ESO Technology Advisory Council

TAC-5

3 December 2021

Meeting slides

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TAC-5 agenda – 3 December 2021

Item	Duration	Time	Topic	Presenter / lead	Notes
1	10 mins	09:00 – 09:10	Welcome and apologies	Vernon Everitt – Chair	
2	5 mins	09:10 – 09:15	Minutes of last meeting and matters arising	Vernon Everitt – Chair	
3	15 mins	09:15 – 09:30	Feedback from the last meeting	Dan Delgado Steve Bird	
4	60 mins	09:30 – 10:30	Zero carbon operability / Enhanced frequency control	Jay Ramachandran Cheng Chen Tim Pinton James Daniels	• Pre-read: material in the slide pack
		10:30 – 10:45	BREAK		
5	45 mins	10:45 – 11:30	The GB Virtual Energy System	Carolina Tortora	• Pre-read: update paper on early thinking (attached to email)
6	30 mins	11:30 – 12:00	RIIO-2 BP2 (April 2023 – March 2025)	Dan Delgado Steve Bird	• Pre-read: material in the slide pack
7	15 mins	12:00 – 12:15	Subgroups update	David Bowman	
8	5 mins	12:15 – 12:20	Next meeting and calendar	Vernon Everitt - Chair	
9	5 mins	12:20 – 12:25	AOB	Vernon Everitt - Chair	
		12:25	Close		

Welcome and apologies

Item 1

Vernon Everitt

Minutes of last meeting and matters arising

Item 2

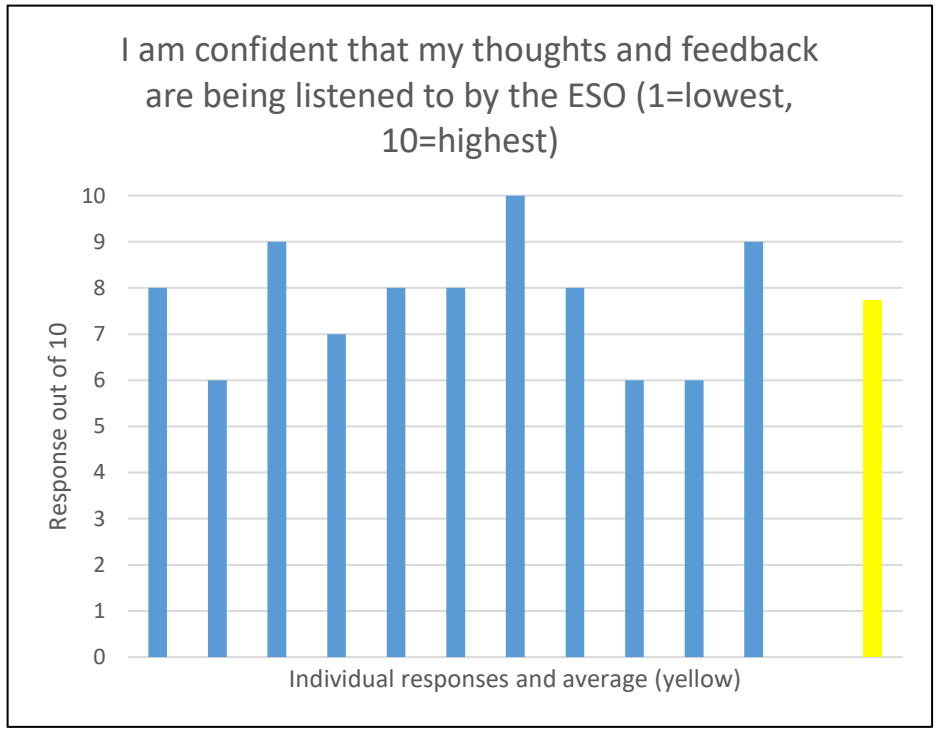
Vernon Everitt

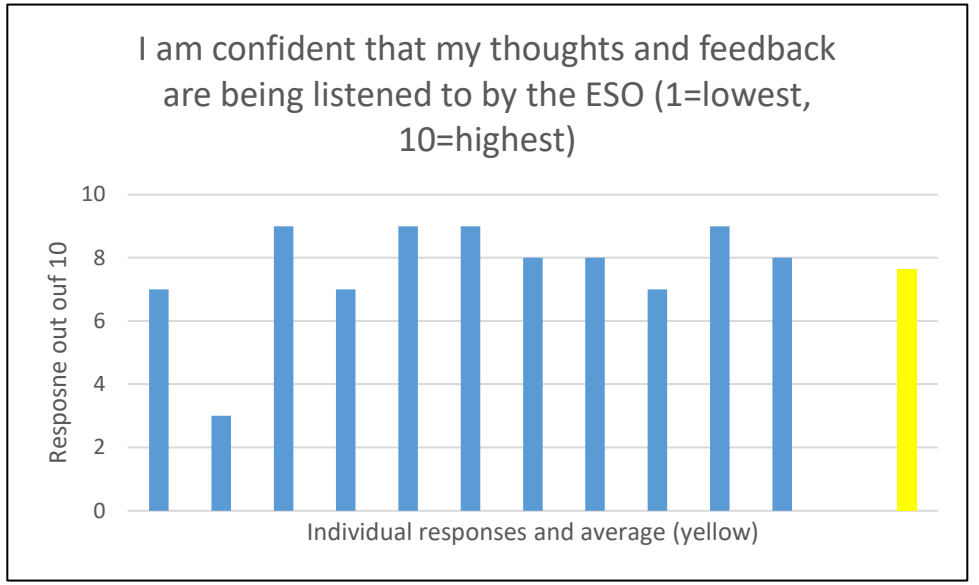
Minutes of last meeting and matters arising

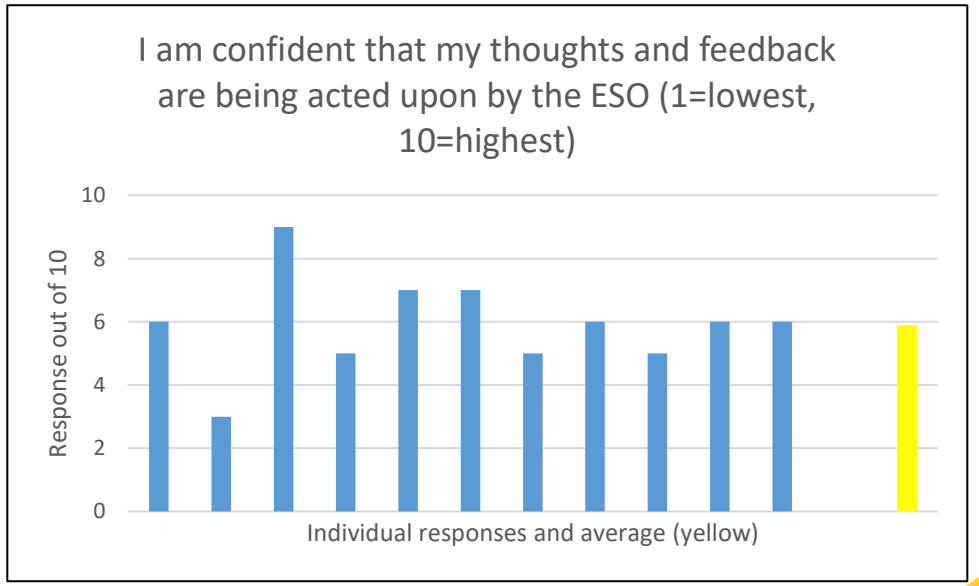
- Minutes of TAC-4 were agreed via circulation and published online
- The feedback from the meeting has also been published

- This section will be used to discuss any matters arising

Feedback from survey







Feedback comments and responses

Comment	Response
Can meetings be face-to-face?	We would like to hold face-to-face meetings in the near future, subject to availability and covid-19 guidance
How are discussions and input of the TAC (including matters minuted) taken forward and actioned (or not) by the ESO?	• At the beginning of each meeting we provide a playback of how we have used the feedback. • In March, we will produce and publish and annual report describing the work of the TAC and how we have used the feedback
It would be good to hear wind and solar generators in the TAC	• We agree – suggestions are welcome on how to enable this
Well organised and managed, good advance information and well chaired during the meetings to ensure the agenda is well covered.	• Thanks!
TAC has been quite high level so far. Some deeper dives may add additional value. It would be helpful to split out discussions about general ESO strategy (market design, operating model) and technology decisions (system design, capability, technology procurement choices) as the two are getting conflated.	• We agree. We have think it has been important and useful to provide an overview of our direction of travel. This helps familiarise people with our journey and because many projects are still in the early phases. • We will discuss more detail in future meetings and in the subgroups, and will try to delineate strategy and technology proposals.

Suggested topics for future discussion

- Data transparency and open data platform for service providers
- Future System Operator Future System Operator, especially the step-up like needed by the ESO to meet roles set out in consultation
- Ofgem DSO governance review, in particular collaboration
- Enabling greater wind and solar participation in markets
- How ESO technology programme overlaps with other industry initiatives such as Modernising Energy Data and Energy Data Task Force
- Co-ordination with other entities in the energy sector. Aligning to international standards such as CIM
- Methodology for setting participation requirements in balancing and ancillary services,
- Design of algorithms and platform issues
- More detail on technology solutions being decided upon by the ESO
- More focus on the technology side – technical architecture, functional requirements feedback, early stakeholder priorities. At the moment it seems culture heavy

Feedback from the last meeting

Item 3

Dan Delgado, Steve Bird

We have broken down the TACs feedback into 3 core themes, and highlighted how we have addressed these in our upcoming submission and wider delivery

Theme 1: Customer-Focused delivery

1

Key topics raised:

- Customer-focussed design; Feedback loops; Avoiding perception that engagements are just 'IT projects'

Actions taken

- Case studies exemplifying customer focus e.g. DEP / Enhanced Balancing Programme
- Highlighting of customer insights, persona mappings and research conducted

- Customer-focussed design thinking now a core component of all delivery engagements.
- Proactive collaboration with business areas and pooling of customer insights

Theme 2: Implementing a Digital ESO Culture

2

Key topics raised:

- Ensuring a 'one team' ethos; Avoiding business/IT service dynamics; Encouraging collaboration to break down silos

- Emphasis on growing collaboration between business and IT, transition towards a product-based Op Model and reduction in silos
- Katzenbach Centre engagement and performance of culture survey

- Our Katzenbach assessment has encouraged us to review our strategic priorities focusing on the three areas: customer care, collaboration and operational excellence, driving a series of transformational initiatives

Theme 3: Implementing a Product-based OpModel

3

Key topics raised:

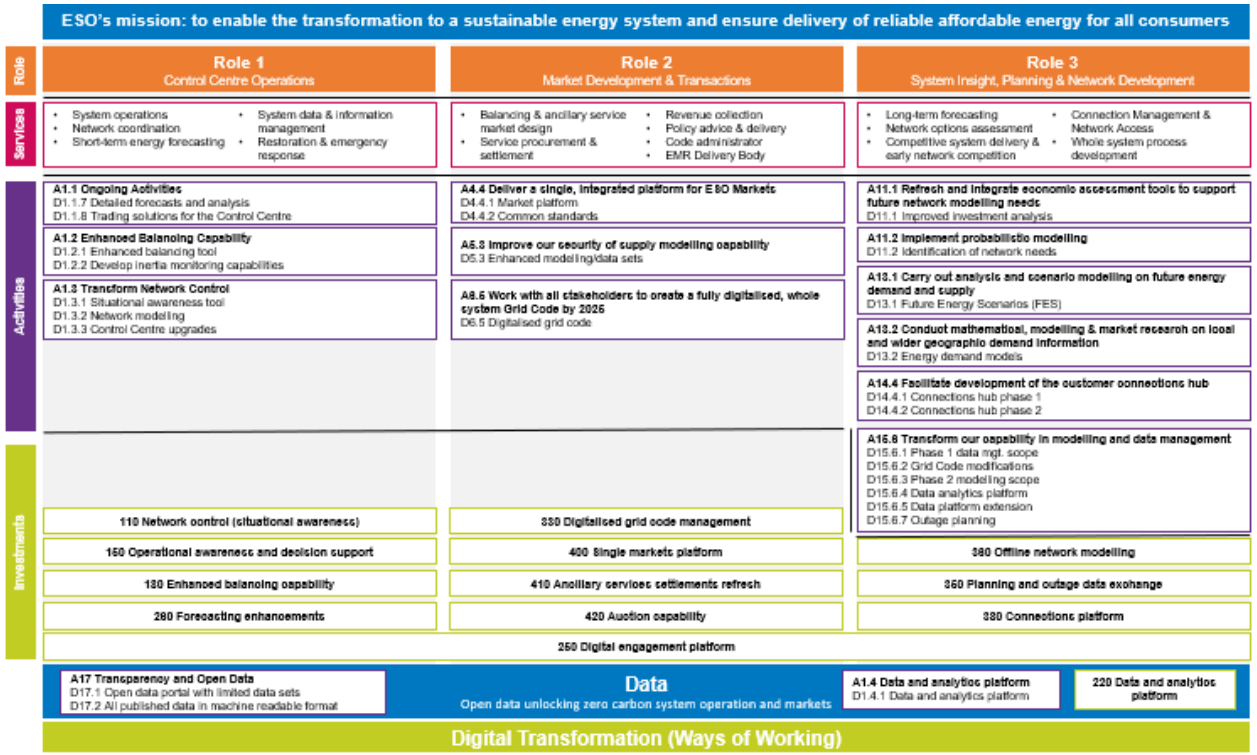
- Sprint / product planning and delivery discipline; Regular feedback; Incremental delivery, Customer validation

- Expansion of ESO phased product-model approach, product planning and roadmaps
- Detailing of product-based portfolio governance vision and early implementation

- Piloting of product-based methodologies on existing inflight ESO projects to drive insights generation and help support our migration

Alignment of our delivery activities to ESO objectives and customer value

- A clear feedback theme was to better demonstrate the linkage between delivery activities, ESO end services, and value to consumers.
- To address this we have developed a ‘Digital Matrix’ (right) which maps our DSAP investments and activities to the ESO’s delivery roles and services, underpinned by our wider Data and Ways Of Working transformation activities .
- Finally, to make this tangible for end consumers we have also mapped our investment activities back to our core consumer benefits outlined in our original RIIO2 strategy paper for enhanced traceability



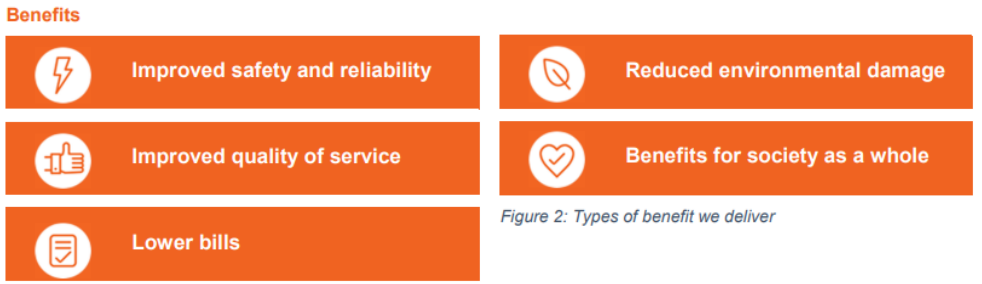


Figure 2: Types of benefit we deliver

Zero carbon operability / Enhanced Frequency Control

Item 4

Jay Ramachandran, Cheng Chen, Tim Pinto & Gary Devine

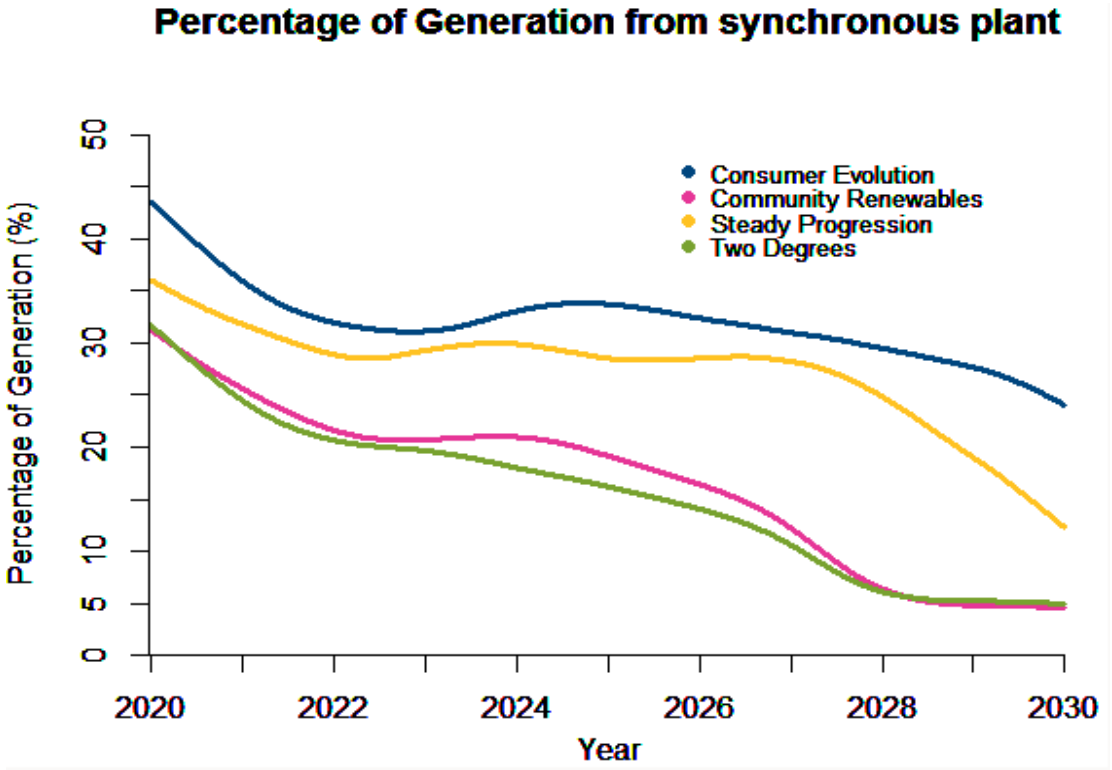
Agenda

- Background
- Scope of Zero Carbon Operability / EFC Project
- Different Phases of EFC Project
- Monitoring and Control System (MCS)
- Discussion

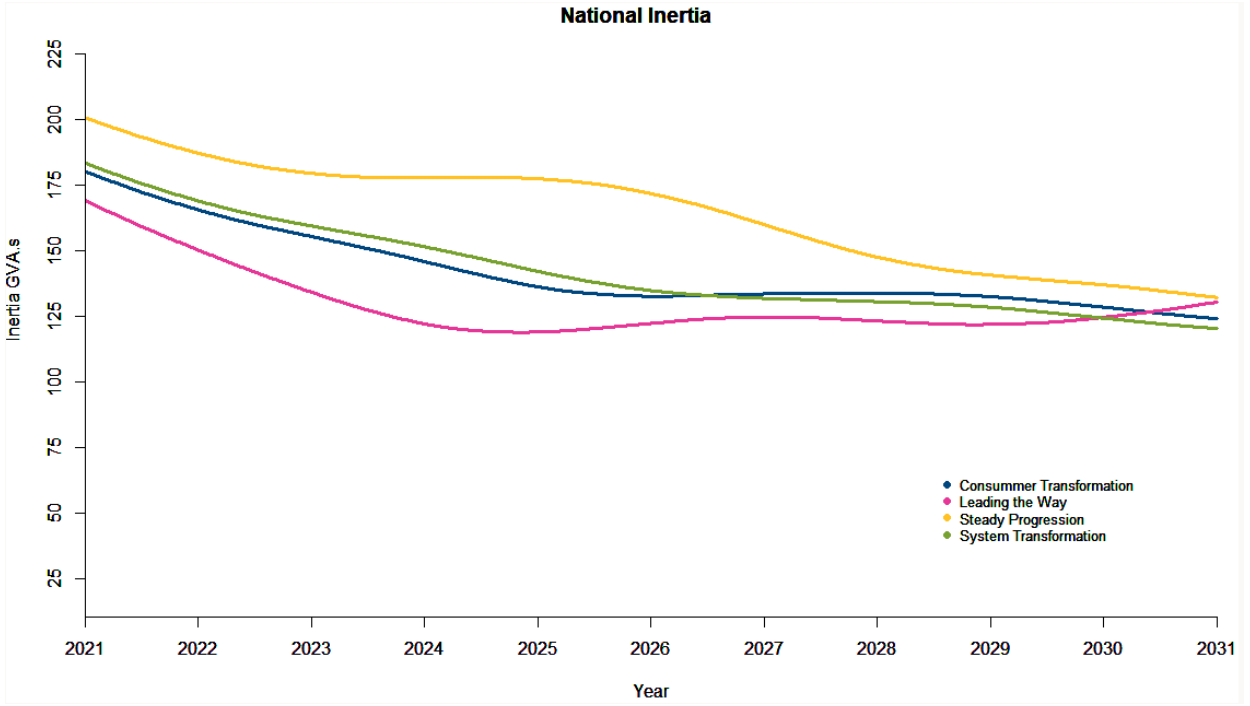
Discussion

- The key points to be considered for the ZCO communication networks / IT infrastructure (latency, Cyber security etc)
- The impact of communication services at the service provider sites (Internet/4G/5G) and associated risks to ZCO project
- The expectation on Frequency Stability Services that could be developed through ZCO (BMU, non-BMU units) and their interaction with other services
- The responsibilities of different parties; NGESO, TOs, Market Participants, DNOs so on

Background : GB System Changes



The conventional synchronous generations connected to the system is declining that reduces the system inertia



The average system inertia is declining for the future years

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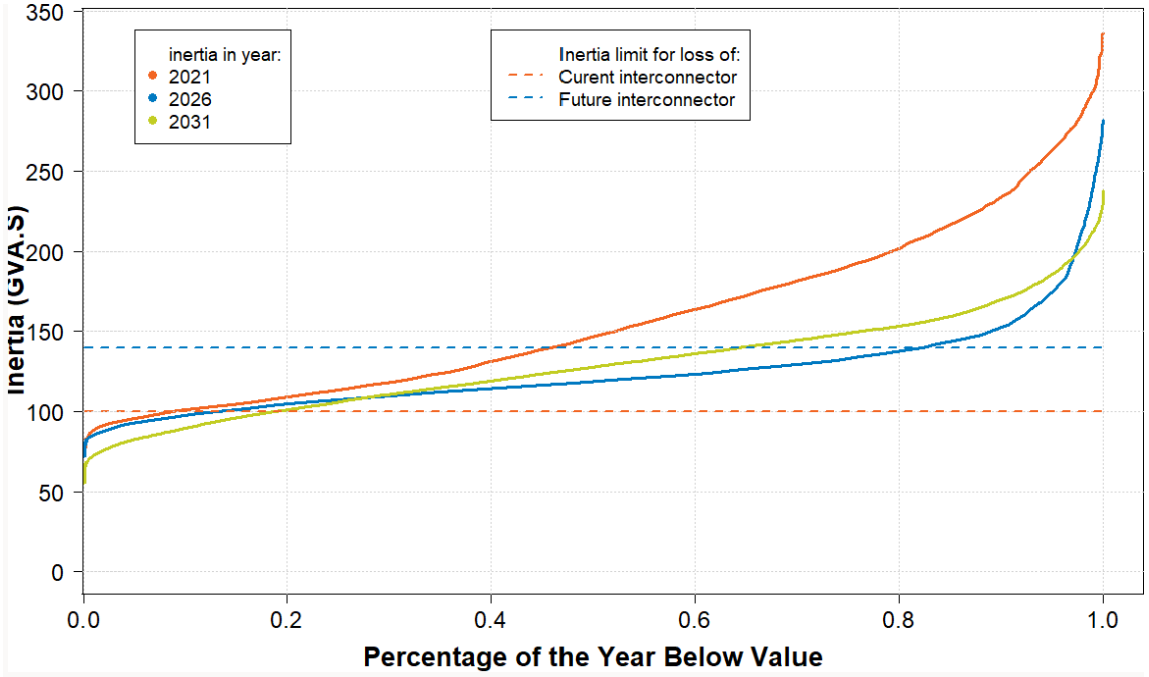
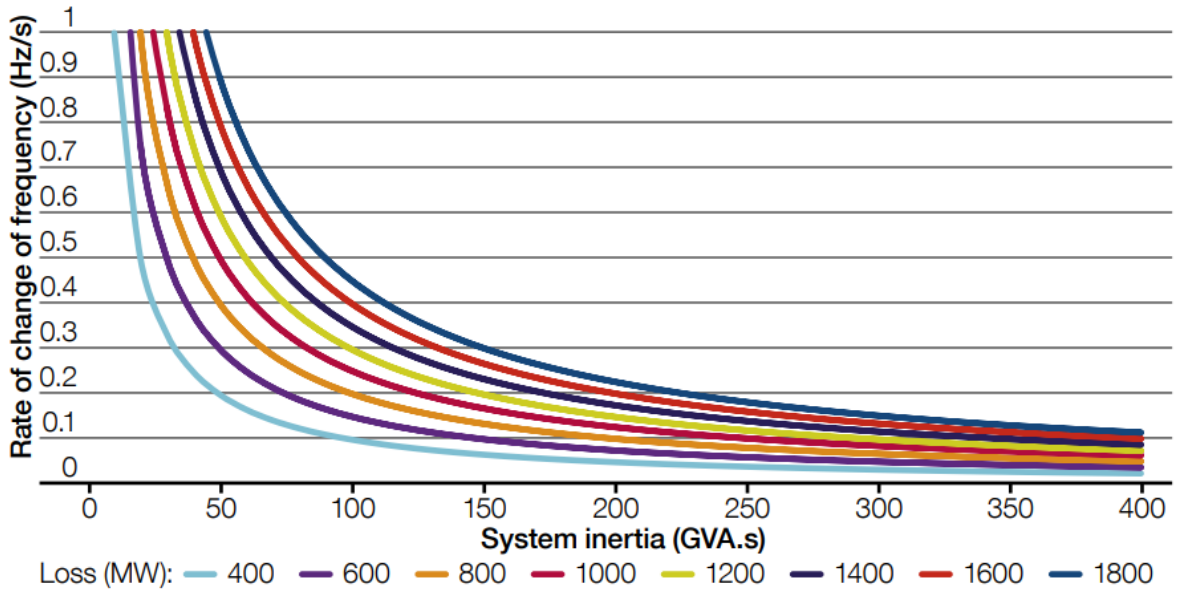
Background : Impact on Rate of Change of Frequency (RoCoF)





- Lower system inertia together with larger power infeed loss would induce higher RoCoF, which requires faster frequency responses
- Frequency is more volatile when system inertia is low
- Frequency response needs to be fast and coordinated

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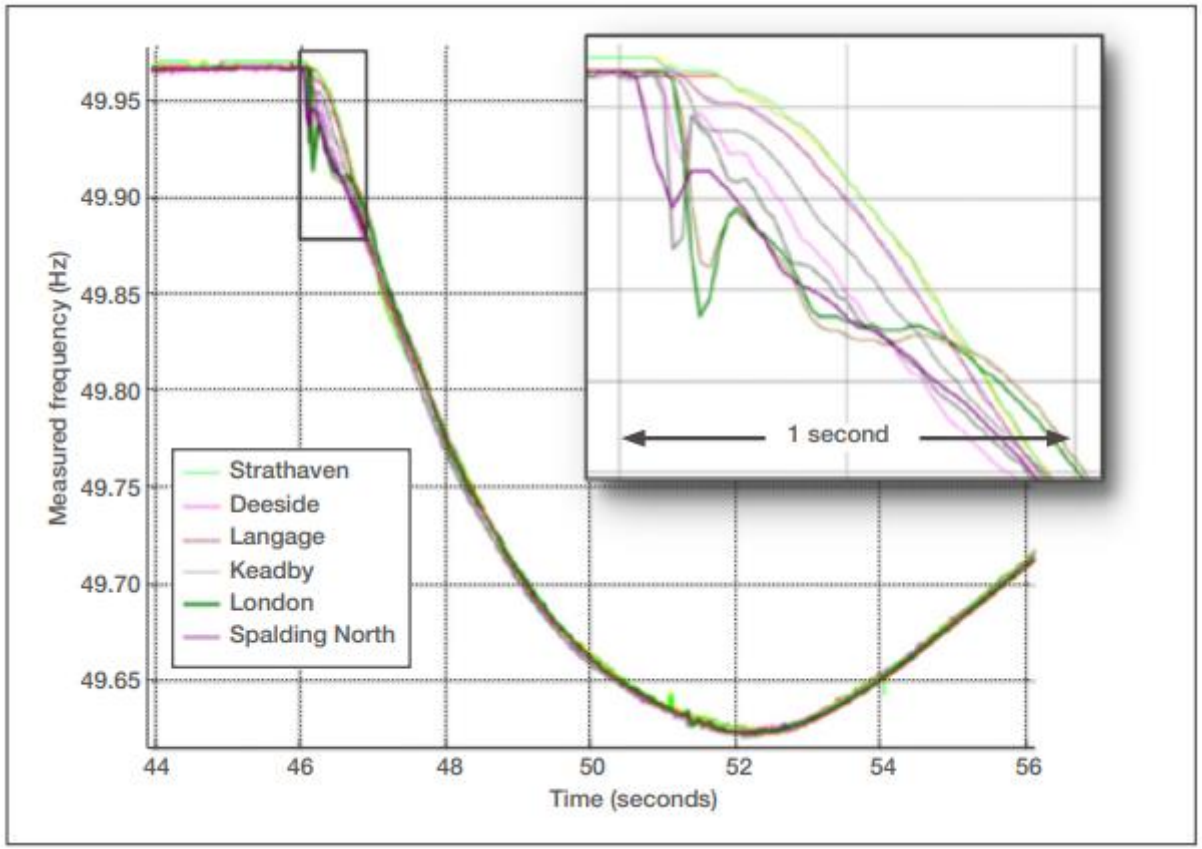
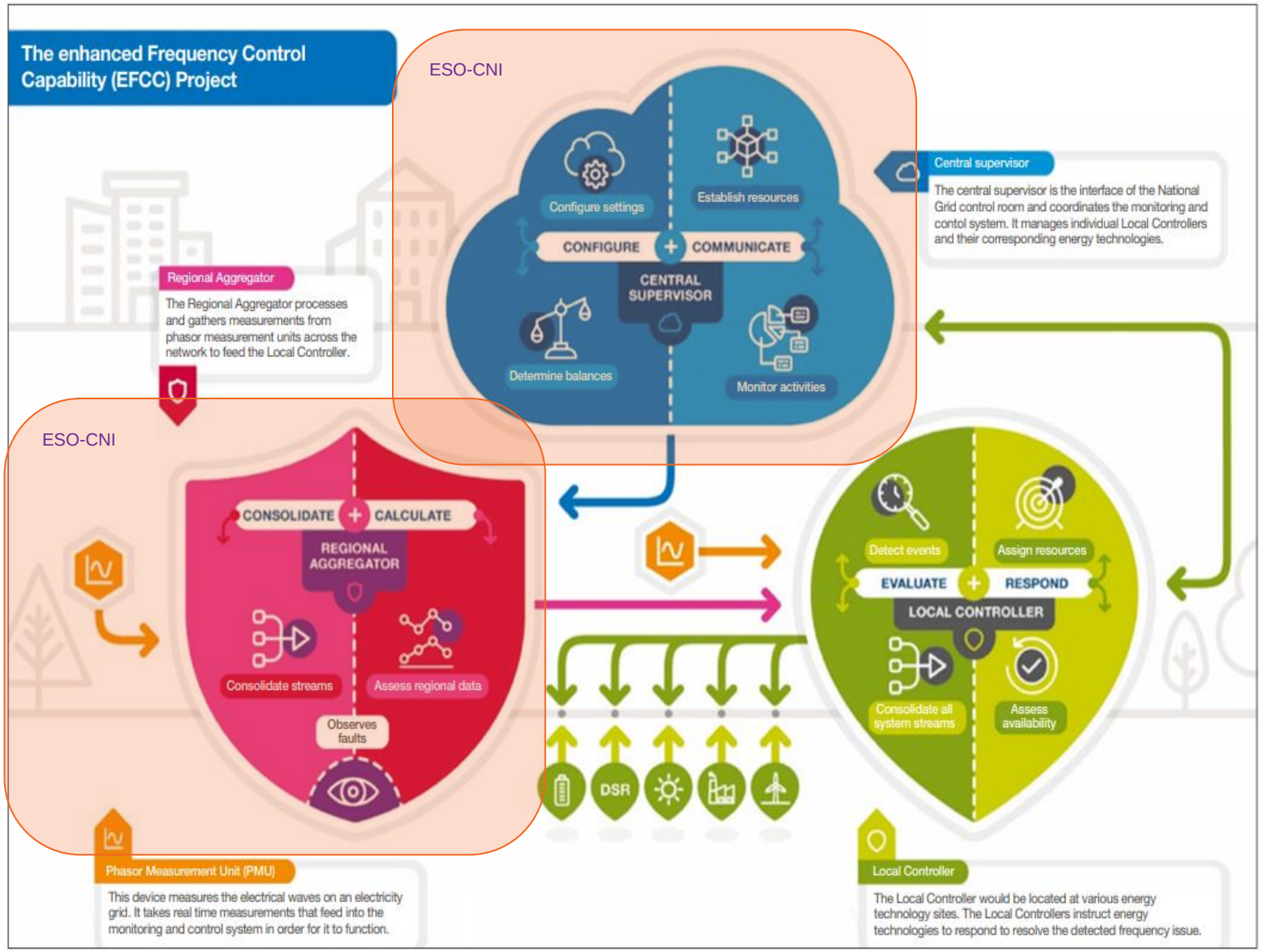
Background : System Frequency



Regional level variations in frequency/ RoCoF

Frequency statutory limits could be violated even RoCoF is within 1 Hz/s (through Accelerated Los of Main Program (ALoMP))

Scope : Overview of the EFC



ESO ran **Enhanced Frequency Control Capability (EFCC)** NIC innovation project (2015-2019) to increase operability in a low carbon world.

Developed a wide area Monitoring and Control System (MCS) to provide fast, coordinated frequency response (ideally within 500ms) from a range of technologies (wind, solar, battery, DSR and thermal) in the laboratory environment by measuring frequency / RoCoF values.

Regional Aggregators (RA)

- Collect PMU data, issue response instructions to LCs after detecting events. Original EFFC suggested 12 RA's . Phase 1 Demo will have 2 RA's

Local Controllers (LC)

- Initiate response following instructions from RA and send resource information to CS.

Central Supervisor (CS)

- Collect resource information from LCs and send the resource portfolio to RA
- Potentially managed in the Control Room to report and respond to Frequency Events

Scope of ZCO Work

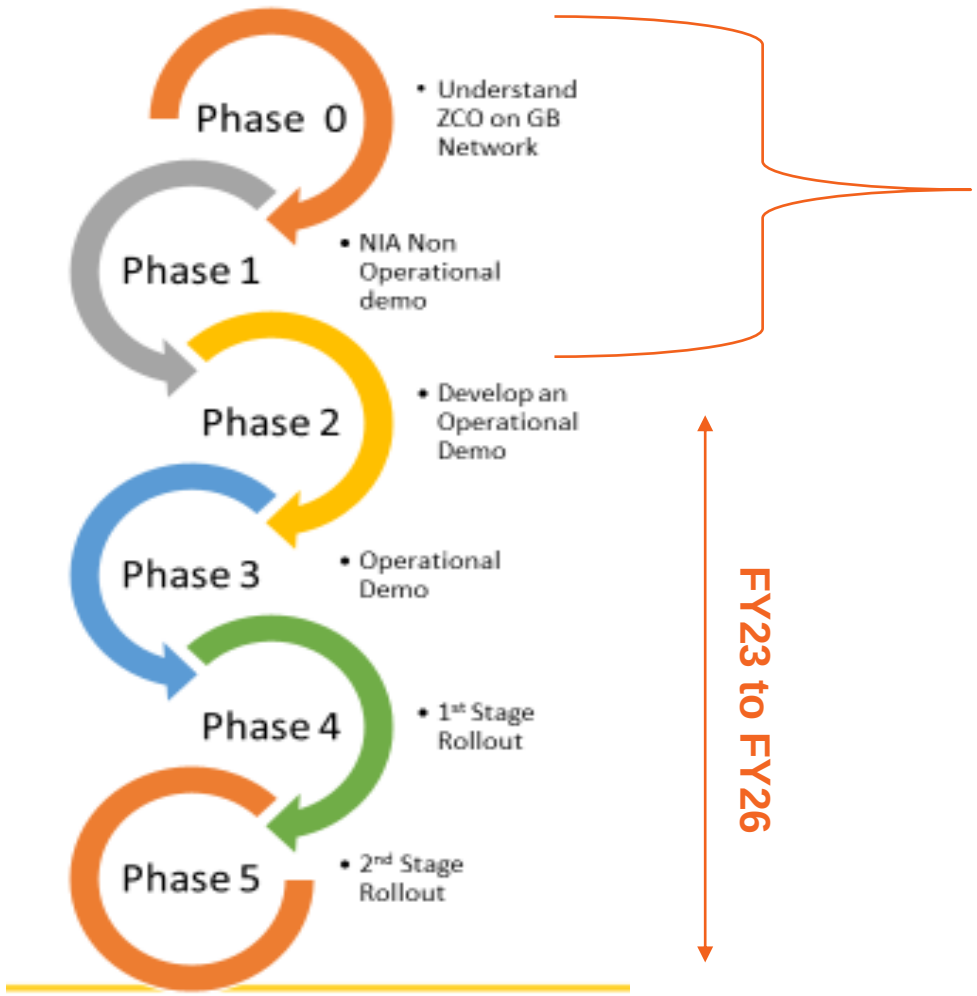
ZCO / EFC project aims to develop a new Frequency Stability service and a new Monitoring and Control System (MCS) capability

The new service and capability would mitigate an increasing operational risk of system frequency instability by making coordinated decisions across regions of the Great Britain (GB) power system to despatch providers to deliver energy within 0.5 second of a frequency event

The benefits expected from this initiative are more reliable and secure operation, reductions in operational spends on procuring Inertia and Frequency Response and reduced carbon-emissions from ESO control actions

This is a six-phase programme, with Phase 0 activity to enable prototyping of the MCS within current infrastructure and incorporate what is learnt into a strategy for the future state. Phase 1 activity is Network Innovation Allowance (NIA) project delivering the prototyping (Non-operational demo) of the MCS

Phased Implementation Approach for ZCO



Phase 0 and 1 Sept 21 to Jun 22 Objectives:

- **Engage industry** participants and technology solution partners to participate in Non Operational Demo
- **Develop requirements and technical design** for the Non Operational Demo, building on the solution delivered via the EFCC project as a basis
- **Build the tools and enable the IT infrastructure** for the Non Operational Demo
- **Run the Non Operational Demo (from March 2022 to December 2022)** using a series of proof points to evaluate the success and determine the solution design as a basis of the new service, in readiness for transition into Phase 2 and 3 (Operational Demonstration)
- **Conduct an Impact Assessment** of the proposed new ZCO capability on existing and emerging systems, services and market products building a consolidated roadmap
- **Develop a programme delivery structure**, stakeholder engagement strategy and roadmap for future phases, agreeing and putting in place the governance and delivery mechanisms to set the foundations for success.

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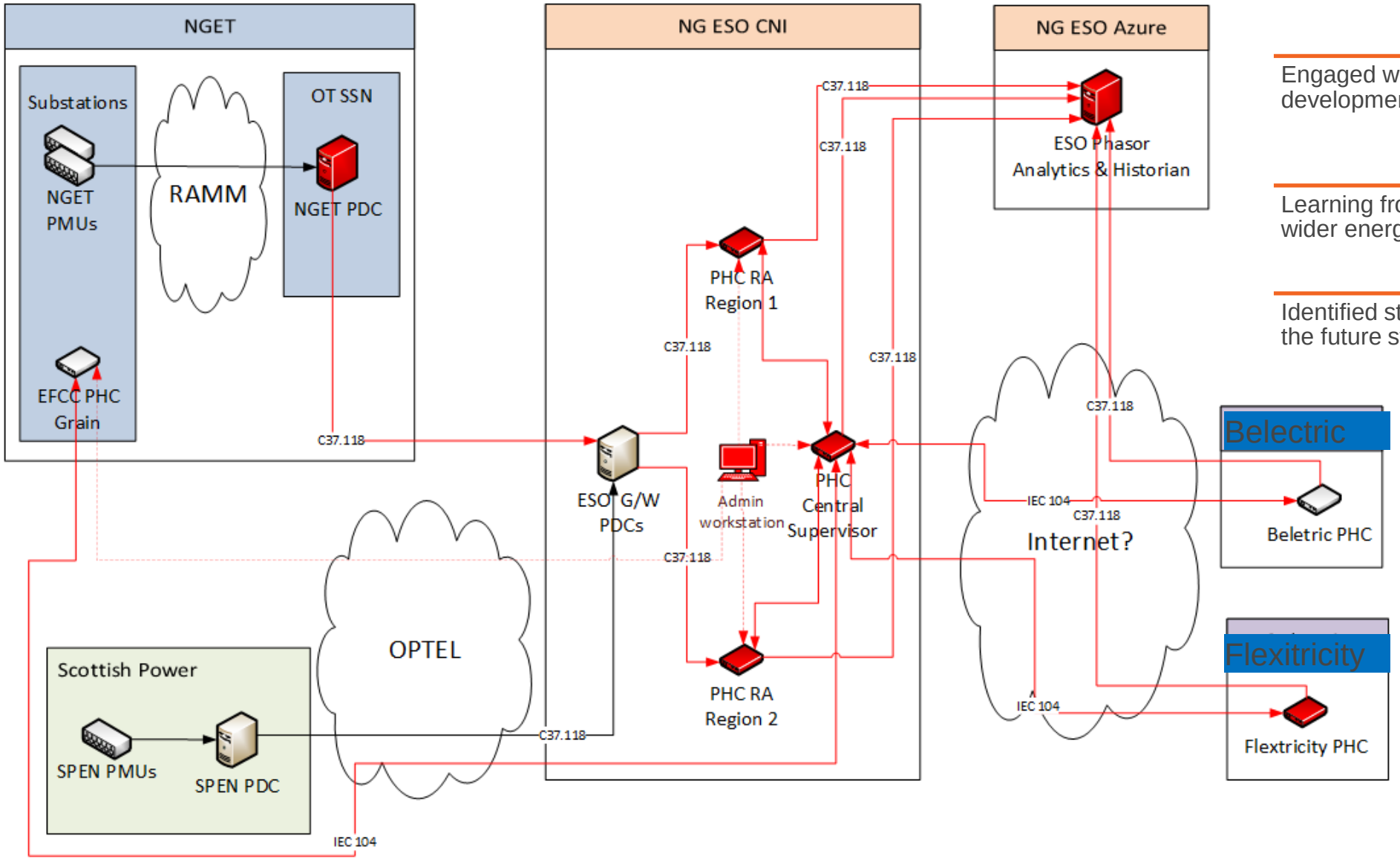
MCS : Proposed Design for Phase 1



Engaged with internal and external stakeholders, for the Phase 1, and interdependencies of different projects

Engaged with project partners for the development of NIA design and proposal for NIA

Learning from NIA innovation will be shared with wider energy industry participants

Identified stakeholders for Phase 0, to design the future states and commercial strategy

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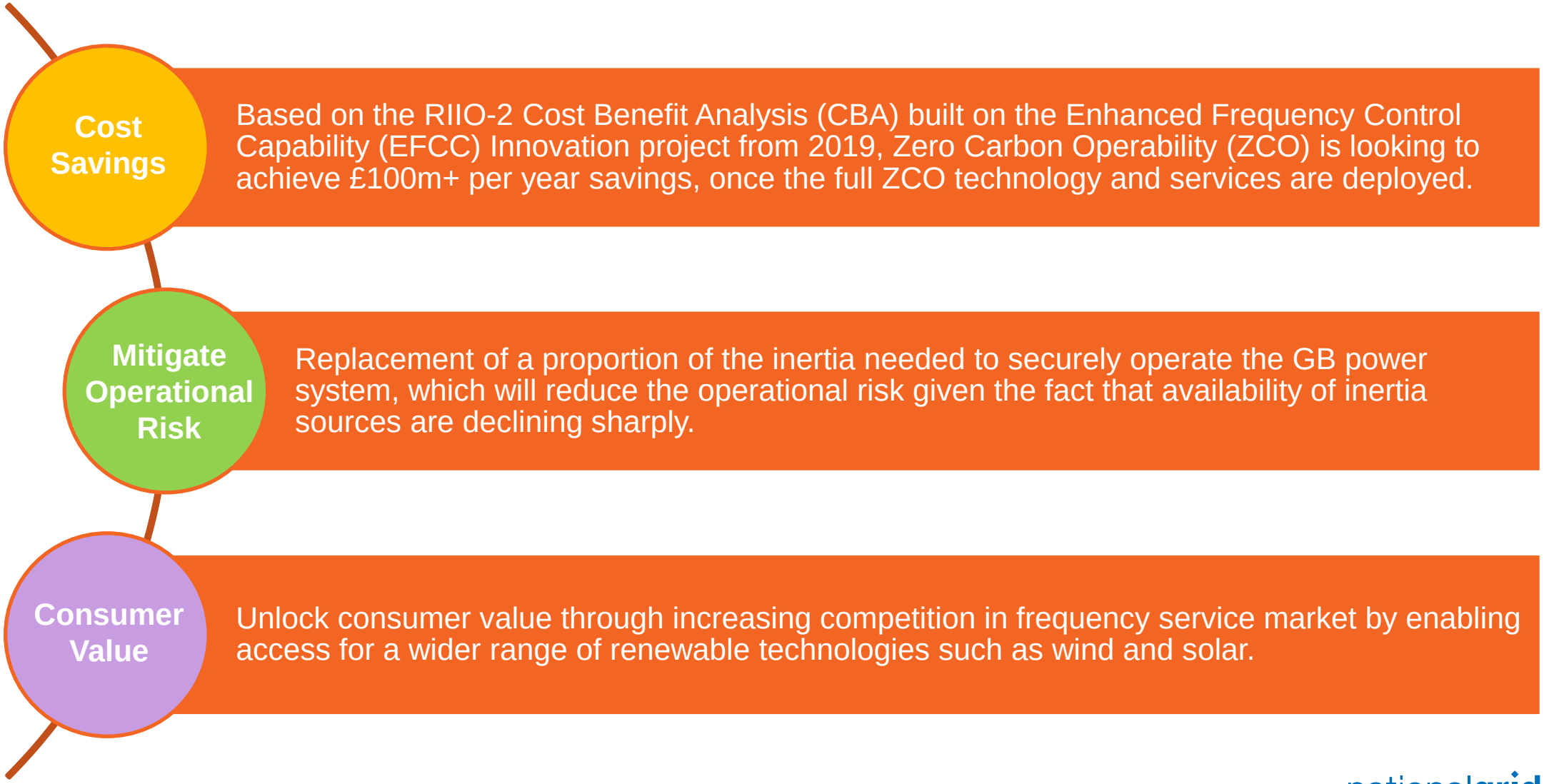
Discussion

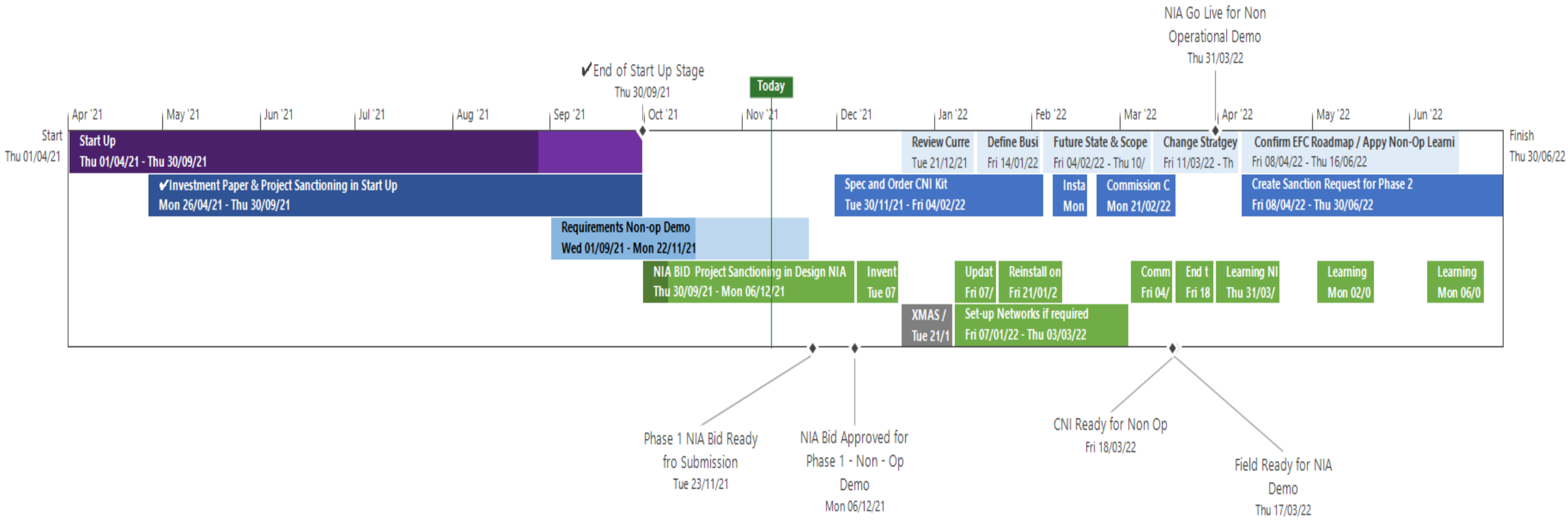
- The key points to be considered for the ZCO communication networks / IT infrastructure (latency, Cyber security etc)
- The impact of communication services at the service provider sites (Internet/4G/5G) and associated risks to ZCO project
- The expectation on Frequency Stability Services that could be developed through ZCO (BMU, non-BMU units) and their interaction with other services
- The responsibilities of different parties; NGESO, TOs, Market Participants, DNOs so on

Appendix

Anticipated Benefits and Outcomes



EFC Plan on Page – Phase 0 and 1



Shift of Context over past two years since EFCC Closure: Learning about new Response services

- **New Response Services (DC, DM, DR) are / will be part of the Current State in which the ZCO project changes would be implemented**
  - Dynamic Containment (+/- 0.2-0.5Hz). Full delivery by 1s but no faster than 0.5s
  - Dynamic Moderation (+/- 0.1-0.2Hz). Full delivery by 1s
  - Dynamic Regulation (+/- 0.015-0.1Hz). Full delivery by 10s
  - EFCC CBA based on a Current State without these services i.e. versus P/S/H Response services (10s P / 30s S)
- **EFCC unique points**
  - Speed (0.5s versus 1s)
  - Coordination (Who responds and Where)
  - Triggered by RoCoF (versus absolute Frequency value)

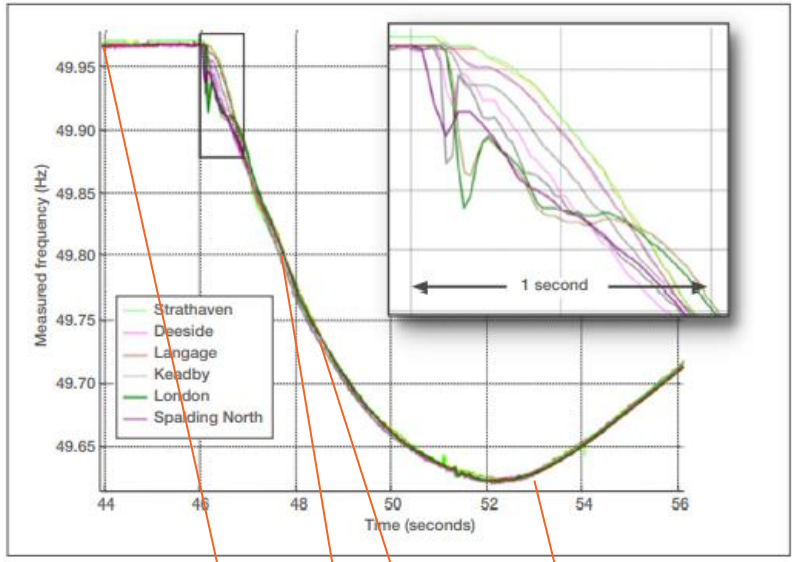


Figure 2: Variation in system frequency within the first second after a frequency event

(~57+5)% DC used after reaching low of ~49.62Hz

Dynamic Containment delivered (proportional) 1 second after trigger

Dynamic Containment delivery triggered (proportional) at 49.8Hz

Dynamic Containment small delivery (up to 5% of delivery) would already have been active in this example as frequency already at ~49.975Hz, within the range of 49.985-48Hz)

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The GB Virtual Energy System

Item 5

Carolina Tortora

The GB Virtual Energy System

- In this section, we will discuss our proposals to create a digital twin of the GB energy system

- Pre-read: update paper on our early thinking (attached to email)

- On the day discussion:
  - Overview of our proposals
  - Question and answer session

RIIO-2 BP2

Item 6

Dan Delgado, Steve Bird

Context & Purpose

- As part of Ofgem's latest IT guidance, a new requirement has been incorporated requesting that ESO provide a summary of its IT investments and spending in the Technology Business Management (TBM) taxonomy.
- As such we are currently working to define our delivery approach, and we have committed to developing a manual near-full TBM breakdown of our IT costs in line with Ofgem's submission deadline of April 2022.
- The purpose of this session is to outline Ofgem's specific TBM requirements, to seek feedback and advice from TAC based on the committee's delivery experience, and to capture any further guidance on how ESO should approach this request.
- We would also value the TAC answering the following questions to aid our open discussion:

		Axis submission areas
01	What is your experience of TBM cost transparency implementation and what benefits did you derive?	Experience
02	What challenges did you encounter during this and what guidance would you offer the ESO?	Challenges & Guidance
03	What advice would you offer the ESO in working towards this manual implementation?	Submission Advice

What is Ofgem's RIIO-2 BP2 draft guidance?

Ofgem continue to place significant scrutiny on IT investments and wants to ensure we are building the right technology capabilities to support net-zero operation with justified spending.

- Ofgem have deemed the BP1 guidance for IT investments inadequate for their assurance needs
- As such moving forward ESO is required to provide a summary of all IT solutions and costs in the **Technology Business Management (TBM) taxonomy**
- Specifically, Ofgem require:
  - A TBM taxonomy-compliant description of the ESO's as-is and to-be IT cost stack (RTB); and
  - Inclusion of an additional layer that lists the ESO IT investment projects in this same structure covering both Shared and Direct investments.
- The submission deadline for this work is end of April 2022

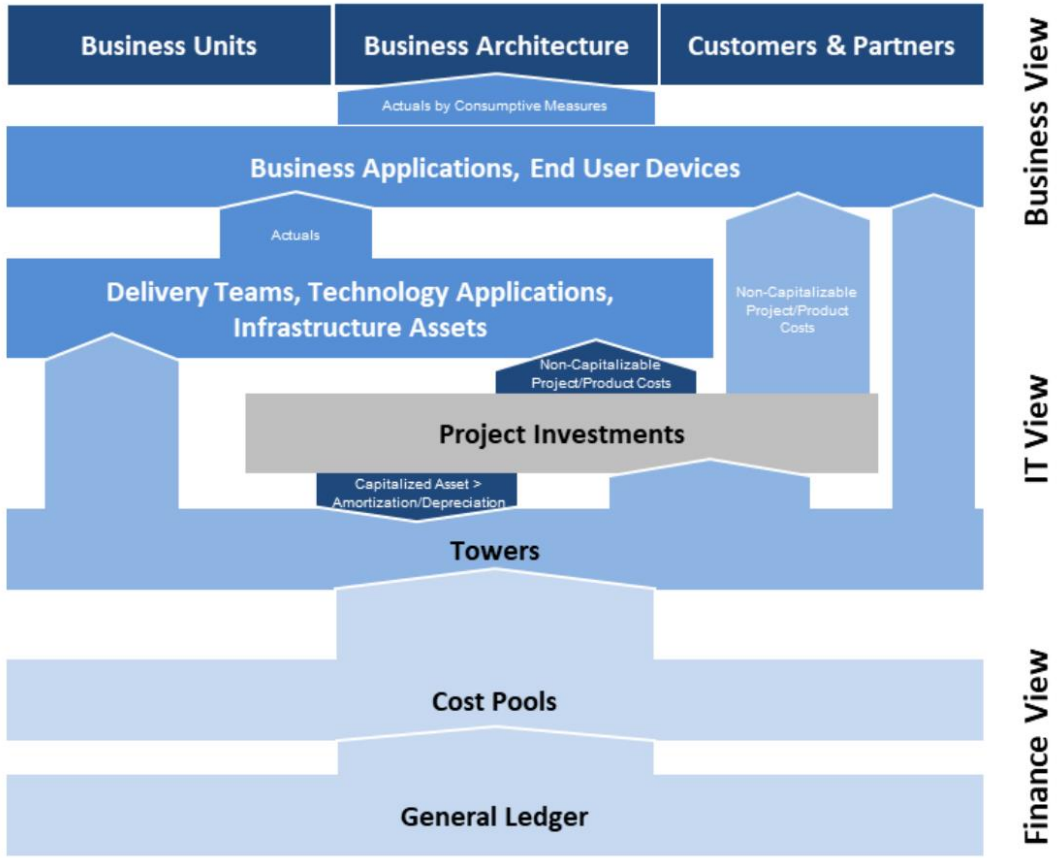
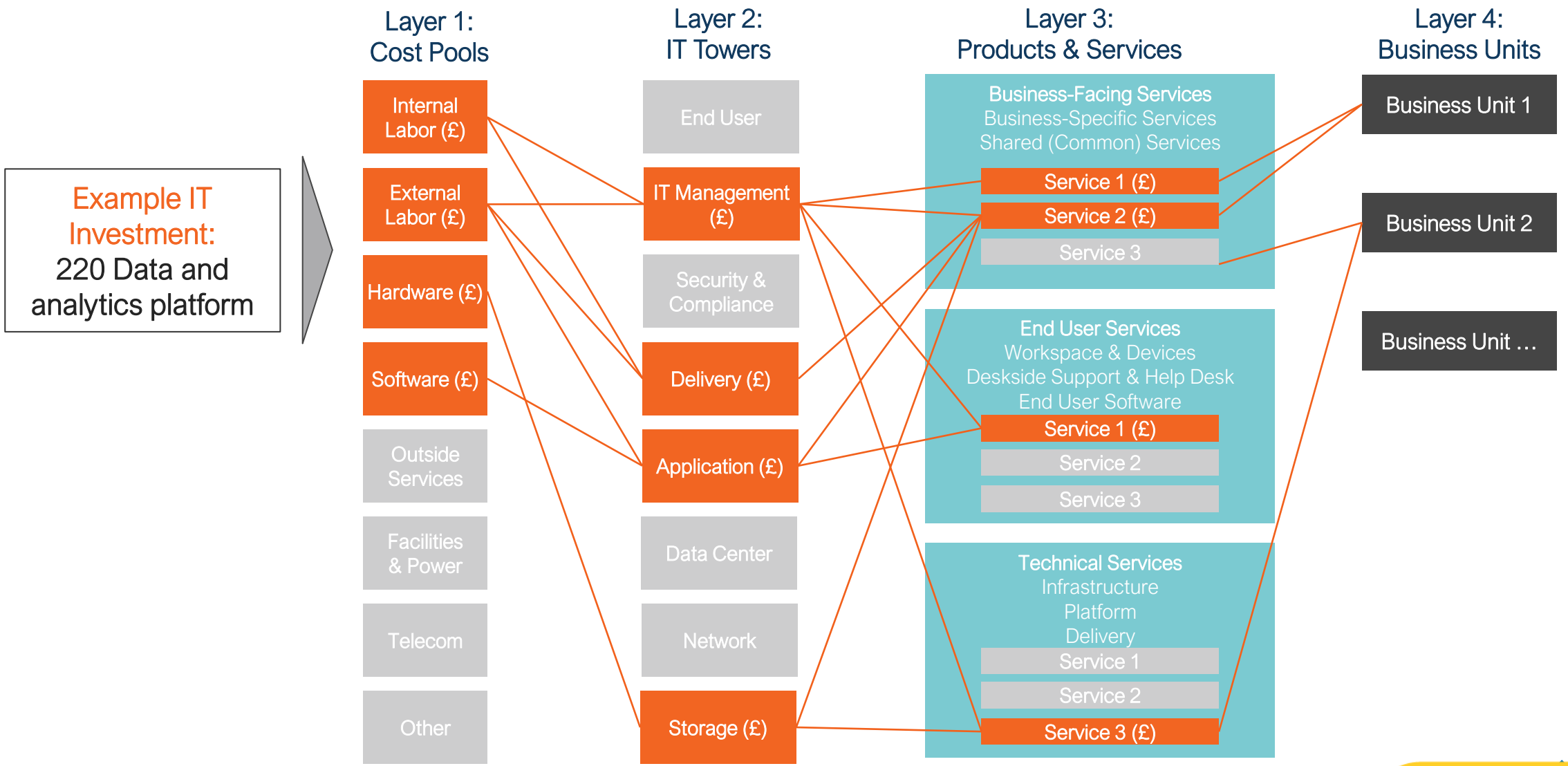


Figure 1: Conceptual TBM Model

We can conceptualise the cost mapping exercise we will need to perform through the following diagram



Appendix

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The approach we have taken for incorporating the TACs guidance on our DSAP

DSAP Status Summary

- In line with Ofgem guidance, the next ESO DSAP submission is due in December 2021
- As such the project team have been working to compile the latest action plan updates from across the ESO transformation portfolio to provide an updated view of our delivery status and progress
- Our approach has been to focus our primary attention on the action plan updates highlighting the demonstrable delivery progress ESO has made in implementing our its strategic vision the last 6 months. Broader updates to the Digital Strategy will be reflected on and applied in the next submission due in March 2022
- As part of the updates, the project team have reflected on the feedback collated from the TAC back in September and sought to incorporate these points.
- We can categorise our actions on this feedback into two categories:

How we have actioned your feedback

Items for immediate reflection

Feedback items which can be immediately addressed and incorporated into the upcoming DSAP to bolster our submission response

We have incorporated these elements in our latest DSAP submission which we aim to showcase today

Items requiring long-term implementation

Feedback points which relate to broader themes and which require long-term implementation

These feedback items have been fed back to our wider technology transformation teams and we can begin to exemplify early progress

What is TBM?

Technology Business Management (TBM) is a **value-management framework** instituted by CIOs, CTOs, and other technology leaders.

- TBM provides a **standard taxonomy** to describe cost sources, technologies, IT resources (towers), and solutions
- This allows for alignment between IT, Finance, and Business Unit leaders
- The TBM taxonomy **provides the ability to compare** technologies, towers, and solutions to peers and third-party options (e.g., public cloud)
- The TBM taxonomy is needed to support the modelling of costs and other metrics
- A TBM model is software that maps and allocates costs and resource consumption from their sources to their uses, (hardware, software, labour, outside services, and facilities) that tech leaders procure to the solutions they develop, deliver, and support

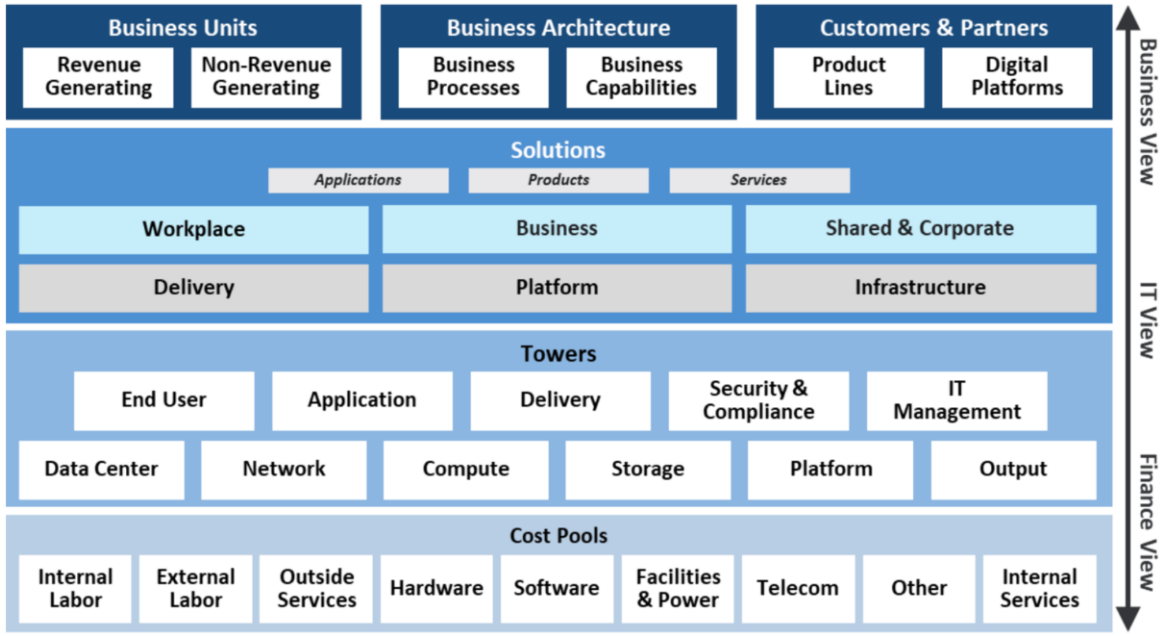

Figure 2: The TBM Taxonomy (Summary View)

Subgroups update

Item 7

David Bowman

Subgroups update

- In this section we will provide an update from the subgroups

Next meeting and calendar

Item 8

Vernon Everitt

Next meeting and calendar

Meetings are every quarter for a half-day on the first Friday morning of the month, 9am-12.30pm

- 4 March 2022
- 10 June 2022 (Note: meeting a week later due to Platinum Jubilee bank holiday)
- 2 September 2022
- 2 December 2022
- 3 March 2023

AOB

Item 9

Vernon Everitt

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