CITY UNIVERSITY LONDON

CCRP Working Paper Series

SYSTEM OPERATORS: LESSONS FROM US AND EU ENERGY INDUSTRY EXPERIENCE AND IMPLICATIONS FOR THE ENGLAND AND WALES WATER INDUSTRY

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CCRP Working Paper No 18
(July 2011)

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Abstract and Non-Technical Summary

This paper examines the potential role of system operators (SOs) in the England and Wales (E&W) water supply industry as a means by which upstream trade and the more efficient use of water resources can be developed.

The paper firstly sets out the main types of SOs that have been tried in the energy and natural gas industries in the USA and the EU and it then reviews the evidence of the effectiveness of the different variants.

The first main conclusion of the review of energy sector experience is that SOs which combine ownership and investment in the transmission/transportation network together with operation and management of the SO (ITSOs) perform better than SOs that *only* handle the operation and management of the SO and lack the responsibility for transmission/transportation planning and investment (RTOs and similar).

The second main conclusion is that whereas ownership separation of networks from upstream and downstream production and sales works well, functional separation achieves little. This has been found both in EU (including UK) natural gas and electricity industries as well as in the USA. Of course, intermediate separation options exist and have been tried in some jurisdictions, particularly in the EU; but, they are not noticeably successful and seem to require intensive conduct regulation.

Unbundling vertically integrated electricity companies may lead to losses in economies of scope. However, in the US, not only are these scope economy losses apparently concentrated on utilities with nuclear power generation; but, for the sector as a whole, where ITSOs are adopted, the loss in scope economies seems to be clearly outweighed by gains in generation efficiency and other aspects of performance.

The third main conclusion of the review of energy experience with SOs is that accompanying measures have a major role along with the choice of SO model in the success or failure of utility unbundling. These accompanying measures include the coherence and effectiveness of regulation and the appropriate design of competition monitoring and enforcement in the newly developed upstream and downstream markets.

Turning to the England and Wales water supply industry, the first main conclusion is that creating functionally separated single-company system operators is unlikely to have any significant effect on the level or growth of upstream trade and competition. Instead, it is

recommended that Ofwat encourage the existing water companies to create separate regional network entities that combine system operation with network operation, planning and investment (ITSOs). There are many advantages in this model, not least that it would also provide a strong basis for developing additional interconnection between company areas.

The second main conclusion is that any appraisal of SO options must consider the gains from more trading as well as of potential lost scope economies. The key question is whether the net effect of these is likely to be positive as it has been in electricity and natural gas. It is suggested that regional network ITSOs may well be the most appropriate way not only of maximizing upstream trade and competition benefits but also of finding new ways of creating the co-ordination benefits of vertically integrated companies.

The third main conclusion is that the development of appropriate accompanying measures is at least as important as the choice of SO model. These accompanying measures include a set of *policy* measures such as: the development of retail competition, the introduction and development of scarcity based abstraction and discharge prices, a more flexible framework for abstraction regulation plus the likely introduction of virtual capacity water release schemes in water surplus areas. The second set of likely necessary accompanying measures are primarily *regulatory* measures for Ofwat and include the use of separate accounting, modular licences, separate price caps as well as network access rules and prices. The purpose of these is to encourage water companies to consider how best to structure and perhaps restructure their businesses, including the development of separate network companies. It is also recommended that Ofwat consider codifying and publishing its approach to vertical unbundling as well as to possible horizontal mergers of unbundled entities, particularly network entities. Ofwat is also advised to codify and publish its approach regarding stranded assets and the future regulation of large upstream (and sewerage) facilities and the RCV.

The purpose of developing and increasing upstream markets, trade and competition is twofold:

(i) to improve efficiency in the water supply industry – the allocative and dynamic efficiency of companies as well as regulatory efficiency, thereby providing greater responsiveness to consumer needs; and

(ii) to provide a framework within which likely regional increases in water scarcity from climate change, population movements, etc can be managed at lowest minimum cost.

The proposals in this paper for regional ITSOs supported by scarcity based abstraction prices and a set of other policy and regulatory changes should significantly help achieve both of these objectives. It is suggested that the proposals be pursued by encouraging the existing water companies to unbundle. However, compulsion is clearly an alternative, particularly if the companies choose not to respond to the incentives offered.

SYSTEM OPERATORS: LESSONS FROM US AND EU ENERGY INDUSTRY EXPERIENCE AND IMPLICATIONS FOR THE ENGLAND AND WALES WATER INDUSTRY

1. Introduction[1]

Ofwat has raised the possibility of creating system operators (SOs) for water companies in its July 2010 paper on water trading and upstream competition "Valuing Water"[2]. The creation of an SO entity was raised as an important way by which both the entry of new water suppliers and more inter-company bulk water trade might be encouraged. That paper raised the possibility of functionally separate (or possibly legally separate) SOs within incumbent water companies. It also briefly discussed the possibility of regional SOs across companies. In this paper, I discuss the various forms of SO in the US and in EU electricity and gas industries and assess their performance. I then try to derive lessons from that experience for the England and Wales water supply industry[3].

SOs originated in the US and, in particular, in the US electricity industry. The US electricity industry "… developed as a loosely connected structure of individual monopoly utility companies, each building and operating power plants [generators] and transmission and distribution lines to serve the exclusive needs of all consumers in its local area"[4]. In the 1990s, the Federal Government and FERC (the Federal Energy Regulatory Commission) moved to foster the development of wholesale generation markets, including entry by new generation companies.

The starting point was the principle that transmission companies operating under FERC jurisdiction (i.e. companies with inter-State transmission) had to allow other entities to access their transmission lines under the same terms, prices and conditions as they applied to themselves. In consequence, monopoly utilities were encouraged (but not mandated) to introduce *functional* separation between generation and transmission and to establish ISOs (Independent System Operators) to manage the transmission network[5]. However, as I discuss in Section 3, these initially weak individual company ISOs seemed to do little to develop transmission system integration or to eliminate discrimination in the generation market. In consequence, FERC moved to encourage RTOs (Regional Transmission Organisations), which cover a wider geographical area and which are

1 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, Michael Pollitt, and others. Nevertheless, the analysis and views expressed in the paper are solely my responsibility and do not necessarily reflect the views either of Ofwat or of any of its staff.

2 The Cave Review Final Report (2009) mentioned possible functional separation of the system operator for E&W water. See para. 4.43.

3 I discuss only water supply. Waste water and sewerage are not covered in this paper. I also ignore embryonic development of SOs in railways and other infrastructure industries.

4 GAO Report on Electricity Restructuring, 2008.

5 FERC Order 888, 1996.

'deeper' and more robust ISOs. To qualify for FERC approval under FERC Order 2000 of 1999 they operate with *ownership* separation of the ISO.

In considering the applicability of US electricity RTOs/ISOs – or weaker EU-style SOs - to the England and Wales (E&W) water industry, some key points need to be remembered:

(i) *Even 'deep' ISOs only own computer systems, wholesale market trading tools etc. They are asset-light co-ordinating entities which neither own nor invest in the transmission network.*

In consequence, ISOs are a compromise arrangement instituted where wholesale competition is desired but where it is either not possible or not desirable to create an independent transmission entity - an ITSO (Independent Transmission System Operator) like National Grid. ISOs neither own their network assets nor have investment responsibility for transmission and this has important consequences.

(ii) *In the US, FERC regulated ISOs are only involved in high voltage transmission and wholesale electricity market organisation.*

Low voltage distribution and all retail sales are the responsibility of the individual States in the US and are regulated by the State Regulatory Commissions. This creates obvious and serious problems of regulatory co-ordination particularly regarding transmission investment since that has to be financed from retail revenues. Two-level regulation is also an issue in EU energy markets.

(iii) *US electricity market liberalization via ISO/RTO does not typically imply significant retail competition.*

Only a minority of States covered by RTOs have effective retail competition (primarily Texas). In most other States, default regulated tariffs mean that retail competition is only marginal, even for industrial users. (In the EU, distribution and retail sales are the responsibility of individual Member States, but EU rules set the framework with mandatory retail competition.)

(iv) *In the EU (European Union) energy sector, functionally separate transmission and system operation was made obligatory in the 2003 2nd Electricity and Gas Directives. This applies to both electricity and natural gas and also to both transmission/transport and to distribution networks.*

The degree of functional separation required in the 2nd Directives is relatively low. The perceived failure of the EU 2nd Directives significantly

to foster trade and eliminate discrimination in upstream and wholesale markets led to the 3rd Energy Package of 2009.

In what follows, I will discuss further the origins and performance of ISOs in the US electricity industry and the EU 2nd Directive entities – primarily in the natural gas industry. I will also discuss the main functions of the energy ISOs and RTOs.

Section 2 defines and provides a typology of observed electricity and gas ISOs, both ISOs that do not include network ownership and investment; and ITSOs (like National Grid for electricity in England and Wales and UK gas) that do combine them.

Section 3 discusses US experience with electricity ISOs and Section 4 discusses EU experience, primarily in natural gas. It is clear that ISOs (including RTOs) are a compromise between (a) vertical integration and (b) wholesale competition over a fully separated transmission network. In consequence, a major question is whether the compromise arrangements yield enough net benefits to make them a relative success or a relative failure. This question is highly disputed.

Section 5 discusses the England and Wales (E&W) water industry. In particular, I consider the potential for company SOs and regional SOs/ITSOs to foster upstream competition in water in England and Wales. To anticipate, my main conclusion is that regional ITSOs with strong supporting measures are by far the likeliest long-run, stable model by which significant upstream market and trade benefits can be obtained in E&W water.

Section 6 provides a short conclusion to the paper.

2. A Typology of SO Arrangements

The most useful typology is in Joskow (2007) based on US electricity experience. In what follows, I adopt his classification for US arrangements and modify it as appropriate for EU and other new models. The relevant models are as follows:

(i) *VISOs (Virtual Independent System Operators)*

VISOs involve the creation of a *functionally separate* system operator. It is a management entity along with transmission operation and planning operating within a single vertically integrated utility. The VISO is not, however, a separate entity in terms of the *ownership* of any assets.

VISOs were the first generation 1990s US ISOs. They were required to publish (regulated) "unbiased" network access terms and conditions and related services and operate an open, transparent and "unbiased" transmission planning system.

Hence, Joskow suggests that they were intended to "operate and plan the transmission system as if there is no vertical integration"[6].

The regulator (and there may be more than one relevant) is responsible for monitoring violations of SO and TO access rules plus general market monitoring and mitigation.

(ii) RTOs (*Regional Transmission Organisations) and other Second Generation ISOs*

Joskow classifies these as a 'separate ISO', since there is some degree of *ownership separation*. RTOs own the control room and communication facilities and operate independently of all market participants – including operating independently of both transmission and distribution owners. This is the type of ISO promoted in FERC Directive 2000 of 1999, a Directive still in force.

The key features of the US 'separate ISO' are:

- They are responsible for all aspects of reliable and economical system operation and interconnection and may cover the facilities of several network transmission owners either within a State (e.g. California and Texas) and/or between States (e.g. PJM).

- They are independent entities with an independent board of directors but can be owned privately, publicly or co-operatively (i.e. not-for-profit).

- They have a network of stakeholder committees to review and comment on procedures and proposed modifications.

- They have transparent, open access network rules, prices and operating protocols which are regulated by FERC.

- There is wide variation in the depth of ISO functions but there is a trend towards deeper functional responsibilities, particularly in PJM and New England. In particular, RTOs are taking more responsibility for the integrated planning of transmission investment.

(But, note that the *implementation* of investment plans remains the responsibility of the companies that own the transmission. In consequence, transmission investment is regulated by the State Regulators of the company in which the relevant transmission network is located and not by FERC. This applies similarly for EU transmission within any Member State).

- These US 2nd generation ISOs are typically integrated with the operation of wholesale generation markets, ancillary services, etc.

6 Joskow (2007) Slide 2.

(Note that since 2005 the Scottish electricity system has had a 2nd generation ISO, which is operated by National Grid.)

(iii) *The ITSO (Independent Transmission System Operator Model*)

The ITSO model embodies full ownership separation of the network and system operation from generation, distribution, wholesale and retail sales. The key features of it are:

- A combination of SO and TO functions under common ownership and control. It is therefore responsible for all SO and TO investment financing and implementation as well as for investment planning.

- Transparent network access, operation, planning and investment under the supervision of a single regulator – typically by incentive regulation.

- Sufficient horizontal integration of transmission across areas to create effectively competitive generation markets.

- It usually operates in combination with organized public markets for energy, for ancillary services, congestion management, etc and the ITSO uses these markets to fulfill its responsibilities.

(iv) *The VITSO (Virtual Independent Transmission System Operator)*

The 2nd EU Directives on Electricity and Gas required, as a minimum, functionally separated transmission (and distribution) networks with designated system operators. Following Joskow's terminology, I designate these as VITSOs. They have been common in Belgium, France, Germany and Central Europe while other North European countries and Spain have opted for full, ownership separated ITSOs.

(v) *The ITO (Independent Transmission Operator) and VITO (Virtual Independent Transmission Operator)*

The EU 3rd Package ITO (or, following Joskow's terminology, a Virtual ITO) is an ITSO that is owned by and remains inside the power/gas company, but it has to operate with a high degree of separation (legal separation)[7] relative to the rest of the utility.

It remains to be seen how many EU countries and electricity/gas companies opt for an ITO. It seems that it will require a high degree of regulatory supervision. However, as yet, none are in operation so the performance of this model in practice is unknown.

[7] Levêque et al (2008) call it an LTSO – Legally unbundled Transmission System Operator

It does not seem particularly relevant for water and so we will not discuss it further in this paper[8].

(vi) *The TISO (Totally Independent System Operator)*

One of the possibilities discussed during the UK Ofgem RPI-X@20 review was to separate the National Grid ITSO into two separate companies:

(a) a transmission owner and operator; and
(b) an independent system operator that would act primarily as a planning and commissioning entity – a TISO (totally independent system operator)[9].

The TISO, like the remaining TO would be a privately owned entity.

The proposal draws on experience with commissioning offshore transmission between offshore Scottish wind-farms and the main on-shore transmission grid. The offshore transmission part was commissioned by an Ofgem-managed tender process which was won by non-incumbents. Future transmission links to off-shore facilities are expected to be developed using a developed version of the tender process[10].

One point of the proposal as regards on-shore transmission was to counter the incentive for TOs to increase their RAB by relatively low return investments in existing connected parts of the network However, the proposal, which unbundles a pre-existing ITSO, was not included in the final Ofgem proposals. Again, we will not discuss it further in this paper as there is no evidence on its performance and it is not obvious candidate for implementation in the water industry, except perhaps in the very long-term.

The SO variants described in this section are summarized in the Table below.

8 See Groenendijk (2009) for a short note on the pros and cons of ITOs relative to ITSOs.

9 TISO-like arrangements have been instituted for transmission connections with Scottish off-shore wind farms.

10 See http://www.ofgem.gov.uk/Networks/offtrans/oriot/Pages/oriot.aspx

System Operator Typology - Summary Table

Type	Main features	Examples
VISO (Virtual Independent System Operator)	Functionally separate system operator. Part of vertically integrated utility. Manages transmission operation and planning.	US electricity in the 1990s – for minority of States.
RTO (Regional Transmission Operator) / Second Generation ISOs	Independent entities responsible for system management, operation and interconnection – but not investment. May cover several transmission network operators.	US electricity (for unbundling States). Scottish electricity
ITSO (Independent Transmission System Operator)	Full ownership separation of transmission network and system operation from the rest of the value chain. Responsible for all SO and TO investment financing and planning.	National Grid England and Wales ((Electricity) GB and US electricity transport. Electricity in several North European countries and Spain.
VITSO (Virtual Independent Transmission System Operator)	Functionally separated transmission networks with designated system operators	Electricity and Gas in Belgium, France, Germany and Central Europe.
VITO (Virtual Independent Transmission Operator)	ITSO legally separated from the rest of the vertically integrated firm.	EU 3rd package reform (not yet implemented anywhere).
TISO (Totally Independent System Operator)	An ownership separated system operator which acts as a planning and commissioning entity. SO unbundled from ownership separated transmission company.	Scottish off-shore electricity transmission. Ofgem discussed idea in RPI-X@20 review for on-shore transmission. Not taken forward.

3. ISO Experience and Performance in US Electricity

In this section, we will discuss the performance of ISOs in US electricity, where SOs and ISOs first developed. Hence, there is more experience with them on which to test their effectiveness than elsewhere. However, electricity technologies impose particular constraints and problems that are not present in other industries, including water. Electricity travels at the speed of light and networks have to be fully balanced at all times to avoid blackouts. Additionally, the allocation of regulatory functions between FERC and the State Regulatory Commissions causes particular problems e.g. over transmission investment that would not apply in E&W water supply

To help readers through the following section, particularly water sector readers less familiar with electricity technical issues, the key conclusions from my review are as follows:

1) There has been no official survey of the performance of US electricity ISOs, but the general conclusion is that they seem to have improved competition in generation, reduced wholesale prices and increased the effectiveness of transmission grid use. They may have reduced prices to retail consumers taking account of all relevant factors but, if so, only by a small amount (e.g. 5-10%).

2) First generation ISOs with functional separation of single company utilities (i.e. VISOs) pre-2000 achieved very little. The losses in economies of scope e.g. between generation and retail sales/distribution were not met by any corresponding market or trade benefits[11]. In particular, VISOs failed to provide any adequate remedy to eliminate or even significantly reduce discrimination in favour of own company generation.

3) Second generation RTOs and 'deep' ISOs with ownership separation of SO functions and transmission management facilities – but excluding transmission ownership - were more successful but have major problems. The organizational ambiguities create serious problems in terms of corporate governance, cost control and incentive design. ISO co-ordination of transmission maintenance and investment across utilities is difficult.

4) A particular problem with RTOs is on transmission investment - particularly on major investments. Low levels of investment and relatively high levels of congestion costs have continued – at least until end-2008. Interconnection with neighbouring areas remains a problem.

5) The main academic observers favour ITSOs over RTOs. There is considerable evidence that ERCOT, the Texas ISO, performs well but that is the closest to an ITSO with a single regulator.

[11] See Text Box on pp 17-18 below for further discussion of economies of scope and relative efficiencies of vertically integrated and unbundled US electricity utilities.

6) There have been major weaknesses both in regulatory arrangements (e.g. the division of responsibility between Federal and State regulators) and in competition oversight where monitoring of the new markets has been less than ideal. These also seem to contribute significantly to the much less than wholly successful performance of second generation RTO/ISOs. At best, the verdict on the 2nd generation 'deep' ISOs is "a glass half-full". This is in marked contrast to the natural gas ITSO model which seems to work very successfully.

3.1 The Origins and Development of US Electricity ISOs 1978-2010

ISOs originated in the US. Their origins go back to the 1970s. In 1978, the PURPA (Public Utilities Regulatory Policy Act) Federal law was enacted. That law tried to create a market for non-utility power generators (primarily renewables) by mandating electric utilities to buy power from the new producers at an 'avoided cost' rate. However, implementation was left to the States. Little new generation was built as a result and much of that was very high cost generation on long-term contracts, most of which are expiring over the next 5-10 years.

The relative failure of PURPA led to more far-reaching attempts to introduce competition into wholesale electricity markets. Since the early 1990s, the Federal Government and FERC (the Federal Energy Regulatory Commission) have made numerous attempts to foster the development of wholesale generation markets, including new entry. This was very much a top-down initiative with the objective of developing wider generation markets and greatly reducing, if not eliminating, discrimination of vertically integrated utilities to use their own generation, even if at significantly higher cost.

The starting point was the principle that transmission companies operating under FERC jurisdiction (i.e. companies with inter-State transmission) had to allow other entities to access their transmission lines under the same terms, prices and conditions as they applied to themselves. In consequence, under FERC Order 888, of 1996, vertically integrated electricity utilities were encouraged (but not mandated) to introduce *functional* separation between generation and transmission and to form ISOs (independent system operators) to manage the transmission network. However, these individual company ISOs seemed to do little to eliminate discrimination in generation or transmission so that FERC moved to encourage RTOs (Regional Transmission Organisations). Under FERC Directive 2000 of 1999, these were encouraged (but not mandated) to establish *ownership* separated ISOs covering a generation market of sufficient size to be viable as a wholesale trading entity.

As discussed earlier, reform of the natural gas regime in the US led to the creation of stand-alone inter-State ITSO high pressure gas lines which operate as pure transportation entities. In addition, there is competition between these gas pipelines. A major extra advantage is that there are clear and transparent Federal-State regulatory boundaries in US gas, so that FERC regulates tariffs, investment, quality etc on the inter-State lines while the State Regulatory Commissions regulate distribution and retail sales. This

effective regulatory separation does not hold in US electricity where there are major Federal-State regulatory overlaps which cause serious problems for electricity transmission investment. Note that the gas inter-State pipelines are established as pure transport companies which do not own or trade gas; their revenues come just from their transport fees[12].

3.2 The Purpose and Objectives of US Electricity ISOs

The ISO-based electricity reform was reviewed in a 2008 GAO (Government Accounting Office) Study for the US Senate[13]. According to the GAO Study, the main objective of the electricity reforms based around ISOs was primarily to increase competition in wholesale markets "with the goal of giving electricity consumers benefits such as lower prices and access to a wider array of retail services"[14]. The GAO did not consider the effectiveness of the 1st generation VISO proposals, but focused on the 2nd generation schemes operating under the FERC Directive 2000 of 1999.

According to the GAO Report, RTOs (i.e. 2nd generation ownership separated ISOs), the FERC objectives from the change were to:

- Improve the pricing of transmission services;
- Ease the entry of new generators;
- Promote efficiency in wholesale markets; and
- Ensure that consumers paid the lowest possible price for reliable service.

In an ex ante appraisal issued before the promulgation of FERC Directive 2000 of 1999, FERC estimated that there would be significant net benefits from:

(i) the elimination of multiple charges incurred when crossing transmission systems owned by different utilities ("pancaking")

(ii) improved management of electricity congestion;

(iii) providing more accurate estimates of transmission system capacity;

(iv) increased efficiency in transmission and generation planning;

(v) improved grid reliability; and

(vi) reduced opportunities for discriminatory transmission practices.

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12 See Joskow (2009), pp. 28-33

13 *Electricity Restructuring*: A GAO (Government Accountability Office) Report to the US Senate Committee on Homeland Security and Governmental Affairs, September 2008.

14 GAO (2008), page 2.

FERC estimated that these benefits should be "at least $2.4 billion annually".[15]

There are now six FERC-approved RTOs in operation. The IRC/RTO Council estimate that, in 2009, two-thirds of the US population was served by RTOs. That includes ERCOT in Texas, which is closer to the more unbundled England and Wales model, but which is State regulated.

Retail competition is not a purpose of the ISO/RTO reforms and, in the US, is controversial. In consequence, its scope is very limited, particularly for households. Switching away from supply by the incumbent utility is relatively low even in States where retail competition does exist (e.g. Massachusetts) - at least for other than the largest industrial and commercial consumers. This is for various reasons, not least regulator-set default prices that allow little or no headroom for new entrants. Texas is an exception where, in 2007, 58% of residential customers and 85% of small business load was supplied by competitive retailers.

3.3 The Performance and Effectiveness of US Electricity ISOs

There has been considerable discussion of the performance of the ISO-based electricity reforms, but surprisingly there has been no formal ex post evaluation by FERC. The 2008 GAO Report is most critical of FERC for its failure to develop a set of standardized performance measures by which to provide a empirically based evaluation of RTO performance. In the absence of such agreed measures or an official ex post evaluation, we must fall back on academic and consultancy based studies.

3.3.1 VISOs Early 1990s-1999

There appear to be no formal, extant evaluations of the 1st generation functionally separated VISOs but their rapid replacement after under 5 years by the 2nd generation RTO/ISOs strongly suggests that they were a failure. In particular, there is agreement that they did not reduce discrimination against outside generation other than trivially.

Joskow (2007) compares the strengths and weaknesses of the VISO, ISO and ITSO models[16]. For VISOs, he concludes that they:

- lose the benefits of vertical integration (e.g. economies of scope);
- fail to realize the trading benefits of horizontal integration of neighbouring transmission networks;
- fail to solve the problems of self-dealing and vertical market power;

[15] GAO (2008), p.11.

[16] P. Joskow, Independent System Operators (VI + Access Rules vs, ISO vs. ITSO), Presentation Sept 2007.

- require strong regulation and competition oversight to prevent abuse;
- evolve "toward a crippled ISO"; and
- are ultimately incompatible with well-performing liberalized wholesale and retail electricity markets.

Other observers are less harsh but I am unaware of any significant supporters of the US VISO model. As we shall see below, the 2007 DG Competition reviews of EU electricity and gas markets under the 2nd Directive came up with a similar verdict on the EU versions of the VISO.

That leaves the question as to the effectiveness of the 2nd generation, ownership separated ISOs, both in absolute terms and relative to ITSOs. That requires, firstly, specifying some evaluation criteria before applying them to the evidence on RTO/ISO performance.

3.3.2 Evaluation Criteria for 2nd Generation RTOs and ISOs

The main criteria for judging the effectiveness of the 2nd generation ISOs has been the level of electricity prices – wholesale and retail prices. The key question discussed in the literature is whether ISOs have or have not reduced them. This is much debated because it is clear that final consumer prices are *higher* in RTO areas. Hence, the question is whether the creation of the RTO and the associated ownership unbundling of generation has helped reduce or increase prices compared with what they would otherwise have been.

The result has been an extensive discussion on what relevant alternative or counter-factual should be constructed against which to compare RTO performance. For econometric studies, the question is whether or not all important control factors have been included (plus whether or not RTO membership is exogenous). A key starting point is the role of fuel prices and their trends given the different fuel mixes of RTO and non-RTO generation. RTO generation is more thermally intensive (particularly with greater uses of natural gas) and uses less hydro[17]. US natural gas prices more than doubled in the 2001-2008 period while coal and hydro prices were virtually static. Since 2008, natural gas prices have since fallen back sharply to 2002 levels[18].

Other criteria discussed by the GAO include efficiency in generation dispatch (i.e. greater use of the most efficient and lowest cost generation), efficiency in regional grid management and operation and ISO costs. Criteria mentioned by other observers include:

- changes in wholesale trade levels, levels of self-dealing/market abuse and market power;

[17] GAO (2008) p.49 refers to the higher use of natural gas powered generation in RTO regions.

[18] See Figure 11, p, 50 GAO (2008) and FERC State of the Markets Report 2009 (April 2010) p.3.

- transmission investment levels;

- ISO governance and regulation – how easy or difficult it is to incentivize them.

3.3.4 RTO/ISO Performance

There is a very large number of published studies of RTOs and their effectiveness. Many have been carried out either by organizations, for or against (like the ISO/RTO Council or the APPA[19]) with a particular case to argue; or by consultants commissioned by these entities. In what follows, I ignore all of those and focus on the findings (a) of the 2008 GAO Report – which, inter alia, discusses much of the pro and con arguments of studies/researchers advocating a case for or against RTOs; and (b) two leading US energy and regulatory economists – Paul Joskow and John Kwoka.

A The GAO 2008 Report

The GAO 2008 Report was commissioned by a US Senate Committee to provide an authoritative, official study of electricity reform based on RTOs/ISOs. As it only discussed post 2000 experience, it used the term "RTOs" to cover all 2nd generation ISOs whether multi-State or single-State. The report discusses a wide range of evidence from the formal, academic to the informal, interview opinions.

The GAO 2008 Review reached the following main conclusions on RTO performance[20]:

(i) Wider market areas have provided benefits in terms of more efficient management of the transmission grid and improved generator access to wholesale electricity markets - but RTO critics claim that some or all of these benefits could have been achieved without RTOs.

(ii) Wholesale markets have benefitted from more efficient dispatch and greater use of low cost generation, but the question as to whether retail consumers have benefitted is less clear. (See discussion below on the academic debate). This raises the question as to whether there are serious market power problems in the new generation markets even if incentives to discriminate against lower cost new entrants have been reduced.

(iii) RTO expenses have risen sharply although they are still a very small percentage of total costs, accounting for $0.4-0.8 per MWh[21] i.e. between 5-10% of retail prices.

Other issues arising from the GAO Report are:

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19 The American Public Power Association – the organisation which represents distribution and supply companies and which supported vertically integrated utilities.

20 See GAO (2008) pp 7-8 and 43-48.

21 See GAO (2008) p. 21.

- *Transmission Investment*

  The absence of any suggestion that the creation of RTOs increased transmission investment – indeed congestion payments were rising over the period from 2001-2007 before falling back sharply in 2008-09. (Note that the latter was to some extent due to recession induced falls in demand.)

  The NERC 2010 Long-Term Reliability Assessment shows very low rates of achieved transmission investment (under 2% in 2008-09 and on average since 2000 if not earlier). The NERC Assessment cites transmission investment as a major problem " … transmission permitting and siting is considered one of the highest risks facing the [US] electricity industry over the next ten years"[22].

- *Regulatory Federalism and Confusion*

  Regulatory problems arising from States being unwilling to approve investment or upgrades that benefit consumers in other States emerge clearly. They are more acute for transmission but the GAO Report quotes one stakeholder complaining about the incidence of costs of generators needed to maintain system reliability. The stakeholder was concerned that in RTOs " … the costs of these generators, which may benefit only certain local areas was *unfairly borne by consumers outside those local areas*"[23].

  Given those attitudes, it is clear that there are major problems of achieving approvals for new inter-state transmission (or even market promoting inter-state transmission). To this must be added the issue that the investments are made by the original asset-owning power companies and <u>not</u> the ISO.

- *ISO Governance*

  The GAO narrative shows that there are clear problems in the governance of the ISOs and even greater problems in how regulators and stakeholders can and should provide effective governance and incentives for cost and productivity improvements.

B Major Academic Reviews: Paul Joskow and John Kwoka

Joskow and Kwoka disagree on the performance of 2nd Generation ISOs with Joskow seeing them as more successful than Kwoka. However, interestingly, they agree that ISOs are very much a compromise arrangement and both prefer ITSOs. Kwoka appears to prefer vertical integration to ISOs whereas Joskow does not. However, Joskow is clear that there are many snags with an ISO that does not own transmission and that it is best thought of as a transitional arrangement.

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22 NERC (2010), p.21 and Table 3, p.22.

23 GAO (2008), p.8.

Both have written extensively on this topic and in what follows, I focus on relatively recent presentations given by each that summarise their earlier papers – a 2007 presentation by Paul Joskow and a 2010 presentation by Kwoka.

There have been other important reviews (e.g. Hogan (2008)) but they do not change the overall verdict that 2nd generation ISOs have some significant benefits but also major problems e.g. over transmission investment.

Much of the debate hinges around the benefits of generation trading relative to lost economies of scope and related efficiencies from vertical integration relative to gains from wholesale trade. The discussion in the Text Box below summarises a series of technical papers on output performance and frontier measurement. Readers wanting more detail on the individual studies are referred to the cited papers.

TEXT BOX 1: ECONOMIES OF SCOPE, VERTICAL INTEGRATION AND UNBUNDLING BENEFITS: US ELECTRICITY

Economies of Scope and the Benefits of Vertical Integration Relative to Unbundling in US Electrical Utilities

The main economies of scope identified for electricity utilities in Kwoka (1998) are as follows:

(i) least cost dispatch;

(ii) aggregation of load patterns (i.e. matching generation use most effectively with the temporal and spatial pattern of retail demand);

(iii) O&M (organization and maintenance) expenditure levels and co-ordination, particularly co-ordination of maintenance shutdowns;

(iv) system reliability; and

(v) simultaneous discussions and planning of generation plant size and siting together with coordination of transmission planning and investment.

The relative impact of these was examined in Kwoka (2002). This widely cited paper finds that the total cost savings from integration of 42% for already vertically integrated utilities. However, he found no significant incentives for integration for *either* pure generation companies *or* for pure distribution companies.

The main cost savings from integration appear to arise from lower O&M costs for power supply, followed by lower operating expenses for transmission and distribution. A higher share of nuclear generation and higher capacity utilization were also associated with lower costs. One important result of this study was that *electricity holding companies*

operating across all segments can achieve economies comparable to those from vertical integration.

More recent studies (e.g. Arocena et al (2009)) also find that nuclear generation is crucial for whether or not there are significant economies of scope in US electricity. They find that divesting hydro and thermal generation and retaining nuclear plant provides no loss in economies of scope. (This is presumably because the existence of large, must-run baseload nuclear plants with very low short run marginal costs of operation provides a major advantage to US distribution entities. For them, the alternative would be to buy in higher price non-nuclear generation).

Kwoka (2002) found that divesting US utilities had lower distribution efficiency but Kwoka et al (2008) found that this only existed for *mandatory* divestitures. Against this there is evidence of significantly improved efficiency in divested generation. An important issue here is that when utilities vertically unbundle, there are commercial and sometimes regulatory incentives to allocate joint and fixed costs as far as possible to the (monopoly) distribution arm rather than to the (competitive) generation arm.

The most recent – and thorough – paper on these topics is Triebs et al (2010) who look at US power utilities over the period 1994-2006. Using panel data methods, they conclude that divestment and unbundling do reduce distribution efficiency (measured in monetary rather than technical terms) - *but that the effect declines over time*. They also find that divesting nuclear generation is the key efficiency reducing factor.

Against the loss in distributional efficiency, Triebs et al find that there are significant cost savings from power sourcing where efficiency gains outweigh any losses in economies of scope. These net gains grow over time along with gains from other induced organizational and/or technological changes. The gains from these more than outweigh the distribution efficiency losses. Generation efficiency unequivocally increased as a result of divestment, so that the costs of generated power and the prices of bought-in power unequivocally fell.

In consequence, Triebs et al estimated significant net benefits from US electricity utility divestiture at the sector level, with a net gain of around 5.5% of total costs after 10 years. However, for individual power companies, there were gainers and losers. It is unclear how far the firm-level variation is due to company/management characteristics and how far to regulatory variations between States.

The Triebs et al analysis brings together the various strands by which unbundling of vertically integrated power utilities could increase or reduce costs. The results for these US utilities show that divestment clearly created net gains for the electricity sector as a whole and hence for consumers, even if there were losses in economies of scope. These scope losses were significantly offset by gains in power sourcing and other factors – at least for the majority of utilities whose generation assets excluded nuclear plants.

(i) Paul Joskow: RTO's - A Glass Half Full

Joskow's 2007 presentation is based to a considerable extent on his 2005 survey paper on US electricity reform which, in its Conclusions, uses the 'glass half full rather than half empty' analogy. He argues this partly because RTOs have brought some positive benefits to the operation of generation markets and the utilization of transmission capacity; and partly because of the failures with regulation of vertically integrated utilities (e.g. high cost PURPA and nuclear generation, etc)[24]. Hence, RTOs are a good first step towards regulation by structure to replace unsatisfactory regulation by conduct.

Joskow does claim that RTOs have helped reduce retail prices for both residential and industrial consumers. He makes this claim on the basis of some panel data regressions on data from almost all States, firstly, for the 1970-2003 period and, secondly, for the 1981-2003 period. The regressions specifically test whether the share of unregulated generation in each State from 1998 onwards has a statistically significant effect on retail prices, controlling for fuel prices and other relevant effects. Unregulated generation is a substitute for the generation that a vertically integrated utility might produce from its own plants. The share of unregulated generation is much larger in RTO states, where mandatory generation unbundling has been common.

Joskow (2006) finds that both generation competition (the RTO proxy) and retail competition have significant negative effects on retail prices. Each effect is of the order of 5-10% of the retail price[25]. However, Joskow urges caution about the precision of these estimates because of data and other problems[26].

In his 2007 presentation, Joskow makes it clear that he prefers ITSOs. ISOs, even 'deep' RTOs with transmission planning responsibilities, face problems over integrating the responsibilities of the RTO with the transmission organization. They can better manage generation competition and trade – at least within the RTO area – as well as reduce discrimination in generation markets. He claims that "ISOs with 'deep functional' responsibilities that are well integrated with wholesale markets *work reasonably well.*[27]" [My emphasis.]

His main reservations are that RTOs suffer from:

(i) the absence of vertical integration with transmission functions with adverse effects on maintenance and investment planning plus cumbersome interconnection; and

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24 See Joskow (2005) p.42.

25 See Joskow (2005) p.39-40

26 Kwoka (2006) presents a review of all the studies of the impact of electricity restructuring on retail prices. He is less critical of Joskow's study than other studies but is still unpersuaded. He concludes that "Its limitations are sufficiently serious that its results should not be relied on as a guide to the effects of restructuring". See Kwoka (2006) p.32. This strikes me as harsh.

27 Joskow (2007), Slide 22.

(ii) difficulties over devising effective performance incentives – even problems in ensuring hard budget constraints.

His final point is that ISO responsibilities tend to expand over time to deal with these inefficiencies – particularly as regards transmission investment – so that "TOs become passive owners of regulated assets that march to the ISOs' orders.[28]"

(ii) John Kwoka: ISOs - A Glass Definitely Less than Half Full

In his earlier papers, Kwoka has defended vertically integrated electricity utilities against RTOs and ISOs, primarily because of the loss of economies of scope from unbundling generation. He has shown particular concern over adverse effects on distribution and supply from separating generation from retail supply. However, his 2010 presentation[29] makes it clear that he has considerable sympathy with ITSOs.

Kwoka's position seems to be that vertical unbundling creates significant costs. Hence, it is only worth doing if there are sufficiently high benefits from wider generation markets and trading to outweigh those costs by enough to make the change worthwhile given: (a) the initial costs of change and (b) ongoing transaction costs. However, the more radical unbundling allows ways of re-establishing contractual relationships that help restore some of the lost economies of scope. In consequence, he favours strong ITSOs with ownership separation of generation. He argues that these ITSOs should have the responsibility for planning and managing transmission investment as well as all transmission operation and maintenance – plus all associated generation market services.

From this perspective, ISOs (and RTOs) give the worst of both worlds since States:

(a) lose the benefits of generation-distribution/supply integration;

(b) *but without* achieving the benefits of a strong transmission company that is responsible, firstly, for co-ordinating generation markets for power (including dispatch); and, secondly, for transmission management, planning and investment.

Hence, Kwoka sees ITSOs as the successor natural monopolies to the vertically integrated utilities, which can provide the central integration necessary for electricity systems and markets. While ITSOs can replace the co-ordinating role of the vertically integrated utilities, RTOs cannot - and that is why he is highly skeptical of them.

Kwoka argues that ITSOs can (and should) be publicly regulated and, he suggests, be publicly owned. Kwoka also argues that devising appropriate governance and cost incentives for ISOs is very difficult. However, as regards ITSO ownership, it is typically the case that it is harder to devise effective incentives for publicly owned relative to privately owned entities.

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[28] Joskow (2007), Slide 22

[29] Kwoka (2010) Presentation to World Bank Energy Practice Day

To help reduce the impact of lost economies of scope, Kwoka suggests allowing the integration of retail supply with generation, while keeping networks (at least transmission) fully separate. This has been allowed in England and Wales but not without controversy and problems. In particular, it has been argued that allowing the integration of generation with retail supply creates oligopolistic competition with significant barriers to entry from others, particularly as regards smaller companies.

3.3.5 ISOs, Incentives and Accompanying Measures

One of the sub-themes of the discussion of the performance of US electricity ISOs has been the difficulties with regard to incentives and governance.

Firstly, it is unclear what type of organization they are. It has been suggested that they act in some ways more like a regulatory institutions than a utility[30]. For multi-owner RTOs, there are also major problems of corporate governance and accountability.

Secondly, the GAO Review and the academic commentaries emphasise the difficulties of providing effective incentives for efficiency improvements and cost reduction. These problems were serious for vertically integrated utilities under traditional cost of service regulation and there were no apparent benefits in this area from 1st generation VISOs. However, it also seems very difficult to provide generally effective dynamic cost and efficiency incentives for 2nd generation RTOs/ISOs. Finding an RPI-X or similar forward looking incentive mechanism has not been achieved, except perhaps in Texas which is closest to an ITSO structure with a single regulator.

Even if RTOs have been successful in terms of generation market competition and short-term grid utilization, it is clear that the disconnect with transmission investment implies little effective control on congestion costs - which, from 2000 until 2009, were rising steadily without stimulating an increase in transmission investment. A large part of this may be due to Federal-State regulatory confusion over transmission investment, but some seems to be due to incentives (or the lack of them) on RTO performance.

Thirdly, it is clear that the ISO programme works more successfully (a) where generation is clearly separated from transmission (legal or preferably ownership separation); and (b) where retail competition is introduced without default price regulation. The former does give rise to losses of economies of scope which have to handled in some other way (e.g. by the RTO/ISO effectively running transmission as well as generation markets, or by an ITSO, or by allowing generation companies to own retailers).

Fourthly, the literature review shows very clearly the importance of accompanying institutions. The US ISO-based reform programme has not been accompanied either by coherent regulation or by effective competition policy in generation and related markets. One of the problems with RTOs is that they function as the first-line generation market monitors and supervisors as well as providing the market framework and rules. This

[30] S Kelly (2008)

inevitably creates a governance problem and leads to questions as to whether the RTO is a commercial or a regulatory institution.

The 1st generation ISOs could only have achieved significant benefits with heavy-handed and intrusive regulation while the 2nd generation RTO/ISOs still required more regulatory direction than an ITSO.

One final point is that choosing an ISO – whether a VISO, an ISO or an ITSO is not enough. The consensus is that the supporting institutions, primarily regulatory and competition agencies, with their powers and duties is crucial.

In this context, Léautier and Thelen's 2009 study of electricity grid expansion (or, more strictly, reductions in congestion costs) in a number of countries and US states is particularly relevant. The study shows that both the degree of unbundling and the strength/effectiveness of transmission incentives are important determinants of reductions in grid congestion costs. (They point out that the relevant investments to relieve congestion included many small upgrade projects as well as major new transmission lines.)

On this test, Léautier and Thelen find that (a) England & Wales and (b) Argentina performed best, combining full grid unbundling with effective transmission incentives. They achieved low and declining congestion cost levels. However, a number of countries with relatively unbundled electricity ITSOs (the Nordic countries and Spain) did worse than some of the main US RTOs because the greater strength of the investment incentives in the latter overcame the design weaknesses of RTOs relative to ITSOs. But, RTO performance was quite varied with ERCOT (Texas) and, to a lesser extent, the New England RTO having low and falling congestion costs over the 2000-06 period, unlike the other RTOs[31].

4 EU Electricity and Gas Experience

Mandatory unbundling of EU electricity and gas companies was required in the 2nd Electricity and Gas Directives of 2003. These required, among other things that, at least as a minimum, all Member States:

- introduce full retail competition by 2004 for commercial customers and 2007 for households;

- establish regulated TPA (third party access) based on approved and published tariffs set by national regulators for transmission/transport, distribution and some related services;

[31] See Léautier and Thelen Energy Policy Blog (2008).and JRE (2009)

- establish legal and management unbundling on top of accounting separation for transmission/transport and distribution system entities – but not necessarily ownership unbundling;

- impose non-discriminatory obligations to ensure fair access to networks, primarily in gas (e.g. over availability and allocation of firm and interruptible capacity); and

- impose (at least in theory) the same access rules on interconnector/transit transmission lines/transport pipelines as for within country transmission. In practice, for gas, this was controversial and uncommon because of "ship-or-pay" terms in long-term gas purchase contracts with non-EU gas suppliers.

Hence, the Directives required at least *functionally separated* transmission and distribution networks with published, cost based tariffs with a designated system operator – VITSOs following Joskow's terminology. Some countries went further and imposed ownership separation of networks i.e. full ITSOs. For gas, the ITSO countries were: Denmark, Netherlands, Sweden, Spain and the UK, with Italy now moving down that route – and a similar list of countries for electricity. France and Germany led the group of countries opposed to ownership-separated ITSOs, along with the Central European countries and Ireland.

There has effectively been an ex post evaluation of the impact of the 2nd Directive reforms via the DG Competition Energy Inquiry of 2005-6, which was published in January 2007. It was highly critical of the reforms and it shows, with extensive and very thorough statistical reporting, how and why the reforms had had so little impact. In particular, the Inquiry focused heavily on the absence of ownership separation of networks and the ways in which VITSOs led to continued market discrimination, particularly against new entrants.

The Inquiry led to the proposals for - and negotiations on - the 3rd Package where the EU Commission and the reformers pushed hard for ownership unbundling. However, in the face of implacable opposition from France, Germany and their allies, they were forced to accept the compromise alternative of ITOs (or VITOs - virtual independent transmission operators) with legal but not ownership separation of transmission and system operation as an alternative to full ownership unbundled ITSOs.

In what follows, I summarise the conclusions of the DG Competition Inquiry. Having discussed electricity in the previous section, I focus primarily on natural gas – which seems to be rather more relevant for water sector reform. Following the summary of the DG Competition Inquiry conclusions, I look at a case study of the problems with gas VITSOs in Belgium.

The findings reported below are particularly relevant for E&W water upstream trade potential and the role of SOs since EU electricity and gas markets operate as weakly interconnected markets where previously vertically integrated incumbents retain

considerable commercial (and political) power. In some countries, including the UK, this has changed by a combination of (a) new market and trading opportunities for incumbents with (b) tough-minded – and in some cases, very forceful – actions by government policy and regulatory actions. However, the intended EU pro-competition and trade benefits of compromise VITSOs has, so far, been relatively easy for the politically supported incumbents to avoid or evade.

Only the intervention of EU and other competition authorities against clear competition discrimination and cartelization abuses – and use of conditions in merger approvals – has had much impact on the behaviour of unwilling incumbents. Out-of-court settlements of competition investigations have led to full ITSOs beginning to emerge in previously hostile countries (e.g. in Germany, where RWE has established an ownership separated gas network and Eon a fully unbundled electricity network).

I discuss the implications of these issues for E&W water in more detail in Section 5.

4.1 The EU DG Competition Inquiry Results

The main findings of the Inquiry are set out below[32]. I focus primarily on issues concerning network-service separation. The criticisms set out below were focused at VITSO countries rather than ITSO countries. Wholesale trade and competition were significantly better developed in the latter and reported barriers by actual and potential new entrants were much less significant (particularly in the UK).

1) *With VITSOs, wholesale gas and electricity markets remain national with little new entry or incumbent entry into other areas.* Concentration levels and market power remain high. For gas, incumbents trade only a small percentage of upstream supplies. New entrants are dependent on vertically integrated incumbents throughout the supply chain – particularly as regards network services.

2) *Functional separation of transmission and system operation has serious weaknesses regarding (a) the functioning of wholesale markets and (b) network investment – particularly network investment that would primarily benefit non-incumbent suppliers.* There is clear evidence that VITSOs favour their own affiliates and that network investment decisions are taken on the basis of the supply interests of the integrated incumbent.

3) *Cross-border sales do not currently impose any significant competitive constraint on incumbent behaviour.* For gas in particular, lack of access to interconnectors (and insufficient capacity on them) are a major constraint on developing wholesale trade. Concerning access to primary markets via interconnectors, contract reservations on interconnector capacity plus some physical constraints are major issues used by incumbents to protect their position. However,

[32] This is mainly drawn from the DG Competition Report on Energy Sector Inquiry (2007), Executive Summary.

interconnectors are often physically under-used with significant spare capacity because there are no effective secondary markets or UIOLI (use-it-or-lose-it) constraints. For gas, access to transit lines is particularly difficult because of "ship-or-pay" clauses in long-term gas import contracts. Gas companies argue that these prevent applying domestic transmission access rights to transit lines.

In all cases, VITSOs have strong incentives not to add to existing interconnector capacity. (In Italy, ENI has had action taken against it by the competition authorities for discontinuing works on investment on a major new import pipeline which would have benefited gas supply competitors. This was done after ENI had signed ship-or-pay transport contracts with independent shippers who were the main intended customers for the pipeline.[33])

4) *There is a considerable absence of transparency, particularly on network availability and especially on interconnector lines/pipes.*

5) *Market pricing is primarily based on prices from long-term contracts so that trading markets are thin and lack liquidity*. This is particularly a problem in gas with long-term take-or-pay wholesale supply gas contracts.

6) *Retail competition is limited in France, Belgium and other similar countries* This is partly (a) because of regulator-set low default supply prices (c.f. the US); and also (b) because of long-term contracts between suppliers and industrial customers on top of long duration gas import generation supply contracts. The number of competitive, non-incumbent offers available is very small.

7) *Balancing zones are very small which increase the complexity, costs and risks for non-incumbents in shipping gas across the incumbent's network.* Similar issues arise in electricity over market balancing, reserve energy and ancillary services. In gas, effective network unbundling seems to be necessary to create a level and transparent playing field in balancing markets and reduce barriers to entry.

Specifically discussed abuses of dominance by gas VITSOs include:

- Parent company restrictions on transmission entity investment;
- Trading names, brands and logos shared between transport and supply companies;
- Shared use of facilities between transport entity and other parts of the business with regulators not sufficiently resourced to be able properly police information separation;
- Bundled rather than separate contracts for gas transport and gas supply;
- More favourable conditions to the incumbent company's supply arm over nominating transport capacity requirements – and on other aspects of network access;
- Preferential treatment to "associated" supply companies regarding access to available firm capacity on transit routes;

[33] DG Energy Inquiry Final Report pp 58-59.

- Requirements for advance payments for capacity from independent shippers but not from "associated" supply companies;
- Major elements of discrimination against independent shippers over transit line capacity availability[34].

Similar issues arose in electricity.

The key perceived problems are in 1) – 7) above (plus one on LNG which I omit). The main solutions offered as follows. Following the Inquiry Report, I focus on the unbundling remedies.

(i) *Anti-Concentration Measures.* DG Competition identify divestitures (e.g. to break up generation and upstream gas supply concentrations) They place particular emphasis on Virtual Power Plant (VPP) auctions and gas release programmes and they have imposed such requirements as conditions for merger approval in several cases (e.g. the GdF-Suez merger discussed in the next sub-section).

(ii) *Taking action to promote market integration.* This includes both action to prevent lack of investment and delays in network investment plus action against long-term take-or-pay contracts (and ship-or-pay and other subordinate restrictive clauses). Widening balancing zones also comes into this category.

(iii) *Ownership unbundling of networks.* The absence of this is emphasised several times as the major flaw with the 2nd Directive. The findings and associated recommendation led to a concerted (but ultimately unsuccessful) attempt by the Commission to press for full ownership separated ITSOs in the 3rd Package.

It is noticeable that the DG Competition Inquiry did not recommend the US ownership-separated ISO route as a good option. They did consider it but explicitly rejected it as follows: "The independent system operator approach would improve the status quo but would require more detailed, prescriptive and costly regulation and would be less effective in addressing the disincentives to invest in networks"[35].

The consensus among European academic energy economists has also been in favour of ITSOs relative to 'shallow' or 'deep' ISOs. However, in the EU context, there is one intriguing significant exception – Levêque et al (2008). They argue that ITSOs dominate ISOs and (V)ITOs - except where the benefits from regional markets and network integration are large and there are major problems in integrating transmission companies and regulation. This might apply to a tightly meshed network with extensive interconnection where national governments and/or regulators might allow a cross-border 'deep' (RTO style) ISO but would not allow a merger of national transmission

[34] DG Energy Inquiry Final Report pp 59-61 and 70-77.
[35] DG Energy Inquiry Final Report p. 14.

companies. They suggest Belgium, Netherlands, France and Germany are in this position.

Levêque et al put forward an interesting 2nd best argument. However, it is clear that they would much prefer removing the constraints and adopting a multi-country ITSO. However, whether or not this is correct, their arguments do not apply to E&W water because:

(i) E&W water does not have tightly meshed networks with extensive interconnection[36]; and

(ii) Ofwat covers the whole of England and Wales so regulatory incompatibility is not an issue – although on market structure and upstream competition, the Welsh Assembly Government could adopt a different policy from England.

4.2 Belgian Gas: A VISO Case Study

In 2007, CREG, the Belgian electricity and gas regulator, commissioned CEPA to write a report on the "Structure and Functioning of the Natural Gas Market in Belgium in a European Context". The report was completed in March 2008 and can be downloaded from the CREG website[37].

The purposes of the report included:

- Helping CREG identify any artificial barriers hindering the efficient functioning of Belgian gas markets; and

- Making recommendations as to how the identified barriers might be addressed.

At the time of the writing of the report, Suez had dominant ownership stakes in all aspects of the Belgian gas incumbent including upstream gas contracting, the transport network which owned and operated domestic and transit high pressure pipelines (Fluxys), in wholesale and retail sales and low pressure pipelines (Distrigas), storage and LNG (Fluxys). After the CEPA report was completed, Suez merged with GDF (Gaz de France) and, as a condition of the merger, DG Competition required GDF Suez to reduce its stake in Fluxys from 57% to 44% and to divest itself fully of Distrigas (which was sold to ENI).

Fluxys may have been a functionally separate entity within Suez, but the report found that the Suez Group acted consistently in favour of its own interests and against any transmission capacity availability or transmission investments that would have allowed

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36 If only!

37 See www.creg.be I should declare an interest - I was involved in the CEPA project team but not in a major capacity.

competitors to threaten its position in downstream markets (particularly as regards availability procedures and investment on transit lines).

The dominant theme of the report is the set of problems arising from the lack of de facto separation between the transport network and the rest of Suez' activities. This caused major problems to shippers and to would-be competitors to Distrigas in the retail market.

The main problems were:

- a lack of capacity at crucial entry points and, in particular, on transit lines. This was identified by Distrigas competitors and potential new entrants – along with balancing problems - as the most significant barriers to entry and expansion

- a marked lack of information on transit line capacity and secondary market treading;

- considerable discrimination against new entrants regarding access to gas entry points in the network and no effective secondary markets;

- an inability by non-Suez companies to trade on the Zeebrugge gas hub because such trading required prior pipeline access (leading to significantly lower trading volumes than on the UK hub);

- allocation of all currently available gas storage to shippers with distribution connected customers – i.e. Distrigas thereby significantly impeding new entrant suppliers selling to industrial customers;

- a lack of new investment in transport and storage – and weak (if not perverse) incentives on Fluxys and Suez on both; and

- an unnecessarily large number of balancing zones and complicated balancing rules, including hourly constraints.

The report proposed a range of potential remedies including more transparency on capacity availability, secondary markets for pipeline capacity and effective UIOLI clauses, powers for CREG to mandate additional investment in network capacity – and also both forced gas release programmes and full ownership separation of the transport network.

The findings and recommendations are unsurprising – they echo those of DG Competition, but do so with a more intensive look at a single company. The more interesting point is that CREG (the Belgian energy regulator) was unable or unwilling *on its own* to prevent these abuses or to implement most of the suggested remedies. It was only the DG Competition merger conditions which resulted in any significant divestment and network separation.

The EU examples show that to obtain genuine competition without ownership separation of networks requires extensive, consistent, continuous and highly interventionist action by a strong-willed regulator – supported by government and competition agencies. This set of conditions typically does not exist for any significant period of time, which is a major reason why functionally or legally separated network operators rarely succeed in fostering effective upstream competition in network industries. Regulation by conduct is much more intrinsically difficult than regulation by structure – and much harder to sustain effectively.

Two final points:

(i) *The EU and Belgian gas examples demonstrate clearly how hard it is to reduce investment disincentives on network operators without full ownership separation – particularly on transport pipes and even more on interconnectors.*

The UK was specifically picked out in the EU Energy Inquiry (along with other unnamed ownership unbundled transport companies) as having proper and effective incentives for network capacity expansion[38].

(ii) *A repeated point in the EU gas (and electricity) examples is the need for compulsory gas (or generation) auction release programmes.*

To create effective competition requires several upstream suppliers and gas/generated power available to new entrants on retail markets. This is the European parallel to the forced divestment of generation in the US RTOs and 2nd generation ISOs.

Interestingly, maintained incumbent *ownership* of the upstream auctioned gas or electricity producing facilities does not seem to impede the development of effective competition as it clearly does with networks. Indeed, it can (and does) lead to medium-to long term asset trade sales and ownership unbundling, either voluntarily or with the encouragement of nudges from competition agencies and/or regulators[39].

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[38] See DG Inquiry (2007), para 172, p. 62. The recent Ofgem review of network regulation has found that, particularly in electricity, ownership separation has not encouraged new transmission investment to meet the demand for additional transmission capacity as much as they and others would like. This seems to be largely a consequence of ambitious government commitments for renewable generation in general and for more wind power in particular. There seem to be fewer problems with gas network arrangements, particularly after the divestment by NGC of some gas distribution networks. However, although improvements may be needed (particularly in electricity), the investment incentive weaknesses seem massively less than in the VISO or VITSO examples discussed above.

[39] That was largely true in the case of British Gas in the 1990s. Something similar may be developing in Spanish and Italian markets not least from trade and corporate transactions between them and French energy companies.

As will be argued in the next section, these lessons may well be important in the E&W water context.

5. England and Wales Water: The Potential Role of SOs and ITSOs

In this section, I summarise the main lessons from the surveys of ISO experience in US electricity and EU gas reported in Sections 3 and 4 that are relevant for E&W water sector reform. I then make a set of specific recommendations for a reform strategy that would involve the development of upstream competition involving new system operator and network entities.

A fundamental point – and my main message- is that the choices concerning SOs and similar can only be sensibly taken in the context of other decisions about abstraction and discharge arrangements, upstream and retail competition, etc. Given the objective of maximising the net benefits from trade, it is very unhelpful to consider SOs in isolation of the other elements that are crucial for creating trade incentives or disincentives.

Regarding SOs, ISOs and ITSOs, my clear recommendation is that we should move towards the formation of *regional* ITSOs i.e. network companies responsible for co-ordinating and transporting bulk water trades across a relatively wide area. ITSOs clearly have the advantage of creating most trade benefits with minimum losses in economies of co-ordination and scope relative to SOs and ISOs.

My recommendation in favour of regional ITSOs would require Ofwat to work closely with Defra and the Environment Agency and would require some key policy decisions by the government. This process should, as far as possible, be done in an evolutionary way via incentives for incumbent water companies to move in this direction. Compulsion may be necessary if the companies resist – as has been required for UK gas and EU energy upstream market creation – but, if so, it may be compulsion via competition policy and merger approval powers[40] rather than regulatory diktat on structure.

The reasons for these recommendations are set out below along with more detail on the recommendations.

5.1 Main Lessons from US and EU Energy ISOs for E&W Water Reform

The main lessons for E&W water from the surveys of ISO experience in US electricity and EU gas reported in Sections 3 and 4 are as follows:

1) *The context and the surrounding institutions matter at least as much as the form of company institution chosen*

[40] I would include the forced trading proposals in Stern (2010) under this heading.

The impact of ISO-based reforms has been weakened relative to their potential by poorly integrated two-level regulation. This is most obvious in the US but also important in the EU energy industries. The impact of this is greatest on network investment levels, particularly interconnectors.

Stronger incentives can sometimes achieve more with weaker structures than ideal structures with weak incentives, as shown by the better performance of some of the US RTOs in improving network congestion than the ITSO designs in Spain and the Nordic countries.

The existence of sufficient upstream competition (typically created by government policy or regulatory decisions) and effective competition oversight of the new markets is also very important for the degree of success of the chosen network/SO unbundling option.

2) *Functionally separate single company VISOs and VITOs do not seem to have any significant positive effect either in the US or in Europe.*

They appear to have very little practical effect on reducing or resolving *either* discrimination in favour of own-company upstream facilities, *or* in significantly increasing wholesale trade. Further they maintain disincentives on increasing network and interconnector capacity by new investment – and may even reduce the incentives relative to vertical integration. Hence, both the early US and the EU electricity and gas VISO/VITO models were replaced within 5 years by more ambitious unbundling options.

The DG Competition Study and the Belgian gas study showed that, among VITO companies, the 2nd Energy Directives had led to no significant increases in trade by incumbents in neighbouring areas but had led to some very disappointed new entrants.

Unless there are already potential traders willing and able to trade, the system operation trading element of VISOs and VITOs is redundant, which is why it is understandable that E&W water companies do not see the point of creating them in this market.

3) Ownership separate ISOs covering large market areas (big US States like California and Texas or groups of States like PJM and the New England ISO) have been more successful but still problematic.

These models have enabled more competition in generation and more efficient generation usage/dispatch plus better grid utilization. They seem, on balance, to have brought down wholesale prices and probably retail prices – but not by large amounts. But, their corporate governance is problematic and they are difficult organizations for which to create well-targeted incentives, particularly long-run investment incentives.

Their main weakness is that even 'deep' ISOs do not own the network assets or commission investment. They own sets of computers and systems and co-ordinate trading, dispatch, maintenance etc. They can carry out investment planning functions; but, the more that they do so, the more that the "TOs become passive owners of regulated assets that march to the ISOs' orders[41]"

4) *Unbundling vertically integrated companies inevitably causes losses in economies of scope. Those losses are only worthwhile (a) if there are significant enough benefits from more trade and competition (upstream and in retail markets); and (b) new co-ordinating methods can replace the vertical integration.*

In general, vertically integrated companies tend to be created because, given the product characteristics, markets and technologies of the time, transaction costs are minimized by that method – as exemplified in the history of the car manufacturing industry and relationships with component suppliers[42]. Technologies and markets may change and that can affect whether or not vertical integration remains optimal. It has not remained optimal in oil or in much manufacturing. (One of the main problems with the performance of Central and East European manufacturing and other industry was that their companies were inefficient and very highly vertically integrated autarkies.)

For industries where economies of scope are genuinely important for efficiency – and dynamically as well as statically – attempted unbundling leads to repeated attempts to re-integrate by long-term contracts or by other methods. It is only if unbundling leads to enough new and profitable market opportunities being created that the unbundling will seem worthwhile. In US energy, that has happened with natural gas but hardly if at all with electricity VISOs; and, at best, only on balance with RTOs (2nd generation, ownership unbundled ISOs) - with Texas, the most ITSO-like model probably the most successful.

The US VISOs led to losses in economies of scope with no compensating wider market benefits. Kwoka convincingly argues that there are lost economies of scope from 2nd generation RTOs/ISOs, partly because of mandatory generation unbundling and partly because of separation of generation from retail supply. However, he supports ownership unbundled ITSOs because they recreate the co-ordination functions of the vertically integrated utility.

ITSOs do this by assigning the responsibility for transmission planning and the incentive framework for generation siting to the company that manages the transmission network. In addition, the *same* company has the responsibility for carrying out and financing transmission investment. Hence, the ITSO, unlike the

41 Joskow (2007) cited in section 3 above.

42 See the discussions by Oliver Hart on incomplete contracts and Oliver Williamson on transaction costs.

ISO, has a coherent and integrated network function which links effectively with upstream and downstream supply companies.

Joskow, Kwoka, the EU DG Competition Inquiry and many others favour ITSOs over ISOs largely because they:

(a) create the maximum trading and competition benefits; and

(b) largely restore the network related economies of scope within the ITSO.

The monopoly ITSO requires regulation but it is much more straightforward to regulate an ITSO than to regulate an ISO, even an ownership separated ISO.

5.2 Some SO-based Policy Recommendations for E&W Water Reform

If these are the main lessons, how best can they be applied to England and Wales water – if at all?

I draw the following conclusions:

(i) ***Requiring water companies to create functionally separate system operators and doing nothing else is highly unlikely to create any significant benefits.***

The evidence is that functionally separated electricity/gas network and trading SOs (VISOs):

- have no positive effect on trading volumes,
- do not significantly reduce discrimination against other existing suppliers or provide opportunities for new entrants;
- have no positive benefits on network investment or interconnection capacity – and may even encourage cartel behaviour among existing incumbents; and
- reduce vertical co-ordination and economies of scope.

All of these effects seem even more likely for E&W water than in US and EU energy unless there are strong additional accompanying incentives for trade and market creation. In view of these factors, the water companies' hostility to creating simple, within company SOs in the current state of the industry is very understandable. Given abstraction licensing and the absence of clear network pricing access rules and prices, significant new upstream entry is not expected so that water company VISOs are highly unlikely to have any significant volumes of water to trade (assuming that there is no outbreak of market share wars between incumbent companies, an event which is extremely unlikely).

Summarising, in the absence of other measures, mandatory vertical unbundling with SOs reduces economies of scope while hampering network investment and creating few trade benefits. This is probably also true for ownership separated SOs as well as for functionally or legally separated SOs.

TEXT BOX 2: ECONOMIES OF SCOPE, VERTICAL INTEGRATION AND UNBUNDLING BENEFITS: WATER SUPPLY

Economies of Scope and the Benefits of Vertical Integration Relative to Unbundling in the Water Supply Industry

How far there are significant economies of scope in water supply (excluding sewerage) raises different issues from electricity not least because river and groundwater sources of water are much more spatially fixed than for electricity so that there is no obvious equivalent for generation siting choices. There are, though, questions as to which water sources are used and what sequence as well as a trade-off between investment (a) in upstream facilities and (b) in transport networks. There are also issues related to the use and specificity of treatment works and some of the management issues (e.g. on O&M) are likely to show similarities between electricity companies and water companies.

The evidence on economies of scope in water is a lot more limited than for electricity. For England and Wales, Stone and Webster (2004) find positive economies of scope between water "production" and water distribution – but the evidence for this was only clear-cut for Water-only companies. This research only covered the period up to 2003 so this is well worth another look. To advance the analysis, it would also be helpful to have case study or similar information on *how and why* scope economies arise in water companies as well as results from additional econometric studies.

Nevertheless, economies of scope are only half the story. It is clear from the US electricity literature that the analysis of the likely outcomes of the creation of SOs or ITSOs from E&W water company divestment should concentrate on estimating the *net* benefits and costs of unbundling vertically integrated companies rather than the just the costs of lost scope economies. In addition, the analysis should look at whether specific economies of scope can be recreated in other ways e.g. via obligations on an ITSO.

The implications are that the focus of attention for water supply unbundling in England and Wales needs to be set on *whether and how far the benefits from higher upstream trade, divestment, and other measures to increase upstream competition can be expected to outweigh any potential loss of scope economies*. It may still be worth incurring some loss in scope economies if the benefits are sufficiently large (in terms of e.g. costs, prices, efficiency, regulatory effectiveness, environmental objectives, etc) as a result of vertical unbundling and the creation of upstream trade and competition.

(ii) ***ITSOs, where system operation is combined with network operation <u>and</u> investment, have considerable advantages over VISOs and ISOs that exclude networks, but again the degree to which they offer net benefits depends critically on the trading, institutional and competition context within which they operate. Regional ITSOs are likely to provide far greater net benefits than company specific ITSOs***

In the E&W water context, there may be scope for company specific ITSOs – preferably ownership or legally separated. However, the format most likely to create maximum net benefits is of *regional* ITSOs. This view is not only the one most likely from a priori economics of network infrastructure industries but is also strongly supported by US and EU energy sector experience.

Regional ITSOs might arise from existing water companies jointly owning and operating network systems within a single upstream trading market. However, they could also be created by a single company choosing to unbundle its network and buying other companies' networks, leasing other networks or agreeing operating franchises – and, almost certainly, in a variety of other ways. This type of path is very attractive but would require a set of supportive measures, most obviously including changes to water sector merger rules.

A particular issue to be resolved is whether, for regulatory purposes, regional ITSOs do or do not include water treatment works. My preference is that, in general, treatment works should not be included as part of the pipeline network but instead should be treated as an 'essential facility'. However, although this is my general recommendation, there may well be specific cases where that does not provide the optimal allocation of functions[43].

The major advantage of ITSOs is that, unlike SOs and ISOs, they do provide coherent and integrated network planning and market organization. Vertically integrated monopolies provide this but only within their own company area. Regional ITSOs would do so over a wider geographical and market area which allows – indeed fosters - the utilization of much more in the way of potential gains from trade in bulk water (and trade in water rights).

Regional ITSOs for E&W water would have the following advantages:

- they provide effective commercial planning and implementation of investment within a sizeable wholesale market and set of water resources;

- they can (and should) be operated as pure transport and trade facilitation companies, not owning the water – like the (successful) US natural gas industry arrangements and unlike the (much more problematic) US electricity industry and Franco-German etc energy and gas companies;

[43] See Stern (2010) Section 4.1.

- organization on these lines effectively separates network from supply incentives. It eliminates use of network as an anti-trade discriminatory device and encourages network expansion (including interconnection) to increase trade by upstream and downstream users whereas both vertical integration and VISOs/ISOs discourage it[44];

- regional ITSOs provide the obvious way in which interconnection expansion between existing company areas can be planned, implemented and financed . The provision of sufficient interconnection to support higher water trade volumes was highlighted as a major problem in Stern (2010) and has been picked up elsewhere. Regional ITSOs, unlike VISOs or ISOs, would encourage as well as allow combined interconnector and other pipeline investment planning and its integration with upstream water resource availability, local and imported – plus exports.

- regional ITSOs would be the core corporate entity for Ofwat to regulate along with household prices (or retail margins). They have major corporate governance and incentive advantages over VISOs and ISOs.

However, even if regional ITSOs look attractive as a long-term goal, are they feasible and, if so, how can one move towards then – is there a coherent transition path? For various reasons set out below, it would not be remotely sensible for the Government and/or Ofwat, at least in the current state of knowledge to impose a top-down mandatory framework as in the US RTO process or, to a lesser extent, the EU unbundling process. That risks losing significant economies of scope long before the market and trading benefits arise.

Given the right supporting incentives, the incumbent water companies could well move significantly and relatively quickly in the direction indicated (e.g. over the next 3 years or so) - in which case, regional ITSOs could be established with little conflict and with low transactions costs. However, if they refuse to move significantly in this direction, not only would it be open to the government and Ofwat to impose mandatory requirements to do so, but any such requirements could be designed in the light of much better information than we currently have on the different costs of different water company activities, potential water company business structures, etc.

5.3 Trade Enhancing Accompanying Measures

If the recommendations above are taken as a potential basis for moving forward, what else needs to be done, firstly, to help ensure that they can be developed and; secondly – and more importantly - that they can achieve the objectives of upstream market

[44] The statement above would be harder to defend for UK *transmission networks* where there is a single operator (National Grid) than for E&W water or UK electricity distribution where Ofgem can compare across operators.

development and the most effective use of increasingly scarce water resources? There are certain things that are wholly within Ofwat's powers but others depend on government policy decisions and on new primary legislation. I discuss these below, but starting with the larger policy issues.

Note that the "upstream" in water includes both:

(a) abstraction rights, licences, licence trading etc; and

(b) water trading – bulk trade to wholesalers and to eligible non-household consumers of both raw and treated water.

In consequence, it is crucial to consider these jointly across the Environment Agency as well as Ofwat, with Defra as the key policy co-ordinator.

5.3.1 Purpose and Objectives

The purpose of increasing the role of markets and trade in water is twofold:

(i) to improve efficiency – particularly *allocative* and *dynamic* efficiency (and innovation) and thereby to provide greater responsiveness to consumer needs; and

(ii) to provide a framework within which likely increases in water scarcity from climate change, population movements, etc can be managed at lowest minimum cost.

The first objective proposes unbundling of water companies as a way of focusing regulation on the monopoly elements and making it much more transparent. This is done not least by focusing ex ante regulation on monopoly elements and relying progressively more on step-in safeguards and ex post competition controls where competitive markets can develop. This line of argument sees unbundling (including SOs) primarily as a way of promoting regulatory transparency and efficiency, with progressively more reliance on decentralized company and consumer responses to market-based price signals.

The second objective is clearly closely related to the first but emphasizes upstream water trade (bulk water – raw and treated – plus abstraction licence trade, etc) as the most effective way of valuing water as the demand-supply balance changes. In consequence, this market based approach provides the best method for establishing the water scarcity prices to which the suppliers and users of water can respond. In particular, this perspective emphasizes the role that upstream water trade can make in reducing the costs of dealing efficiently with growing scarcities of water.

In the absence of significant water trade, the South-East and other water scarce areas can expect to see:

- sharply rising retail water prices; *and/or*
- growing water shortages and rationing of water use; *and/or*
- significant increases in environmental degradation of rivers, lakes and land dependent on water.

Considering the two objectives set out above, higher intra and inter-regional water trade is important for both objectives but more central to the second.[45]

The problem is that, starting from vertically integrated monopolies, water trade has to be made; significant increases in the current low level of inter-company water trade will not spontaneously arise[46] – particularly in the absence of scarcity based abstraction prices. Hence, the interest in SOs and similar pro-trading mechanisms in water, as previously introduced into electricity, gas and even telecoms.

5.3.2 Key Policy Choices and Legislative Implications

If upstream trade in water is to be deliberately fostered, what external policy and legislative mechanisms are needed? The main ones are as follows:

1) *Retail competition*.

In Scotland, we have retail competition for all water customers other than households and the 2009 Cave Review recommended the same for England and Wales. However, apart from the defence of vertical integration per se, no convincing arguments have been made for retaining a legal monopoly on water sales to non-household consumers.

It may not be obvious why retail competition is the first main mechanism mentioned in a discussion of SOs and upstream trade. There are two reasons why it should be taken as the starting point.

The first reason is that continued development of retail competition and its impact on efficiency depends on retail consumers being given an effective choice of upstream suppliers. This also leads to the development of consumer-oriented supply companies configuring and organising themselves in different ways. As has been seen in EU energy markets, even with SOs, retail competition develops very slowly without effective upstream competition.

The second reason is that, in the absence of effective retail competition, SOs and other methods used to promote upstream markets and trade inevitably become top-down government/regulator managed processes. This is very clear in the US electricity RTO

[45] See Stern (2010) for a fuller discussion

[46] In 2008, inter-company trade in raw and treated water accounted for 5% of delivered water in E&W as a whole and 8% in the South-East, levels that seem to have remained stable for many years. See Stern (2010), p.7.

programme[47] and is one reason why the US electricity reforms have been a lot more problematic than the consumer-driven US natural gas (and telecom) reforms.

Reform of upstream competition and moves towards greater unbundling and trade would be much more straightforward and consumer-driven if the Government were prepared to adopt and enact the Cave Review recommendations on retail competition in new legislation.

2) *Abstraction Rights, Duties, Licences and Prices*

The current abstraction licence regime has many powerful critics and few defenders. With increasing water scarcities (national and particularly regional scarcities), abstraction pricing operates perversely with higher administration cost based abstraction prices in the North-West than in the South-East. There seems to be virtual unanimity that any rational policy towards efficient water use must be based on *scarcity-based abstraction prices*. How these are set and administered is far from straightforward but, as argued in the Cave Review, Stern (2010) and elsewhere, it is difficult to see upstream water trade developing significantly in the absence of scarcity-based abstraction prices. They seem to be a necessary condition for the development of efficient water resource use, albeit far from a sufficient condition.

The key point is that the development of upstream trade in the absence of scarcity-based abstraction prices requires a lot more compulsion and quantity controls and these are likely to be strongly resisted and/or create new inefficiencies. This is not only true of the 'forced trading' proposals in Stern (2010), but also of the 2009 Severn Trent bundled service and network trading which clearly requires heavy-handed regulatory imposition and support.

Attempts have been made to remedy the situation via greater licence trading flexibility, reverse auctions etc. However, the problems of modifying existing abstraction licences to allow for scarcity factors seem very serious. It is very difficult to make substantial progress without a lot more quantity allocation by the Environment Agency as well as dealing effectively with highly problematic legal issues over revising existing water company property rights.

Given the centrality of this issue to fostering trade, I would argue that it is imperative to look for new ways of developing scarcity-based abstraction prices.

One possibility would be to develop *abstraction right permits* to be held by current abstraction licence holders. These abstraction right permits would need to be held as a subsidiary instrument attached to current abstraction licences which would continue to give a general permission to abstract ('dog licences').

The abstraction rights permits might be issued for various lengths of time from a few months to several years, all-year-round, off-peak and peak times etc. The abstraction

[47] Other than Texas, which is the only area with significant retail competition in electricity

rights permits would provide regulatory 'contracts' with defined terms that could include step-in rights for the Environment Agency (e.g. in cases of drought or flood). Permits on these lines, if feasible, could be auctioned and traded without the problems of potential excess abstraction from licence trading on the basis of existing licences without previous licence removal/reduction in excess demand areas. This structure, separating general abstraction licences from detailed rights permits, could provide one way in which significantly greater flexibility into the terms under which companies can abstract water relative to the current framework.

The idea above may be worth looking at further and is potentially useful as a way of handling upstream competition issues from the concentration among existing water companies of useful abstraction licences for the public water supply. However, there are, of course, various other options to developing scarcity-based abstraction prices. One simple one would be for the Treasury to levy a tax on excess abstractions – "Climate Change Levy: Water"[48].

The changes described above are major policy issues on which the government will need to decide and which would also require primary legislation.

TEXT BOX 3: DISCHARGE PRICING

DISCHARGE PRICES

Discharge prices are the dual of abstraction prices and should also be scarcity (and quantity) related with, at least in water scarce areas, incentives to return water at the quality and point where it maximizes useable resources. The combination of higher abstraction and discharge prices should encourage more reprocessing of waste water to bring it up to the appropriate quality for it to be classified as either 'grey' water or drinking water. That water is then available for use within the starting area and for trading into other areas.

It is noticeable that effluent reuse and transfer options have been frequently considered, particularly in the South East of England – but, in the absence of developing scarcity-based abstraction (and discharge) prices, major new potential projects are frequently uneconomic. This is revealed in WRMPs (Water Resource Managing Plans) and in the November 2010 report by Anglian Water, Northumbrian Water and Cambridge Water on trading and opportunities for water resource sharing in East Anglia.

[48] Or a Defra/EA levied charging equivalent.

3) Virtual Capacity Auctions: Water Release Schemes

These are attractive mechanisms which have been used successfully – and without rancour – to promote competition. For example, virtual capacity auctions in electricity and gas have been successfully developed to drive upstream competition in both the US and EU and are now relatively standard.

Under such schemes, large incumbent energy companies are obliged to sell specified quantities of generated power or imported gas that they own to other companies by auction. These quantities are set by the electricity/gas regulator or relevant competition agency. DG Competition has required such conditions in the context of merger approvals with EDF for electricity and with GDF and Suez for gas. There are a number of other EU and US examples – and, in the UK, the gas release programme imposed on British Gas by Ofgas in the 1990s[49].

In water, given the (apparent) high concentration of ownership of abstraction licences among existing water companies, this mechanism could be useful in making water available for new upstream entrants. It is again an important contextual mechanism in helping ensure that market, trade and competition benefits are maximized from any structural unbundling.

Note also that existing water companies in water surplus areas (or with water surplus pockets) would gain substantial increase in asset values from scarcity based abstraction prices via higher expected profits on sales to water scarcity areas. This would arise from their ownership of existing water abstraction rights[50]. The consequential economic rents could enable them to undercut would-be entrants as well as provide them with windfall profits. Water release auctions should considerably help in tackling the 'economic rent' problems arising from windfall gains in the increased value of abstraction rights as their prices increase to reflect scarcity values.

Concerning abstraction rights permits, one reason for trying to develop them to accompany current water licences is that, under a mandatory water release auction scheme, incumbent water companies could be required to offer a vertical slice (x%) of their portfolio of varied water rights. That would mirror the energy style virtual capacity auctions adopted in the EU.

One interesting point is that virtual capacity auctions seems to be an area, unlike networks, where functional separation works well. This may account for the relative absence of hostility to these programmes in France, Germany and Belgium as opposed to the hostility to ownership unbundling of networks.

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[49] See Stern (2010) Section 4.1.1 for a fuller discussion.

[50] This is analogous to the implication of the impact on airline values of changes in the prices or quantities of airport slots.

In terms of implementation, it seems highly desirable if not absolutely required that any decision to proceed on these lines be taken including Defra and perhaps the Competition Commission and embodied in new legislation.

5.3.2 Key Regulatory Issues for Ofwat

There are a number of ways in which Ofwat can clearly help encourage moves towards an industry structure with an effectively competitive upstream. The main ones are set out below. The focus, as explained above, is to create mechanisms and structures that encourage companies towards network and trade separation and the establishment of regional ITSOs.

Some of the proposals below may require new primary legislation - and/or would work much better if they were addressed in primary legislation - but others do not. Ofwat would be well-advised to use whatever opportunities it has to progress on an upstream trade promoting track as that will maximize the net benefits of moves towards network-service separation of the existing incumbent water companies.

The main areas which Ofwat is advised to develop are as follows:

1) Separate Accounting

Ofwat currently has in place a project on separate accounting. The key question is the degree of accounting unbundling. It looks to be crucial that the new accounting framework should provide separate accounts for:

(i) *company pipe networks* – including system operation and maintenance. If possible, this category would require separate accounts for: (a) interconnecting pipes (both raw and treated water – but not necessarily separate accounts for each); and (b) non-interconnecting pipes;

(ii) *water trading facilities* – including all market and financing operations associated with bulk water trading and financing, including licence trading; and

(iii) *water treatment facilities.*

The main reasons for advocating a relatively disaggregated level of accounting separation is that:

- It allows Ofwat maximum flexibility in disaggregating the number of price caps and, if other conditions were met, would allow a network only price-cap from 2014;

- It encourages companies to consider anew the relative value to their business of the various different activities. This process may well encourage

companies to examine in which parts of the value chain they wish to operate and from those that they might franchise out or from which they might wish to exit;

- It provides a much better background against which to examine the competition implications of any proposed mergers – particularly mergers of network elements or other horizontal segments.

2) Modular Licences

The natural next step to the recommended accounting separation is the development of modular licences by main function. This would allow the Ofwat water supply licences to be designed more by main function, with purposive clauses according to degree of unbundling and market orientation. It would also provide the best basis for licensing new entrants according to the segment(s) of the value chain in which they wished to operate.

This would again encourage companies to consider anew the relative value to their business of the various different activities. In addition, it might be possible for Ofwat to design the new licence modules in ways that provided incentives towards network-supply separation, more trade and regional ITSOs.

3) Network Access Rules and Pricing

The development of network access rules and access prices has been identified in the Cave Review, Stern (2010) and various other places as crucial for the development of upstream trade.

In the context of this paper, it is worth pointing out that clear and published access prices would allow companies to assess whether their water transport business is a major profit element. If not, such prices provide a basis for appraising whether it is something that they would prefer to lease out, to sell, to combine in joint ventures with the networks of other operators, etc.

A key issue in access rules is that access between company networks should be mutual. One of the main objections to the 2009 Severn Trent trading proposals is that it required water exporting companies to have access to the network of the company to whom they were selling bulk water but not access by buyers to sellers' networks.

4) Separate Price Caps

A separate network only price cap from 2014 would be major step towards creating company and regional ITSOs. One issue that would need to be resolved is how interconnector pipes (for raw and treated) water would be handled – whether within an overall network price cap or separately.

5) Ofwat's Attitude to Unbundling and Horizontal Network Mergers

In the boundary between regulatory structure and regulatory conduct, there is a clear trade-off between the stringency of regulation and the degree of unbundling. Indeed, one of the most important reasons why British Gas unbundled itself in the 1990s was to reduce the degree of regulation in the non-network parts of the business. Oftel tried to do the same with BT in the 1990s; that attempt failed, but the approach came to fruition with the creation of Openreach as a (heavily) functionally separated element of BT in 2006.

Considering this previous UK experience, Ofwat would be well-advised to issue guidance as to how it would approach regulation and horizontal mergers were incumbent water companies to choose voluntarily to unbundle themselves – particularly their SO and network activities - functionally, legally or in ownership terms.

Companies are bound to be wary that Ofwat would wish to claw back in subsequent price reviews all (or almost all) of any profit increase achieved from network unbundling and horizontal mergers, whether efficiency generated or not. Issuing guidance on how Ofwat might approach these issues, plus when and how they might use regulatory forbearance, could be very important in encouraging companies to proceed towards more trading, commercial restructuring and regional ITSOs.

This issue, and the appropriate use of regulatory forbearance, has been a major topic for Ofgem - and even more so for Ofcom where dynamic efficiency issues and likely temporary monopoly concerns are crucial. Ofwat may be able usefully to draw on the other UK regulators' experience in this area.

6) Stranded Assets, RCVs and Related Issues

The standard response by the incumbent water companies and the supporters of vertical integration to network unbundling proposals of the kind advocated in this paper is, firstly, to warn of stranded asset issues; and, secondly, to warn of the potentially serious adverse implications of unbundling for the RCV (Regulatory Capital Value) and thereby on investor attitudes and the cost of capital. It is worth ending this section with a discussion unpicking these issues.

The crucial issue on both of these topics is how Ofwat can and should regulate large upstream (and sewerage) investments. The original regulatory framework established post-privatisation was effectively based on a single price cap set on the basis of cross-company efficiency comparisons. A fundamental purpose of that price cap was to contain investment outlays on large-scale investments upstream and sewerage projects – it essentially imposed a corset on them. Hence, one reason why menu regulation could not be more than an adjunct to standard Ofwat regulation as in PR04 was that menu regulation was originally designed for *network* regulation. Given the extra discretion it gave to companies it was judged in its pure form to be too risky too apply to major upstream and sewerage works investments as well as to network investment. However, the disadvantages of the standard method of regulation have now grown manifest,

particularly for these large investment projects and it is time to look for alternative solutions.

The rhetoric on both stranded assets and RCVs is essentially a concern about trust and a fear that Ofwat (and the government) might be reneging – or at least tempted to renege-on past promises. The RCV per se is not "the real problem" – it is an important symbolic problem around which companies and people nervous of unbundling (as well as opponents of unbundling) can coalesce to express their discomfort and fears. In consequence, if Ofwat wishes actively to pursue network unbundling, it would be very well-advised to promote the appropriate reassurance to the companies that they will not be left to fail. To help start this discussion, the following points are worth making:

A *Stranded Assets*

(i) The appropriate treatment of potentially stranded upstream assets is well-established from experience in energy and telecom industries. Ofwat would be well-advised to indicate publicly the approach it would address to companies who faced significant stranded asset problems.

(ii) The greater are likely water shortages, the less likely are companies to face serious stranded asset problems – existing facilities and assets will become progressively *more* valuable. Indeed, market dominance and its associated market power, together with rents from scarcity based abstraction charges, are very likely to dominate considerably relative to stranded assets.

(iii) Ofwat should not, and probably could not, unilaterally remove RCV protection for <u>existing</u> major facilities. Hence, RCV protection for existing assets would continue unless companies wanted to withdraw them fully as useable assets - in which case, these assets could be handled under stranded asset procedures as in (i) above.

B *The RCV*

(i) Regulatory Capital Values would not necessarily need to be reallocated unless and until companies went some way beyond management separation of their businesses – which could well be 5-10 years time.

(ii) As in energy, the network (pipeline) assets would retain an RCV and hence have full future as well as past RCV protection.

(iii) Given RCV protection for already installed major assets, the real issue is how Ofwat should handle <u>future</u> major upstream (and sewerage) investments. The answer is that, even without vertical unbundling, there are significant advantages in moving to a ***contract*** approach for any investment project with a value above a defined level (e.g. over £50

million). These contracts could be of various types covering one or other or both of (a) construction and (b) operation post-construction and with many options for contract ownership, financing and tradability.

There are ample precedents in public procurement and from PFI/PPP projects from which Ofwat and the companies can draw, including regulated industries such as rail and airports.

(iv) The concerns over the RCV are, effectively, a concern about regulatory risk. The reasons above show why water companies and investors should not feel as worried as they currently appear to do. However, to some extent they can insure against such risks. Political and regulatory risk insurance is well-established, at least for capped risks.

For the RCV, there remains the issue of how to allocate the privatization discount, but that should be resolvable by negotiation if the underlying issues above are addressed and trust can replace distrust. The problems seem far from insuperable given enough transparency and time and, if resolved, could make a major contribution to ensuring the success of a water industry with much more upstream competition and trade fostered by emerging regional ITSOs.

Note that the RCVs were successfully reassigned without major problems for British Gas in the 1990s and that Scottish Power has also recently done so without significant problems.

6 Concluding Comments

The main conclusions of this paper are relatively clear. They are as follows:

Firstly, in terms of choices among SO (system operator) models, ITSOs – transmission/transport companies with associated trading functions – perform far better than the SO/ISO models which leave network ownership and investment with the incumbent operator. For E&W water, the strongly preferred solution put forward in this paper is that the system move towards a relatively small number of regional ITSOs.

Secondly, the degree of success from implementing regional ITSOs – or any intermediary step – depends critically on introducing other effective incentives to trade. These include various high-level policy decisions including:

- scarcity based abstraction prices;
- effective network access rules and prices;
- movement towards retail competition for all non-household customers; and,
- almost certainly, virtual capacity water release auctions.

It will also require a reconsideration of competition policy and merger rules with moves towards a more ex post competition approach (both for upstream and for competitive retail supply) plus a reconsideration of merger rules for horizontal mergers of unbundled water industry segments.

Thirdly, Ofwat should design its separate accounting framework so that (a) networks and (b) system operation are considered as separate entities – and similarly for all other segments critical for network-trade separation (e.g. water treatment works). Ofwat should also try to provide separate price caps for networks in PR14. Looking ahead, Ofwat would be well advised to develop modular licences with purposive clauses.

More generally, it would assist this process considerably if Ofwat could provide appropriate guidance and advice regarding its future regulatory treatment of unbundled networks and upstream investment. Water companies need to know that there is some genuine and continuing "upside" from embarking on an unbundling and pro-competitive trading path – and consumers need to know what kind of benefits they can expect.

Finally, Ofwat (probably with Defra and/or the Competition Commission) would be very well-advised to consider and publish options how best to handle the regulation of the RCV and stranded assets. It is suggested in this paper that moving towards a contract-based approach for future major assets (in sewerage and water) may be a better way forward. This could then make significantly easier the resolution of concerns over perceived RCV and stranded asset treatment in the future.

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January 2011

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