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ESO Technology Advisory Council

TAC-2

Date:	05/03/2021	**Location:**	Virtual
Start:	09:00	**End:**	12:30

The feedback captured during the meeting on the Axis collaboration tool can be found in the accompanying spreadsheet. This document summarises the feedback received verbally and via the Chat function.

Participants

Attendee	Organisation
Vernon Everitt (Chair)	Transport for London
Randolph Brazier	Energy Networks Association
Graham Campbell	Scottish Power Energy Networks
Claudia Centazzo	Smith Institute
Chris Dent	University of Edinburgh
Kate Garth	RWE Renewables
Andy Hadland	Arenko
James Houlton	Amazon Web Services
Jo-Jo Hubbard	Electron
Teodora Kaneva	TechUK
Dennis Leach	Limejump
Alastair Martin	Flexitricity
Simon Pearson	Energy Systems Catapult
Emma Pinchbeck	Energy UK
Alvaro Sanchez Miralles	STEMY Energy
Melissa Stark	Accenture
David Sykes	Octopus Energy
Anastasia Vaia	BP
Judith Ward	Sustainability First
Ulrika Wising	Shell Renewables and Energy Solutions

Sonia Lalli (Facilitator)	Accenture
David Bowman (Technical secretary)	ESO
Graham Dolamore	ESO
Norma Dove-Edwin	ESO
Colm Murphy	ESO

For specific agenda items

Attendee	Organisation
Craig Dyke	ESO
Gavin Brown	ESO
Sree Menon	ESO
Gary White	ESO
Ian Dytham	ESO
Keith Eller	ESO

Apologies

Attendee	Organisation
Chris Kimmett	Reactive Technologies
Peter Stanley	Elexon
Grendon Thompson (Observer)	Ofgem
Pirvinder Bansel	ESO

Agenda

#	
1.	Welcome and introductions
2.	Minutes of last meeting and matters arising
3.	Business Plan summary
4.	Introduction to Role 1 (Control Centre Operations)
5.	Introduction to the Balancing and Network Control Programmes
6.	Control Centre: Balancing Programme overview and technology
7.	Control Centre: Network Control Programme overview and technology
8.	Balancing and Network Control wash-up

Discussion and details

#	Topics discussed

1. Welcome and introductions

- The chair welcomed everyone to the meeting.
- Four new members introduced themselves.

2. Minutes of last meeting and matters arising

- The chair noted that the minutes of the last meeting had been published on the ESO website.
- The terms of reference document was approved and will be published on the ESO website.

3. Business Plan summary

- Craig Dyke (Head of Strategy & Regulation) provided a summary of the ESO RIIO-2 Business Plan.
- As background he outlined the ESO's ambitions, how the ESO sits at the heart of the energy sector, and the energy landscape assumptions the Business Plan has been developed to manage.
- He provided an overview of the ESO's RIIO-2 proposals, which are centered around three Roles: Role 1 (Control centre Operations), Role 2 (Market development and transactions) and Role 3 (System insight, planning and network development).

Q&A

- Q: Does the ESO have the investment it needs?
- A: The ESO has what it feels is enough, but the cost-pass through funding model means it can unlock additional investment if this is in the interests of consumers.

- Q: Does the Technology Advisory Council (TAC) sit across all three Roles?
- A: It will sit primarily across Role 1 and Role 2 as this is where most of the technology investment is. It was noted that Role 3 is key to enabling investment to decarbonise energy.

4. Introduction to Role 1 (Control Centre Operations)

- Gavin Brown (Power System Manager and Head of ENCC Future Design) provided a summary of the ESO's control centre operations.
- He outlined the energy trilemma and operability challenges that need managing in real time, the changing generation and supply mix and the control room processes from day-ahead to real-time.

Q&A

- Q: What licence or codes changes would need needed to factor carbon intensity into balancing?
- A: The ESO currently has licence obligations to balance the system economically and efficiently, independent of carbon-intensity. Our ambition is to be able to operate the electricity system carbon-free by 2025. The ESO is developing a metric to monitor the carbon intensity of balancing.

Other comments and feedback

- As we move to an environment with more renewables and individual units (including those which time-shift demand), what aspects of market design and decision analysis algorithms do we need to re-visit, to complement the hardware and software implementation? For example Bid-Offer Acceptances (BOAs), where the combination of piece-wise linear shape over time of deviation from

forward contract position, with the effective unwinding costs meaning that it's necessary to decide both when to issue instructions as well as what instructions to issue, are very challenging for mathematical optimization. There are also major optimization and control challenges in managing network constraints if flow patterns become more complex, and in coordinating management of transmission and distribution network constraints.

- As the number and indeterminacy and impacts of behaviour driven changes to demand/generation profiles changes and become more distributed it will be critical to consider balancing issues across all levels (DNO/DSO etc) in the system rather than the regulated silos.

5. Introduction to the Balancing and Network Control programmes

- Graham Dolamore provided an overview of the Balancing and Network Control programmes, and where the ESO would most value the TAC's expertise and input. This will centre around people, process and technology.

Q&A

- Q: How will the ESO manage micro-resources, for example heat pumps and electric vehicle chargers? Will the associated culture change, away from an engineering focus, come fast enough, to allow these to be used?
- A: The ESO sees a role for aggregators and virtual lead parties (VLPs) (or their equivalents in the future) in enabling the ESO to use micro-resources. Development of codes and a common data standard across the industry are also important. Indecision should not be allowed to get in the way of decarbonisation - if the ESO can facilitate the pace of change in technology, the industry will naturally decarbonise.

6. Introduction to the Balancing Programme

- Graham Dolamore, Sree Menon and Gary White presented an overview of the Balancing Programme.
- They focused on the current challenges, the desired state and the foundations of the Balancing Transformation.
- The key inputs for the TAC will be: is our approach right, what are the different types of challenges you have addressed and how, is a micro-service architecture the right way to go, and how do we set our teams up for success?

Q&A

- Q: What are the instructions listed on the slides?
- A: They are bid-offer acceptances (BOAs) – a request for a market participant to increase or decrease the energy generated or consumed. Most of them are sent manually by the control room, although there is some basic multi-dispatch functionality.

- Q: Does GB use AGC (automatic generation control) dispatch?
- A: Unlike some other markets, GB does not have set-point dispatch, locational margining pricing or AGC. It is a purely economic model - we instruct for commitments and instruct if we need to pull back.

- Q: How is Firm Frequency Response (FFR) procured?
- A: FFR is procured through a monthly tender process. Work is ongoing to reform the Response and Reserve markets.

- Q: Will the ESO be participating in European balancing markets?
- A: As a result of the UK's exit from the European Union, GB does not have access to EU balancing platforms and is therefore unable to participate in projects such as TERRE.

- Q: Has the ESO settled on a micro-services architecture?

- A: A micro-services architecture is the ESO's vision for the future, but we want to seek the TAC's expertise around what the considerations are. We are currently in the foundation stages of our thinking.

7. Introduction to the Network Control Programme
   - Ian Dytham introduced the Network Control programme.
   - He focused on the current technology, the limitations of the current systems and the desired state.

   Q&A
   - Q: Is the ESO using international automation / protection standards (eg IEC 61850)? International (open) standards are essential, as they reduce the risk of vendor lock-in and bespoke systems, and enable modular interoperability.
   - A: We do use standards, although some of these are old and need to be updated. One of the challenges is to change the business position on the legacy technology without impacting the rest of the industry in a costly manner.

   - Q: Do all the of the current systems use common data sources, or are there lots of duplicate or overlapping data sets?
   - A: Outside of the IEMS there are lots of duplicate data sets that contain the same information. For example, Balancing Mechanism Unit IDs. In theory, Elexon hold a master list but internally we use several different lists for various purposes.

   - Q: What are the current interfaces with DNOs/DSOs?
   - A: We have ICCP links to DNO SCADA systems. For some DNOs we have direct links to their SCADA systems. As part of our Regional Development Programmes we are looking to expand this, because to manage embedded generation we will need direct SCADA links.

   - Q: Is the GE solution full stack in the sense that it does hardware interface, communications, data capture, storage, calculations, user interfaces? Is there a way to start to decouple those elements?
   - A: Yes to both. We think there are ways to decouple, however product vendors tend to sell integrated solutions, but we are seeing some evidence of this model starting to evolve to more open approaches.

   Feedback
   - Potentially lots to learn from other sectors (such as telco) about shifting from alarms to service management in their control centres (alarm volumes are humongous). The systems analyse the alarms, determine services impacts and service restoration and help identify root-cause.
   - It would be good to get clarity on the objectives / outcomes articulated from a business outcome perspective. What are key whys and then work from that to align solutions needed. For example - what's the why behind a real-time sharing data platform (what are we looking to enable), what will a digital twin enable us to do and what is the value. This will help make sure we are driving the right solution aligned to a why / business or customer outcome.
   - DSO links is a key area. The ESO will need more links with DSOs to make collaborative ancillary service / BM procurement function properly.
   - The COORDINET project is an example of TSO/DSO coordination.
   - Considerable development is required to enable DSO across all distribution networks. Real-time visibility of power flow below 11kV is very limited so investment is required to provide the visibility and capability required. This is a key foundation for RIIO-ED2 plans.
     - The ESO is doing work in this area – some examples include 1) with WPD and Centrica in the Cornwall Local Energy Market, 2) through the RDPs on constraint management, 3) with UKPN on Reactive Power market coordination through the Power Potential project, 4) with Scottish Power Energy Networks on Distributed ReStart.

8. Balancing and Network Control wash-up

The feedback captured on the Axis collaboration tool can be found in the accompanying spreadsheet. The notes here are a summary of the discussion during this section.

Transmission-Distribution collaboration

- All transmission and distribution networks agree that deep collaboration is vital. A national and a local approach is needed.
- T-D (and other suggestions) are not entirely within the ESO's control – it will also need action from other networks, Ofgem, BEIS and others.
- The ESO has a leadership role through its position in the energy system and due to its track record. The ESO should be proactive and go beyond what it is mandated to do.

Technology and operations collaboration / collaborative transformation

- The companies that are really using technology to transform the way they operate have a close synergy between technology and their operating model – they build technology to enable their operating model rather than procuring technology for the operating model they currently have. This requires product-like teams and technology teams who are close to the operational teams. This is hard to achieve if too much technology is procured.
- Developing technology in house can help connect organisations with their customers rather than being bound by contracts.
- A simple test: can the person using the software speak easily to the person who wrote the software?
- Operations teams need to *own* change and feel like it is being done *with* and *for* them, not *to* them. An example was given of a large transformational programme where the change team was embedded into the operational community (rather than the other way around). This did not change what was done but did change the mentality.
- Need to understand the operational mindset – not many people have sat in the control room and experience difficult operational situations.
  - The Balancing and Network control programmes are embedded in the business community. The ENCC Future Design team (Gavin Brown) provide validation that solutions are operable. But the ESO is early on its journey and is keen to learn from other organisations and avoid mistakes of the past.
  - The teams are multi-disciplinary with product managers, service managers, CNI representation, control room engineers. This is how the ESO is starting, but we need to find the right balance between bringing in the right expertise from outside and growing our own talent. Once the transformational programmes are complete, some of the expertise that needed to run a change programme may not be required.
  - The ESO is moving to an operating model which will form a true partnership between operations and technology.
  - On working with third-parties the ESO has sometimes found it difficult to get more bespoke or modular products and services. TAC input on areas or examples over where members have been able to turn off-the-shelf into more of a partnership model is appreciated.

Skills

  Need to make sure the ESO has the right skills internally to work with external partners. ESO is going through a transition from needing a large focus on power system engineering to one where a much wider range of disciplines are needed.

Start-up mentality

- Need to be clear what parts of a start-up mentality the ESO should copy. Start-ups are designed to fail – this is not an option for the ESO.
  - As part of the RIIO-2 Business Plan the ESO sought funding to build alongside, rather than refresh, the current suite to move towards a start-up mentality with the option to innovation and (where appropriate) fail.

Relationship between hardware/software and human-machine interface implementation

- There are two sides to this. The implementation of hardware and software, and how people use it, and the underlying decision science that need to be resolved.

Percentage of perfect

- A perfect hindsight model would provide a "north-star" to ensure focus on actual business outcomes. This will help with prioritisation of the transformational roadmaps. As the system evolves, it will allow us to check we are maintaining or improving performance.

Planning under uncertainty

- Need to be able to visualise and predict errors and uncertainty and incorporate these into planning. Then you can optimise under uncertainty.

9. Open data and digital market enablement

- Colm Murphy provided a summary of the ESO's plans for open data and digital market enablement. These will be discussed in more detail at the next meeting.
- The ESO will become a "better buyer" – maximising participation, reducing barriers to entry and increasing competition in markets. The aim is to allow all market participants 1MW and above to participate in all our markets.
- Plans include shortening the procurement horizon and reducing ESO and participant exposure to uncertainty.
- Underpinning this is an increase in transparency and visibility of need.

10. Ways of working

- The group briefly discussed how the meeting had run. There was broad agreement that the interactive elements had worked well.
- A suggestion is to allow voting and categorisation of ideas earlier on.
- The ESO and the Chair will discuss how to best set up the working groups where feedback can be provided on more detailed proposals, with the key themes brought back to this strategic level.

11. Next meeting and calendar

- Proposals is for the group to meet every quarter for a half-day on the first Friday morning of the month, 9am – 12.30pm. The next meeting will therefore be 4 June 2021.
- The provisional agenda for the next meeting is: data and analytics platform, digital engagement platform, Balancing and Network Control programmes.

12. AOB

- There was no AOB.

The chair closed the meeting by thanking members for their participation.

Decision Log

Decisions: Made at last meeting

ID	Description	Owner	Date
1	Minutes to be held under the Chatham House Rule and anonymised minutes published	All	ERSG-1
2	Template for ESO papers, as presented at ERSG-1	ESO	ERSG-1
3	Format for discussion of ESO papers, as discussed at ERSG-1	All	ERSG-1

| 4 | Action Log, as presented at ERSG-1 | | | ESO | ERSG-1 |

Action Item Log

Action items: In progress and completed since last meeting

ID	Description	Owner	Due	Status	Date raised
1	Provide comments on Terms of Reference	All	15/01/2021	Closed	ERSG-1
2	Provide comments on the non-disclosure agreement and conflicts of business interest forms	All	15/01/2021	Closed	ERSG-1
3	Confirm arrangements for signing NDA and COI forms	ESO	15/01/2021	Closed	ERSG-1
4	Provide guidance on the process for reviewing and scrutinising material	ESO	15/01/2021	Closed	ERSG-1
5	Create an annual calendar of meeting dates	ESO	ERSG-2	Closed	ERSG-1
6	Provide a photo and short biography suitable for the ESO website	All	15/01/2021	Closed	ERSG-1