

PROCUREMENT OPTIONS FOR SYSTEM SERVICES

A note from Pöyry Management Consulting to the SEM Committee

December 2013

SUMMARY

At its October 2013 meeting, the SEM Committee asked Pöyry to provide a paper outlining 3 or 4 procurement/remuneration options for system services for consideration by the SEM Committee. It was requested that where possible, options should be matched to particular system services and a definitive recommendation made (with respect to design of the procurement option rather than specific values).

Development of procurement options

Any procurement option will represent a set of trade-offs between:

- the risks assumed by the providers and purchasers of the service;
- the prices obtained in the short and long run, and the underlying profits; and
- the efficiency signals for improved service in terms of quality and costs.

There are two main dimensions that will determine how a procurement option balances these trade-offs: duration of revenue certainty for contracted providers, and the choice between a regulated and competitive approach.

The range of choices available in these two dimensions of contract duration and degree of regulation is illustrated by the diversity of approaches seen internationally in the procurement of system services. Therefore, it is helpful to breakdown these two high-level dimensions into more detailed elements of procurement options.

Table 1 summarises some of the alternative choices for these detailed elements, and how these alternatives could be grouped together depending on the extent to which the procurement process relies on competition. Of course, Table 1 does not have a fully exhaustive list of permutations as the four groupings (and the elements that make them up) are not mutually exclusive categories. However, the groupings are designed to describe some distinct approaches to provide a basis for discussion for how these could be applied to the different system services.

The four approaches listed in Table 1 are:

1. **'Mandatory provision'** – a highly regulated approach under which the TSO contracts for all available volumes of this mandatory service. The payments are based on ex-ante regulated cost estimates¹, with a fixed price penalty for non-provision and no scope for secondary trading. This approach is typically most effective for generators participating in the energy market, but may not work so well for encouraging efficient provision of the service from other sources.
2. **'Regulated'** – the TSO procures a fixed amount of the system service through a mandatory bidding process, with contracts allocated on the basis of an agreed set of 'quality' criteria. The price of the system service is value-based (i.e. based on the cost of the next best alternative for the TSO) – for example, where it is perceived to be very difficult to robustly assess the cost of providing the service. There is no scope for secondary trading and the penalty for non-delivery is linked to the price paid to the provider.
3. **'Regulated competition'** – this approach introduces some competitive elements through voluntary participation with contracts awarded on the basis of price and transparent 'quality' criteria. Given this, the price for the service is Pay as Bid (PAB). The penalty price is based on the cost to the TSO of procuring the service from an alternative provider. Competition is limited though with no secondary trading, and procurement of a fixed volume (up to total cost cap).
4. **'Fully competitive'** – this puts price-based competition at the heart of the procurement process. This includes some price elasticity of demand (which could be driven by competition from other 'system services' or could simply result from use of a fixed payment pot), and secondary trading, where they can beat the penalty. Allocation of system service contracts is on the basis of price only (subject to meeting minimum requirements) with Pay as Cleared (PAC) pricing.

The other elements of the procurement option either relate to analogue definitions (e.g. anything related to time, such as the duration of the contract) and/or are very specific to the technical aspects of the service (e.g. is the contract unit-specific? is cost recovery targeted or socialised?). Therefore, these will vary depending on the nature of the service to be procured. There is however, some relationship between the contract duration and the degree of regulation of the procurement approach, as a regulated price setting process could introduce more risk into shorter term contracts.

This typically means that:

- in a more regulated market, the price will be fixed for the expected timeframe over which the service provider will be useful; and
- in a more competitive market, the price may be fixed for a shorter term period.

¹ We have considered the approach used in several countries for some system services of mandatory unpaid participation. This relies on energy markets to recover the needed investments through the sales of energy, in the same way that capacity is recovered only through sales of energy in energy-only markets. However, this can then distort the merit order in the energy market particularly when the service is mandatory for new but not for existing plants.

Table 1 – Procurement approaches with differing emphasis on competition

Issues	Definitional questions for procurement approach	1) 'Mandatory provision'	2) 'Regulated'	3) 'Regulated competition'	4) 'Fully competitive'
Contracting process	How is the total procurement volume determined?	Available supply	Fixed amount	Fixed amount (up to total cost cap)	Price-quantity trade-off
	What regulations are there on the participation of providers in the procurement process?	Mandatory	Mandatory participation	Voluntary participation (with price caps)	Voluntary participation
	How are the contracts allocated between possible providers?	Mandatory	'Quality'	Price + 'quality'	Price only
	How are the prices for the services determined?	Ex-ante cost estimates	Value-based	PAB	PAC
Contingencies	What are the penalties for a provider who fails to meet contracted requirement?	Ex-ante fixed penalty	Linked to value-based price paid to provider	Cost to the TSO of procuring the service from alternative provider	Linked to actual market prices at time of non-compliance
	Can providers transfer the obligation?	No	No	No	Yes

Major uncertainties for system service procurement options

There are two important 'external' factors to be considered when considering which options would be best suited for procurement of particular system services in the SEM.

- interactions with the wholesale electricity market; and
- constraints imposed by European regulatory framework.

The design of the wholesale market arrangements is crucial in determining the mechanisms for the recovery of opex costs for delivery of system services, and the control that providers of system services have over their dispatch position (which can affect their ability to be in position to deliver the service).

Under current arrangements, the recovery of opex costs for system services are currently recovered through either constraint payments or SMP (depending on the interaction with the ex-post schedule).

Secondly, generation (and Demand Side Units) typically have very little control over their dispatch position (as a result of tightly regulated SRMC bidding with no allowance to take into account potentially lost system services revenue in bid).

If the system services procurement option is designed to take account of these particular features of the current arrangements, it must also take account of the fact that a revised HLD for the wholesale electricity market is due to be implemented from 1 January 2017.

The Electricity Balancing Network Code potentially places some restrictions on the procurement on some of the reserve-based system services, as a part of a phased move towards much greater cross-border sharing of energy balancing resources. These restrictions include requirement to use market-based procurement methods, and no contracting for longer than one year without national regulatory approval.

In addition, the EC has recently published working documents on the factors that would be taken into account in the approval of state aid to support generation adequacy. It is unclear whether this guidance could be interpreted as applying to long-term capacity-based contracts (as recommended for system services in Ireland by the TSO). Therefore, we suggest that the RAs seek detailed legal advice (and/or clarification from the EC) on the applicability of State Aid rules to the system services framework.

Application of procurement options to different system services

Table 2 lists the system services that the TSO has recommended it procures under the DS3 framework. The RAs have consulted on the technical definitions of these services (to apply to all potential providers²). Although the final decision is expected to be taken at the December 2013 meeting of the SEM Committee, our working assumption is that the technical definitions will be fixed as set out in the RAs' Consultation Paper.

As summarised in Table 2, we have collected the system services into 4 groups based on the issues they raise for the design of a procurement option.

² 'DS3 System Services Consultation Paper. SEM-13-060', 3 September 2013.

Table 2 – Grouping of system services

New Services		Existing Services	
SIR	Synchronous Inertial Response	SRP	Steady-state reactive power
FFR	Fast Frequency Response	POR	Primary Operating Reserve
DRR	Dynamic Reactive Response	SOR	Secondary Operating Reserve
FPF	Fast Post-Fault Active Power Recovery	TOR1	Tertiary Operating Reserve 1
APR		TOR2	Tertiary Operating Reserve 2
RM1	Ramping Margin 1 Hour	RRD	Replacement Reserve De-synch
RM3	Ramping Margin 3 Hour	RRS	Replacement Reserve Synch
RM8	Ramping Margin 8 Hour		

In Table 1, we described four high-level groupings that provided a range of regulated and competitive approaches to procurement. We now consider how the more competitive approaches might be applied to the procurement of system services under the DS3 framework. This is based on the limited evidence currently available on supply and demand-side issues.

In general, a fully competitive approach might be considered for the Group 2 services (Ramping Margin), as ultimately they could be rewarded through the development of a liquid and efficient intraday energy market, as part of the revised HLD for the SEM. Therefore, this creates a risk for allowing long-term contracts to be struck between the TSO and providers that could restrict the development of that intraday market from 2017 onwards. This also raises the questions of how the TSO should procure the product (if required) ahead of the implementation of a new HLD.

For the other services (Groups 1, 3 and 4), it might be possible to introduce limited competition in the form of ‘regulated competition’ around the award of ‘long-term’ contracts. These services are not typically covered through energy market contracting, and therefore the TSO may remain the sole purchaser even in the revised HLD. This may limit the scope for introducing demand-side competition particularly in the absence of evidence to inform a possible demand price-quantity trade-off; i.e. how much more (less) will the TSO buy if the price of the service goes up (or down)?

The consideration of procurement options for Groups 1, 3 and 4 can be differentiated by:

- the scope for moving further towards the fully competitive (and/or short-term) contracting approach, which could be higher for Groups 3 and 4 (Reserve Products); and
- the possible impact of the provisions of the Electricity Balancing Network Code.

The Electricity Balancing Network Code will not apply to Group 1 services, but could affect Group 3 services (in relation to provisions for Frequency Containment Reserves) and Group 4 services (in relation to provisions for Replacement Reserves). These provisions include the requirement to use market-based procurement methods, and no contracting for longer than one year without national regulatory approval.

The introduction of competition between possible providers at the time of contract award then raises questions about the treatment of services that are currently based around mandatory provision (at least up to a Grid Code compliance level) – either transitional measures would need to be put in place, or the competitive procurement will only be used for ‘additional’ volumes above the required minimum level. The latter approach raises questions around the consistency between the prices paid for mandatory services and prices paid for competitively procured services, and for the scope to allow innovation and entry by new providers.

The scope for co-provision of a number of these services might support a joint procurement approach so that market participants could have visibility of all the potential revenues before making an investment decision. This joint procurement may be limited to covering all of the services within one of our groups (rather than all 14 services) given the trade-off between benefits of joint procurement and tailoring the procurement approach to the needs of individual services. A PAB approach would allow providers to provide prices in relation to the whole bundle of services they are offering to provide (which could be a single service) rather than providing a price for each service (or the TSOs having to create a clearing price per service).

Structure of the note

The rest of this paper is structured as follows:

- Section 1 describes the main elements of a procurement option, and presents four ways of combining these elements that differ in the emphasis placed on competitive procurement.
- Section 2 discusses two major uncertainties for the system services procurement framework – Irish wholesale electricity market design, and European regulations/guidance;
- Section 3 describes how more competitive procurement options could be applied to different groups of system services; and
- Section 4 provides a brief summary of our main conclusions, and highlights the work needed to develop firmer recommendations.

1. DEVELOPMENT OF PROCUREMENT OPTIONS

In this Section, we consider the:

- trade-offs underpinning any procurement option;
- two main dimensions of procurement options – duration, and regulation vs. competition;
- key elements of any procurement option; and
- groupings of key elements to provide a range of approaches between regulated and competitive.

1.1 Trade-offs in procurement options

Figure 1 illustrates that any procurement option will represent a set of trade-offs between:

- the risks assumed by the providers and purchasers of the service;
- the prices obtained in the short and long run, and the underlying profits; and
- the efficiency signals for improved service in terms of quality and costs.

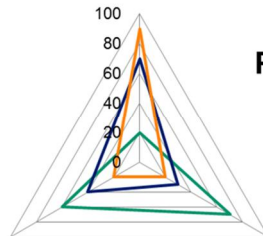
For example, the TSO has recommended procuring system services based around long-term contracting (5 years) at a 'regulated' price (rather than through dynamic price discovery through competitive procurement). This approach is designed to provide some more long-term certainty³ to providers of the service to support investment. The purchaser (i.e. the TSO who will ultimately pass the costs onto consumers) bears the costs of providing this certainty.

³ There have been discussions about whether a 5 year contract is really long enough to provide the certainty needed to support major capital investment.

Figure 1 – Trade-offs underpinning any procurement option

Risk

- allocation between providers and purchasers
- short-run vs. long-run risks in quantities and prices (linked to investment and operational decisions)
- certainty period on cost recovery (particularly for capex)



Providers vs. purchasers

Profits

- short-run vs. long-run aspects
- dynamic price discovery vs static fixed prices
- profits as an investment signal

Efficiency

- short-run vs. long-run efficiency
- incentives for investment
- incentives for innovation and new entry

Source: Pöyry Management Consulting

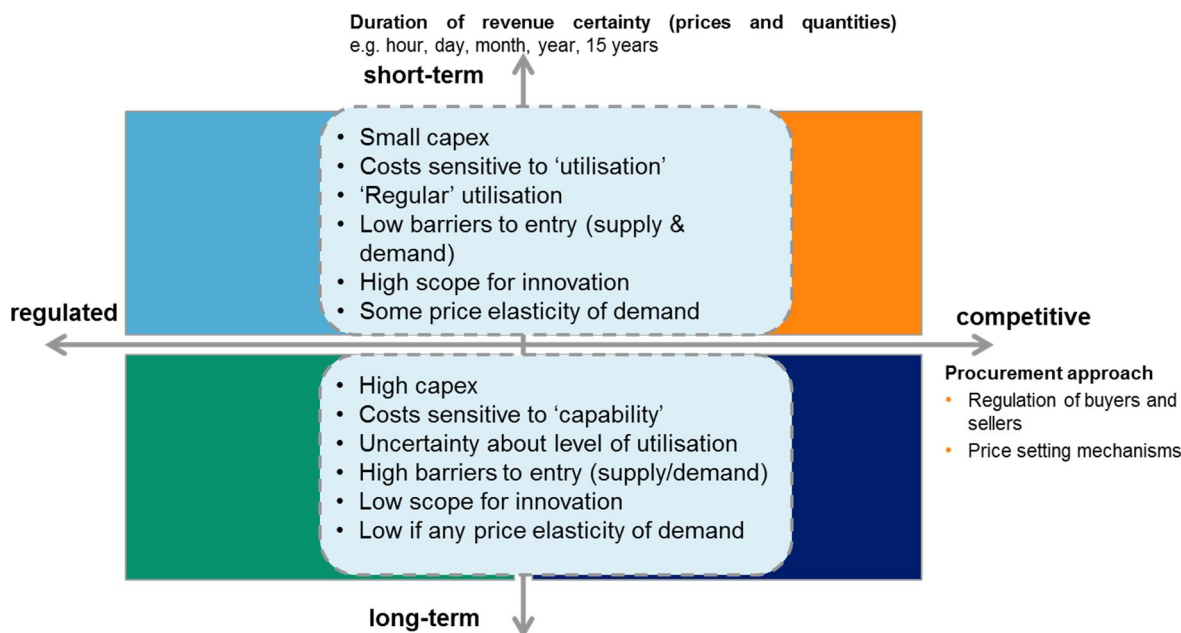
1.2 Main dimensions of procurement options

There are two main dimensions to the high-level philosophy of how a procurement option approaches the trade-offs set out in Figure 1:

- **Short-term / Long term duration** (vertical axis): refers to the period over which contracted providers have a high degree of certainty over their (net) revenues (assuming they comply with the requirements of the contract). For example, a long-term contract implies a very small risk for the provider of not recovering their capex costs, but at the cost to the purchaser (ultimately consumers) of not being able to fully benefit from cost reductions from alternative providers (during the lifetime of the contract).
- **Regulated / Competitive** (horizontal axis): refers to the philosophy of the procurement approach – for example, whether there is a competitive price discovery process.

Figure 2 lists the factors typically taken into account when deciding whether a procurement option should involve short-term or long-term contracting.

Figure 2 – Short-term vs. Long-term procurement characteristics

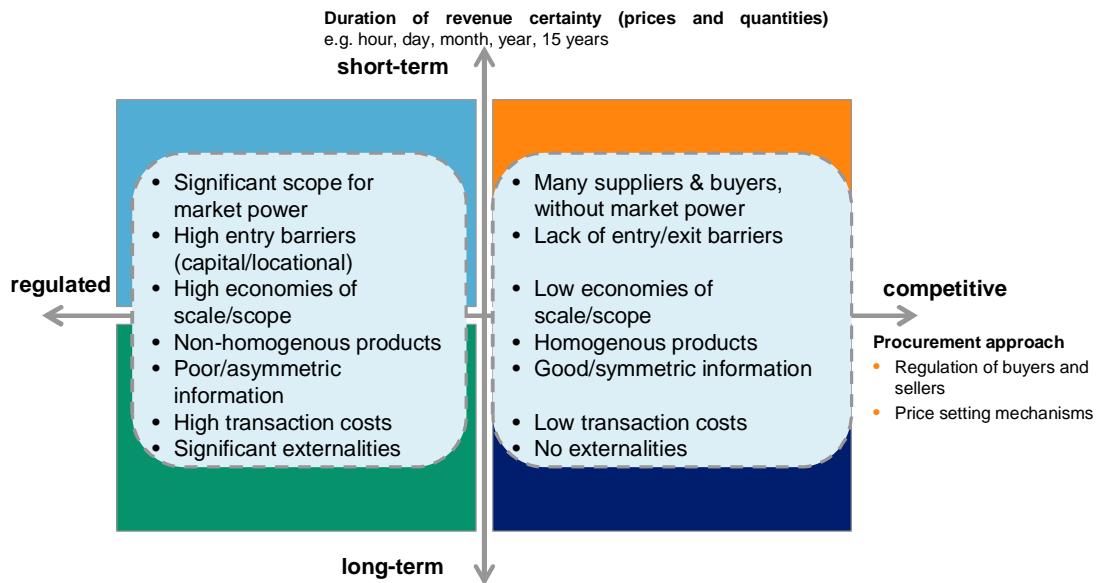


Source: Pöyry Management Consulting

Similarly, Figure 3 lists the factors to be considered in a decision about whether to follow a competitive or regulated procurement process. Typically, the challenges for applying competitive procurement for system services include:

- the TSO is usually the single buyer with low price elasticity;
- investment costs for new providers, versus sunk costs for existing market players are a possible barrier for entry;
- the economies of scope and interactions between different services (i.e. co-provision);
- number of potential providers and/or services: some services are very local products – e.g. the demand for reactive power ensuring voltage control; and
- uncertainty on future costs and performance of different technologies governs the need (and appetite) for risk-sharing between purchasers and providers.

Figure 3 – Regulated vs. Competitive procurement characteristics

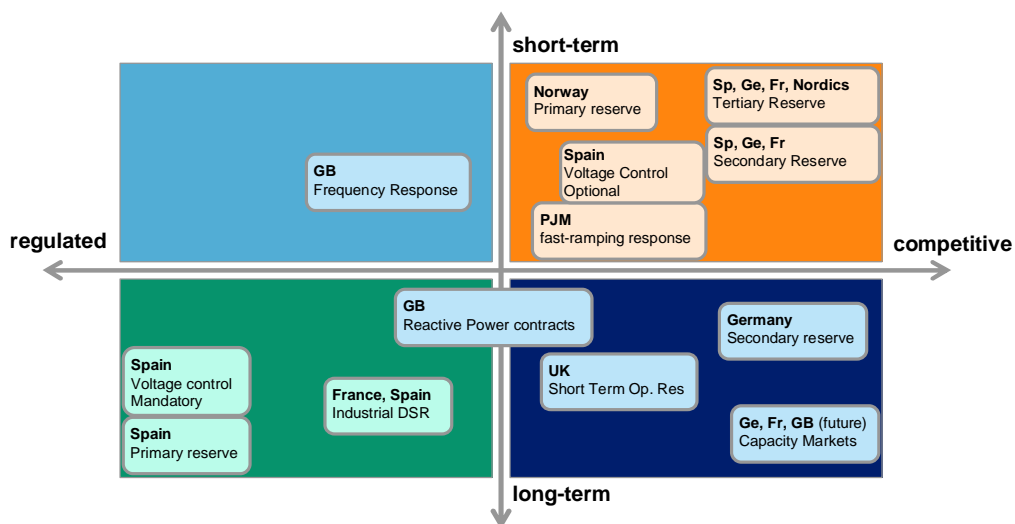


Source: Pöyry Management Consulting

Figure 4 illustrates that a range of different procurement approaches are used internationally for system services, in terms of the choice between long-term and short-term contracting, and between regulated and market-based procurement.

The clustering of different examples in Figure 4 also illustrates that whilst the two dimensional approach is useful for summarising the philosophy of a procurement approach, a fuller, more detailed list of characteristics is needed to differentiate between approaches.

Figure 4 – International benchmark of system services procurement



Source: Pöyry Management Consulting

1.3 Main elements of procurement options

Table 3 lists the main elements that help to differentiate between different procurement approaches at a more detailed level. We have included a note in Table 3 of which dimension of the procurement matrix (as shown in Figure 2 and Figure 3) is most relevant for each element. This helps to highlight which elements may need to be considered together in constructing a coherent overall procurement approach.

Table 3 – Elements for defining a procurement option

Issues	Definitional questions for procurement approach	Relevant dimension
Contracting process	How long before contract window is contract agreed?	Short-term vs. long-term
	How is the total procurement volume determined?	Regulated vs. competitive
	What regulations are there on the participation of providers in the procurement process?	Regulated vs. competitive
	How are the contracts allocated between possible providers?	Regulated vs. competitive
	How are the prices for the services determined?	Regulated vs. competitive
Product definition	What is the duration of the contract (in terms of fixed price and quantity)?	Short-term vs. long-term
	What is the nature of the service (capacity vs. delivery)?	Short-term vs. long-term
	How does the price and/or quantity of the service vary over time within the contract period?	Short-term vs. long-term
	Are there any locational elements in terms of price and/or quantity?	Short-term vs. long-term
	Is the contract unit-specific?	Regulated vs. competitive
Contingencies	What are the penalties for a provider who fails to meet contracted requirement?	Regulated vs. competitive
	Can providers transfer the obligation?	Regulated vs. competitive
Cost recovery	Is cost recovery targeted or socialised?	Regulated vs. competitive

We now discuss the possible choices for each characteristic, highlighting the interaction between different characteristics.

1.3.1 Contracting process

How long before contract window is contract agreed?

The lead time can range from several years ahead, typically for large investments with significant planning and construction times, down to close to real time for short term balancing products. It is also possible that the contracted volumes may be determined after the event (ex-post) – e.g. under the current arrangements in the SEM, it will not be

confirmed until after the event whether the payment for a generator dispatched by the TSO is on the basis of an unconstrained energy trade (i.e. in the schedule with access to the SMP), or on the basis of a constraint payment (which is Pay as Bid).

The lead time for contracting is usually linked to the length of the contract – i.e. the longer the contract, the longer the lead time.

The main evidence for determining the lead time for contracting is the lead time for the delivery of any changes required by the provider to be able to provide the service – e.g. any new construction required, legal and planning timescales, the time needed to implement any change in operating arrangements etc. This would be gathered by further supply-side analysis of the possible providers of different services, focusing on deployment timelines.

In theory, it is possible to award contracts after the ‘investment’ process has begun (i.e. to reduce the risk to the buyer of non-delivery) but that would typically increase the perceived riskiness of the project from the perspective of the seller as there is no ‘guarantee’ of contract award to support the incurring of investment costs (hence increasing the cost of capital for the project).

How is the total procurement volume determined?

The total volume of the system service procured can be:

- a fixed amount (e.g. pre-determined by the TSO or regulators in terms of reserve procurement), which could be subject to an overall cost cap;
- determined by available supply (e.g. in the case of mandatory provision of the service); or
- based on a demand price-quantity trade-off for the particular service⁴.

At the simplest level the price-quantity trade-off on the demand-side may simply result from there being a fixed budget for the procurement of the service. The use of a fixed budget could cause challenges for the early round of investors (especially if the service is mandatory for future plants), as the investment gets devalued with every future new build.

By definition, a regulated procurement approach with a fixed price would not lend itself to a demand-side price-quantity trade-off (except at the time when the fixed price was set).

The demand-side modelling evidence provided by the TSO for the cost-benefit analysis (CBA) could inform the level of a cap on total procurement costs; e.g. by setting the cap at the estimated ‘value’ of the system services. In the CBA, the value is estimated in relation to the avoided wind curtailment as a result of the system services allowing a higher limit on the instantaneous penetration of non-synchronous generation (rather than say avoided investment in network measures by the TSO, or avoided loss of load).

The main evidence for establishing whether a demand-side price-quantity trade-off is useful is to understand how the volume of the service procured interacts with other services:

⁴ There is always a supply side price quantity trade-off (perhaps except for a mandatory service, and even then people can close plants and refuse to open new ones), and therefore, the real issue is whether there is a demand side trade-off.

- e.g. if the price of service A goes up, what is the cost of the next-best alternative?
- e.g. if the price of A goes down, what extra value can be derived from buying more of the service?

Ideally, this choice for each service (or group of services) should be based on the demand-side modelling evidence provided by the TSO for the CBA.

What regulations are there on the participation of providers?

Different procurement approaches can differentiate between whether it is mandatory or voluntary to submit bids into the contracting process, and whether bid prices are regulated for any competitive procurement processes (including price caps or floors).

The distinction between mandatory and voluntary is whether or not providers are obliged to have the capacity to provide the system service in order to participate in the energy market.

A mandatory approach is more likely to ensure that sufficient quantities of the system service are delivered where it is a spin-off from investment in capacity to participate in the energy market. However, it requires a regulated price as there is no scope for price discovery through competition, and it may deter innovative provision of the system service including by providers who do not participate in the energy market (e.g. flywheels or Statcoms). In addition, it may not be technology-neutral.

The major piece of evidence needed to inform this choice is the probability and impact of voluntary participation not delivering sufficient volumes of the service.

In addition, any decision would need to consider current approaches to the procurement of these system services in the Irish market. For example, a move to voluntary provision of services currently procured on a mandatory provision would need to consider whether the voluntary provision only applies to additional quantities. In that case, a competitive price may be established for the voluntary provision, and the question is whether that should be applied to the mandatory provision rather than a regulated price. If the voluntary provision applied to all quantities, there would need to be a consideration of whether there was any issue of stranded costs⁵.

The evidence required for determining any preferred further regulation of the participation of providers in the contracting process (e.g. through bidding regulation etc) is the scope for the possible abuse of market power. This is because typically any regulation is designed to be a market power mitigation measure. This would be informed by further supply-side analysis of the possible providers of different services.

How are contracts allocated between possible providers?

Where participation is mandatory (possibly up to a certain level), contracts are allocated to a provider on the basis of compliance with the requirements.

Alternatively, contracts can be voluntary (e.g. provision of the service above a specified minimum requirement). There is then a question of how the total volume to be procured

⁵ However, under current procurement of mandatory system services in the SEM, there is no guarantee of the recovery of any capex investment as payments only made on whether the service could be provided from the position the provider was dispatched to,

can be allocated to different providers (assuming that there is a limit on the total volume). This allocation process can be done exclusively on the basis of price, where quality and reliability of products is assumed comparable (e.g. providers of secondary or tertiary reserves).

Alternatively, where a regulated price is used, the contract can be allocated on the grounds of the 'quality' of the offering from the provider (in terms of reliability, innovation, effectiveness). This requires a transparent set of decision-making criteria so that providers can understand on what grounds contracts are allocated, providing incentives for them to focus on meeting the key requirements.

The contract allocation process is also linked to how frequently the procurement process is run. For example, contracts can be through a periodic auction (in which all bids are compared), or on a first come first served basis (where providers meet the minimum requirements).

The main evidence for determining the mechanism for allocating contracts to providers is the homogeneity of the service. For example, for more homogenous services (which are more akin to commodities), price is typically a key allocation mechanism. This evidence is gathered from both demand-side and supply-side analysis.

How are the prices for the services determined?

Under a competitive procurement, the price resulting from the selection process can be Pay-As-Bid (PAB), or Pay-As-Cleared (PAC).

In theory, the PAC approach will provide greater inframarginal rent (or profit) to providers. This can increase short-term costs but provides a profit motive to invest in lower-cost production (compared to PAB). In practice, however, the results of PAC versus PAB may not be so different if providers are allowed to change their bidding behaviour. This is because under PAB arrangements, the providers may adjust their bid based on their expectation of the bid price of the most expensive provider to be awarded a contract. Therefore, PAB may not necessarily support truthful bidding.

A joint tender process for a number of different services could be used with a PAB approach. This could also allow similar services to be procured together (i.e. provider could provide a 'block' fill or kill bid for multiple services within a group) so that TSO gets best overall procurement.

There are a variety of approaches that can be used to determine prices for services procured through a regulated approach. These include:

- zero (with costs being recovered through other revenue streams);
- an ex-ante estimate of the value of service provision (e.g. in terms of avoided costs);
- an ex-ante estimate of LRMC of service provision plus reasonable return;
- an ex-ante estimate of SRMC of service provision plus reasonable return (with fixed costs to be recovered through other revenue streams); or
- an audited ex-post calculation of cost of provision plus reasonable return.

The two key pieces of evidence for the decision of the price determination mechanism are the scope for competition in the provision of the service, and the scope for innovation in the service provision (which for example wouldn't be encouraged by a price based on an ex-post audit of actual costs of provision).

1.3.2 Product Definition

What is the duration of the contract (in terms of certainty on price and quantity)?

This refers to the period of (net) revenue certainty for providers. Both prices **and** contracted quantities affect revenue certainty.

For example, quantities can be determined for long periods, but if the prices are determined for short periods, there is only short-term revenue certainty. Conversely, if the price is fixed through a long term auction, but the provider has no control or forward visibility over volumes, then again there is only short-term revenue certainty.

The duration of revenue certainty is a matter relating to security for buyer and seller.

It is important to consider why there could be uncertainty with a short term contract. Even where the duration of the contracts may be short, repeated contracting processes may reduce the degree of revenue uncertainty.

Therefore, if there is a strong requirement for the service post-contract period and a competitive basis for calculating prices and volumes, then shorter term contracts might be acceptable without frontloading the revenue recovery. However this is unlikely to be the case for these services given uncertainties about

- **Future system needs:** for example, if wind penetration is lower than expected? Generally this is a risk that sits with the buyer, and the risk should not be loaded onto the seller.
- **Technology innovation:** seller's technology is overtaken by cheaper providers (but even in this case, if the investment is required but only useful for a few years, it still needs to recover its money, so this should not be a seller risk).
- **Incentives on single buyer in repeated contracting:** single buyer may underprice in future once the seller has sunk its investment costs (aka regulatory risk). Again this should not be a seller risk.

Ideally the payment should be over a similar timeframe to the period that the service is expected to be valuable for. Squeezing the capex repayment into a shorter period just inflates the short term price, whereas amortising over a longer term period than the service is useful means that the repayment is over a period when the service ceases to be valuable.

Another alternative of paying capex over a short window and then just paying opex for the longer term gives a low incentive for the provider to maintain availability after the initial repayment.

Typically capex is recovered over longer term contracts of say 10-15 years but these contracts do not necessarily give full revenue certainty over that period – e.g. the SEM capacity payment parameters are fixed for 3 years. The key issue is whether there is likely to be a value for the service after the expiry of the fixed price period.

These issues are similar to those considered for a competitive / regulated process: single buyer, non-homogenous products tend to mean a regulated process, and this would tend to mean longer term contract duration as the regulated price setting process could introduce more risk into shorter term contracts.

In conclusion, this typically means that:

- in a more regulated market, the price will be fixed for the expected timeframe over which the service provider will be useful; and
- in a more competitive market, the price may be fixed for a shorter term period.

There are international examples of contracts for system services with very different lengths of price and quantity certainty – for example, ranging from a 15 minute period (balancing reserve utilisation in Germany) up to multi-year contracts. In Spain, a bonus payment of 3.8 €/MWh was made to wind energy production for compliance with new requirements (equivalent to APFAPR and DDR in Ireland), between 2008 and 2013.

Balancing reserves are generally paid in Europe through hourly availability payments, with weekly auctions in Germany for Primary Reserve availability, monthly auctions for Secondary, and 4-hour-blocks payments for Tertiary, complemented by utilisation payments for Secondary and Tertiary. The STOR contracts in GB fix availability and utilisation prices of operational reserves for seasonal periods. Also, the industrial demand response contracts in France and Spain are signed for yearly periods.

The evidence that informs the design of the duration of the contract includes:

- the cost structure of provision (e.g. importance of investment costs);
- scope for innovation in provisions (including new entry); and
- potential price elasticity of demand (i.e. shorter procurement periods where demand is more elastic).

What is the nature of the service (capacity vs. delivery)?

A service can be paid on the basis of capacity or delivery, depending on the nature of the service. In the TSO proposals for DS3, all of the payments are effectively capacity-based as it is assumed that any energy delivery costs would be recovered through the market schedule or through constraint payments.

Capacity-based payments can be further differentiated into (hardware) capability (i.e. the provider has made themselves available to provide the service to the extent that they are dispatched), or dispatch availability (i.e. the provider was in a position to be physically available to provide the service on the day) or simply availability.

In short, capability payments are seen as reducing risks for providers under the current wholesale market arrangements in Ireland, whereby a provider cannot control the position to which they are dispatched. However, it does mean that payments will be made to providers who were not actually in a position to provide the service on the day.

It is interesting to separately consider the operational costs of being in a position to be able to deliver the service when required. These costs can reflect the cost of changing position away from the market schedule and/or any possible 'efficiency penalties' of operating in a mode that is able to provide the service (assuming that the schedule does not include the inertia and other constraints).

The change in position with respect to the schedule may be up or down (in MW terms), but either way, the out of merit or foregone inframarginal rent should be dealt with in the market arrangements e.g. constraint costs.

If operational costs are recovered through a separate payment, it is harder to establish any foregone inframarginal rent as a result of ‘efficiency’ penalties in operating in a mode able to provide the service. This is because there is the challenge of how to calculate the counterfactual of the inframarginal rent the plant would have received if it had operated in an alternative (higher efficiency) mode in which it could not have provided the system service (without a scheduling/bidding process that recognises the scope for multi-mode operation).

The three main pieces of evidence for deciding on the design of this element of the procurement approach are:

- the ease of verification/measurement of the service⁶;
- the relative importance of capital costs; and
- the control that a provider who has incurred any capital costs has over their ability to be in a position to physically provide the service.

How does the price and/or quantity of the service vary over time within the contract period?

The prices (and quantity) of the service during the contract period can be constant during the whole contract period (e.g. industrial demand response capability in Spain has a constant hourly price for a whole year).

Alternatively, prices can follow a static time of use profile, or follow a ‘dynamic’ time of use profile (according to a specified formula).

Ultimately, the main evidence required to decide whether or not to have constant prices is how the ‘scarcity’ of the service changes over time – this will determine the benefit of providing an incentive to different providers to be available in critical moments.

Are there any locational elements in terms of price and/or quantity?

Contracting can be done on a locational basis or a system basis.

The evidence required to decide whether or not to have locational elements depends on how the need for the service is distributed geographically – locational contracting allows the payments for the system service to be focused on where it is needed, but at the risk of greater complexity, and fragmentation of the markets for system services (compared to a fully unconstrained solution).

Is the contract unit-specific?

System services can be procured per unit, with individual monitoring of compliance or delivery – e.g. for voltage control, or tertiary reserves. Or they can be procured by portfolio bidding, which also facilitates aggregation as a route to provision of the service. One example of this is Secondary Reserve in Spain, remunerated at company portfolio level.

⁶ For some services, capacity to deliver the service can be measured in certification labs or specific tests. However, verifying the delivery in real time is either complex or too expensive (large volumes of information to store and interpret). In those situations, it is a valid common practice to verify and certify the capability, and not to make additional payments for delivery.

The two main pieces of evidence in fixing this element of the procurement option is the homogeneity of the service and the relative quality of information held by the purchaser (the TSO) compared to the provider.

For example, a participant might strike a long term contract for provision of some part-loading service from one of its several units but that it needs the choice on the day which unit to use to deliver the service (provided they are interchangeable from the TSO viewpoint).

In addition, if the TSO does not have a complete set of information on the technical and performance characteristics of different units, it is possible that allowing portfolio contracts (i.e. 'local' optimisation across the units of a single seller) might provide a more efficient outcome than a global optimisation carried out by TSO on the basis of incomplete information.

1.3.3 Contingencies

What are the penalties for a provider who fails to meet contracted requirement?

In a simple world, the system services would be spot priced (without long-term contracts) and the cost of non-provision would be failure to earn the spot prices at the relevant time: a low opportunity cost if there was no system shortage, and a higher opportunity cost when the service was highly desired.

In a more complex world with long term contracts and also spot prices, the penalty cost would be the spot price (which might be determined ex-post, like an imbalance price).

Ideally the value of the service (payment and penalty) would be targeted at the times most required through time of use pricing (i.e. rather than a fixed ex-ante penalty) and also dynamic trading. Secondary trading can give some indicator of the spot price (as long as the penalty arrangements don't distort outcomes) but a competitive market (between market participants) is highly unlikely.

Therefore, as the system services are difficult to derive spot prices for, alternative (second-best) penalty approaches may need to be considered.

There are two main elements to the definition of these alternative penalty approaches – definition of 'performance' levels at which payment reductions are applied; and how much of a 'penal' element should there be to encourage reliability (and whether this penal element should be fixed ex-ante or dynamic).

The definition of the performance levels would need to robustly determine:

- the minimum level of performance required for full payment (of capex costs);
- the minimum level of performance required for any payment (of capex costs);
- the change in payments between these two performance levels;
- the period over which performance is measured; and
- whether under-performance in one period can lead to cancellation of the contract for the subsequent periods.

When the provider does not meet its contracted requirements, then penalties may apply. The level of these penalties can be based on (inter alia):

Therefore, the main pieces of evidence are:

- the control that a provider has over the ability to provide the service when required;
- the options open to the purchaser (TSO) (or the provider) for making up the shortfall in service provision; and
- how the impact of non-provision varies with system conditions.

Can providers transfer the obligation?

Transferring the obligation to another provider is one way in which the provider may be able to avoid a penalty for not providing the contracted volume. Therefore, the interest of providers in transferring the obligation will depend on the strength of the penalty regime that is in place, and the duration of the contract. The secondary trading would be more useful for long-term contracts, where there is scope for secondary trading of the service for shorter periods than the full contract – for example, if the seller is going to be unavailable for a short period, then it may procure the services from another seller rather than face the risk of having the whole contract cancelled if its unavailability means that it falls below agreed minimum performance standards.

This element is heavily influenced by the choices made at other elements. In general, transfer of the obligation fits better with competitive procurement rather than regulated procurement, as it is a decentralised mechanism allowing market participants to address their own problems.

The main piece of evidence for deciding on this element of the procurement mechanism is the extent to which alternative service providers have been judged to be eligible to provide comparable services (i.e. no locational elements), to the satisfaction of the TSO in terms of cost and also operational security.

1.3.4 Cost recovery

Is cost recovery targeted or socialised?

The procurement cost of the system services can be recovered in a number of different ways:

- targeted to those who increase the requirement for the service when they can accurately be identified⁷ (and respond to the incentive);
 - there may be a time dimension to this with different approaches to the recovery of capex or opex;
 - this may be done on an individual user or for particular groups (e.g. demand, particular generation technologies) where the parties causing the requirement for the service can only be generically identified; and
- socialised and spread pro-rata among all users when cost-reflective targeting is not simple, robust, possible and/or desirable (for example, we note that the recovery of the costs for holding reserve for the largest single infeed is not targeted at the largest single infeed).

⁷ For example, in theory this could be through targeting of the charges levied by the TSO to recover their procurement costs, or by making market participants directly responsible for paying the system services providers (e.g. through cooptimisation process).

Generally in most European markets the operational reserves availability payments and grid constraints payments are socialised, whereas the cost of utilisation of those reserves is typically allocated to consumers who deviate from their contracted volumes of energy delivery. However, the dampening impact of reserve procurement on imbalance prices is coming under scrutiny in some markets, e.g. GB.

For example, in this case, the TSO is procuring the system services to enable it to deliver a feasible and safe system whilst reducing the curtailment of wind generation (i.e. to allow part-loaded thermal plant). Therefore, one option for targeting the cost recovery would be to charge it to wind generators. However, this would probably require the wind generators to have the ability to manage their exposure to the costs – e.g. through investment or operational measures.

1.4 Different procurement options

We now consider how the choices at the different elements could be grouped together coherently. We consider 4 possible groupings, as summarised in Table 4, focused around the contracting process and the contingency arrangements, as the discrete choices for these elements can be seen as defining the philosophy of a procurement approach in relation to its reliance on competitive processes.

Of course, Table 4 does not have a fully exhaustive list of permutations as the four groupings (and the elements that make them up) are not mutually exclusive categories. However, the groupings are designed to describe some distinctly different approaches that could provide a starting point for the development of end to end procurement options to the different system services.

The four approaches listed in Table 4 are:

1. **‘Mandatory provision’** – a highly regulated approach under which the TSO contracts for all available volumes of this mandatory service. The payments are based on ex-ante regulated cost estimates⁸, with a fixed price penalty for non-provision and no scope for secondary trading. This approach is typically most effective for generators participating in the energy market, but may not work so well for encouraging efficient provision of the service from other sources.
2. **‘Regulated’** – the TSO procures a fixed amount of the system service through a mandatory bidding process, with contracts allocated on the basis of an agreed set of ‘quality’ criteria. The price of the system service is value-based (i.e. based on the cost of the next best alternative for the TSO) – for example, where it is perceived to be very difficult to robustly assess the cost of providing the service. There is no scope for secondary trading and the penalty for non-delivery is linked to the price paid to the provider.
3. **‘Regulated competition’** – this approach introduces some competitive elements through voluntary participation with contracts awarded on the basis of price and transparent ‘quality’ criteria. Given this, the price for the service is Pay as Bid

⁸ We have considered the approach used in several countries for some system services of mandatory unpaid participation. This relies on energy markets to recover the needed investments through the sales of energy, in the same way that capacity is recovered only through sales of energy in energy-only markets. However, this can then distort the merit order in the energy market particularly when the service is mandatory for new but not for existing plants.

(PAB). The penalty price is based on the cost to the TSO of procuring the service from an alternative provider. Competition is limited though with no secondary trading, and procurement of a fixed volume (up to total cost cap).

4. **'Fully competitive'** – this puts price-based competition at the heart of the procurement process. This includes some price elasticity of demand (which could be driven by competition from other 'system services' or could simply result from use of a fixed payment pot), and secondary trading, where they can beat the penalty. Allocation of system service contracts is on the basis of price only (subject to meeting minimum requirements) with Pay as Cleared (PAC) pricing.

The other elements of the procurement option not listed in Table 4 either relate to analogue definitions (e.g. anything related to time) and/or are very specific to the technical aspects of the service (e.g. is the contract unit-specific? is cost recovery targeted or socialised?). Therefore, this will vary depending on the nature of the service to be procured. There is however, some relationship between the contract duration and the degree of regulation of the procurement approach, as a regulated price setting process could introduce more risk into shorter term contracts.

In conclusion, this typically means that:

- in a more regulated market, the price will be fixed for the expected timeframe over which the service provider will be useful; and
- in a more competitive market, the price may be fixed for a shorter term period.

Table 4 – Procurement approaches with differing emphasis on competition

Issues	Definitional questions for procurement approach	1) 'Mandatory provision'	2) 'Regulated'	3) 'Regulated competition'	4) 'Fully competitive'
Contracting process	How is the total procurement volume determined?	Available supply	Fixed amount	Fixed amount (up to total cost cap)	Price-quantity trade-off
	What regulations are there on the participation of providers in the procurement process?	Mandatory	Mandatory participation	Voluntary participation (with price caps)	Voluntary participation
	How are the contracts allocated between possible providers?	Mandatory	'Quality'	Price + 'quality'	Price only
	How are the prices for the services determined?	Ex-ante cost estimates	Value-based	PAB	PAC
Contingencies	What are the penalties for a provider who fails to meet contracted requirement?	Ex-ante fixed penalty	Linked to value-based price paid to provider	Cost to the TSO of procuring the service from alternative provider	Linked to actual market prices at time of non-compliance
	Can providers transfer the obligation?	No	No	No	Yes

1.5 Conclusions

Any procurement option will represent a set of trade-offs between competing goals – this trade-off will primarily be determined by the duration of the contract and the choice between a regulated and competitive approach. There is some relationship between the contract duration and the degree of regulation of the procurement approach, as a regulated price setting process could introduce more risk into shorter term contracts.

The range of choices available in these two dimensions of contract duration and degree of regulation is illustrated by the diversity of approaches seen internationally in the procurement of system services. Therefore, it is helpful to breakdown these two high-level dimensions into more detailed elements of procurement options.

We have discussed the possible alternative choices for a number of elements of a procurement method. Table 4 lists these elements and the evidence that can help to inform the choice between different alternatives for each element

Table 5 – Evidence for informing choice of procurement option

Issues	Definitional questions for procurement approach	Evidence and interpretation	Availability of evidence
Contracting process	How long before contract window is contract agreed?	Longer construction → earlier contract	Little – needs further supply-side analysis of deployment timelines
	How is the total procurement volume determined?	More tradeoffs with other services → increased flexibility in total procurement volume.	Little – needs to be informed by demand-side analysis by the TSO of interaction between different system services
	What regulations are there on the participation of providers in the procurement process?	Greater probability and impact of under-supply → may favour more mandatory approach. Greater concerns about scope for market power → greater regulation of bidding behaviour	Little – demand-side analysis by the TSO should inform the analysis of impact of under-delivery; Supply-side analysis (and demand-side analysis) should inform market power analysis
	How are the contracts allocated between possible providers?	More homogenous products → allocation relies more heavily on price	Some – could be further informed by demand-side analysis by the TSO
Product definition	How are the prices for the services determined?	Increased scope for competition and innovation → support more competitive approach to price discovery	Some – could be further informed by more supply-side analysis
	What is the duration of the contract (in terms of fixed price and quantity)?	Increased reliance on capital investment → supports longer-term contracting Increased scope for innovation → shorter-term contracting Increased responsiveness of demand to price → supports shorter-term contracting	Some – further supply-side analysis could provide more information on importance of capital investment and scope for innovation. The TSO demand-side analysis may provide information on responsiveness of demand to price
	What is the nature of the service (capacity vs. delivery)?	Generally, these services are all defined as capacity. More control of provider over own dispatch position → dispatch-based' payments rather than capability based payments	Little – need greater clarity on future wholesale market arrangements before defining detail of 'capacity-based payments'

Issues	Definitional questions	Evidence and interpretation	Availability of evidence
	How does the price and/or quantity of the service vary over time within the contract period?	Value of service highly dependent on system conditions → favour more differentiated payment	Little – demand-side analysis by the TSO likely to be main source of any information on impact of system conditions on value of service
	Are there any locational elements in terms of price and/or quantity?	Value of service highly dependent on location → favour more locational payments	Little – demand-side analysis by the TSO likely to be main source of any information on impact of location on value of service
	Is the contract unit-specific?	Less homogenous products → favour unit contracts Value of service highly dependent on location → favour more locational payments	Little – may be informed by demand-side analysis by the TSO but also needs further supply-side analysis
Contingencies	What are the penalties for a provider who fails to meet contracted requirement?	Provider has more control over ability to provide the service when required → favour stricter penalty regime Fewer options open to the purchaser (TSO) (or the provider) for making up the shortfall in service provision → favour stricter penalty regime Impact of non-provision highly dependent on system conditions → more dynamic penalty regime	Some – may be informed by demand-side analysis by the TSO but also needs further supply-side analysis
	Can providers transfer the obligation?	More potential providers approved by the TSO → more favourable for secondary trading	Some – to be informed by supply-side analysis, but also by length of the contract
Cost recovery	Is cost recovery targeted or socialised?	Easier to identify specific actions increasing need for system services → favour greater targeting Market participant more able to respond to cost signal → favour greater targeting	Little – could be informed by some of the results of the demand-analysis by the TSO but may be too detailed for that modelling

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2. MAJOR UNCERTAINTIES FOR SYSTEM SERVICE PROCUREMENT OPTIONS

We now discuss two major ‘external’ factors to be taken into account when considering procurement options for particular system services:

- interactions with the wholesale electricity market; and
- constraints imposed by European regulatory framework.

2.1 Interaction with wholesale electricity market design

The current design of the wholesale electricity market in Ireland has two features of particular relevance for the system services framework:

- recovery of opex costs for delivery of system services; and
- control that providers of system services have over their dispatch position (which can affect their ability to be in position to deliver the service).

If the system services procurement framework is designed to take account of these features, it must also take account of the fact that a revised HLD for the wholesale electricity market is due to be implemented from 1 January 2017.

2.1.1 Recovery of opex costs

Opex costs for system services are currently recovered through regulated bids into the wholesale market. The change in position with respect to the schedule may be up or down (in MW terms), but either way, the out of merit or foregone inframarginal rent should be dealt with in the market arrangements e.g. constraint costs.

This means that there is no separate payment mechanism for the costs associated with the ‘efficiency’ penalties in operating in a mode able to provide the service. If the seller is constrained upwards, then the costs will be recovered through the PAB payment. However, if the seller is constrained downwards, then there is no calculation of the ‘lost’ inframarginal rent the plant would have received if it had operated in an alternative (higher efficiency) mode in which it could not have provided the system service (without a scheduling/bidding process that recognises the scope for multi-mode operation).

In general, contracting to cover operational costs can be done on a short-term basis – therefore, the introduction of separate arrangements to cover operational costs could be determined once the HLD is decided upon. However, changes to the recovery of operational costs could affect the overall recovery of fixed and capital costs; e.g. depending on whether PAB or PAC pricing is used (as this could affect the level of inframarginal rent) and whether the payments are considered in the calculation of capacity payments). In addition, there is likely to be an emphasis on ‘capex-driven’ solutions for the provision of system services from thermal generation. This is because providing some of these services through operational changes – e.g. part-loading thermal plant – however, this would lead to higher displacement of wind generation.

2.1.2 Control over dispatch position

The second feature of the current market design is that typically generation (and Demand Side Units) have very little control over their dispatch position (as a result of tightly regulated SRMC bidding with no allowance to take into account potentially lost system

services revenue in bid). This is one of the main drivers for ‘capability-based’ payments (i.e. the provider has the ‘hardware’ to provide the service) rather than ‘dispatch-based payments’ (i.e. the provider is actually physically in a position on the day to provide the service).

When discussing ‘capability-based’ payments versus ‘dispatch-based payments’, one of the pieces of evidence that we highlighted was the control that a provider who has incurred any capital costs has over their ability to be in a position to physically provide the service. Therefore, if that changes as a result of the new HLD, then that could change whether a capability-based payment is the recommended option.

2.2 European regulatory framework

We have identified two key parts of European regulatory framework in relation to the system services framework – the Electricity Balancing Network Code (EB NC) and the state aid guidelines.

2.2.1 Electricity Balancing Network Code (EB NC)

Designed to support greater harmonisation of national rules on balancing, the EB NC will play a central role of the implementation of the European Electricity Target Model. The EB NC is still in draft form with ENTSO-E due to submit a version to ACER for its opinion in December 2013. Therefore, our comments in this section are based on v1_30 of the EB NC, which was published in October 2013. Whilst there may be some further amendments to the detailed provisions in the EB NC before it enters into force, we are not expecting any major changes to the provisions discussed below.

The EB NC allows for a phased implementation through some intermediate models for sharing balancing resources. It must be fully implemented 6 years after its entry into force (expected late 2014/early 2015).

Article 30 sets out requirements for the procurement of Balancing Capacity (i.e. reserves) within a Responsibility Area. In particular, it requires:

- all TSOs to use a market-based method for the procurement at least Frequency Restoration Reserves (with activation time of no more than 15 minutes) and Replacement Reserves (with activation time of at least 15 minutes) (Art 30.2);
- regulatory approval for the procurement of Balancing Capacity for longer than one year and more than one year ahead of time (Art 30.3); and
- procurement of upward and downward Balancing Capacity to be done through separate processes (Art 30.4), which raises no issues for the proposed system services under DS3 as only upward reserve capacity will be procured.

In addition, Article 31 requires the TSO to allow (and approve) transfer of Balancing Capacity – i.e. between market participants.

Article 11 sets out the requirement for a TSO to cooperate with at least one TSO from another member state in a Coordinated Balancing Area (COBA), sharing at least one standard product of Balancing Energy. We have not considered this issue further in this note because detailed legal advice should be obtained by the RAs to clarify whether cooperation between EirGrid and SONI would be counted as a COBA. Although the provisions for sharing products in a COBA focus on Balancing Energy, Article 11.4

requires that a COBA established for Exchange of Balancing Capacity should have at least one shared Balancing Capacity product.

2.2.2 State aid guidance

In November 2013, the EC published a communication on 'Delivering the internal electricity market and making the most of public interventions'. This was supported by a Commission Staff Working Document on 'Generation Adequacy in the internal electricity market – guidance on public interventions'.

The EC is also working on State Aid guidelines that are expected to describe a similar framework for the assessment of public interventions with respect to State Aid clearance.

It is unclear as to whether the guidance on capacity mechanisms would also cover long-term capacity-based contracts for system services in Ireland as recommended by the TSO. In general, the documents refer to public interventions on the grounds of generation adequacy – but this term is not specifically defined in the document. Therefore, we suggest that the RAs seek detailed legal advice (and/or clarification from the EC) on the applicability of State Aid rules to the system services framework.

2.3 Conclusions

We have discussed two major 'external' factors to be taken into account when considering procurement options for particular system services:

- interactions with the wholesale electricity market; and
- constraints imposed by European regulatory framework.

The design of the wholesale market arrangements is crucial in determining the mechanisms for the recovery of opex costs for delivery of system services, and the control that providers of system services have over their dispatch position (which can affect their ability to be in position to deliver the service).

If the system services procurement option is designed to take account of these particular features of the current arrangements, it must also take account of the fact that a revised HLD for the wholesale electricity market is due to be implemented from 1 January 2017.

The Electricity Balancing Network Code potentially places some restrictions on the procurement on some of the reserve-based system services, as a part of a phased move towards much greater cross-border sharing of energy balancing resources. These restrictions include requirement to use market-based procurement methods, and no contracting for longer than one year without national regulatory approval.

In addition, the EC has recently published working documents on the factors that would be taken into account in the approval of state aid to support generation adequacy. It is unclear whether this guidance could be interpreted as applying to long-term capacity-based contracts (as recommended for system services in Ireland by the TSO). Therefore, we suggest that the RAs seek detailed legal advice (and/or clarification from the EC) on the applicability of State Aid rules to the system services framework.

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3. USE OF COMPETITION IN PROCUREMENT OF SYSTEM SERVICES

We have described the detailed elements that can be defined to describe a procurement options, and the alternative choices at each element. We then described four distinct approaches with a different balance between competition and regulation. Although the duration of the contract will be influenced by the nature of the service to be procured, there is some relationship between the contract duration and the degree of regulation of the procurement approach. This is because a regulated price setting process could introduce more risk into shorter term contracts.

We then described some possible external constraints on the design of the procurement options for system services – the wholesale electricity market design, and complying with European requirements.

We now consider how greater competition could be introduced into the procurement of system services under the DS3 framework. In doing this, we draw on the available if limited evidence on the supply and demand of system services – e.g. the recent Call for Evidence, the Kema report on the investment costs of different technologies. We have already where further evidence is required to come to a firmer recommendation on the choice of procurement option for each system service (Table 5 in Section 2.3).

3.1 Grouping of system services

Table 6 lists the system services that the TSO has recommended it procures under the DS3 framework. The RAs have consulted on the technical definitions of these services (to apply to all potential providers⁹). Although the final decision is expected to be taken at the December 2013 meeting of the SEM Committee, our working assumption is that the technical definitions will be fixed as set out in the RAs' Consultation Paper.

One of the major challenges in establishing the procurement framework is the interaction between system services, particularly given that some of them can be co-produced. Therefore, potential providers may wish to have a joint (or at least coordinated) procurement process for those services so that they could have visibility of all the potential revenues before making an investment decision.

Therefore, in considering the scope for applying more competitive procurement processes, we have collected the system services into 4 groups based on the issues they raise for the design of a procurement option. This grouping is summarised in Table 6.

⁹ 'DS3 System Services Consultation Paper. SEM-13-060', 3 September 2013.

Table 6 – Grouping of system services

New Services		Existing Services	
SIR	Synchronous Inertial Response	SRP	Steady-state reactive power
FFR	Fast Frequency Response	POR	Primary Operating Reserve
DRR	Dynamic Reactive Response	SOR	Secondary Operating Reserve
FPF	Fast Post-Fault Active Power Recovery	TOR1	Tertiary Operating Reserve 1
APR		TOR2	Tertiary Operating Reserve 2
RM1	Ramping Margin 1 Hour	RRD	Replacement Reserve De-synch
RM3	Ramping Margin 2 Hour	RRS	Replacement Reserve Synch
RM8	Ramping Margin 8 Hour		

3.2 Group 1 services ('Grid stability')

These services generally relate to the transient stability of the system. There is a wide range of potential providers of services in Group 1, such as synchronous generators, synchronous condensers including flywheels, Statcoms, or batteries. In addition, HVDC links may be able to provide voltage control, or be controlled in a way such that they comply with the requirements of these services.

The nature of these services would typically favour a long-term procurement approach with scope for competitive allocation of the contracts ('competition for the market'). The contracts are expected to be of relatively long duration given the specialised nature of these services, and the expected high requirement for capex (investment in hardware capabilities). A longer contract period and reliance on capex solutions would typically require a longer window before contracting, which is driven by the lead time needed to prepare for and implement any required investment.

Therefore, it may be more appropriate to introduce competition for the procurement of these system services using the 'regulated competition' approach (as described in Table 4 in Section 1.4).

This approach is summarised in Table 7, which describes how competition could be introduced to the procurement of Group 1 services (based on the limited evidence currently available).

Given the scope for co-provision of many of the services in Group 1, a joint procurement approach may be beneficial for these services. This would involve the TSO issuing tenders for all the services in this group together and the TSO then selecting the most optimal combination¹⁰. A PAB approach would allow providers to provide prices in relation to the whole bundle of services they are offering to provide (which could be a single service) rather than providing a price for each service (or the TSOs having to create a clearing price per service).

¹⁰ As part of this process, the TSO might ask providers to provide prices for contracts of different durations.

The joint procurement approach would also be consistent with placing a cap on the total cost of procurement of these services – this cap should be informed by the ‘value’ of these services produced by the TSO in its demand-side modelling for the cost-benefit analysis (CBA). There then remains the question of how the ‘volumes’ procured of each service would be reduced if the total cost cap was reached (again, this should be informed by the TAO demand-side modelling).

In general, delivery of these services is infrequent and very fast, and hence is not practical to measure on a regular basis. This means that penalties should be based on testing of capacity rather than verification of delivery. We suggest unit-specific procurement as this fits best with the verification process.

In this approach, there is no opportunity to transfer obligations (through secondary trading); however, the services provided are broadly homogenous, which could support the development of secondary trading mechanisms if that was of interest.

We have not found any evidence to support the targeting of cost recovery from particular system users.

SRP has some differences from the other system services in this group in terms of:

- location, which may be particularly important for SRP;
- measurement of real-time delivery, which may be easier for SRP (although the costs of delivery are very small); and
- some existing requirements for mandatory provision.

However, we judged that these differences are not significant enough to put SRP in a separate group for the purposes of this note.

Table 7 – ‘Regulated Competition’ for procurement of Group 1 services

Issues	Definitional questions for procurement approach	Group 1 (Grid Stability)	Rationale
Contracting process	How long before contract window is contract agreed?	Long lead time	Linked to contract duration, with further supply-side analysis required
	How is the total procurement volume determined?	Fixed amount (up to total cost cap)	Uncertainty about trade-off between services. CBA modelling to inform cost cap
	What regulations are there on the participation of providers in the procurement process?	Voluntary (with price caps)	Allows for competition from range of providers, including those outside of the energy market.
	How are the contracts allocated between possible providers?	Price + ‘quality’	Competition not just on the basis of price for a single service given nature of ‘new services’ and joint tendering process
	How are the prices for the services determined?	PAB	Consistent with use of ‘quality’ factors in contract allocation and joint procurement process for services within this group
Product definitions	What is the duration of the contract (in terms of fixed price and quantity)?	Long-term (e.g. 5- 10 yrs)	Capex expected to be important
	What is the nature of the service (capacity vs. delivery)?	Capacity	Where relevant, delivery costs to be captured through wholesale electricity market arrangements (e.g. Balancing Mechanism)
	How does the price and/or quantity of the service vary over time within the contract period?	No variation	No firm evidence currently available to support differentiation – this should be reviewed based on the results of the

Issues	Definitional questions for procurement approach	Group 1 (Grid Stability)	TSO modelling Rationale
Contingencies	Are there any locational elements in terms of price and/or quantity?	No variation (apart from possibly SRP)	No firm evidence currently available to support differentiation – this should be reviewed based on the results of the TSO modelling (particularly of SRP)
	Is the contract unit-specific?	Unit	Testing and verification usually done on a unit basis
	What are the penalties for a provider who fails to deliver contracted requirement?	Cost to the TSO of procuring the service from alternative provider	Pass-through of remedial costs to provide incentive for compliance
Cost recovery	Is cost recovery targeted or socialised?	Socialised (where not recovered through imbalance)	No strong evidence available on basis for targeting (although SRP may raise locational issues)

3.2.1 Further issues for consideration for Group 1 services

The major issues for consideration in the next stage of development of procurement options for the services in Group 1 include:

- treatment of opex costs in contract allocation process
- mechanisms for recovering opex costs;
- the determination of the cost cap for procurement, which should be informed by the updated demand-side analysis provided by the TSO for the CBA (and consideration of how the cost cap is applied across a group of services);
- the impact of system conditions on the value of the service (e.g. to what extent should pricing and penalties be dynamic); and
- the impact of location on the value of the service.

Typically, the system services in this group are associated with hardware capabilities, requiring high investment costs, and low or negligible utilisation costs (in general, and except for the decoupled or part-loaded operation mode of some conventional generators). This would favour a longer-term contracting approach.

However, any decision on contract duration should also consider the scope for innovation, e.g. in emulated inertia, that could be deterred by long-term contracts being issued to cover the required volumes. This will be involved by further evidence from supply-side analysis.

A long-term contract would also need to consider how to address:

- the scope for opex-driven provision of capacity (e.g. some generation units can provide SIR being de-coupled or at low outputs with additional energy consumption); and
- that some providers (e.g. pumped storage hydro; and synchronous demand) can incur significant opex in providing this service.

These additional operating costs are an example of 'efficiency' penalty of operating in a mode in which the system service capacity can be provided. Therefore, the contract would need to provide certainty of how these opex costs would be recovered. In awarding the contracts, the TSO would also need to consider how to compare bids from different providers that have different mix of capex and opex costs in providing the capacity to deliver the system services.

In general, introducing locational aspects and/or time profile to procurement only seems to be relevant for SRP, based on current limited evidence and international experience. At this stage, we do not expect location and time profile variation for the other products – although this should be checked against the results of the modelling produced by the TSO for the CBA. These time profiles may need to be dynamic rather than following a fixed ex-ante profile given that the 'value' of many of these services will depend on the level of wind output for a given penetration.

3.3 Group 2 services ('Ramping margin')

The Group 2 services are new system services requiring the capability to ramp-up, and sustain delivery of power output. The flexibility capability is typically provided by a higher investment in the generation plant, or the sizing of storage facilities, or adjustments on the demand side.

In general, a fully competitive approach might be considered for the Group 2 services as described in Table 8 (Ramping Margin). This reflects the fact that ultimately they could be rewarded through the development of a liquid and efficient intraday energy market, as part of the revised HLD for the SEM. Therefore, it will be very important to understand how the provision of flexibility within market timescales is rewarded in the new market arrangements, before designing any mechanisms that would provide supplementary revenue from the TSO for this flexibility.

This raises the challenge of how the TSO should procure the product (if required) ahead of the implementation of a new HLD. Allowing long-term contracts to be struck between the TSO and providers could restrict the development of that intraday market from 2017 onwards.

Given this, it may be appropriate to consider a short-term procurement approach based on a 'fully competitive' approach (as described in Table 4 in Section 1.4).

Table 8 – ‘ Fully competitive’ procurement of Group 2 services

Issues	Definitional questions for procurement approach	Group 2 (Ramping Margin)	Rationale
Contracting process	How long before contract window is contract agreed?	Short-term	Consistent with intraday-trading
	How is the total procurement volume determined?	Price-quantity trade-off	TSO modelling for CBA to provide further information on possible trade-off between different services
	What regulations are there on the participation of providers in the procurement process?	<i>Voluntary participation</i>	Dependent on HLD arrangements
	How are the contracts allocated between possible providers?	Price only	Homogeneous products
	How are the prices for the services determined?	PAC	Introduces efficiency incentives for trading of homogenous products
Product definitions	What is the duration of the contract (in terms of fixed price and quantity)?	Short-term	Consistent with intraday-trading
	What is the nature of the service (capacity vs. delivery)?	TSO only procure capacity	Delivery costs should be recovered from energy market. Mechanisms for recovery of capex to be determined by HLD
	How does the price and/or quantity of the service vary over time within the contract period?	Variable with system conditions	Needs of ramping change hourly
	Are there any locational elements in terms of price and/or quantity?	No	This is a system-wide service focused on energy balancing

Issues	Definitional questions for procurement approach	Group 2 (Ramping Margin)	Rationale
Contingencies	Is the contract unit-specific? What are the penalties for a provider who fails to deliver contracted requirement?	No	Allow provider portfolio optimisation (compatibility with HLD)
	Can providers transfer the obligation?	Yes	Secondary trading could support entry of new providers.
Cost recovery	Is cost recovery targeted or socialised?	Socialised (where not recover via imbalance)	No strong evidence available on basis for ex-ante targeting of capacity costs. (Long-run) energy delivery costs may be targeted through 'imbalance' arrangements in new HLD

3.3.1 Further issues for consideration for Group 2 services

Moving to a 'fully competitive' approach ahead of the introduction of a revised HLD would require changes to existing market arrangements; for example to allow marginal pricing (PAC) for the ramping margin services, and participation of new providers (outside the energy market) on a competitive basis. Therefore, further analysis would be needed of the costs and benefits of modifying the existing market arrangements to support a fully competitive approach (e.g. with marginal pricing for ramping margin service) ahead of the implementation of a new HLD.

In addition, further analysis on the demand-side and supply-side is needed to understand the impact of not introducing 'long-term' contracts for ramping margin services ahead of the move to a HLD – i.e. is investment needed soon in the capability to deliver RM1, RM3 and/or RM8 in support of 75% SNSP?

3.4 Group 3 services ('Fast Reserves')

Group 3 services are fast reserves that are activated between 5 seconds and 20 minutes after a frequency event. These reserves would fall into the category of the Frequency Restoration Reserves products for which the EBNC requires market-based procurement.

The nature of these services could support a long-term procurement approach with scope for competitive allocation of the contracts ('competition for the market'). Therefore, Table 9 summarises how a 'regulated competition' approach could be used for the procurement of Group 3 services (based on the limited evidence currently available). As more evidence emerges from the demand-side and supply-side analysis, there may be scope to move further towards a 'fully competitive' and/short-term approach, on at least some elements – e.g. PAC, or portfolio- based award of contract).

These services can require the investment of significant capex – which would be supported by a long-term procurement process. However, this is not consistent with the requirement for contracting for Frequency Containment Reserves to be for no longer than a year under the EBNC (although regulatory approval can be given to a longer contracting period). Indeed, many of these services are procured through short-term contracts (less than a year) in other European markets – however, this may reflect the fact that the services can largely be provided by changes in operation of existing plant on the system, which may not be the case in Ireland in the future.

The procurement of these services is currently supported by mandatory requirements (e.g. in Grid Code). This means that either transitional measures would need to be put in place, or the competitive procurement will only be used for 'additional' volumes above the required minimum level. The latter approach raises questions around the consistency between the prices paid for mandatory services and prices paid for competitively procured services, and for the scope to allow innovation and entry by new providers.

Table 9 – ‘Regulated Competition’ for Group 3 services

Issues	Definitional questions for procurement approach	Group 3 (Fast Reserve)	Rationale
Contracting process	How long before contract window is contract agreed?	<i>Uncertain</i>	Linked to contract duration
	How is the total procurement volume determined?	Fixed amount (up to total cost cap)	Uncertainty about trade-off between services. CBA modelling to inform cost cap
	What regulations are there on the participation of providers in the procurement process?	Voluntary participation (with price caps)	Allows for competition from range of providers, including those outside of the energy market.
	How are the contracts allocated between possible providers?	Price + ‘quality’	Allows non-price factors to be taken into account in contract allocation (if seen to be important)
	How are the prices for the services determined?	PAB	Consistent with use of ‘quality’ factors in contract allocation
Product definitions	What is the duration of the contract (in terms of fixed price and quantity)?	<i>Long-term?</i>	Capex expected to be important , but needs to be consistent with European requirements, and allow competition from range of providers
	What is the nature of the service (capacity vs. delivery)?	Capacity	Delivery costs to be captured through wholesale electricity market arrangements (e.g. Balancing Mechanism)
	How does the price and/or quantity of the service vary over time within the contract period?	<i>No variation</i>	No firm evidence currently available to support differentiation – this should be reviewed based on the results of the TSO modelling

Issues	Definitional questions for procurement approach	Group 3 (Fast Reserve)	Rationale
Contingencies	Are there any locational elements in terms of price and/or quantity?	No variation	No firm evidence currently available to support geographical differentiation (which is consistent with international experience)
	Is the contract unit-specific?	Unit	Consistent with a more regulated approach, but could be scope to move to portfolio contracting
	What are the penalties for a provider who fails to deliver contracted requirement?	Cost to the TSO of procuring the service from alternative provider	Pass-through of remedial costs. Incentive for compliance
Cost recovery	Can providers transfer the obligation?	No	Consistent with the fact that contract allocation not solely price-based. But could be benefits of secondary trading if contracts are awarded for long duration
	Is cost recovery targeted or socialised?	Socialised (where not recover via imbalance)	No strong evidence available on basis for ex-ante targeting of capacity costs. (Long-run) energy delivery costs may be targeted through 'imbalance' arrangements in new HLD

3.4.1 Further issues for consideration for Group 3 services

The major issues for consideration in the next stage of development of procurement options for the services in Group 3 include:

- The appropriate length of contracting period (and the lead time for contracting): which should be informed by further supply-side analysis of the impact of different contract lengths on different types of possible providers, and the strength of the requirements in the EBNC not to contract for longer than a year for Frequency Containment Reserve Capacity.
- Interaction with current requirements for mandatory provision of service.
- The scope for more use of elements of the 'fully competitive' approach (on at least some elements – e.g. PAC, or portfolio- award of contract).
- The impact of system conditions on the value of the service (e.g. to what extent should pricing and penalties be dynamic).

3.5 Group 4 services ('Slow reserves')

Group 4 services are the slow 'reserves' which are activated between 20 minutes and 1 hour following an event – this covers two types of Replacement Reserves (Synchronised and De-synchronised).

The nature of these services could support a long-term procurement approach with scope for competitive allocation of the contracts ('competition for the market'). Therefore, Table 10 summarises how a 'regulated competition' approach could be used for the procurement of Group 4 services (based on the limited evidence currently available). As more evidence emerges from the demand-side and supply-side analysis, there may be scope to move further towards a 'fully competitive' and/short-term approach, on at least some elements – e.g. PAC, or portfolio- award of contract).

These services can require the investment of significant capex – which would be supported by a long-term procurement process. However, this is not consistent with the requirement for contracting for Replacement Reserves to be for no longer than a year under the EBNC (although regulatory approval can be given to a longer contracting period). Indeed, many of these services are procured through short-term contracts (less than a year) in other European markets – however, this may reflect the fact that the services can largely be provided by changes in operation of existing plant on the system, which may not be the case in Ireland in the future.

Table 10 – ‘Regulated Competition’ for Group 4 services

Issues	Definitional questions for procurement approach	Group 4 (Slow Reserve)	Rationale
Contracting process	How long before contract window is contract agreed?	<i>Uncertain</i>	Linked to contract duration
	How is the total procurement volume determined?	Fixed amount (up to total cost cap)	Uncertainty about trade-off between services. CBA modelling to inform cost cap
	What regulations are there on the participation of providers in the procurement process?	Voluntary participation (with price caps)	Allows for competition from range of providers, including those outside of the energy market.
	How are the contracts allocated between possible providers?	Price + ‘quality’	Allows non-price factors to be taken into account in contract allocation (if seen to be important)
	How are the prices for the services determined?	PAB	Consistent with use of ‘quality’ factors in contract allocation
Product definitions	What is the duration of the contract (in terms of fixed price and quantity)?	<i>Long-term?</i>	Capex expected to be important , but needs to be consistent with European requirements, and allow competition from range of providers
	What is the nature of the service (capacity vs. delivery)?	Capacity	Delivery costs to be captured through wholesale electricity market arrangements (e.g. Balancing Mechanism)
	How does the price and/or quantity of the service vary over time within the contract period?	<i>No variation</i>	No firm evidence currently available to support differentiation – this should be reviewed based on the results of the TSO modelling

Issues	Definitional questions for procurement approach	Group 4 (Slow Reserve)	Rationale
Contingencies	Are there any locational elements in terms of price and/or quantity?	No variation	No firm evidence currently available to support geographical differentiation (which is consistent with international experience)
	Is the contract unit-specific?	Unit	Consistent with a more regulated approach, but could be scope to move to portfolio contracting
	What are the penalties for a provider who fails to deliver contracted requirement?	Cost to the TSO of procuring the service from alternative provider	Pass-through of remedial costs. Incentive for compliance
Cost recovery	Can providers transfer the obligation?	No	Consistent with the fact that contract allocation not solely price-based. But could be benefits of secondary trading if contracts are awarded for long duration
	Is cost recovery targeted or socialised?	Socialised (where not recover via imbalance)	No strong evidence available on basis for ex-ante targeting of capacity costs. (Long-run) energy delivery costs may be targeted through 'imbalance' arrangements in new HLD

3.5.1 Further issues for consideration for Group 4 services

The major issues for consideration in the next stage of development of procurement options for the services in Group 4 include:

- The appropriate length of contracting period (and the lead time for contracting): which should be informed by further supply-side analysis of the impact of different contract lengths on different types of possible providers, and the strength of the requirements in the EBNC not to contract for longer than a year for Replacement Reserve Capacity.
- The scope for more use of elements of the 'fully competitive' approach (on at least some elements – e.g. PAC, or portfolio- award of contract).
- The impact of system conditions on the value of the service (e.g. to what extent should pricing and penalties be dynamic).

3.6 Conclusions

We have considered how competitive procurement approaches could be applied to the procurement of system services under the DS3 framework. This is based on the limited evidence currently available on supply and demand-side issues.

In general, there is potential to at least introduce competition into the tendering processes for these services. We have collected the system services into four groups, with the scope for introducing additional competitive elements differing by group.

Group 1: grid stability services

The nature of these services would typically favour a long-term procurement approach with scope for competitive allocation of the contracts ('competition for the market'). Therefore, it may be more appropriate to introduce competition for the procurement of these system services using the 'regulated competition' approach (based around competitive tendering).

Co-provision may be particularly important for these services, which could support a joint procurement approach across all of the services in this group – this would help market participants to have visibility of all the potential revenues before making an investment decision.

Group 2: ramping margin services

These services are provided over timescales that are expected to overlap with the intraday market that will be put in place as part of the revised HLD for the SEM. Therefore, it will be very important to understand how the provision of flexibility within market timescales is rewarded in the new market arrangements, before designing any mechanisms that would provide supplementary revenue from the TSO for this flexibility.

A fully competitive approach might be considered for the procurement of these services (based on marginal pricing etc). Further analysis would be needed of the costs and benefits of modifying the existing market arrangements to support a fully competitive approach (e.g. with marginal pricing for ramping margin service) ahead of the implementation of a new HLD.

Group 3 – ‘fast reserve’ services

The nature of these services could support a long-term procurement approach with scope for competitive allocation of the contracts (‘competition for the market’). However, there may be scope to move further towards a ‘fully competitive’ and/short-term approach (on at least some elements – e.g. PAC, or portfolio- based award of contract).

The main issues for the procurement of these services are around contract duration (particularly given default position in the EBNC of no contracting for longer than a year), and how any move to competitive procurement would interact with the current mandatory requirements for these services (in the Grid Code).

Group 4 – ‘slow reserve’ services

The nature of these services could support a long-term procurement approach with scope for competitive allocation of the contracts (‘competition for the market’). However, there may be scope to move further towards a ‘fully competitive’ and/short-term approach (on at least some elements – e.g. PAC, or portfolio- based award of contract).

The main issues for the procurement of these services are around contract duration, particularly given default position in the EBNC of no contracting for longer than a year.

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4. CONCLUSIONS

Any procurement option will represent a set of trade-offs between competing goals – this trade-off will primarily be determined by the duration of the contract and the choice between a regulated and competitive approach. There is some relationship between the contract duration and the degree of regulation of the procurement approach, as a regulated price setting process could introduce more risk into shorter term contracts.

4.1 Introduction of competition into system service procurement

We have considered how greater competition could be introduced into the procurement process for four groups of system services, taking into account:

- the nature of the services;
- interactions with wholesale electricity market design; and
- relevant European requirements and guidance.

These groups are:

- Group 1: grid stability services;
- Group 2: ramping margin services;
- Group 3: 'fast reserve' services; and
- Group 4: 'slow reserve' services.

In summary, a competitive tendering process using non-price factors in contract allocation, and pay-as-bid pricing could be introduced for any of the groups. After the introduction of a revised HLD, Group 2 services may be covered by the trading activity in the intraday market which could support a 'fully competitive' procurement approach.

There may be scope to move further towards a 'fully competitive' contract allocation and pricing process for Groups 3 and 4 than for Group 1. This would also be consistent with the Electricity Balancing Network Code requirement of not contracting for longer than one year (without national regulatory approval) for the types of services in Group 3 and 4. However, it would raise questions about how to introduce any 'competitive' elements for service procurement where mandatory provision is currently required.

4.2 Major uncertainties to be resolved

These conclusions are subject to a number of uncertainties, which remain to be resolved:

- **Outcome of the detailed modelling of the demand for system services that the TSO is currently carrying out** – for example, this could include informing the level of any cost cap (based on 'value') and whether prices and qualities should be profiled over time and/or vary by location.
- **Further detailed analysis of the supply-side for system services** – to inform more detailed proposals for the duration of the contract and the lead time for contracting. This should also consider the impact of using short-term procurement approach for ramping margin services (e.g. impact on investment incentives).
- **Extent to which the procurement options should be designed around the existing market arrangements** (in particular considering capability vs. dispatch

payments), given that a new set of wholesale market arrangements will be introduced from 1 January 2017.

- **Detailed legal review of the European requirements that could apply to the procurement of these system services;** particularly as to whether the proposed guidance in relation to the (state aid) assessment of public intervention for generation adequacy could apply to long term capacity-based contracts for system services.

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