

MEMO

TO: Viridian (DS3 Workstream)
DATE: 11 February 2016
FROM: George Anstey; Graham Shuttleworth (NERA)
SUBJECT: Auctions for DS3 System Services

1. Introduction

This Memorandum contains our initial thoughts on DotEcon's proposed market design for allocating contracts to provide system services.¹ DotEcon has formed these proposals within the framework of previous decisions taken by the SEM-C, but has chosen to deviate from those decisions in some respects. In our view, *either* DotEcon should abide by the SEM-C's decisions, *or* the SEM-C's decision should be amended in the light of experience from implementing the current version, *or* DotEcon should make a different proposal that deviates from the SEM-C decision in a different way. We have reached this conclusion because DotEcon has chosen to impose an arbitrary set of constraints on its current proposals that distort incentives and hinder the efficient procurement of system services. The outcome is a flawed proposal that is not consistent with either regulatory guidance or economic imperatives.

The purpose of setting up an auction for system services is to allow the TSO to procure those services efficiently, given that different providers incur different costs to provide them. The arrangements must also give market participants an incentive to incur the costs of providing those services, when asked to do so. DotEcon's proposed auction design suffers from two problems: (1) it fails to ensure that providers have an incentive to deliver necessary system services when required; and, (2) as a result, the proposed auction will not award system service contracts efficiently.

Many of the problems with the system proposed by DotEcon are caused by giving insufficient attention to the cost of delivering system services. This deficiency lies behind the following problems with the current proposal:

- The uniform pricing rules that DotEcon proposes deriving from package bids may not provide winners with incentives to deliver the agreed services when required, because the cost of delivering a service for contracted generators can lie above the price paid for that service;
- Each option requires providers to bid a guaranteed price and volume for services whose costs are intrinsically uncertain. DotEcon expects providers to allow for these risks by building a risk

¹ DotEcon (2015), *DS3 System Services auction design report*, December 2015.

premium into their bids. However, many of these risks derive from the design of the system and are not necessary for procuring system services. Owing to the arbitrary nature of these risks, they will affect different providers to different degrees, requiring them to include different risk premia in their bids, leading to an unnecessary and inefficient distortion of the auction. In addition, this unnecessary risk may discourage investment even if it raises prices.

- The proposed contingent-commitment model does not reward generators who are constrained on for providing system services, which undermines the incentive for generators who are frequently constrained on to invest in the provision of ancillary services; and
- Unless the demand curve adopted is granular enough to reflect the system's locational need for ancillary services, it will not provide incentives for participation of the plant the system needs..

Below, we describe first a general cost structure for the provision of system services. We then review each of these deficiencies in the current proposal and show how they will distort the process of selecting system services.

2. Cost of Providing System Services

DS3 ("Delivering a Secure, Sustainable [Electricity] System") is the workstream devoted to the TSO's procurement of system services. System services (also known as "ancillary services") refer to certain products, other than electricity pure and simple, that are required to operate a transmission network securely. They include various forms of reserve (i.e. the option to take more or less energy at varying degrees of notice) and reactive power (voltage support that facilitates the transmission of energy over a network).

Although generators have provided the bulk of these services in the past, it is conceivable that they might be supplied in future by customers (as demand-side response) or by novel technologies (such as batteries). Where we refer below to the provision of these services by "generators", we do so for clarity when discussing specific operational characteristics and costs; the same considerations apply in principle to other types of provider.

In general, the costs of providing system services include some or all of the following components:

1. The investment cost of specialised equipment required to provide the system service;
2. The operating cost (often fuel) of providing the system service when required; and/or
3. The operating cost of producing energy, net of any energy sales revenue, in order to be able to provide a system service when required (e.g. support for a transmission constraint, a reduction in output as "downward reserve", reactive power, etc.); and/or
4. The opportunity cost of *not* producing energy when it is profitable to do so, in order to be able to provide a system service when required (e.g. additional output as "upward" reserve).

In many electricity markets, the cost of producing energy (cost 3), or of not producing as much energy as desired (cost 4), is managed through the Balancing Market, where a generator is reimbursed for increasing output at its incremental offer price (or charged for reducing its output at its decremental offer price). This approach keeps revenues in line with costs. However, DotEcon has not adopted this simple model in its proposals, which leads to incentive problems, as we explain below.

3. Analysis of Deficiencies in the Current Proposal

DotEcon's proposed auction does not guarantee efficient delivery of system services. In particular, flaws in the design may result in an outcome which is not incentive-compatible and a pattern of procurement which is inefficient. We discuss deficiencies in the proposed auction rules in sections 3.1 to 3.4 below and draw out their implications for results of the auction.

3.1. Uniform Pricing Rules Do Not Guarantee Incentive Compatibility

DotEcon notes that the high-level framework set out by the SEM Committee constrains its proposed auction design, including the requirement to identify individual uniform prices for each system service.² DotEcon argues that its proposed approach will identify the "[u]niform prices that are closest to the efficient outcome."³ DotEcon's assessment of efficiency appears to be based on whether a particular allocation of contracts maximises the happiness of winners and losers. However, the uniform prices that emerge from its procedure may in practice be inefficient because they are not incentive-compatible when it comes to delivery of system services. Thus, DotEcon's proposals do not achieve their objectives.

3.1.1. Statement of the problem

The combinatorial auction that DotEcon recommends is frequently used for auctioning telecoms spectrum but with a significant difference: those bidders who are awarded some part of the spectrum incur up-front costs for a licence and to build the necessary facilities, but they are then permitted to charge competitive (or cost-based) tariffs, and the variable cost of providing services is minimal. The format recommended by DotEcon for system services is an auction for a fixed price contract, under which providers are paid for the "availability" of system services in any half-hour.⁴ In the electricity industry, where the provision of system services incurs variable (opportunity) cost, offering only a fixed payment for availability creates adverse incentives not to

² DotEcon (2015), *DS3 System Services auction design report*, December 2015, page 14.

³ DotEcon (2015), *DS3 System Services auction design report*, December 2015, page 12.

⁴ Whereas "availability" normally refers to the capacity of a generator to produce electricity, it takes a different meaning in this context. For instance, in the case of upward reserve, "availability" refers to the capacity of a generator that is *not* being used to produce electricity at present (but which can be used to produce more electricity if required).

deliver the service.⁵ This problem undermines not only the efficiency with which system service contracts are used, but also incentives to bid efficiently for such contracts in the auction.

DotEcon has proposed criteria to constrain auction outcomes which rely on the notions of “happy winners” and “happy losers”. These criteria are intended to ensure efficient selection of system services. However, they only apply in expectation for the “package” (a bundle of service offerings) as a whole. They do not guarantee that the parties who commit to provide a package will actually have an incentive (be “happy”) to provide individual services at the time of delivery.⁶

3.1.2. The proposed auction process

Given a set of bidders offering individual system services and/or a variety of different packages, DotEcon’s price determination algorithm chooses the winners to satisfy three constraints:⁷

- Step 1: identifies clearing prices for individual services which ensure that: (1) bidders prefer to win with their winning bid rather than any of their other bids; (2) winning bidders make zero or positive surpluses; and (3) clearing prices are no higher than regulated tariffs;
- Step 2: If step 1 identifies multiple outcomes, step 2 selects the prices that maximise revenues for system service providers (with the aim of inducing truth-telling in bidding strategy); and
- Step 3: If step 2 identifies multiple outcomes, step 3 finds the set of prices that is closest to regulated tariffs (by minimising the sum of squared differences).

Table 1 provides a simple example (even simpler than those presented in the workshop of 1 February 2016) of how the auction would work. This auction covers two services (A and B), which bidders offer in single unit blocks. Each bidder offers to supply either just one of the services, or a single package of both services, at bid prices that reflect their costs of supply. The auctioneer needs to procure two units of service A and two units of service B.

There are four bidders. Bidders 1 and 2 each offer a single package of one unit of each service at €100, their total cost of providing both services. Bidder 3 offers one unit of service A for €55 and Bidder 4 offers one unit of service B for €55, again both at cost.

⁵ To provide reserve, a generator must make its capacity available *and agree not to use it for producing electricity for the market*. The opportunity cost of this service depends in part on the interaction between energy prices and the generator’s marginal cost of production at the time of delivery.

⁶ This inconsistency between (1) willingness to commit to take action at a future time and (2) willingness to fulfil the commitment when the time comes is a problem in economics known as “incentive compatibility”. The problem is akin to encouraging people to make a promise, but offering them no reason to keep their promise. Incentive incompatibility renders the original promise worthless.

⁷ DotEcon (2015), *DS3 System Services Auction Design Report*, page 92.

Table 1
Bidders and Winners: A Simplified Example

	Cost Service A	Cost Service B	Bid
Bidder 1	60	40	100
Bidder 2	40	60	100
Bidder 3	55		55
Bidder 4		55	55

In this auction, Bidders 1 and 2 would be successful, because Bidders 1 and 2 offer the lowest cost combination of all the bids to meet the system demand of two units of service A and two units of service B. If the auctioneer selected both Bidders 3 and 4, it would still have to take either Bidder 1 or Bidder 2 to meet its requirement. Having selected one of those bidders, the auctioneer would find that the other was cheaper (at €100 for both services) than the combined offering of Bidders 3 and 4 (€110 for both services). Bidders 3 and 4 are therefore outbid by Bidders 1 and 2.

The rules then require the auctioneer to set uniform clearing prices for each service, A and B. To comply with DotEcon’s principle of “happy losers”, the uniform prices for each service would have to be less than €55, the bids from Bidder 3 and Bidder 4, so that neither bidder would want a contract. To comply with DotEcon’s principle of “happy winners”, the total value of a package of both services would have to be at least €100, the bids from Bidder 1 and Bidder 2, so that they are happy to accept a contract. Several prices meet these criteria, so the auction must proceed to the next step.

Applying DotEcon’s second step, prices would be set at the level which maximise revenues to the winners, whilst remaining below €55 – so the price for each service would be €54 (assuming that prices are stated in whole euros and provided that regulated tariffs do not cap prices at a lower level).

However, there is a problem with this solution. Prices of €54 per unit of service would not be incentive-compatible for the winning bidders when the time comes to deliver the service. Bidder 1 has costs of €60 for service A and Bidder 2 has costs of €60 for service B. If offered a price of only €54 for each of these services, Bidder 1 will try to avoid providing service A and Bidder 2 will try to avoid providing service B.⁸ Here, the clearing price for each service has been set below the marginal cost of providing it, which discourages the contracted providers from delivering the service. Nothing in DotEcon’s proposed auction method rules out such perverse (“incentive incompatible”) results.

⁸ Although penalties could in principle ensure compliance, they are likely to be an inefficient mechanism for ensuring compliance given prices which are not incentive-compatible. Adding penalties to the mechanism could further deter participation, raise bidder risk and impose higher costs on consumers.

3.1.3. The need for cost analysis

In the example above, we have assumed that all the costs are variable – i.e. marginal costs of providing a unit of service at the time of delivery. In these conditions, additional steps in the auction would be required to divide the price bid for a package among the individual services in a way that is “incentive compatible”, but we cannot say whether such rules exist, given the other criteria that DotEcon has imposed on the solution. Package bidding might work in the case of economies of scope, where the package has a fixed cost and individual services have low marginal costs (as in telecoms). However, neither of these conditions may apply to system services in the electricity sector, because the different services require different facilities and have separate marginal costs. Conditions vary between system services, but at the very least we can say that not all system services meet the necessary conditions for package bidding to work as DotEcon proposes.

DotEcon has not set out in its report what assumptions it makes about the structure of the costs of system services. As a result there seem to be inconsistencies in the assumptions about costs and incentives. As discussed above, the auction rules are incompatible with high variable costs. However, some of the proposed despatch rules are incompatible with the existence of fixed costs or other costs unrelated to energy production. For example, Box 3 sets out one possible scheme for the reimbursement of adjustments to output for generators that must be constrained on to provide system services. The scheme proposes that providers would be paid their incremental cost of generation *less AS revenue (for output) plus AS revenue (as per contract)*. That rule results in the reimbursement of only the incremental cost of generation, and makes no contribution to the fixed or non-energy costs of providing the system service (such as the cost of installing additional machinery, extra wear-and-tear on the generator, etc.). This solution is also “incentive incompatible” whenever generators incur costs to provide a system service.

DotEcon has adopted such solutions because of self-imposed constraints. DotEcon proposes that winning bidders should make a commitment to be “available”; we criticise the design of this commitment in the following section. The proposed auction rules set prices for services that may be *below* the cost of providing them.

This combination of rules does not provide a sound basis for any scheme. The only solution is for DotEcon to set out its assumptions about the costs of providing system services (as we have done above) and to analyse the implications for incentives, contracts and auction design. In the meantime, it would be imprudent to implement auction rules that give perverse incentives for efficient provision of system services.

3.2. Risks Associated with Uncertain Costs

The fixed payment per hour or MWh of “availability” proposed by DotEcon bears little resemblance to the structure of the costs of providing system services. These costs vary between different plants and different technologies. Although there are some predictable fixed costs (cost component 1 above), other costs depend upon when they expect to be generating, what their fuel

costs are at those times (cost components 2 and 3 above), and what margin they can earn from the market price at those times (cost component 4 above). The resulting mis-match between fixed revenues and uncertain costs creates a risk to profits. The amount of risk facing each provider depends on the cost structure and operating regime of the provider concerned.

Different providers will face different degrees of risk when offered a fixed payment for system services. Different types of plant and technology generate (or consume, or store) electricity in different periods, have different cost structures, and have different proportions of fixed and variable costs. Since DotEcon has not given this issue any consideration, its proposals impose risk arbitrarily on different plants and technologies to different degrees. It is hard to work out a priori which plants and technologies will be hit hardest by these risks, and which to a lesser extent, but investors will have to estimate the risks they face when compiling their bids in the auction for DS3 contracts. Those facing the greater risks will need to bid a higher price to compensate for greater risk and will face a disadvantage in the auction.

The need to build a risk premium into bids is a consequence of certain decisions about the auction design and so represents an unnecessary additional cost to consumers, relative to other more cost-reflective (and less risky) approaches. In addition, this unnecessary risk may discourage investment even if it raises prices.

Furthermore, the allocation of these risks at the time of the auction among the bidders will be somewhat arbitrary, but it reduces the likelihood that the most efficient providers of system services emerge from the auction as its winners.

On the basis of the cost analysis described above, it would be possible to define less risky forms of payment, which more closely reflect the general cost structure of system services. A less risky (and less punitive) set of arrangements would encourage lower cost provision of the services.

3.3. “Contingent Commitment” Fails to Reward Providers Vital to System Stability

At a high level, DotEcon’s proposed model asks a winning bidder with a generator to commit to operating at a particular level of output at specific times, so that some of its capacity is available to provide a system service. If a generator fails to operate at this particular level of output, it is contractually obliged to offer the means whereby the TSO can “re-despatch” the generator. In other words, the TSO will adjust the generator’s output to the contracted level, using pre-defined incremental (INC) and decremental (DEC) offer prices in the Balancing Market.

As a result of transmission constraints, the TSO must often despatch a higher cost generator to provide energy in a particular location, but also to meet a local need for reserves and voltage support (reactive power). In practice, some of these higher cost generators required to support the transmission system may fail to win system service contracts in the auction. Their high incremental cost of production means that they incur the highest opportunity cost to make themselves “available” to provide system services, in the form of a loss on energy sales (cost

component 3). Under DotEcon's option A, they would have to include that loss in their bid prices at the auction stage, which makes it unlikely they will be selected. The TSO will then have to commission their output through the arrangements proposed for dealing with auction "losers". Under DotEcon's option B, constrained-on plant would not make a loss on energy production, but any payments for system services would be withdrawn.

3.3.1. Proposed arrangements for re-dispatch

Specifically, the proposed arrangements are as follows:

- (i) **Fully-loaded/part-loaded generators:** DEC at "energy price" (i.e. a market price), which means a generator must buy back energy it has sold and must forgo the margin on that sale in order to gain a system service payment, if called to be available.
- (ii) **Non-runners – option A:** INC at energy price, which is likely to be below the generator's incremental cost (given that it is not running at the time). In return, the generator receives a payment for system services, which may or may not cover the loss on the incremental cost of generating energy and the incremental cost of providing the system service.
- (iii) **Non-runners – option B:** INC at the generator's own incremental cost (offer price), less system service payments, which means the generator is indifferent between being constrained on and being left not running.

Each of these proposals is troublesome, in different ways.

3.3.2. Problems with the proposals

Case (i) concerns a generator that is producing too much energy to be available to provide reserve (for instance). This case would normally arise if the generator was in-merit, i.e. if its own marginal cost of production is below the energy (market) price. However, that implies that it would have to submit a DEC that is higher than its INC (which is normally impossible for reasons connected with despatch algorithms), or else to submit an INC that is higher than its costs (which would raise concerns over the potential abuse of market power).

DotEcon notes in passing that case (ii), option A for increments, may impose losses on the generator,⁹ but does not follow through the implications of such analysis in general.

DotEcon's proposal for case (iii), option B for increments, results in the generator making no margins whenever it is constrained on to provide system services. (Generators who are already generating may make a profit if the margin on the system service is higher than the margin on selling energy.) As a result, DotEcon's design does not offer an incentive to invest in plant and

⁹ See Box 2 on page 56. "Notice that this implies a loss for the provider (the energy margin is negative, otherwise it would have preferred to be in the market schedule)." Table 6 on page 59 also points out that these arrangements may make auction winners worse off than those without a contract ("losers") in some cases.

equipment for the type of generators which are needed to provide system services to deal with system constraints but which would otherwise have a low load factors. In particular, a generator anticipating that they will be exclusively constrained on when providing system services, will be indifferent to the clearing price for those services in any auction, and so will not participate on an efficient basis.

The lack of incentives to deliver system services is a problem if providers incur costs to provide system services. However, if there were no cost to providing system services, then it would be unnecessary to hold any auction for the services, since they would be free. The proposal to hold an auction is therefore predicated on some theory about the cost of providing system services and it is important to consider the effect of these costs on incentives.

3.3.3. Source of the problem

DotEcon's analysis of the incentives facing providers of system services is incomplete and mis-states the incentives faced by market participants. In particular, DotEcon has sometimes mis-specified pay-offs in terms of revenues to generators (i.e. costs to consumers) and has overlooked differences in the costs to generators and hence in their profits. For instance, Box 1 on page 54 says that "the pay-off is the same in the case where the provider is constrained down as in the alternative case where the winner had chosen a market position at which it could have provided the required reserve (i.e. a market position q_m equal to q_d)."

However, this analysis does not consider the margin that the generator makes on sales of energy if the market price (p_e) exceeds its marginal cost of generation (undefined in this example – say, c). When the generator submits a bid to buy energy at p_e , it is not simply buying back energy it sold at that price and so in some sense indifferent. It is forgoing the margin on energy sales of $p_e - c$ (i.e. the system forces generators to buy energy at p_e instead of making it at a cost of c). That margin should affect all considerations of incentives, returns and auction prices.

- At the auction stage, it creates risk, since the margin on energy sales is unpredictable;
- At the delivery stage, it creates incentive problems, since it discourages compliance with instructions (unlike the rest of the BM).

The margin on energy sales is also the opportunity cost of holding reserve on this generator, which the TSO should take into account for the sake of efficiency, but which Dot Econ (deliberately, but mistakenly) excludes from the charges facing the TSO.

In slide 13 of the presentation on 1 February, Dot Econ acknowledged that "Plant may have an incentive to withdraw reserve if the energy price is high relative to the DS3 payment", but only under the heading "Difficulties with the no commitment model". DotEcon does not consider the impact of high energy prices (relative to the cost of generation) on incentives to "withdraw reserve" in the so-called "full commitment model" or "contingent commitment model".

3.3.4. Implications

DotEcon is aware that the high opportunity cost of providing system services may give providers an incentive to withdraw service, but the problem is more widespread than its report acknowledges and DotEcon offers no solution to the problem. The search for any solution must begin by setting out the structure of the costs of providing different system services, and designing incentive compatible arrangements for their delivery. Only at that point is it possible to start designing an auction or other arrangements for procuring these services.

3.4. An All-Island Demand Curve Would Not Reflect the Need for System Services

System services are required to support the secure operation of the transmission network and must be provided at specific locations. DotEcon's proposals recognise this need in so far as they accept the requirement for bids and contracts to be defined for a particular installation (generator, consumer, battery, etc.). However, DotEcon's report and the RAs' consultation paper both leave open the question of whether the TSO should define a national or locational requirement.¹⁰ In practice, a locational requirement would be necessary to procure the correct quantities of system services because a national requirement would offer no guarantee that winners will be located where the system needs them. Adopting a locational element to the volume requirement, to reflect the needs of the system, would ensure that the TSO could procure the system services in the right places, but it may also make auctions unfeasible due to concerns over market power. (In the extreme case, only one bidder may be able to satisfy the locational provision of services.) However, creating an entirely fictitious national market, with a single national demand, would not remove these concerns over market power; it would merely cause the auction to procure system services "in the wrong place" that could not be used, and require the TSO to enter into negotiations with providers located "in the right place".¹¹

3.4.1. Problems with the proposals

DotEcon writes that "Winners and losers cannot be in the same situation after the auction if bidding is to be meaningful" and that its report relies on the "implicit assumption that the volume of system services procured through the auction is sufficient that it would not typically be necessary to call upon auction losers to provide system services (especially reserve) other than in exceptional circumstances".¹²

¹⁰ SEM Committee (2015), DS3 System Services Auction Design - Consultation Paper, SEM-15-105, 22 December 2015, page 12.

¹¹ In principle, the same criticism could apply to a national tariff for ancillary services. However, in practice the TSO would choose which generators supplied system services based on their total cost (including the tariff for ancillary services and energy cost), provided the TSO bore some incentive to reduce system balancing and ancillary service costs.

¹² DotEcon (2015), *DS3 System Services Auction Design Report*, page 4.

For DotEcon's assumption to hold, the demand curve for the auction would have to be granular and to reflect the geographic spread of the system's requirements, including requirements that may only arise in particular conditions. As DotEcon puts it:

"Ignoring locational constraints in the SS auction could have undesirable consequences because it would be likely to select mostly providers located in the more competitive region (likely to be Ireland). This could result in over-procurement of system services from this region, relative to what is likely to be required in real time, whereas the availability of system services in Northern Ireland falls short of requirements."¹³

In practice, setting up efficient auctions would probably require more granularity than is provided by merely defining separate demand curves for Northern Ireland and the ROI, given the constraints in the all-island market. Without that level of granularity, the system operator has no guarantee that the reserve products procured in the auction will meet the system's needs and it will be necessary to procure at least some system services from auction losers.

In practice, defining a locational requirement may result in auction demand volumes for which the number of feasible bidders is too low to support competition. DotEcon's proposed solution in such circumstances is to remove services at those locations from the auction process:

"We would suggest excluding any services with significant market power from the auction and rely (sic) on a regulated tariff for these services. For example, these could be services where all or almost all providers of these services would be required as winners to satisfy the volume requirement. The benefits of including such services in an auction are most likely negligible, but the potential for distorting the outcome for other services could be substantial."¹⁴

We agree with DotEcon that it may be necessary to abandon auctions in locations with market power, in order to ensure the system gets the services it needs. We also believe that this situation may be a common occurrence and that the alternative system of procurement should be identified in advance.

Running a national auction does not offer a viable solution to the problem of local market power. In the absence of a locational element in the volume requirement, the clearing price in the auction could fail to remunerate higher cost but system-critical plant. As discussed in section 3.3, DotEcon has structured the payments for system services awarded to generators (both "winners" and "losers"¹⁵) who are "constrained on" (i.e. who would not otherwise be running) to be

¹³ DotEcon (2015), *DS3 System Services Auction Design Report*, pages 71-2.

¹⁴ DotEcon (2015), *DS3 System Services Auction Design Report*, page 19.

¹⁵ Winners would be required by the system service contracts to submit offers no higher (and sometimes lower) than their incremental costs. Losers have more flexibility to offer higher prices into the BM, but only within the confines of the applicable Market Power Mitigation measures.

unremunerative, i.e. to reimburse less than the costs of provision. DotEcon has done so with the intention of encouraging providers to take part in the auctions. However, that rule provides no incentive to take part in an auction, since winning the auction would also be unremunerative if the generator has to accept a price below its costs.

Thus, a national volume requirement would exclude any specific requirement to accept high cost generation if it is connected to certain parts of the transmission network, so these generators will not be selected in the auction. The rules for taking system services from “losers” would then penalise these generators for having “lost”, even though they could not win without accepting another penalty (in the form of a clearing price that is below their costs). DotEcon therefore expects generators to accept the least unattractive of these two punitive outcomes – but it is more likely that they will simply not offer to provide the services by any means, wherever they have the scope to do so.

The relative terms for winners and losers of the system services auction, creates incentives for the TSO to lower the volume requirement artificially, particularly in expensive locations for system services. Some generators may not be able to avoid providing system services, even if they lose the auction, because those services from that generator are necessary for system stability. The TSO can therefore reduce the cost of procuring system services by mandating losers to provide those services on worse terms than the TSO pays to winners. Therefore, reducing the volume requirement and mandating the provision of more services will tend to reduce the costs of system services provision in the short run. However, doing so has the cost of undermining incentives for investment in system services or providing efficient, market-based signals for delivery of system services.

3.4.2. Implications

Relying on a national demand curve for ancillary services is likely to lead to inefficient outcomes and may be unworkable. It would be imprudent to proceed on this basis, particularly since some of the constraints limiting the design were defined by DotEcon and deviate from the instructions set down in the SEM-C decision. If deviations from that decision are allowed, they should at least be deviations that produce incentive compatible arrangements and efficient outcomes.

4. Conclusion

DotEcon has accepted or amended the constraints imposed on the DS3 process by the SEM-C decision, *ad hoc*. DotEcon appears to have done so to preserve its proposed auction format, which is not specifically designed for system services in the electricity sector. However, in doing so, it has not given due consideration to the costs involved in providing system services, particularly at the time of delivery. As a result, the structure of the proposed payments does not match the structure of costs. The current proposals therefore impose unnecessary risks on different producers, to different degrees, and fail to provide incentives for efficient delivery. The anticipation of these

risks and incentive problems will affect the conduct of the auctions and undermine the prospect of an efficient outcome.

It does not make sense to try to salvage or amend individual parts of the current proposals, without undertaking a basis analysis of the costs of providing system services. Proceeding with proposals developed without the benefit of such a cost analysis would be imprudent. Auction outcomes would not be efficient and are unlikely to meet the needs of system security.

As a starting point, it would be desirable to distinguish between the energy-related costs of being available to provide system services (cost components 3 and 4) from the fixed and variable costs of facilities used to produce system services (cost components 1 and 2). The energy-related costs can be managed through normal Balancing Market transactions. Then, only the facility costs require special payment mechanisms.

That division may make it difficult to conduct an auction for the payment to cover just the facility costs, since the appraisal of bids might have to take account of the energy-related costs. However, the electricity industry does not exist in order to spawn auctions. Rather, auctions help the electricity industry achieve its objectives if, and only if, they produce a more efficient outcome. If they produce inefficient outcomes, they are unhelpful and should be dropped.

If it is not possible to structure an auction efficiently, it may be necessary to procure system services by offering a tariff (as at present). There is always a risk that tariffs do not accurately reflect costs. If tariffs are too low, then the TSO will be unable to procure enough system services and will have to revise the tariff upward. If the tariffs are too high, providers may be overpaid for providing system services. However, in such circumstances, systematic differences between these tariffs and the provider's costs would be largely offset when market participants come to bid for Reliability Options in the CRM auctions. The more they expect to earn from system service tariffs, the less they will require in the CRM. Indeed, fixing tariffs for system services would provide a more certain basis for CRM auctions than the risky auction proposals outlined by DotEcon.

Thus, rather the proceeding with an auction which may not work, it would be advisable to analyse first the costs of system services, and second the potential for meaningful competition in their provision. Proceeding on any other basis would be imprudent.

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