. by attaching bulk water purchase and sale obligations to a continuing monopoly household retail sales franchise. The suggested approach has many features in common with the successful programmes to develop upstream competition and trade in UK and EU gas and electricity markets, not least the suggested use of virtual water capacity auctions.

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<sup>36</sup> See Stern (2009) for a fuller elaboration of this argument.

The approach suggested is very much an outline. It is intended to provide starting point for discussion of potential changes over the next 15 years or so. It would need much fuller and more detailed exploration. In particular, this paper has identified some major potential issues that would need to be resolved. The main ones are:

- (i) The acceptability of a regulator-designed market development framework;
- (ii) The problem of economic rents – in particular, the potential problems arising from the concentration of water abstraction ownership rights among incumbent water companies;
- (iii) The need for revision of the current security of supply regulations on existing public water supply companies to make them less discouraging of inter-company trade – i.e. moving to a position where security of supply in water is secured via greater diversity of sources rather than almost entirely by self-sufficiency;
- (iv) A need for careful consideration of the responsibilities, roles and co-operation between Ofwat and the Environment Agency. It is clear that major changes to the water abstraction regime (changes almost certainly requiring primary legislation at some point) would be required as well as some possible reallocation of rights and duties between the agencies as competition policy concerns became more explicit.
- (v) The probable need to develop co-ordination and possible planning arrangements for network development and new interconnection - possibly including some planning and collective financing facility. In general, there is the need to develop access, pricing and competition arrangements for water interconnection as well as for existing networks.

Although these are potentially serious issues, none is irresolvable and most have been successfully addressed in energy and other infrastructure industries.

In conclusion, this paper presents an approach that jointly tackles competition and environmental issues in water. There are many successful examples of such changes for other industries, albeit not for water supply. Nevertheless, the changes would, if sustained, amount to a fundamental change in the way that water companies operated. Hence, the only sensible route is one based on experiment and discovery. Given the water shortages in the South-East and the existence of the WRSE simulation model, that is an obvious potential place where a start might be made.

The approach proposed in this paper should bring to the water industry both the static and dynamic efficiency benefits from progressively unbundling the companies and replacing regulation by competition for non-network elements. As the energy and other industries have shown, this process, where implemented in ways that safeguard the needs of household customers, can bring substantial benefits to consumers. It should also greatly help increase the efficiency and reduce the costs of maintaining environmental obligations on rivers and other water supplies while meeting consumer demands across the whole country - including water scarce areas. Finally, the proposed approach should enable the development of upstream competition and water trading in ways that minimise the actual and perceived effect on both the RCV and the cost of capital of the water companies.