# Regulatory Reform and The System Operator Model

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Regulation grows. It is never reaches a stable equilibrium. There are always more things that politicians, regulators and the multiple vested interests want to do. These include new duties and responsibilities, new incentives, and most of all new spending on the particular interests. Governments want to shift public expenditure onto private tax bases. Then there are the "unintended consequences" that follow each new intervention. These in turn need to be fixed and they create their own unintended consequences and so on. Finally, there is the natural organisational bias of regulatory institutions towards expanding their budgets and staff numbers.

There is nothing new about this. It is a pretty standard part of the political economy of regulation. What is surprising is that anyone would be impressed with the results. For all the growth of regulation in Britain, there is no clinching evidence that its results have got much better. For those who rely upon the core utility infrastructures, it is hard to argue that it has been an unbridled success. A quick look at the state of the railways, the electricity bills, the reliance on copper wires and the problems of broadband speed and coverage, mobile black spots and the absence of roaming, the state of some river catchments, the congestion on Britain's roads, and the sheer cost of the renewable electricity generation suggest there is much to be done.

In some of these examples, there is an understandable despair of anything really working. Most politicians and most commuters have long given up on the hope that there can be significant improvements in the railways. No one is surprised that the electrification of the Great Western line is a shambles of cost overruns, failure to meet timetables, and that some of the resulting train services might actually be slower. Few are surprised that little has yet been done about electricity bills. These utility failures are now just part of everyday life in Britain.

Though some regulators have been better than others, and some ministers have had a better grip of the issues than others, the scale of the problem is one that points towards much more fundamental structural issues. Whilst it is true that regulators let the great leveraging of the utility balance sheets just happen, that the average cost of capital allowed shareholders to benefit from arbitrage between the costs of debt and equity, that great CAPEX games were played out, and capitalising operating costs allowed higher returns, and most of all that the utilities made hay out of the falling interest rates since 1990, better regulators would still have left us without twenty first century infrastructure. It is the framework of regulation, funding and finance that lie behind these problems, and until these are properly addressed, more disappointments will follow each new regulatory initiative. This is where regulatory reform has to start – with the basics.

**Regulatory frameworks**

Regulation is needed where markets fail, and the costs of intervention are expected to be significantly less than the costs of the failures. That is the easy bit, but it hides the sheer complexities of each industry. Market failures are multiple, not singular. There is natural monopoly, there are barriers to competitive entry, there is pollution, and there are multiple social and distributional dimensions.

The classic approach has been to deal with each failure *separately* and to do so in marginal cost-benefit terms: the private and social marginal costs and benefits are weighed up, and then intervention takes the form of trying to correct for the prices through an aggregate price cap, on the (mistaken) grounds that since firms in perfectly competitive markets are price takers, that this is a model that can be transferred across to utilities. In competitive markets, firms do not face fix price fixed period contracts of say 5 years. They do not have certainty from changes in the many exogenous factors going on around them. In competitive markets, prices are changing all the time as a result in changes on the demand and supply sides of the markets. There are multiple prices and costs, and the

special features of utilities and infrastructure is that they come in *systems* and not discrete marginal units.

RPI-X was always a crude and simplistic mechanism, aimed at forcing down costs in the short run. But what its designers got wrong was that they thought this crudity did not matter because it would only be *temporary*. When RPI-X was invented to regulate BT, the assumption was that after a holding period of 7 years, it would wither away. It was not widely assumed at the time that the temporary would become permanent. Many regulators has continued through the 30 years since then with the fiction that competition will be able to gradually take over most of heavy lifting, and eventually price caps might be much more limited or even fade away.

**Structures matter**

Once regulation is understood to be permanent, the key structural issue is to match the market failures with the structures of the industries that are being regulated. Only in energy was this fully understood. Natural monopoly regulation applies to natural monopolies. By bundling many of the parts of an industry together, as for example in the current BT structures, the lines between competition and monopoly are blurred, and all sorts of anti-competitive and predatory behaviours becomes possible. There is a fundamental conflict of interest.

In energy, gradually, supply was split from network transmission and distribution. Supply could then be liberalised, and the natural monopoly regulation could be focussed on the networks. In other utilities, it has never been straightforward. In both water and railways, it is far from clear what the natural monopoly actually is, and the costs of competition have turned out to be large. In the water case, this is because the marginal cost is often zero, and the costs of trading abstraction rights and bulk water supplies, and reflecting the small marginal costs in bills, have proved at best “difficult”. Even the Treasury-driven attempts to get retail water competition going could only in the most optimistic

scenarios produce a possible maximum £8 per year benefit for customers in the latest OFWAT study. In the case of the railways, the concept of competing rail services on the main railway lines was never properly evaluated, other than for a limited number of competitors, and the franchise monopoly model replaced the open access model almost from the start.

**Natural monopoly and the central role of the System Operator**

The separation of natural monopoly from potentially competitive supply was the correct approach in energy back on the 1990s. It is now necessary for Openreach. It was probably not right for railways, and it is unlikely to be correct for water. It all depends on the underlying cost structures and in some utilities information technology has changed these dramatically, and in energy zero marginal cost renewables have changed the supply side to one of capacity rather than energy.

What all these examples have in common is that they are *systems*, and there are *system* dimensions to their operation and expansions, which are monopolies – natural monopolies. There are *system* questions about the shape of the energy industries, *system* questions about river catchments, *system* questions about the roll out of fast broadband and fibre, and *system* questions about airports, rail and roads.

These systems questions are the ones which not only dominate the shape and evolution of these industries, but they are the core issues facing the government and the regulators now. The current agenda includes such system questions as: whether and where to build new runways in the south east; whether to develop decentralised energy systems; how to maintain system security of supply in electricity, the high speed rail system developments and HS2, the electrification of railway lines; Crossrail 2 and the future of the London transport systems; the natural capital of the river systems and the future of flood defence systems; and the London Tideway. None of these can be competitive market decisions, though all of them could be contracted out to the private sector to deliver.

The System Operator is where public interest and typically national decisions get made. These are therefore inevitably political, requiring decisions to be taken often over long time horizons as to what sort of infrastructures Britain needs. The most urgent structural issue for regulation in all the main infrastructure utilities is to identify and separate out the System Operator function, and to then design the political and regulatory framework within which these functions should be discharged.

**System fixed and sunk costs – infrastructure as capacity**

The old distinction between natural monopoly and the potentially competitive parts of the utilities took for granted that competition would be about the delivery of variable amounts of the commodity, which went through the network monopolies. The lead case was electricity and gas, and their wholesale markets, with prices set at marginal costs. This is where the competitive actions took place.

This works provided there are marginal costs and these marginal costs play a significant role in the provision of the utility services. The trouble with utilities is that they rarely do: the norm is for a heavy preponderance of fixed costs. This has recently become apparent in the electricity industry: most renewables (and nuclear) are pretty close to zero marginal costs. It is true most of the time on the roads, for water, and even for the railways in off peak times. Mobiles and broadband are cases *par excellence*: there are virtually no marginal costs.

This matters because the main economic resource allocation issue is more about the provision of capacity, and less about the services that flow through that capacity. It is the capacity of the system that needs to be determined (by the System Operator), and it is for the provision of that capacity where competition has most relevance.

By focussing overwhelmingly on the wrong question (how to make commodity competition work) rather than the right one (how to make capacity competition work), the regulatory regime has failed to deliver the full benefits of maximising competition where it has most economic impact. The System Operator is required to determine both the level of capacity and the efficient operation of the system at each point in time, and the structural separation is necessary to split out this natural monopoly element. The rest of the utilities can be opened up to competitive bidding, capacity auctions and the full force of competitive markets. Competition has been promoted where it is typically least important: the task now is finally to move onto the main stage.

**The USO**

If structure and especially the System Operator role is the first issue in the design of effective regulation, the USO is the second. The utilities provide basic social primary goods that citizens need in order to participate in society. They are also the necessary infrastructure of the economy. Companies need roads, rail, airports, electricity, gas, water and broadband if they are to compete on global or even local markets. As a result, a modern economy and a civil society will need to provide these systems to all. Furthermore, since much of the costs are fixed and sunk, there is no right way to allocate these between the users, separate from the overarching social and economic objectives.

Put simply this means that these core utilities services need to be provided universally, and that there has to be an element of cross subsidy between customer classes as to who pays the fixed and sunk costs.

In a number of cases, the USO has been used by regulators as a regulatory handicap. It has been placed as a cost burden on incumbents, and not entrants, with the view to promoting competition. It was tried out in energy (including the notorious E factor), in telecoms by placing USO burdens (like rural phone boxes) on BT, in postal services on the Royal Mail but not entrants, and in electricity by requiring the big players to have special tariffs.

This blurring of the USO with the promotion of competition is a mistake and with serious consequences. *The correct way to view the USO is as a system cost, to be recovered through system charges*. This can be a levy on bills, or added to the use of system charges for the networks.

Embedding the System Operator monopolies and the USO into an enduring regulatory framework are the main bits of an efficient regulatory architecture. This has radical implications in devising a practical agenda for reform.

**The Reform Agenda**

Reform has several parts. These are: (i) the establishment of System Operators across the utilities, with the appropriate licences and responsibilities; (ii) the defining of the USOs, incorporated into the System Operator licences; (iii) the development of competitive auctioning procedures for the System Operators; (iv) the establishment of the financial structures of the auctioned contracts; and then (v) the recasting the regulatory institutions and the role of the state.

**(i) the establishment of System Operators across the utilities**

There are a number of generic principles which should apply to all cases, and then more detailed tailoring to each specific case. The general principles are the requirement of the System Operator to have a system plan for the development of the systems, on the basis of high-level outputs and the necessary spare capacity margins.

The most advanced case is electricity (and to a lesser extent gas). Here there is already a System Operator, but one whose primary role started out as being the operation of the existing system. When National Grid was privatised, the idea was that it would be largely passive in respect of investment in generation. It would passively respond to requests for new connections, and then wire them up, incorporating the costs within its regulatory asset base.

It has become increasingly apparent that this passive role is not sustainable, once the initial large margin of spare capacity had worked itself out. Not only were the early gas stations located in the wrong places, but the system had additional requirements in terms of: the level of capacity (and the capacity margin) for security of supply; the diversity of the system; the flexibility of the system; and finally the requirement to met carbon budgets and hence decarbonise.

The capacity margin, and the types of capacity have ended up being determined not by the market, but ultimately by the government. There are no significant investments in electricity generation in Britain without government-backed contracts, in the form of Feed-in-Tariffs and capacity payments. Yet the determination of the system requirements has ended up in lots of different, often overlapping places. The government has a central role, as does OFGEM and the National Grid, and even the Treasury gets in on the act. On top of all this, the National Infrastructure Commission is supposed to advise the government on the long-term investment needs of energy (and transport, water, broadband and so on). As a result, when it all goes wrong, there will no doubt be a merry go round of blame – as there is in the railway industry.

This mess needs to be cleared up, and quickly before there are very costly mistakes. To do this a series of questions need clear and unambiguous answers. These include:

- Who is responsible for drawing up the capital investment plan for the system in the short, medium and long term?

- Who is responsible for establishing the required capital maintenance of the system?

- Who is responsible for contracting for capital investments and for capital maintenance?

These are the core functions for a System Operator, and the first two at least are both ill defined in all the utilities, and currently partly carried put by the regulators in negotiations with the regulated monopolies through the periodic reviews.

**(ii) the defining of the USO functions**

The USO cannot be determined by companies in competitive markets. The essence of the USO is that all citizens and all companies have rights to the provision of services. This defines the extent, form and content of the systems. The new example of broadband illustrates the evolutionary processes for postal services, telecommunications, water and electricity over decades and even centuries. It is now argued that all citizens should be entitled to a minimum level of broadband capacity.

These sorts of rights have to come through the political process, informed by economic analysis of the costs and benefits. It is for society to decide what bundle of rights citizens should have, and it is for Parliament to legislate to effect these.

Legislating for these ends requires providing the means to achieve them. Hence someone or some institution has to have the obligation to put these rights into effect. In the nationalised industry days, this was straightforward. Statutory monopoly could deliver the rights, and because they were statutory, recover the costs from across their customer bases. It could decide how to extend these rights, and in some cases such as the Beeching cuts to the railway networks, how and when to withdraw them.

As noted above, the privatisation ad competition agendas never properly resolved who would be responsibly once the statutory monopolies had been abolished, and regulators played games with incumbents as a form of regulatory handicapping. Wherever commodity competition raises it head, the ambiguity is

further exposed. The latest idea is that water companies should face competition from new rivals who are not either in theory or even probably in practice lumbered with the requirement not to disconnect.

The efficient delivery of the USO requires the following questions to be answered:

- What are the USO rights?
- How are these rights modified over time?
- Who has the duty to ensure that they are fulfilled?
- How should they be paid for?

The obligations need to be defined generally through primary legislation, as they are for example for postal services, and then modification can be dealt with through secondary legislation. These requirements could be placed on the System Operator, to ensure that the system can deliver. The charging then can be added to the system use charges. The reason why the System Operator is involved is because the USO dictates the sort of system that is required, and the associated expansions and capital maintenance.

### (iii) the development of competitive auctioning processes

There is no requirement for the System Operator to carry out the main functions described above directly. Its primary duties are to see that they are carried out. It does not therefore need to be a big organisation, and to have a contraction and operating workforce. It can be quite small, and importantly much smaller than most of the current regulatory bodies.

Most capital projects in Britain are carried out by contractors, not the utilities themselves. Few if any build their own power stations, and install their own new

pipes and network cables. There is already a competitive market in these activities, and utilities put these out to tender on a regular basis. It is reasonable to expect that competitive tendering should almost always be one option.

There are however areas where bundles of contracting activities are best done in one unit. Franchising parts of systems for periods of time is one way. It has been used with mixed results on the railways, but it is very common internationally. Franchises are a particular form of bundled contract.

### (iv) the establishment of the financial structures for the auctioned contracts

The carrying out of these activities is separate from their funding and their financing. The funding has to come from either taxpayers or customers or some combination of the two. In other words, someone has to pay for the system enhancements, capital maintenance and operations. This is the funding question:

- Who is going to pay?
- What credibility does the promise to pay carry?
- Who bears the risk of non-payment?

With funding determined, the financing depends on whether in the case of investments, it is *pay-as-you-go* or *pay-when delivered*. In the latter case (which was a major motivation in privatisation), there needs to be a mechanism to ensure that efficient CAPEX is properly accounted for and commitments to both service the finance and pay back the principal. The standard mechanism in regulation is the regulated asset base (RAB), as the solution to the time inconsistency problem.

In the System Operator model the RAB raises the following question:

- Where is the RAB to be located?

The options are: with the System Operator, with the franchised companies (like the existing water and energy distribution companies) or with the contractors for the specific works. Of these the System Operator is an obvious choice. The RABs can then be ring fenced, and the debt within them traded – or indeed even the whole RAB could be traded. Provided the ring fence is tight and transparently accounted for, the RAB can function like gilts. Indeed, since there is typically a government guarantee to ensure that utilities can finance their functions (and in this model these would be the System Operators) there is a sense in which RAB debt is just a special form of gilts. It is a subsidiary question as to whether the RAB debt is secured against taxpayers (as for example in the case of Network Rail's debt) or customers. In the former case, the security is the ability of the state to raise extra taxes, and in the latter it may or may not be the physical assets, depending upon whether at the limit the state explicitly or implicitly stands behind the utilities. (These RAB assets could in turn be part of a National Balance Sheet).

### (v) the recasting of the regulatory institutions and the role of the state

The above regulatory framework has significant institutional consequences, particularly in respect of the System Operators. The starting point is to work out what the regulatory functions under this restructured model are, and then to work out which institutions should deliver them.

The functional questions are:

- Who decides the economy-wide outcomes for the level of capacity and USO rights?

- Who decides what sort of medium to long run infrastructure and utility decisions are required - what might be called the infrastructure plan?

- Who decides what the detailed capital expenditure and capital maintenance plans should comprise?

- Who ensures that the contracts are efficiently contracted and delivered?

- Who decides whether competition is fairly carried out and whether there are anti-competitive practices?

Whilst back in the 1980s and 1990s the answers to these questions were set largely around the new regulatory offices which have proliferated on an industry by industry basis, over time the answers have changed considerably. The evolution has been typically gradual, and as a result somewhat opaque.

The first development has been for the political process to create more duties for the regulators to deliver outcomes, which the political process determines. Hence decarbonisation, sustainability, considerations of distributional justice and vulnerable customers and social obligations have all been variously added.

This has now moved towards a much more overt set of government interventions. The state now determines the investments in the electricity industry as noted above. It has moved into broadband, and not only started to define a USO but also to provide direct subsidies. In the railways, the state is ubiquitous, even if from time to time it tries to pretend that it can't intervene between the companies and the unions.

The limits to state intervention may in any event be about to be significantly weakened through BREXIT and the repeal of various directives on independent regulation of utilities, state aids and competition

In terms of the longer-term infrastructure plans, the state started the process of developing National Infrastructure Plans and now has set up a new institution to

address these issues, the National Infrastructure Commission (NIC). It also has the new National Planning Statements.

Whether the state is the right location for such plans is a matter for some debate. It could be that the state's role is to make sure that the various infrastructure developments are coordinated, whilst leaving the System Operators to come up with the sector plans. In practice, the longer-term infrastructure plans will need a significant element of political sanctioning, and the process might be for the sector regulators to draw them up in consultation with the NIC, and then for government to table these as part of the National Planning Statements.

Note that at no point have the regulatory offices been included in the above discussion. It is not clear how or why they should have any part to play. Instead all this national infrastructure policy architecture has been added *on top of and separate from the existing utility regulators*.

Next comes the detailed capital expenditure and capital maintenance plans. Here the institutional issue depends upon who is carrying the obligation to honour the contracts to do the works. If it is the System Operator, then it is the System Operator that owns the detailed business plans. If it is the contractors, and in particular the utilities like the current water and energy network companies, then they should propose their contents. The role of the regulators has to date been to adjudicate on these in detail on a five year basis (eight years in the energy cases). This has been the role of the periodic reviews, and carrying out network periodic reviews has been a major regulatory office undertaking.

But why do the plans need regulatory scrutiny? The answer to date is because they are proposed by monopolies. But what if the monopolies were themselves subject to competitive bidding either in whole or for all or most of their parts? Might not existing utility providers bid for the periodic review outcomes, for example by offering a consumer price limit, or by bidding competitively for each of the parts of the works to the System Operator, as in the case of the electricity capacity contracts?

Even if the competition is limited, the key role for the regulatory office would be in promoting competitive bids, opening up the capital investment and capital maintenance to rivals, and then making sure the process of bidding was open and fair. The outputs themselves would have already been determined by the state, the NICs and the System Operator

On the issue of contract compliance, and making sure that what is in the bid is in fact delivered, again there are options. It could be for the System Operator, or it could be an auditing function of the existing regulatory institutions. On the competition side, this is a function that could be carried out by the competition authorities rather than the regulatory offices as currently composed.

Some further tweaks to the regulatory processes might further reduce the burden on regulatory offices. The cost of debt and the cost of equity can be indexed to the market and there is a case for getting rid of fixed periods, as neither necessary nor consistent with the way competitive markets and different vintages of lumpy capital projects work. (see Helm 2016: Do we need any more periodic reviews?)

The conclusion that follows is that rather than growing the size, functions and budgets of the existing regulatory offices further, they could be considerably shrunk. It is even possible to imagine a theoretical case for abolishing them altogether, with the roles that the System Operator might take on.

The obvious objection to the above proposals is to argue that really all that has happened is that the System Operator has become the regulator, and that it is more a matter of changing the names than a significant restructuring and reform of the regulatory architecture.

It is true that some functions currently performed by the regulatory offices are transferred to the System Operators, but the context is very different. The regulatory offices are constructed around the periodic reviews and detailed

engagement with the utilities over their business plans. In many respects, the regulators have taken over the jobs of the managers of the utilities, such that the managers are in an effect working for the regulator. Public ownership been replaced by public regulatory control. In a world without periodic reviews, focussed on the system nature of the infrastructure networks and around the capital development of those systems, the key interface is between those in charge of developing and implementing the system plans and the social and political framework, most notably including the USOs, which can only in a democracy be grounded politically. Indeed this interface between the System Operator and the government has been an obvious result in the electricity industry, side-lining OFGEM. In the case of river catchment plans and river catchment operators this would also be the case (see Helm 2015: Catchment management, abstraction and flooding: the case for a catchment system operator and coordinated competition). There would be environmental objectives within which farming practice, flood defences, abstractions and water and sewerage services would be set. In railways, it has always been a public-private partnership.(see Helm 2015: What do to about the railways?).

A key issue is to keep government "clean" in this interface, and therefore to construct the System Operator licences with clear obligations and duties, clear open competitive bidding processes, and an open process for developing longer term infrastructure plans. The funding and financing need to remain credible. It is this last crucial requirement that may require regulators to guarantee the process of ensuring that the functions are financed.

**Transitional arrangements**

It is rarely a good idea to tear up a regulatory structure and start from scratch. It worked at privatisation because it had to. Privatisation was a radical process, and the new private rights and duties needed to be addressed. They could not be avoided.

Britain has a regulatory architecture that works in the sense that the functions of the utilities are provided primarily though the private sector. Indeed, from the private shareholder perspective, it works very well: the returns have been very high, and arguably much higher than is strictly necessary. It has worked well too for management, who have reaped big salaries, bonuses and pensions.

It has however not been so successful for some customers, and the framework has not provided an infrastructure fit for twenty first century purposes. Let us remind ourselves of the points made at the outset: broadband is a mess, mobile services are patchy, the railways are often dysfunctional, the roads are congested and many electricity customers have paid too much. Almost everyone agrees we need to prioritise infrastructure investment.

The task then is to get from here to there – to a sustainable and decent set of infrastructure systems with USOs.

There are several initial no regret steps. These include: abandoning the periodic reviews after the current round is completed; merging the regulatory offices into a single body; cutting out the duplications and the multiple consultancy budgets; and transferring competition matters to the CMA

None of these is difficult, and indeed in practice all are already underway. The extension of the periodic reviews to 8 years in the energy case, the allowance for multi-period capital expenditure, and the separating out of a number of big long term projects are all features of the evolving regulatory architecture. The regulators are beginning to cooperate on generic issues like the cost of capital and efficiency measurements, though the process of merging common services is slow and riven by the rivalries between the regulatory offices. On the third, as in the recent CMA electricity case, serious issues are already given to the CMA. So far, so un-radical.

Next the creation of explicit System Operators is less radical and more evolutionary than it may seem. There is already an enhanced System Operator

function in electricity and gas, and the gradual break up of Network Rail does isolate out system questions that need to be answered in a more disaggregated world. What is needed now is to extend this to water and to make sure the System Operator functions in Openreach are sorted out. In the case of airports, the Davies Commission has in many respects been making System Operator decisions. In the case of water, the catchment approach, the natural capital approach and the 25 year environment plan, the weaknesses and problems around flood defences, and the ending of the Common Agricultural Policy all point to a need to make sure there is someone in charge of catchments, and the concept of a System Operator fits better with the plans for more disaggregating water companies that OFWAT is pushing in any event. Finally, there is the NIC which does some dimensions of system planning. Again, not so radical as it might seem.

Abandoning periodic review, merging the regulators and creating clear System Operators would cumulatively change the game. It would be a transition to a better place, and it would stop the process of regulatory expansion of functions. The cost savings would be very great. There could be a very big cut in their bureaucracies. When OFGAS was first setup, it had 20 people. There is no reason with these transitional steps above that the number for the combined regulatory office could not be much lower.