Stability Market Design Expert Group 2

Date:	09/01/2023	**Location:**	Teams
Start:	13:00	**End:**	15:00

Participants

Attendee	Organisation	Attend/Regrets
Ed Farley (Chair)	National Grid ESO	Attend
Thomas Pownall	National Grid ESO	Attend
Cian McLeavey-Reville	National Grid ESO	Attend
Kelly Larkin	National Grid ESO	Attend
Rob Lee	AFRY	Attend
Emilio Ambrogi	AFRY	Attend
Stephen Woodhouse	AFRY	Attend
John McShane	AFRY	Attend
Nicola Todd	National Grid Electricity Transmission	Choose an item.
Iain McIntosh	Orsted	Attend
Cem Suleyman	Drax	Attend
Anser Shakoor	GE	Attend
Max Collins	Statkraft	Attend
Guy Nicholson	Statkraft	
James Hill	Ofgem	Attend
Priyanka Mohapatra	Scottish Power Renewables	Attend
Murdo McGhie	SSE Renewables	
Mike Ryan	Constantine Energy Storage	Attend
John Costa	EDF Energy	Attend
Matthew Tucker	Welsh Power	

1.0 **Introduction and recap from Expert Group 1**

1.1 Ed Farley (EF) introduces the meeting, thanking the attendees for their time and input and then provides a short summary of the meetings' agenda.

1.2 Roundhouse introductions of the panel are then made.

1.3 EF summarises the minutes from the first expert meeting and the discussions held.

1.3.1 This includes the discussion on the tole of the TO in long term stability markets and how they are to participate and the variety of roles that they can fulfil, network planning facilitator, a competitive provider and the provider of last resort. EF also reflects on the discussions held on how the TO should compete within the stability market.

1.3.2 EF provides a summary on the second key topic discussed during the first expert group, the eligibility criteria for the short-term market, with reflections on how we treat the different types of technologies with regards to their capabilities, especially given that some capacity may already be built whereas other projects are still in the development phase.

1.3.3 EF then reminds the panel that both the slides and minutes from the first expert group can be found on our dedicated Stability Market Design Phase II webpage.

1.3.4 A member of the panel asks whether it would be possible share the slides further in advance of the call to allow the member to familiarise themselves with the content. EF acknowledges the merits of supplying this information and will do so where possible in the future.

1.3.5 EF hands over to AFRY to begin sharing the slides.

1.4 AFRY begin sharing their slides, outlining the exam questions for this session, namely 'How do we enforce the selective eligibility for the ST market? Open to all providers? Are there unintended consequences?', 'How is depreciation of TO assets assess in a competitive market?', 'What are the participation routes and business cases for OFTOs and Interconnectors? And 'What are the eligibility rules for expired RAB assets?'.

1.4.1 AFRY then provide an illustration of the outcomes from the Phase 1 of the stability project, touching out the modelling that AFRY has carried out which suggested significant extra cost if stability products are procured on a 'gross' basis, rather than using more selective eligibility criteria which compensates only plants willing to change their behaviour. Accordingly, AFRY reflects on the decision to pursue a selective payment approach.

1.4.2 AFRY then reflect on the Feedback from industry that more work needs to be done to explore these options, with AFRY subsequently undertaking additional research to explore alternative angles to explore this problem.

1.5 Slide 8 is then presented to the panel which outline some of the different models that AFRY has considered. The three core models are then presented to the audience, specially the 'D-1 indication by ESO/units', 'Segmented eligibility' and 'Focus on 0MW synch. Gen'. The approach for indication of intention for both synchronised generation units and 0MW and/or non-synch generation/storage units is also presented.

1.5.1 The 'D-1 indication by ESO/units' is presented to the panel, which requires a forecast of the units' position, either made by the ESO (model 1a) or supply by a unit's self-declaration (model 1b).

1.5.2 The 'Segmented eligibility' excludes baseload units, through a methodology or an agreed approach defined by the ESO; for example, those with a historical pattern of synchronised operating hours higher than e.g., 80% in the relevant season.

1.5.3 The 'Focus on 0MW synch. Gen' model which is itself split into four sub-models each other their own approach for indication of intention for synchronised generation, whereas no indication needed for the 0MW / non-synch assets as these are always eligible as assumed to not otherwise offer stability unless contracted, as is the case with the other two models (1.5.1, & 1.5.2). The nuances of each model are then presented to the panel.

1.5.4 A representative of the panel commented on the complexities of the proposed models and enquired as to whether you would need a clutch to be installed for option 3c. AFRY respond that you would need a clutch for option 3c, but one would need to forgo the payment if you end up running for energy and not using the clutch. AFRY will amend slides to add this clarity.

1.5.5 A fellow representative questioned the ability to stack these revenue streams, to which AFRY responds that there is a piece of work to be undertaken on the stacking of revenues and coordination of procurement of different ancillary services, but in principle if the services are addable, they are stackable.

1.5.6 Another representative asked whether this would be discriminatory as it allows non-synchronous generation units to provide both inertia and energy, receiving payments for both services. AFRY responds by explaining how the principle is you pay for incremental actions or incremental decisions. Another panel member agrees with AFRY's assumption that the megawatt can't be used twice, you either pay for stability or for energy.

1.5.7 A discussion between panel members follows on the topic of whether the system has already bought a MW and a stability service is provided as a by-product, whether payment is to be made for both. AFRY clarifies that for the proposed model 3, if you were going to deliver energy then you are not eligible for an additional stability payment. This was then followed by a discussion between a panel member and AFRY of the technical capabilities of specific technologies, such as wind farms and their provision of inertial services via synthetic inertia.

1.5.8 The discussion moved forwards, with a panel representative referring to possible complexities that stem from splitting and creating a new market for the procurement of stability services. AFRY respond by explaining that there are nuances for different technologies in the services they can provide, referring to a unit fitted with a clutch that would allow for 0MW stability services compared to a traditional thermal plant without the retrofit. AFRY continued by discussion the operational flexibility which comes with fitting a clutch, as being able to provide stability services without the addition of MWs on a system which may not require this additional active power injection. EF then contributed to this, stating a key benefit would be during high wind low demand periods overnight where wind is having to be displaced to allow for conventional generation to come online; bidding off green MW and replacing them with more expensive MWs.

1.5.9 A panel representatives enquired into the modelling behind the cost benefit analysis and how this fed into these conclusions. The representative then asked how the thresholder for baseload exclusion in model 2 would be calculated and whether this is fair given that there are existing plants operating currently that are providing inertia at the moment but aren't being paid. An AFRY representative suggested to move to the next slide, which provided a RAG rating for these different models to help with this discussion.

1.5.10 AFRY presented slide 9 which demonstrated their thinking on the relevant considerations and feasibility of each of the models proposed on slide 8, using a RAG rating for illustration. AFRY then summarised the relevant considerations for each of the sub-models. For example, model 1a was given a red RAG rating owing to the questions this would rise about the forecasting methodology needed, which would need to be transparent as this would likely be subject to challenge. AFRY then continue to merit model 1b as the forecasting is self-determined by units and not the ESO.

1.5.11 AFRY recognised that there will need to be further research into these models, but these suggested options and their ratings are driven by the maximisation of customer welfare. AFRY continued, discussing how these stability markets would not replace conventional markets, such as issuing CCGT via the Balancing Mechanism, and indeed depending on the market structure a CCGT plan may be incentivised to install a clutch to access additional revenue streams. EF reaffirmed the ESO does not want to disincentivise CCGT plant from providing us both as if they are in cost then we would want to utilise them for both MWs and inertia. EF provided a contrasting scenario to the high wind low inertia scenario provided in 1.5.8, in which high peak demand and at low wind, where CCGT would be in merit within the BM for MWs as well, the ESO should not be taking back the stability payment as the ESO is the one who have activated the MW.

1.6 A panel member raised a question on the eligibility for wind farms to provide stability services and for them to get paid how they do not need to be de-loaded to 0 output. AFRY confirmed that this thinking is correct on the basis that they provide the stability services required. The panel member then questioned if there was an unintended consequence from a consumer perspective of this set up, that why should a wind unit de-load when a convention unit could do the same, and save on the fuel cost. An AFRY representative highlighted that if we are de-loaded wind, prices would typically be much lower from a customer perspective. The key point here, they argued, was the use of green MWs for stability rather than turning up conventional units.

1.7 Another panel member clarified that the ESO was of a minded position not to provide stability payments to synchronous plants if they intend to run, which EF confirmed. The panel member then questioned whether the knock-on impact on the short term run cost for units if they did receive a stability payment would be enough to consider a change to eligibility rules, under the assumption that the addition of a revenue stream would allow for the synchronised unit to bid in at a lower price into the wholesale market. EF confirmed that the assumption was that this was not worthwhile.

1.8 A member of the panel thanked EF and AFRY for discussing the different options available.

1.9 AFRY then proceeded to slide 10, offering more depth into the forecasting requirement processes across the three models rated as feasible in the RAG rating (1b, 2 and 3b), shortly followed by slide 11 which provided a deep diver into the relative merits of the shortlisted options. AFRY then explained their three assessment criteria consisting of efficiency, competition level and simplicity to which model 3b was shown to be their preferred option.

1.9.1 AFRY provided their considerations for option 1b, detailing concerns over the D-1 indication system being open for opportunities of gaming and the potential incentivisation given to participants to submit inaccurate and physical notifications. Option 1b was given a green rating for competition level owing to the market potentially being open to all types of technology and simplicity due to ease of implementation.

1.9.2 AFRY provided their considerations for option 2, with an amber rating on efficiency owing to the need to define ‘baseload units’ and concerns that this may not fully prevent other ‘non baseload’ (e.g. CCGTs) units from having the potential to make windfall gains. Competition was rated red due to the this method implicitly discriminating by technology based on the level of generation. Simplicity was rated green due to the ease of implementation as models rely on historic data.

1.9.3 AFRYs preferred option, 3b, was rated a mix of green/amber across the three categories with efficiency rated as higher due to the reduced number of units potentially making windfall gains, however this could lead to distortions on the intraday market. From the competitive perspective, there is the exclusion of participation of sync units without clutches, but there is the option to increased competition by allowing synchronous units to finance clutches through long term or medium-term contracts. For simplicity, there is again the use of information already provided by units, however an added layer of

complexity was noted in the verification process which will add an additional level of complexity for the ESO.

1.9.4 Following this breakdown, a panel member commented that it was welcome to see that the criteria for eligibility was focused on cost minimization and whilst considering wider participation. The representation then questioned where the carbon performance of the resource should be considered given that there is the need to meet net zero. EF responded, summarising ESO's current position to dispatch in cost order, but that we are acutely aware of the carbon implications of this. EF then reflected on the use of zero MW technology, be that from a synch or non-synch plant. AFRY then commented that this point on carbon assets is implicit, not explicit as this design is identifying means to replacing the current methodology which is to spin up CCGT within the balancing mechanism.

1.9.5 The panel member then asked on whether the effectiveness of the providing asset would be taking into account. EF confirms that this will be taking into account and how there will be a performance monitoring regime to ensure that we are paying providers appropriately for what they have delivered. AFRY built on this confirming that there would be need for some testing regime to make sure that the service is being delivered before an asset can become eligible for the service.

1.9.6 A panel members asked the ESO/AFRY team on their awareness of the different regulations which try aim to incentivise accurate physical notifications and disincentives those that are inaccurate which could aid in mitigating the risk identified in option 3b such as through grid code and REMIT. EF recognised the value of this, but clarified that this is less of an element in accuracy when a provider deviates from their intended position, but rather the opportunity for gaming. EF gave the scenario in which a service provider might have an intention at day ahead not to generate but between the day ahead stage and within day, there's significant opportunity for that to change their position. The panel member acknowledged that this is a fair point for consideration.

1.9.7 A panel member reflected that option 3b shares similarities with how a stability pathfinder phase 1 works, in that this works fine by build in the effective opportunity cost in short marginal cost which is fine. The same representative noted that there is the scope for better communication/automation as the operations are present requires resource to monitor large volumes of emails.

1.10 AFRY then present a slide summarising their final thought on this topic which considered how synchronous generators and actually have that inherent capability to offer provide stability services to the grid. And whereas nonsynchronous generators are grid following and did not inherently provide stability. That said, AFRY then acknowledge the development of grid forming converters offers the potential for non synchronous generators to provide stability services, though there are currently limited examples of stability capability for non-synchronous assets in operation so there is the need for a strong signal to encourage equipment to be installed.

1.11 AFRY then opened up the discussion to the panel members.

1.11.1 A panel member raised a comment on the role of existing marketplaces to procure these services, and whether the ESO should prioritise a homogenised set of markets which recognises the value of different services that are provided under different tenders. The member then continued to discuss overlaps within services when buying the same service under different markets. EF responded that the ESO recognises the links between different services, such as restoration, stability and voltage in particular.

1.11.2 A panel member then questioned whether these markets will still be viable under the timelines of implementation. An ESO representative responded in turn that the designs should be fit for purpose in the future and that the design itself may need to take a different form given wider technological changes.

1.11.3 A discussion on the role of mandating grid-forming followed. A panel representative questioned the efficiency of mandating, compared to using a market to identify the right capacity to procure at the correct cost.

1.11.4 A member on the panel wondered if the ESO had considered informing the market that we would commit to buying inertia/SCL at a certain rate when the service was needed through a short term day ahead market, with a price that would either be set per year or by per band, slightly like the DC market. EF responds that the stability market could do exactly this, where this is a price cap on the ESO's willingness to pay for a service and provides that signal. EF then reflects on how the current signals come via pathfinders, but only a few grid forming solutions have been procured thus far. EF highlighted that these narratives are likely to be explored within the third phase of this project.

2 Work Package 2:

2.0 AFRY provided a recap on Work Package 1 and Expert Group 1 recommendations that the counterfactual regime should be the enduring approach, and the want to ensure a level playing field between commercial providers and TO assets to account for the fact that commercial providers could bid in some residual value as part of their submission. Building upon this, they then presented an illustration of how the counterfactual calculation works, based upon annuities calculations and depreciation which followed the Treasury Green Book guidelines. They highlighted the need to consider the current counterfactual approach which AFRY outlined on slide 15; with a focus on the risks of these asset costs being overpriced by assuming that the full cost of the asset would be recovered over the tender period.

2.1 AFRY then presented a slide which examined different models to compare the TO counterfactual against commercial offers to try and improve on the Pathfinder approach. Six models were presented which included a pathfinder evaluation model where the total cost of a counterfactual was depreciated in the tender period without accounting for any residual value after that; models where the ESO could assume a residual value for the TO counterfactual and an option to adjust the commercial offer, so depreciation is assessed over a more equal period. AFRY then provided a description on the role of the TO counterfactual and the commercial providers for each of these six models.

2.1.1 A member from the panel questioned whether there is a need for a TO counterfactual anymore given the success of the pathfinders. Leading on by saying that if they were to try and secure funding for a new project, the first question asked would be if there is going to be a TO involved in the tender and then remarked on the difficulty of securing development funding for these projects. AFRY responds by pointing out that the TOs are not legally allowed to invest in these forms of technology and therefore the TO counterfactual won't be universal, but there should be a counterfactual, at least for SQSS requirements.

2.1.2 Another member commented that if the counterfactual was successful and were to build the stability asset, that asset would then go into the RAB and would deliver a return over the 40 years of the asset. If you depreciate that asset or assume no residual value over the contract life then you are recognising the full cost that the consumer is going to pay for that asset over the pathfinder contract. The panel member then explained that there is a difference between a decision that a commercial provider takes over the residual life of the asset and one where the TO gets a natural advantage as the regulated monopoly. The panel member argued that this should be assessed on the minimal cost to the consumer. AFRY responded that considerations had been made to make the residual value parallel, both for the TO asset and the private asset. However, AFRY continued to explain that this wasn't possible because you know the residual value is a function of many aspects such as the requirement to make money back over a period of time, the state of the asset, and the system requirements. AFRY then explained how option 3 is focused on getting better clarity on that residual value and option 6 is about extending the contract and reducing the magnitude of residual value. The panel member raised that there is a danger of the commercial providers being able to factor residual value into their bid and therefore not

necessarily recovering the full asset value over the contract period. However, there is also an imbalance of the risk that commercial providers face to TO, so balancing one without compensating the other tilts the playing field in an opposite direction. AFRY agreed to this observation.

2.1.3 A member of the panel also pointed out the level playing field implications of these model options to which an AFRY representative agrees that there are no simple answers to solving the question at hand. The member then questioned whether the pathfinder approach provides value for money given the level of inertia (GVAs) provided by the latest pathfinder auction and the expense of this. EF commented that as the recent pathfinder was predominantly based on securing SCL so whilst the costs are higher it does not mean that this was driven by the same inertia requirement and costs.

2.1.4 A panel member raised a question how much resource the ESO wants to spend on the question explored in 2.1.3, and how much work has the ESO done on number crunching and what they think will be the lowest cost assets and refine the market that is being created to draw out those lowest cost assets. As the ESO could continue to commit resources to come up with the optimal level playing field between a TO asset, when in fact it might be a fairer consideration to have this at 5 years given the uncertainty is so high and yet this is taking away resource from developing a short-term market. EF thanks the member for these comments and agreed that there are good points raised here. EF continued to explain that the market aims to deliver the lowest cost solution, which will come from a blend of long- and short-term markets which will work in harmony with one another. That said, EF recognised that there are likely to be events where new capacity is required in a particular area which the ESO would want to procure via a long-term procurement methodology.

2.1.5 A panel member raised the comment that this requires transparency from the ESO in terms of the methodology that has been employed, recommending a consultation before the first tenders run.

2.2 AFRY then presented slide 18, an overview of the different depreciation models taking into account a RAG rating based on the impacts on consumers, the ESO, TO's and commercial providers, highlighting their preference for 1, 3 and 6 for further thought. The ESO asked for further investigation into option 3.

2.3 AFRY then summarised how the proposed methodology for Model 3 would calculate the residual value on the basis of the forecast of future asset usefulness and the choice of contract length (Slide 20) and how further analysis of future needs would provide information to forecast the usefulness period (Slide 20).

2.4 Building on the previous slides, AFRY then stated that, based on the estimation of the future requirement, both model 3 and model 6 remain viable alternatives to the pathfinder evaluation. AFRY then draw this segment to a close and opened the floor up for questions.

2.4.1 A panel member questioned the assumption that the stability criteria would be the same for 20 years. AFRY respond that this project does not accurately assess the need. The panel member commented that stability has a different discussion now, and inertia does not really define stability and questioned whether the ESO is defining the market to fit the technology or defining a market which is in consumer's best interest. AFRY responded that the markets are being designed to fit the technology that we perceive today to be useful, as no market can be designed to be completely technologically neutral, but we do design markets for competing providers to deliver the service cost effectively. The panel member then requested to see a comparison between grid forming and synchronous compensators over the next ten years, though the panel member recognised that this is not a technical forum.

2.4.2 The panel had a discussion on the technologies that are being considered within this project. AFRY reassure that group that there are a host of technologies being considered, and that while there has

been significant discussion on the role of synchronous compensators, this is not a market solely for them.

2.5 Section 3.2: Participation of OFTOs and ICs

2.5.1 Given the limited time that remained of this session, the ESO brought up the summary slide providing an overview of the recommendations for OFTO and ICs (Slide 40). AFRY described how the focus on this exam question wasn't necessarily to determine whether OFTO's and I/Cs should participate, but more can they participate from technical, commercial, economic, and regulatory perspectives. AFRY explain that with the addition of tech such as voltage source converters, synchronous condensers, and more, there is the capability for these transmission assets to provide services. AFRY then summarised that there are a number of regulatory economic issues that are blockers and would need to be considered in order to make this work. These are illustrated on the slide.

2.5.2 A panel member questioned that due to the technical overlaps between stability services and restoration services, is there the scope for overlap between these markets to help drive more efficient value. AFRY acknowledged that there is the scope for cross over.

3.0 **Next steps and close**

3.1 EF provides thanks to the panel, informing the panel that the slides and minutes will be shared and would welcome any written feedback on the content, but also on the running of these sessions.

3.2 EF provides thanks to AFRY as well for preparing the slides and material.