

ESO Technology Advisory Council

TAC-8

Date: 02/09/2022	Location: Virtual
Start: 09:00	End: 12:30

All material from the meeting can be found on the ESO Technology Advisory Council website: <https://www.nationalgrideso.com/who-we-are/stakeholder-groups/technology-advisory-council>

Participants

Attendee	Organisation
Vernon Everitt (Chair)	Transport for London
Chris Dent	University of Edinburgh
Jo-Jo Hubbard	Electron
Simon Pearson	Independent
Fred Drewitt	Limejump
Andy Hadland	Independent
Judith Ward	Sustainability First
Alastair Martin	Flexitricity
Kate Garth	RWE Renewables
Melissa Stark	Accenture
David Sykes	Octopus Energy
James Houlton	Amazon Web Services
Naomi Baker	Energy UK
Shubhi Rajnish	ESO
David Bowman (Facilitator)	ESO

For specific agenda items

Attendee	Organisation
Bernie Dolan	ESO
Gabriel Diaz	ESO
Chi-Ho Lam	ESO

Andrew Fletcher	ESO
Steven Bland	ESO
Ian Dytham	ESO
Richard Winterburn	ESO
Rob Rome	ESO

Apologies

Attendee	Organisation
Graham Campbell	Scottish Power Energy Networks
Teodora Kaneva	TechUK
Randolph Brazier	Energy Networks Association
Peter Stanley	Elexon
Claudia Centazzo	Independent
Chris Kimmett	Reactive Technologies
Anastasia Vaia	BP
Alvaro Sanchez Mirales	STEMY Energy

Agenda

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1. Welcome and introductions
2. Minutes of last meeting and matters arising
3. Feedback from the last meeting
4. Balancing Programme – Programme Vision
5. Balancing Programme – Open Balancing Platform
6. Network Control Programme
7. Subgroups update
8. Next meeting and calendar
9. AOB

Discussion and details

Topics discussed

1. **Welcome and introductions**
 - The chair welcomed everyone to the meeting.
 - Shubhi Rajnish (ESO CIO) introduced herself.

2. Minutes of last meeting and matters arising

- The minutes from the last meeting are out for circulation. Comments are requested by 9 September ahead of publication.

3. Feedback from the last meeting

- Bernie Dolan outlined the feedback from the last meeting and how it has been used by the Balancing and Network Control programmes.

4. Balancing Programme Vision

- Rob Rome introduced the vision of the Balancing Programme.
- ESO talked through the Balancing Programme Strategic Capability Review and the vision for the programme.

Discussion points

Demand side response (DSR)

- Can DSR be privileged?
 - Balancing Programme has been working on the DSR flexibility scheme for winter 2022/23 with several suppliers, following on from a trial with Octopus earlier in the year that the Balancing Programme led. The ESO has licence obligations not to favour particular technologies, but the new platform will put DSR on an even keel.
- Feedback from participants on the winter flexibility scheme has been positive and those involved have enjoyed working on a focussed programme. It demonstrates that the industry can respond quickly and there is a desire to try new initiatives. There is scope to go further.
- The key to maintain pace of change is not to go at the speed of the slowest. Most industry change tries to move the industry in lockstep. The successful programmes appear to be the ones where motivated players opt in.
- While the ESO does have licence conditions, there are ways that specific sectors can be helped, for example like renewables have with various support schemes.
 - If the ESO requires code or regulatory changes, then we should be considering this now.
- From an optimisation point of view, consideration of support schemes and carbon prices may just mean changing numbers in the optimiser rather than technical changes.

Customers

- The product vision does not explicitly talk about customers. This should be detailed further. In addition, topics like cost-of-living should be considered. The Balancing Programme work helps with this as it plays an enabling role for increasing competition in markets and DSR. In general, start with consumers and work backwards.

REMA (Review of Electricity Market Arrangements)

- Where does the Balancing Programme sit with this? REMA will mean profound changes to the market, for example splitting the wholesale market into thermal and non-thermal dispatch. In addition, there may be a move to locational marginal pricing (LMP) or central dispatch. Measuring success will in part be about delivering the bits of REMA that ESO are responsible for.
 - REMA has profound impacts for customers. There are huge issues about winners and losers for commercial customers and households, for example flexible and locational signals going through to consumers.
 - The ESO is engaged with markets and networks team across the ESO who are leading on REMA internally. We are also engaging with international technology providers on LMP solutions to understand what would be required. We have used this to assess the Open Balancing Platform (OBP) to check it is flexible enough. We have tested that platform is adaptable to in terms of optimisation, display and dispatch capabilities, and can implement
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changes when the new arrangements are confirmed. The existing systems cannot cope with this.

- If gas prices are decoupled, what happens with the current balancing system? May need to accept that systems cannot adapt sufficiently for every change.

Net-zero and other policy goals

- The ESO cannot currently consider carbon intensity of actions, but Energy Bill will introduce primary duties on the Future System Operator (FSO) including around net-zero. It is necessary to consider how the vision sits with this.
- Another success criteria should be the ESO not being a blocker to policy goals.
 - We have created a “Service X” that is as different as possible to today to try and test this. In general, need to modernise technology ready for all asset types, new technology etc. Are measuring in the non-functional tests and prototyping.
 - Conversations with international partners has highlighted challenge of how we integrate with partners across the industry. Participants need to be ready for change.

Merit order dispatch

- The vision is looking better than it was this time last year. Measuring success is becoming increasingly complicated. On merit dispatch, one idea would be to have to justify actions for (say) five days per year to the satisfaction of industry, rather than aim for 100% merit order dispatch. Performance could drop if the market has changed and the systems have not kept pace.
 - This is worth exploring. Traditionally, KPIs have been set in advance and then performance measured, but this has meant that we could be “red” because of something out of our control.
 - Also need to consider what is “100% merit order”. We can only take decisions based on the information we had at the time.
- The point is not to get dispatch perfect, but to have a constant attention on performance.
- The ESO may be marked down on performance at the beginning but would get a lot of feedback and engagement from a range of companies.
- The new systems must not bake-in existing system tendencies, for example that CCGT's are able to declare minimum flattops.

Cost of living and winter

- How does the current cost-of-living crisis and rota disconnection sit with the new Balancing Platform?
 - Current control room systems are being changed to cater for the winter coal contracts and demand flexibility service. These will act as prototypes that will be extremely useful when considering the enduring capability.
- If consumers are not using energy because they cannot afford it then DSR is not accessible to them. The distributional impact needs to be considered, especially on customers (industrial or household) who cannot be flexible. Demand turn down is beneficial for the whole system but we but there is a need to think about those left behind.

Market depth

- The Balancing Transformation Programme Strategic Objectives could be expanded to cover market depth, not just the size of the market. For example, could the ESO manage a market with 100% flexible assets.

5. Open Balancing Platform

- The ESO introduced the key concepts for the Open Balancing Platform (OBP)
- OBP will be built on RedHat but the important point is that it will be a hybrid cloud platform be a hybrid cloud platform. This means we can do testing quickly and flexibly using public cloud and then transfer across securely into our CNI systems. This will give great efficiencies.

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- The ESO is using modern cloud native development techniques. We are building modular applications that are deployed within containers. There will be a fully automated development and promotion process.
 - We will use DevSecOps - developers write code using modern techniques and the automated testing that goes with it.
 - Also using GitOps. Traditionally, multiple environments have been used for testing and training that each need to be manually configured. With GitOps, each environment defined in config and any change goes through a control process.
 - We will use incremental build with microservice architecture, under the Scaled Agile with Engineering (SAFE) framework. We have an eye on how much we need to prove to have confidence in the architecture and are applying good system engineering techniques alongside our agile approach.
 - Business outcomes include a platform with high availability and automated recovery built in.
 - The technology stack includes a Gurobi dispatch optimiser with 24-hour supportability and a React display client.

Discussion points

- How do you protect against supply chain vulnerabilities?
 - Andrew – not using many software-as-a-service (SaaS) applications. One of the principles is although we are developing on Azure we are not taking many Azure services as they are not available in the CNI world. Most things run on OpenShift platform so we can have copies on Azure and in the CNI environment so we are protected against third-party hosting.
 - Containerisation – this makes sense but hard to do with databases because they have to live somewhere. How do you maintain like-for-like test data environments? For example, do the databases look similar.
 - We have a rigid policy – only accept products that can be containerised. Main database is EDB.
 - Where is the ESO in the process?
 - We have the development environments up and coming and also have the test approval process.
 - There will be a substantial amount of fascination about the data. For example, academic research, scenario modelling, exploring what-if services/technologies etc. Subject to rules of engagement the databases need to be replicated and made available to those in non-operational timescales.
 - We need to do some more thinking about how to engage with this. Data models of components is optimised for the real-time process. Data will be archived off quite quickly due to nature of real-time balancing. Is there scope for standing up an environment that industry folk can play with?
 - The new architecture looks extremely complicated.
 - The complexity has to exist, and this is something that must be understood.
 - Highly modular systems can pose challenges. For example, to add a new service you need to get people from each area in a room. How many people will have a really good holistic view? How many are from the ESO and how many from IBM?
 - We are one team, not an ESO team and in IBM team. IBM is not delivering this, IBM is part of the team. In terms of who understands the system – there are a lot of boxes but most of them are trivial. Have a good team of architects who understand the bigger picture. We also have leads for each area who have a good understanding.
 - The one team nature is driven from the executive level downwards.
 - The ESO will have an inherent understanding of how the system works.
 - Other questions to consider include: will changes to the system be just part of BAU or will every change be billed incrementally by IBM? Can ESO make their own changes to the system? Who owns the IP for the code, could ESO port it to another technology services provider?
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- Core release component model slide could be used to answer question around REMA, LMP and dispatch. How does this diagram change with LMP? Even communicating this is something that can give stakeholder reassurance.
 - What can be done in market reform to make the balancing challenge easier? For example, if all domestic solar has a battery, then that helps.
 - We may need to tell the market that if you do it a certain way then then it will work straight away. We can tell the market what would be easy or easier to implement.
 - How will the ESO ensure each team and domain is ready for a release? Have you established a release discipline, to stop everyone throwing their commitments in. It is important not to wait until the system is live before developing this.
 - The current domain boundaries are quite soft. We have a number of agile teams but everyone has visibility of entire picture.
 - To create a production like discipline we are learning as we go. For example, in building adapter components to talk to the legacy system and maintaining multiple different environment configurations.

7. Network Control programme

- The ESO outlined the vision for new control room user experience. We want to move towards active situational awareness.
- Current users have multiple screens within a screen. How to navigate through these is something that has become second nature, but this is not right. It should be a natural aid to their experience and ability.
- It currently takes operators 3-6 months to learn the toolset, which is not good enough in the modern world.

Discussion

Human-machine interface and decision support

- There is a lot of academic research on the links between human/machine interface and decision support that is worth considering.
- Parties in the Global Power System Consortium are looking at topics in this area. There may be a chance to drive the agenda.
- Many of the visualisation packages are not up to the mark for ESO needs – this is an extremely complex area. Consider 1) what do you want it to do and 2) how do you blend it with “what-ifs”.
 - We are looking at how we get to a airline cockpit-style environment, where there is an “autopilot” but also the facility to operate manually if needed.
 - We get a control room engineer who is used to seeing everything to a place where they won’t and don’t need to see everything. We need to take people with us.
 - A challenge is making sure every operator sees the same thing (a single version of the truth). The response may be different, but at least the starting point is the same.
- Consider factors that can lead to a negative inertia for change, such as fear of new technology or letting go / automation. These are often bigger challenges than the technology itself. Task will have to be automated because otherwise they will not be possible. Make sure you learn about the non-technical aspects of the transition.
- In control room revamps, the control user needs to guide the technology and set-up choices, but the opposite is also true. For example, a few years ago a control room user would not have thought to develop a control room for a battery. With disruptive technologies such as distributed energy resource it is important to get external people looking it.
 - We are looking at this in certain areas, for example getting car manufacturers to advise on ergonomics.

External case studies

- Telecoms and mobile networks have been through this. Gone from few thousand mobiles to 180 million devices in the UK. Consider going to their control rooms.

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- We have links with Vodafone and this is something we are looking to arrange.
 - There are opportunities to speak to transport operators, for example Network Rail and Highways England.
 - Consider aeroplanes and airports. Airbus are probably the market leader from how to move from analogue to multi-functional. Do you want the set-up to be standardised or with a high-degree of personalisation. With planes, the old world was zero flexibility. Now pilots can configure exactly what they want to see and have swipe-in cards that load their preference
 - We are a bit conflicted about standardisation versus personalisation. There are pros and cons of both. When we have incidents, the reports often say that a particular user did not have a certain display on their screen. There may be a fixed set of displays that everyone has to see.
 - Look at NATS (National Air Traffic Services). They have done a huge digitalisation rollout. First the bit they control and second their consultancy.
 - Look at London City Airport. Everyone is operated remotely and their considerations are similar = eg safety, multiple inputs/outputs, weather.
 - Look at tier one trading houses like Goldman Sachs. Highly dynamic market but customisation with single systems that operate in different environments. Don't have the safety element per se but compliance, regulation and the ability to inflict damage. There may be opportunities to visit given the ESO is not in competition with them.

Alarms and alarm management

- Need to consider alarms. Wind companies have thousands of alarms. There are ICE standards for networks. The wind industry is really good at mapping faults to losses and then mapping losses to how you fix it. Usually the operator can see type of fault, size of loss, production impact and show this allows you to show a smaller number of alarms.
- It is hard to get to a smaller number of alarms unless you map this to impact but this is incredibly engaging for the control room because this is exactly what they are doing in their head. Perhaps have a workshop with the operators on leading alarms and the groupings of them.
- As the ESO and electricity transmission owner (TO) integrated, a lot of alarms are for historic reasons. But we find that some operators like to see them so need to work with them. But also want to go further – don't just want to alarm. It needs to help the operator and guide them what to do. The more it can help the operator the more they will make consistent decisions.
- Modern aircraft looking to offer checklists with alarms.
- Think careful about how you integrate alarms and communication systems (how people communicate eg email, Slack, Teams). When Octopus have an incident it immediately kicks off a discussion in Slack.
 - For the ESO, this could be about links to the corporate affairs and media teams.

8. Subgroups

- There have been no sub-group meetings since the last TAC.

9. Next meeting

- 2 December, 09:00 – 12:30.
- Consider having next meeting in-person in Wokingham.

10. AOB
