Public

Meeting minutes

Industry ORPS discussion group 1

Date:	18/12/2024	Location:	Teams
Start:	14:00	End:	16:00

Agenda

#	Topics to be discussed	
1.	Housekeeping, introductions, and context setting	Chair (10 minutes)
2.	Round table discussion	Chair (45 minutes)
3.	Break	N/A (10 minutes)
4.	Round table discussion - continued	Chair (45 minutes)
5.	Next steps and AOB	Chair (10 minutes)

Discussion and details

#	Topics to be discussed

1. Housekeeping, introductions, and context setting

1.1 NESO introduced the meeting, explaining that it is being hosted by NESO members and project partners DNV, who are conducting the ORPS review analysis and supporting industry engagement. Agenda and housekeeping items were covered, including the recording of the meeting for internal use only, to accurately capture and share the minutes. Any sensitive information raised during the call would not be included in the minutes.

1.2 There was a quick round of introductions followed by NESO providing some context setting: a brief outline of generator requirements and what Obligatory Reactive Power Service (ORPS) is; the 'Problem Statement', i.e., what challenges NESO faces with ORPS and why it is an issue for the consumer; and a high-level view of the review project and its goals, including industry engagement and analysis.

2. Round table discussion

2.1 NESO presented a slide which outlined key areas identified, as well as questions to consider, during the round table discussion.

2.2 An industry representative raised the topic of reactive power from distribution connected generation and whether it is within the scope of the review.

2.2.1 NESO confirmed that at this point DNO assets are being considered within the scope for review and interviews.

2.2.2 DNV confirmed that DNO assets may form some of the technologies to be reviewed, and the potential impact as they interface with the TSO. DNV asked the industry representative if there was any particular point they wanted to share.

2.2.3 The industry representative expanded by stating that the vast majority of distribution connected generation is connected with unity power factor or providing no reactive power. All of that generation has reactive power capability and there ought to be ways of being able to access it.

2.3 An industry representative highlighted that the reason they attended the discussion group was around the question on whether the ORPS would be technology neutral in the future, whether different considerations would be given to different technology types as opposed to just a pure MVAr provision. Ensuring that considerations aren't just purely focused on the cost of the reactive power service and more the whole system impact of the different evaluation methods for different technologies.

2.3.1 NESO responded, highlighting the initial point made during the problem statement, that ORPS is presently a single price, and that part of the review will be to question whether different technology types might get different payment rates. Ultimately ORPS is cost recovery, or at least it has been there as a cost recovery. It could be that an outcome is that different technologies will get paid a different rate because the cost of providing reactive power differs. This is part of what the project is researching.

2.4 An industry representative highlighted ORPS with respect to offshore sites, where there is a split provision between the OFTO and generator, which could be improved. They asked whether this will be reviewed.

2.4.1 NESO advised that the current scope is the commercial element of the formula in the CUSC, while the X Factor being reference here, (i.e., 100% or 20% payment) isn't in scope though the review will be looking at the end-to-end process and taking on feedback to better understand any problems.

2.5 DNV asked an industry representative about a new generation project their company is developing, what ORPS means to their project and what they perceive ORPS's function to be.

2.5.1 The industry representative stated there are two points, one operational and one commercial.

2.5.2 From an operational point, the engineers look to build the project in full compliance with the grid code. From that point of view, it's another technical hurdle that needs to be adhered to but doesn't present an insurmountable challenge to battery technology as it is capable of delivering reactive power. Therefore, it's a service that needs to be in scope in the design phase.

2.5.3 From a commercial point of view, it's about understanding what it actually costs to provide the service and whether it can be accounted for in the business model. If it occurs at a loss or if under current arrangements it can only be provided at a loss, then it needs to be considered, and consideration given to how the revenue is recovered elsewhere. There is not much public information available for battery technologies providing reactive power, and as has been previously mentioned, the payment mechanism has so far been based on gas prices and would benefit from being reviewed it would be good to see investigative work on how different technology types can be fairly compensated.

2.6 An industry representative raised the following points:

2.6.1 One of the good things about ORPS is that it is well understood, and all companies should have a view on power price and inflation. This mean you can have an idea forecasting what the value might be, then it's just a case of what your expected volumes are.

2.6.2 However, there are challenges with ORPS, due to it being based on utilisation only and not capability. A unit may be providing the capability, but if it isn't utilised, there is no value returned.

2.6.3 The linkages between ORPS and the BM could be clearer. A lot of the value of reactive could be coming through the BM rather than through ORPS..

2.6.4 It would be good to create a market-based approach. This is difficult given the locational aspect of reactive power and ensuring there's necessary competition in certain areas. If there are some areas it can be done it, it should be. Where it isn't an option, the market-based prices would then be known and would inform what the value of reactive is.

2.7 NESO responded to a number of the previous comments:

2.7.1 There are ongoing discussions with DNOs about the barriers to NESO accessing reactive, however it must be borne in mind that it's a challenging issue.

2.7.2 From the operations side there is great value to reactive power and especially dynamic reactive that can respond to voltage changes, rather than passive assets like reactors. It's something participants need to provide because as rightly pointed out, there is also the locational issue.

2.7.3 There is some tension between a market solution and an engineering solution. The point of the workshop is that NESO need to understand the costs, what it means to providers, the impact on operations to provide ORPS; to ensure if NESO come up with a change that it is fair, though it may not satisfy everyone.

2.7.4 Additionally, the scheme was designed in the late 90's where the network consisted of large steam powered generators. Understanding the impacts of technology changes is key.

2.8 An industry representative highlighted NESO's last point, that the grid is still being run with the approach of large steam age centralised generation. To a very large extent the cost of providing reactive power services from inverter-based resources/generation, be that windfarm or battery, is very close to 0 as a marginal cost. The requirements in the grid code are that those resources must have reactive power capability to be connected to the grid. As they have invested in the capability to connect to the grid, and if thinking of a radical proposal, why not consider making much more use of them? If a provider was making use of a Volt-VAR response, a response to varying local voltage and the provision of reactor power, rather than a dispatch-based process or market-based system, would make it a zero-cost service. This may be controversial for a providers, but likely has some basis in the underlying economics.

2.9 DNV stated that they would like to understand from developers on the call their views on how potential revenue from ORPS is considered, and whether it is significant/insignificant? How does it compare with other services?

2.9.1 An industry representative responded that ORPS has a low value overall in the grand scheme of an overall business case. However, it does have a role, so would be included. It might be a relatively small percent, but if a project is to be taken forward, it needs to make internal hurdle rates and demonstrate that the investment will be paid back.

2.9.2 If ORPS is changed or reduced, or there is less certainty of the predictability of the future, then it would have to be replaced with something else. For example, for battery storage, you'd be looking to bring in additional revenues from other services, or from wholesale market trading, but you would then have to believe those revenues are available and if it's for a wind farm or a solar site for example, you might then need to believe that you can create a higher CFD price. This goes back to the original point about the whole system impact of a restructure of ORPS, that there would be a knock-on impact to CFD prices, and the actual cost of electricity increases as a whole because developers look to recover costs.

2.9.3 For more traditional plant ORPS is a small overall portion of the revenue stack, but it's an important part to be able to make the hurdle. In summary there are two parts, one is the overall value, and one is the ability to have confidence that that market will be there for the long term.

2.10 An industry representative responded to the previous comment, agreeing that the value is relatively small: for BESS almost insignificant, for Synchronous Compensators more significant.

2.11 An industry representative responded to the above points, on the contribution to overall revenue from these services. It would be useful for the review to quantify what small or very small value means. A quick calculation shows that something of the order of half a percent of the revenue of a generator typically might come from ORPS.

2.11.1 If it is so small, does a market-based solution make sense, particularly if the cost of providing that service is very low. The other side of this is also to look at what is the potential benefit of enhanced reactive power services. A radical standpoint on ORPS could be, what would you need to do in terms of reactive power provision to reduce the number of areas suffering from Voltage constraints? Could this be addressed, particularly in terms of addressing it on a much more localised basis than is currently done?

2.12 An industry representative responded with two points. Firstly, that half a percent revenue on ORPS is lower than they would have expected. Secondly, the value in the short term, for both ORPS and ERPS, has a higher value placed on it, as there is certainty in the business model, as opposed to other services that might change, e, g. the cost of capital and indexation is known, the short-term revenue is of higher value than that same revenue in year 20 or year 25 of a project. This is worth clarifying as long-term certainty is important for any business case, but the short term probably adds more value. However, it would be difficult to share information breaking down the percentage of how much value ORPS and other reactive power services add to a specific business case, as this is commercially sensitive information.

2.13 An industry representative responded, agreeing that providers can't provide commercially sensitive information. They suggested maybe modelling a generic technology to get a view, but there is also the alternative to look at the different technologies in isolation.

2.14 NESO responded that the discussion group isn't asking specific details. Instead, it's seeking a clear understanding of what is impacting providers. As suggested, that could be a generic

model, it doesn't need to be specific numbers, rather is it high impact, low impact, etc, so it helps with understanding the commercial impacts of changing something or even keeping it the same.

2.15 An industry representative added that in terms of the value of these services, NESO report on a national basis in terms of cost of ORPS per day, and that information is publicly available. Calculating ORPS, based on a comparison to active power, is easy to do. The information reported per generator through ELEXON and BMRS may actually make that information effectively available on a public basis per generator.

2.16 DNV asked the group their views on moving from a pure utilisation payment to capability payment.

2.16.1 An industry representative stated that there is merit in this approach, because ORPS utilisation is concentrated on a small number of plant, and this is often what is left of the large baseload generators. However, everyone has to build in ORPS capability, and if not used, there is no value received for it. There could be a more mixed approach, maybe not all capability, but there could be merit in reflecting that everyone's incurred a cost to install the capability into their projects.

2.17 An industry representative added that it's mostly large synchronous machines which are currently providing ORPS, and this should be recognised as part of the project.

2.17.1 Including in connection agreements that new small DER should connect at a 0.99 power factor and absorb a bit of reactive power by default, would make a huge difference. However, this is a fundamental change to the current approach.

2.17.2 It is suggested to include Australia within the TSO analysis, as they are mandating a volt-var response and a volt-watt response from small, distributed energy resources because it helps contribute to the reactive power capability and voltage control across all levels within the network..

2.18 DNV advised that the list of jurisdictions is still being finalised, and it is likely that Australia will be on the list.

2.19 DNV asked the group a follow up question about the dispatch of reactive power. Would there be any technical difficulties or operational difficulties sending out instructions to every generator type, no matter whether is a rotating machine, battery storage, or wind farm?

2.20 An industry representative responded that instructions are quite often at the extremes of lead. By doing so there can be concerns in terms of wear and tear, though it's difficult to anticipate when something will break. Generally speaking, there's not much concern purely from an instructions perspective.

2.21 DNV responded asking the industry representative that this suggests that monitoring the losses in providing leading or lagging power is not considered in the financial models.

2.22 The industry representative responded, agreeing, and explaining that it also comes down to the fact the service is mandated.

2.23 NESO asked the group a technical/operational question. Most generators are put into a target voltage set point and operate more dynamically providing the reactive power. Are there any particular issues operationally or commercially if operating in this mode? If a fixed MVAr instruction is supplied, does it cause any particular issues or cause more costs for the generators?

2.23.1 Another NESO representative responded, stating that most generators are required in target volts, simply because it gives dynamic capability. It can be a challenge for conventional generators because they're given a target reactive but will tap their gen transformer and let the AVR do all the work. Although they are given a target reactive dispatch, they are still capable of providing. For example, for a wind farm using synthetic elements to produce the reactive power, the control system needs a constant target volt dispatch, so they are given a target voltage that will affect their MVAr output depending on the nominal system volts.

2.23.2 ORPS doesn't distinguish between the technologies and just gives a price for dispatch. If a gen transformer is dispatched, it will to some extent vary its output, but with a synthetic unit it will try and keep to its target volts until it runs out of capability.

2.23.3 The primary value in dynamic equipment is not to dispatch it to its full range because then it can't move any more in one direction, so won't respond post fault.

2.23.4 Another question is does it make a difference to operational costs, or technically, when operating at unity or if you're full input or export reactive?

2.24 An industry representative asked a follow up question. From a battery storage point of view, is there an impact on the export of power if the battery has been drained slightly when pre providing reactive power services?

2.24.1 NESO responded, agreeing that it would, adding that some batteries may have another reactive element with them that isn't entirely dependent on the battery.

2.25 An industry representative added that in terms of the group membership here, it could be beneficial to have some of the OEMs present to answer some of these technical questions about the impact on power efficiency, the likes of Siemens or SMA, etc.

2.26 An industry representative added that when delivering reactive capability from a wind farm, depending on if the wind farm is overplanted or not, there are a large number of turbines combined as a module. This can cause availability challenges, as there are always turbines running in and out. It should be noted that they're not as binary as would be seen with synchronous generation, where it is one BMU to one unit.

3. Break

4. Round table discussion - continued

4.1 NESO reopened the round table discussion following the break.

4.2 An industry representative raised the subject of Power Potential, that NESO and one of the DNOs looked at the potential for reactive power services from a distribution level, and that it would be worth revisiting.

4.3 DNV asked the group if there are any technical difficulties to DER around receiving instructions?

4.3.1 An industry representative responded that in terms of receiving instructions, a lot of markets for distribution connected resources are going the way of not needing one, instead just giving a volt-var voltage set point and a slope, necessitated as part of the connection agreement. This removes dependency on communication and there is a predictable performance resources. There is also the potential of having it as a free service as the device is already capable of providing that type of response and can do so at virtually zero marginal cost.

4.3.2 There is a risk around continuing ORPS, or maintaining this as a reactive power market, where the overall value is relatively low. The benefits to the consumer, and the benefits to the overall system operation of having it as a mandatory free service provided by all resources, would be amore attractive mechanism.

4.3.3 DNV responded that one of the issues may be that reactive power is pushed to the distribution level where the distribution network may not be able to cope with the fluctuation of voltage.

4.3.4 The industry representative responded stating that voltage set points at distribution level help address one of the major distribution level challenges, which is voltage fluctuation at the end of long distribution feeders.

4.4 An industry representative responded to the prior point about dispatch instructions, and that they would not see any issues responding to requests to dispatch in different modes for bigger organisations, but there is a question there for smaller developers.

4.5 DNV asked the group, what impact would it bring to the generators if the voltage is not controlled properly or if the power factor at the point of connection is not at unity?

4.5.1 An industry representative responded that the general point is that all generators are able to operate over 0.95 absorption of reactive power. The capability is there already, and the challenge is that there is a large amount that could still be utilised.

4.5.2 DNV asked, if a generator operates at .95 versus at .98, then are there any differences, or extra losses, if the amount of active power is maintained?

4.5.3 An industry representative replied that they have observed that a greater degree of reactive power correlates with a greater amount of active power and loss of expenditure.

4.5.4 An industry representative highlighted that there is a cost to being available for ORPS. Plant exists which can go down to the minimum stable limits and below in most cases. However, there is a point where the units import to keep preservation to achieve the reactive power capability that's being asked.

4.5.5 DNV asked for confirmation that this relates more to older generation types, such as type 1 or type 2 windfarms, or a node synchronous generator getting close to the end of its life. The industry representative confirmed this.

4.6 DNV asked the group if testing or recertification has, or would, bring any challenges to generators.

4.6.1 An industry representative asked for confirmation if this was referring from moving from CC to ECC compliance. DNV confirmed.

4.6.2 The industry representative advised that it would be challenging to move people from one to the other, unless they have significant mods.

4.7 DNV asked group's views on retesting a unit's capability, via on site witnesses, to obtain recertification.

4.7.1 An industry representative stated that an onsite witness test would be unnecessary. Large generators have operational metering, with the option of dispatching remotely a particular voltage set point or MVAr level. Therefore there is the option to be fully remote, independent of any request to the generator, and by being done remotely they would not incur a cost.

4.7.2 An industry representative added that NESO should be aware of the challenges it would cause older generators to switch from the GB code to the EU code. Changing the compliance point and asking for new models could involve a large cost. If there were to be additional expense, there is the possibility that plant would be closed.

4.8 DNV asked the group for their opinions on the ORPS formula. Is it outdated? Can newer elements, other than the power price, be brought into the formula?

4.8.1 An industry representative re-iterated a point from earlier in the meeting, that the formula is well understood. However, it doesn't necessarily reflect the value of reactive power. It is the same price for every half hour of a month, and the value should fluctuate to some extent, so a market-based approach would be better.

4.8.2 An industry representative asked why ERPS hasn't been bid into since 2011?

4.8.3 NESO responded that code modification CMP305 is to remove ERPS, because there will be a reactive power market in place of ERPS..

4.8.4 An industry representative added that to their understanding, NESO won't pay more for reactive than they'll pay for ORPS, potentially creating a barrier to providers.

4.9 DNV asked the group for their views on why the 50% of the ORPS formula is linked to the Retail Price Index and 50% to Power Price Indices.

4.9.1 An industry representative replied that initially RPI didn't comprise 50% of the formula, instead it was the short and long run marginal costs which acted as proxies. It's very difficult to find an index which reflects the actual cost. Given some of the costs are related to losses, which is then related to the cost of the power, there is rationale around basing it on the power price.

4.10 DNV asked the group if they have any concerns over substituting one proxy for another.

4.10.1 An industry rep responded there was no overall concern, as long as the methodology is sound and results in a pricing mechanism which is reflective and accurate. The important

thing is to establish a process that is robust going forward so that the future projects can benefit from the certainty.

4.10.2 An industry representative added that one of the factors that ought to be considered is what would be the benefits of making the price zero and making use of the capability that already exists within the vast majority of generation. How would it impact voltage constraints, and would that impact the ability to connect more generation more rapidly, helping achieve clean power 2030, or net 2050?

4.11 DNV asked the group if there were any reflections they would like to share on the prior comment, i.e. zero reactive compensation.

4.11.1 An industry representative responded that CP2030 will change the way reactive power is utilised. Nuclear is coming off (though has had life extensions) and gas will be running less. NESO should consider what is available in order to manage the requirement. Regarding setting the price to zero, while the costs are not huge, they do exist; therefore, this is not viable. One concern would be that embedded technology may not be wholly effective. There have been studies that pointed towards this. In many of the tenders for reactive stability, many embedded assets were not eligible. There is opportunity for NESO to find a way to utilise the DER capability.

4.11.2 An industry representative added, that as the voice of the consumer NESO should consider zero compensation in conjunction with OFGEM and other consumer representatives. It would take a change in approach within the control room and on the operational side to view reactive power as something that is readily available from resources. In a situation where everything is dispatched pre fault, leaving nothing post fault, it would be beneficial to have reactive power availability from all resources. If done correctly, there could be an extra 5 or 10 GW connected as a result of improved reactive power control.

4.12 DNV asked the group for their views on the concept of a reduced ORPS payment and volumes, but also having a generator market for reactive power.

4.12.1 An industry representative responded that AFRY's report set out short-, medium- and long-term markets and they are the benchmark for reactive. It could be worth reviewing if there is a way the short term could be extended to within day, however the locational aspect makes this difficult. It could be kept as mandatory for areas with low liquidity, while in high areas a competitive process is created.

4.12.2 NESO added that there have been previous discussions about removing the mandatory service and replacing it with a market. The main challenge is around the volume of capacity or capability, given the locational nature of reactive power needs.

4.12.3 The industry representative responded that NESO could incentivise capability in areas of low liquidity through the long-term processes and long-term tenders. Once all providers are on board, then move to a market framework. Mandatory frequency response is a mandatory service with a market. Capability in mandated but there is no mandated price because there is enough capability to ensure price discovery.

5. Next steps and AOB

5.1. NESO reminded the group that the call was recorded the purpose of compiling accurate minutes.The minutes will be shared in due course. DNV will use the information gathered during the call and incorporate it into their analysis.

5.2. They will also be leading on one-on-one engagements with service providers of the 11 potential technologies identified and they'll be taking place in January. They are will also run an industry wide webinar and the provisional date is the 11th of February. Providers on the call were advised to reach out if they’re interested in participating in a one-on-one interview with DNV

5.3. In addition to this discussion group, there will be a second NESO led group towards the end of the project. This will be to gather feedback on the recommended new methodology.

End of meeting