Networks Customer Seminar Glasgow

nationalgridESO

#ncsmay22

Welcome

Susana Neves e Brooks – Customer Connections Senior Manager

Julian Leslie – Head of Networks

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House keeping

Fire Safety

There is no planned fire alarm test today. Should the fire alarm sounds guests are asked to use the nearest fire exit and leave the building calmly. The meeting point is the fireman statue at the front entrance to the hotel on Gordon Street.

COVID

No requirement to wear masks but please be mindful of space

Security

In the event of a security alert, staff will direct us to a safe area

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Agenda

10.00 – 10.15	Welcome
10.15 – 10.40	Five-point plan (plus Q&A)
10.40 – 11.05	Future System Operator Update (plus Q&A)
11.05 – 11.30	Pathfinders Present & Future (plus Q&A)
	Coffee break
11.50 – 12.10	Empowering the Connection Customer (plus Q&A)
12.10 – 12.30	RDP whole systems/DSO/RDP programmes (plus Q&A)
	Lunch
13.15 – 13.45	Round table presentation
13.45 – 14.15	Round table presentation
14.15 – 14.45	Round table presentation
	Coffee Break
15.15 – 15.30	Holistic Network Design update
15.30 – 16.00	Ask the panel
	Please join us for a drinks reception post-seminar

Aims for today

Enable discussion

Networking

Share your questions and concerns

Share knowledge

We will be using Slido today for audience participation

We want to ensure this session is as interactive as possible and there will be opportunities to ask questions throughout the day.

You can download the Slido app or access on your device using the QR codes on the table. Please use code #ncsmay22 to access Q&A and polls.

Five-point Plan

Matt Magill

nationalgridESO

5 Point Plan

In 2021 we introduced our 5 point plan on things we could do to mitigate some of the increase in congestion costs ahead of network re-enforcement, these were items which

- Could be delivered in the short to medium term (by 2025)
- Can work withing existing frameworks
- Not fully develop nor exhaustive.

The trigger of this work is related to the amount of investment, there are rising congestion costs on the network and some of the boundaries are constrained up to 85% of the time.

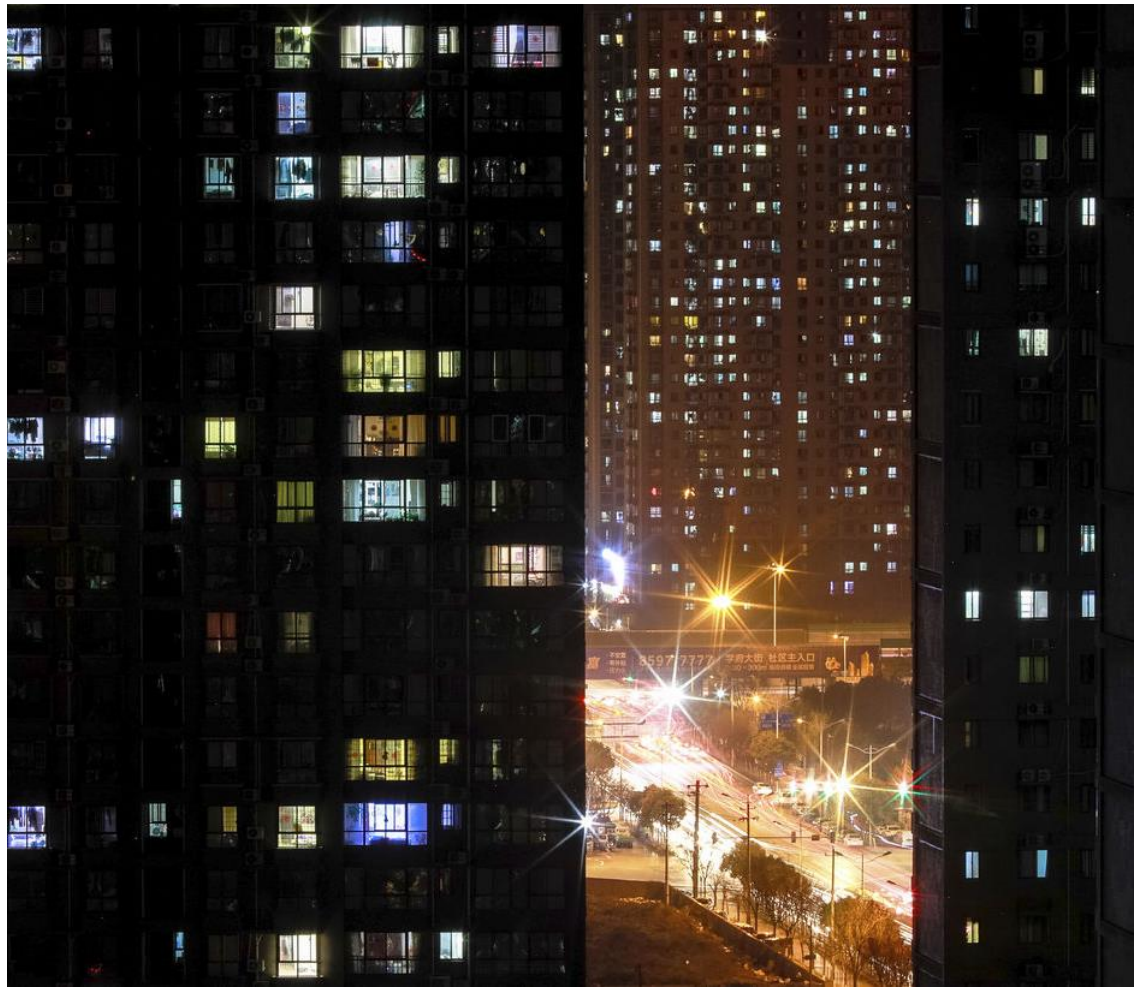
During 2027 to 2030 major investments come online to increase boundary capability and alleviate congestion.

1. BSUoS cost forecasting
2. Develop intertripping through our pathfinder
3. Local Constraints Market
4. Storage for constraints
5. Improve the existing network

1 BSUoS cost forecasting

In 2021 we said that we would build a new team to forecast and optimise constraint costs, we would publish our constraint forecasts, include them in the BSUoS forecasting and start providing ranges where uncertainty existed. Since then we have

- New team
- Rolling forecast published
- Published 24 month constraint forecast
- Constraint forecast included in BSUoS forecast
- We are developing a process to allow a range of costs to be forecast that will take into account different wind scenarios.



2 Develop intertripping through our pathfinder

In 2021 we said that we would launch an interim and enduring intertrip solution for the B6 boundary. We have done both those things

Launch of an interim and enduring intertrip solution for the B6 boundary

- Concluded the B6 2023/24 tender in the Scottish region to deliver an intertripping service
- Generators already connected to the scheme are able to provide this service earlier than the service start date (interim solution)
- TO's are building the connection for generators not currently connected to a scheme. Newly connected parties can start providing the service as soon as connected

Interim solution

Initial Assessment of Benefit for 1st to 18th Apr

- Approx. £5.8 million Balancing Costs savings
- Approx. 64,435 tonnes CO2 savings

3 Local Constraints Market

In 2021 we said that we would investigate a local constraints market to increase competition. We have been working on a market that facilitates access to new providers of flexibility at the B6 boundary.

Working with industry and partners

- We have been co-creating service terms for the local constraint markets building on the ODFM service from the pandemic
- We have confirmed the service will be used ahead of Balancing Mechanism dispatch
- We have developed the requirements for a platform to deliver LCM and begun the procurement process for the platform.

Earliest expected launch is Q4 2022

4 Storage for Constraints

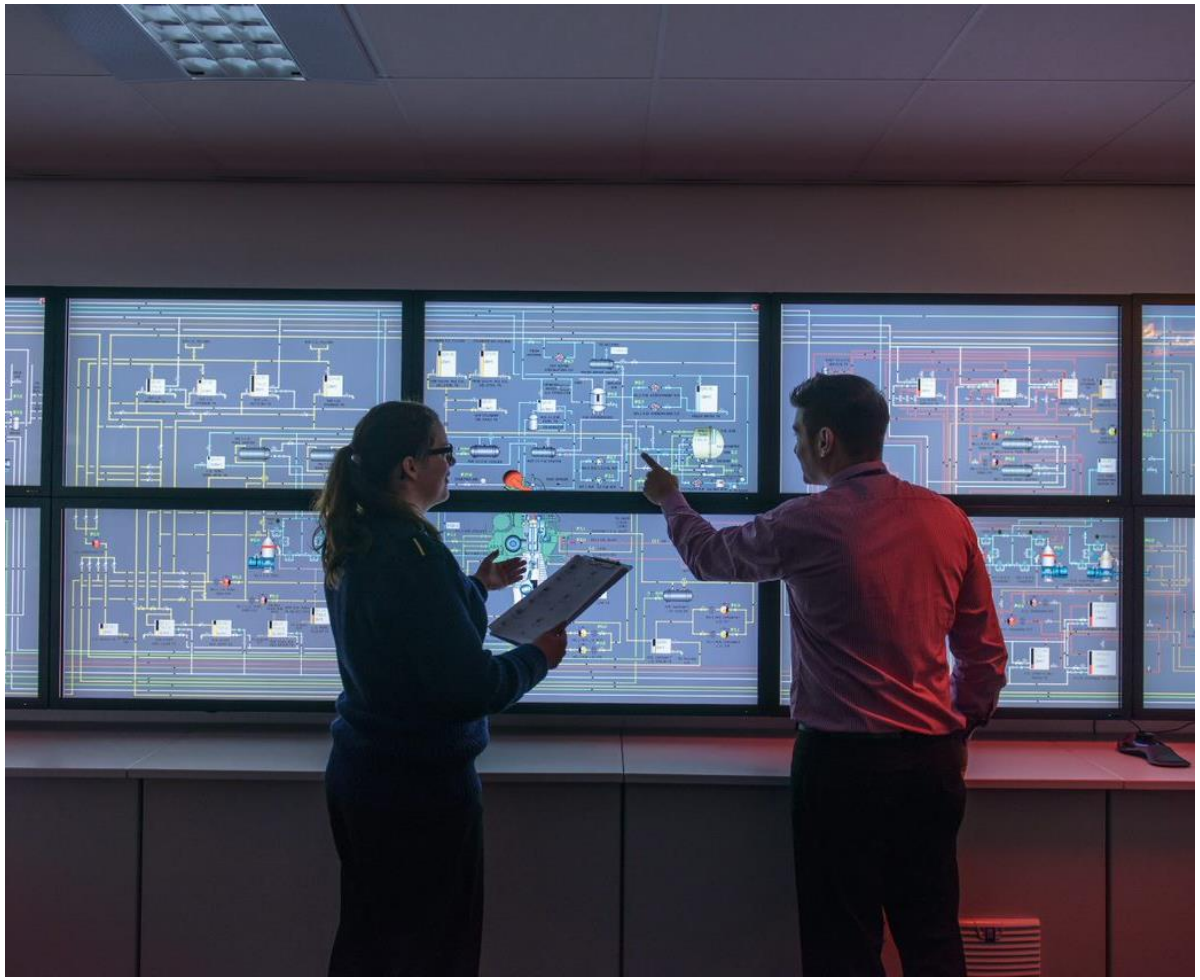
In 2021 we said that we would commission a piece of work to see how effective storage could be in reducing constraint costs

Working with external provider

- Carried out significant analysis using a network model rather than simplified networks
- Assessed cost effectiveness of constraint management on the 70+ circuits crossing the 6 most constrained boundaries
- Qualitative assessment of stacking constraint management with other services.

Findings

- Analysis found that storage operating exclusively to provide constraint management would get low utilisation and is unlikely to be cost effective
- Stacking constraint management with other services is possible, but this is unlikely to deliver high utilisation in very constrained locations
- We will continue working with storage companies to understand and remove any barriers to them competing with other technologies to provide services.
- We will not seek long-term, bilateral contracts with storage companies exclusively for constraint management.



5 TO Solutions

In 2021 we committed to work with the Transmission Owners to see what other options could be deployed to reduce constraints. Project undertaken in collaboration with the 3 transmission owners

What has been identified

- Acceleration – 5 schemes could save £2.5Bn if accelerated 1 year
- Outage optimisation - £1.4Bn savings from optimising 4 re-enforcement schemes
- Further study work on year round constraints offered no further improvements.

TO Support

- All the transmission owners were highly supportive of the work
- Focus on Earlier in service dates for acceleration of works
- Planning reviews on the schemes with possible outage optimisation underway.

6* Planning Optimisation

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***Not part of the five point plan**

We already, year in, year out, optimise the work plans of the network owners to reduce constraint costs

£1.3Bn in optimisation savings

- 19.5 TWh of reduced constraint volumes
- Optimising outage plans, Reducing emergency return to service times, Obtaining enhanced ratings from TO's, Identifying and facilitating opportunity outages, Aligning outages with customer maintenance and generator shutdowns, Facilitating long term alternative solutions for long outages that impact customers.

£37m Output Delivery Incentives - Constraint Cost Savings

- In collaboration with the TO's, Temporary operating regime to allow enhanced post fault actions, Overload protection settings changes, Overload protection scheme installations, Dynamic line ratings.

Increased transparency through the Operational Transparency Forum

Future System Operator

Jenny Doherty

nationalgridESO

What do we mean by a Future System Operator

An **independent** organisation with a mandate to deliver **net zero system operation**, with enhanced **data and digital capability**

Act with a **whole energy system view**, bringing parties together to support **optimised decision-making and action** in the decarbonisation of power, heat and transport

Working with policy makers and regulators, and advising more broadly across the energy sector, to **unlock value and accelerate the net zero transition**

The role of the Future System Operator will evolve over time

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The Future System Operator (FSO) will play a vital role, creating an expert and impartial body with duties to facilitate net zero whilst also maintaining resilient and affordable whole energy system

The ESO today and RIIO-2 Transformational Activities

‘Day 1’ of the FSO

We will introduce the whole energy system capability for:

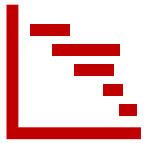
- Network planning and market strategy across both Gas and Electricity
- The Advisory role to support BEIS/Ofgem in decision making
- The new capabilities will be empowered by legislation

Future of the FSO

Future responsibilities may extend to the following:

- Hydrogen
- Heat
- Transport
- CCUS

What comes next



We will be entering into a design phase over the next couple of months

Increased engagement across a range of stakeholders

If you want to further engage with us or have any questions please contact:

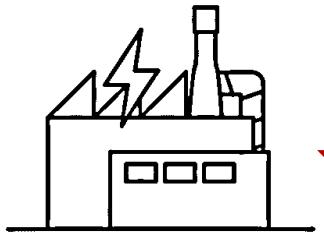
- box.fso@nationalgrideso.com

Pathfinders: Present and Future

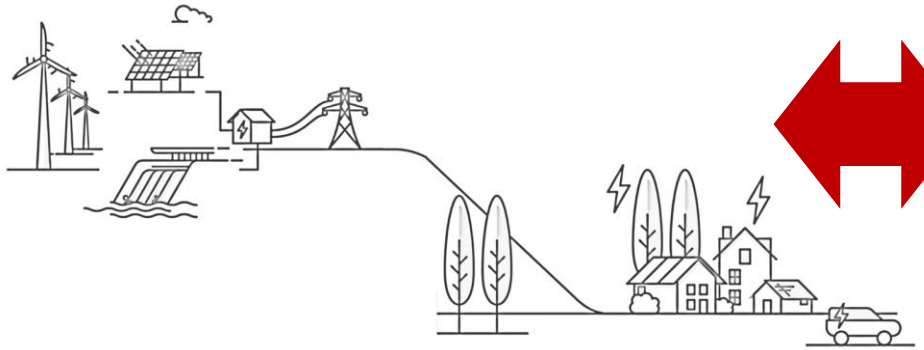
Rob Smith

nationalgridESO

Decarbonisation leading to changing generation technology & location



Less dispatchable synchronous generation



Generation moving to different areas

More variable sources of generation

More asynchronous generation

Impact of generation changes

- Increase in boundary constraints as flow patterns change

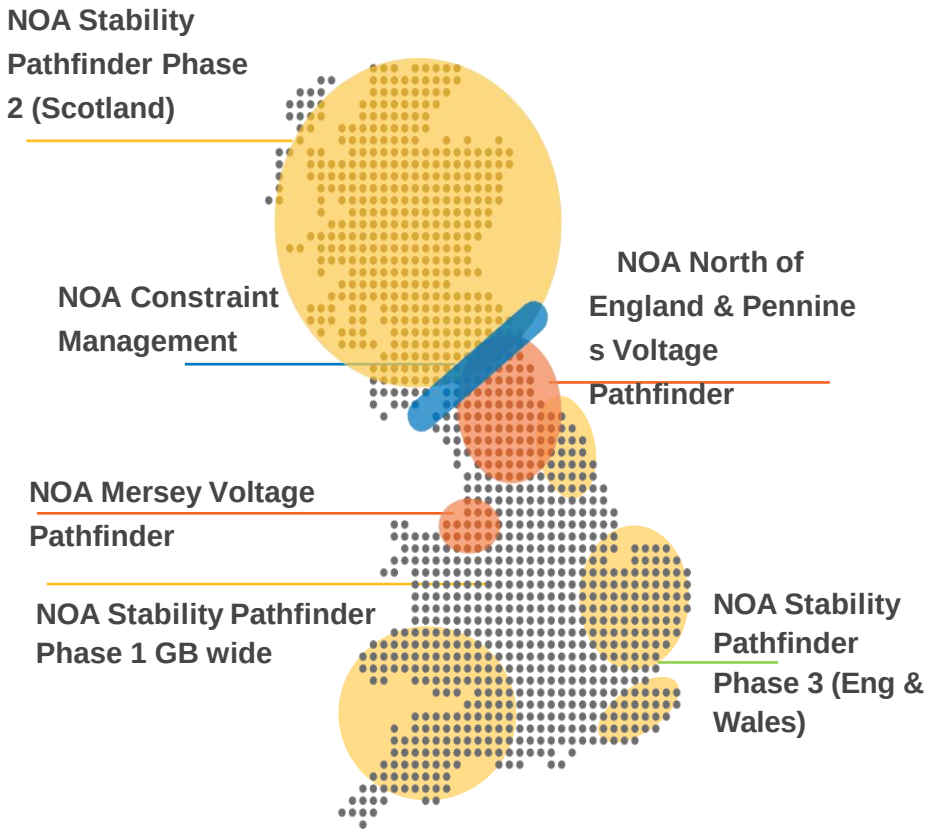
- Less synchronous plant on the bars leading to
    - Reduction in inertia
    - Reduction in generation with MVAr range
    - Increase in short circuit level (SCL) requirements
- **Need to find solutions/secure services to ensure the Network is compliant and run efficiently to meet Net Zero targets.**

What are Pathfinders?

- Effectively a banner round a series of projects
- Each project building on the learning from previous ones
- Seek solutions at lowest cost to consumers to resolve current and future operability & cost challenges
  - Stability : Inertia, SCL, dynamic voltage
  - Voltage
  - Thermal constraints
- Compete solutions from commercial parties & counterfactual solutions from incumbent transmission operators
- Defined needs means we can be technology agnostic
  - Drive innovation in solutions
- Where appropriate provide long term contracts to stimulate investment in new service capacity.

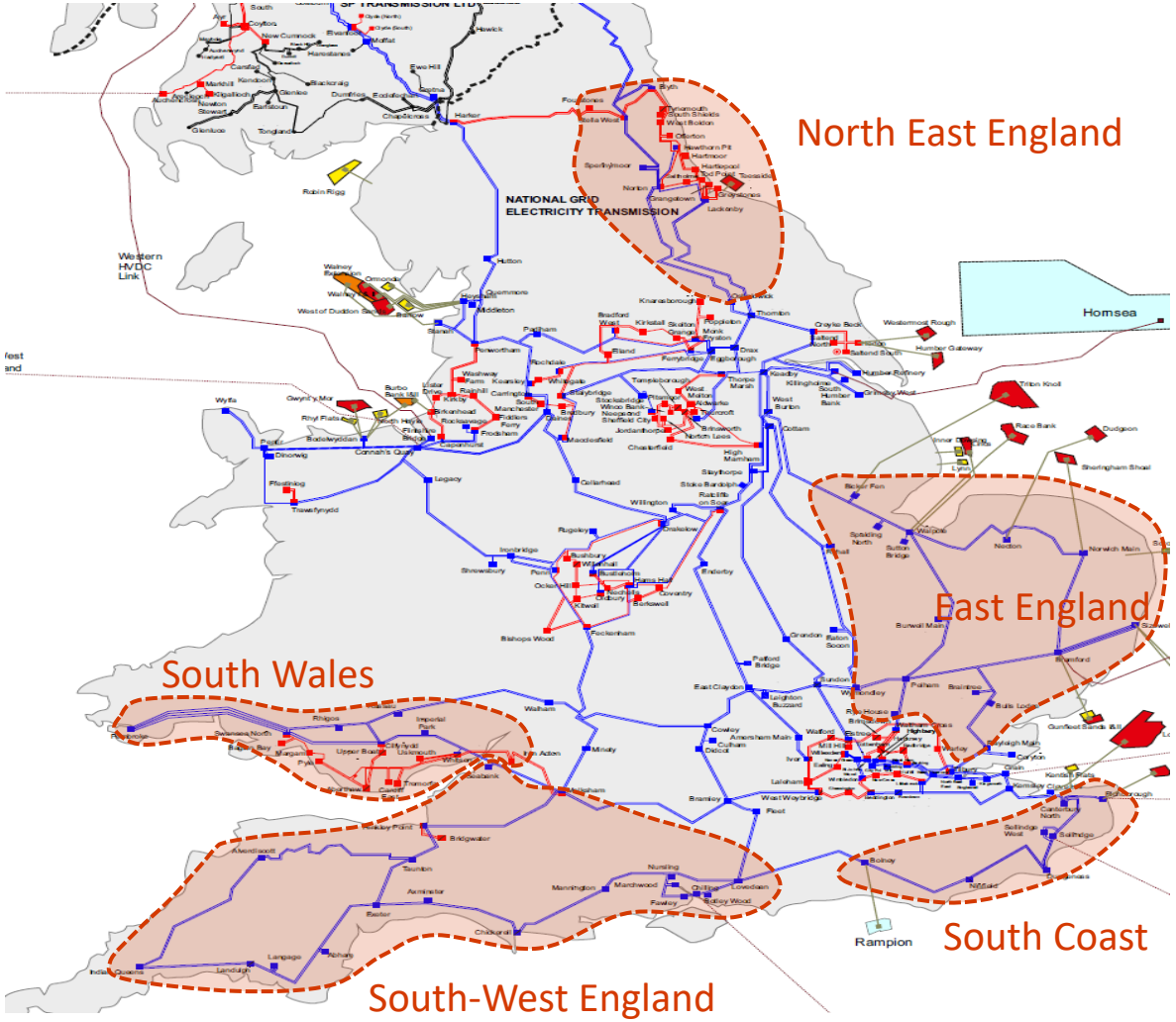
Overview of Pathfinders so far

Pathfinder	Requirement	Status	Participating Technology
Stability Phase 1 (GB Wide)	Inertia and dynamic voltage	Tender concluded with some units now live	0MW Synchronous Compensators only
Stability Phase 2 (Scotland)	Inertia, Short Circuit Level and dynamic voltage	Tender concluded – winners published	Synchronous and Grid Forming Convertor based
Stability Phase 3 (England and Wales)	Inertia, Short Circuit Level and dynamic voltage	Tender period - ITT window currently open	Synchronous and Grid Forming Convertor based
Voltage (Mersey)	Voltage absorption	Tender concluded with go-live from Apr 22	Reactor, Battery based
Voltage (Pennines)	Voltage absorption	Tender concluded with go-live from Apr 24	Reactors
Constraint Management (B6)	Post-fault intertrip	Contracts awarded for 2023. Tender upcoming for 2024-25 delivery.	Transmission level generators



Stability 3 – What we have improved

- Bay Reservations
  - Mitigate provider risks
- Site visits
  - Better coordination
  - Earlier access
- Single stage process for tenders
  - Allow providers to submit commercial and technical elements of solutions together



Pathfinders evolution going forward

Future Procurement (~~Pathfinders~~)

- Constraint Management (CMP) – Assess further boundaries
- Assess forward looking voltage needs
- Assess forward looking stability needs
- Aim to signal to the market needs as early as possible.

Empowering the Connections Customer

Greg Hunt

nationalgridESO

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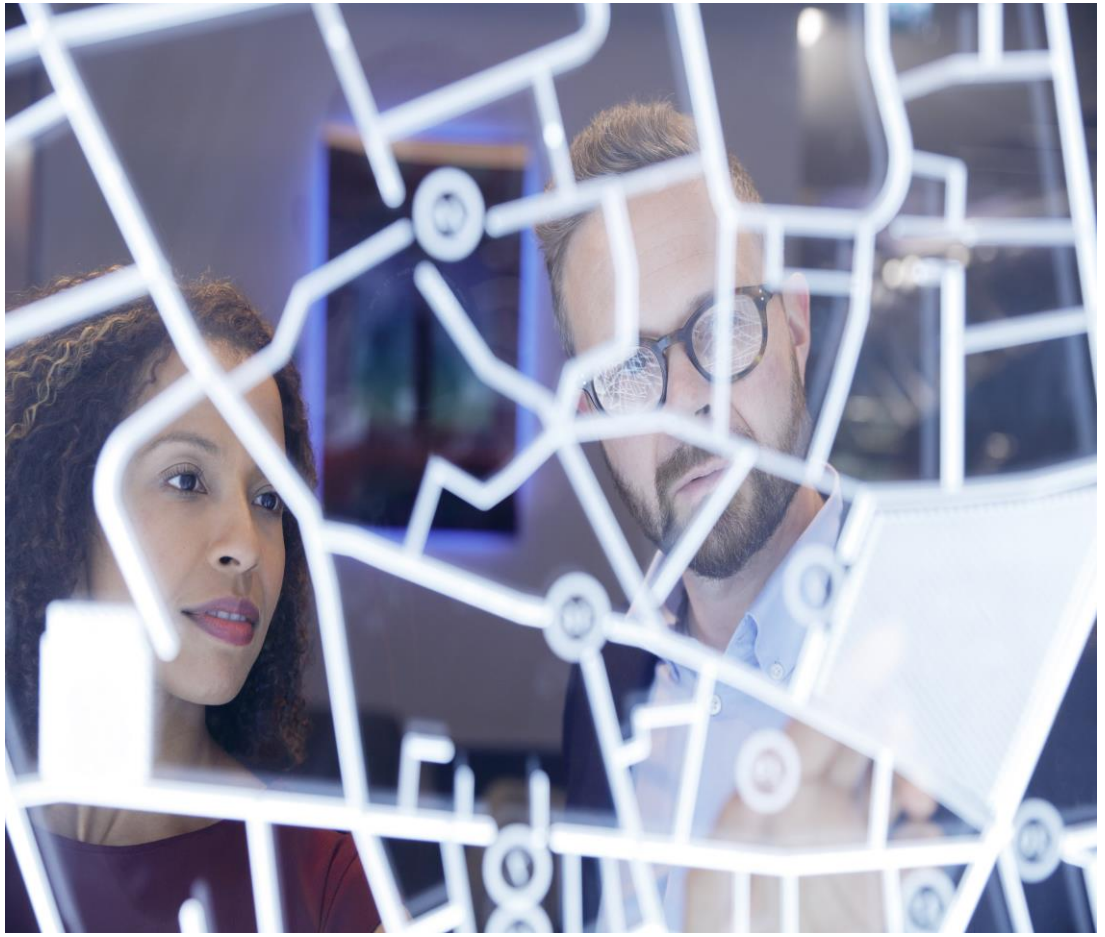
Content

- What is the Connections Portal?
- What is MVP?
- What have we been doing so far?
- Preview video
- User management
- Next steps

What is the Connections Portal?

The Connections Portal will:

- Digitise the connections application process
- Enable customers to monitor their live applications and progress against them
- Provide customers with access to their contract documents and contract history
- Enable customers to provide milestone / project updates
- Provide other useful connections resources.



What is MVP?

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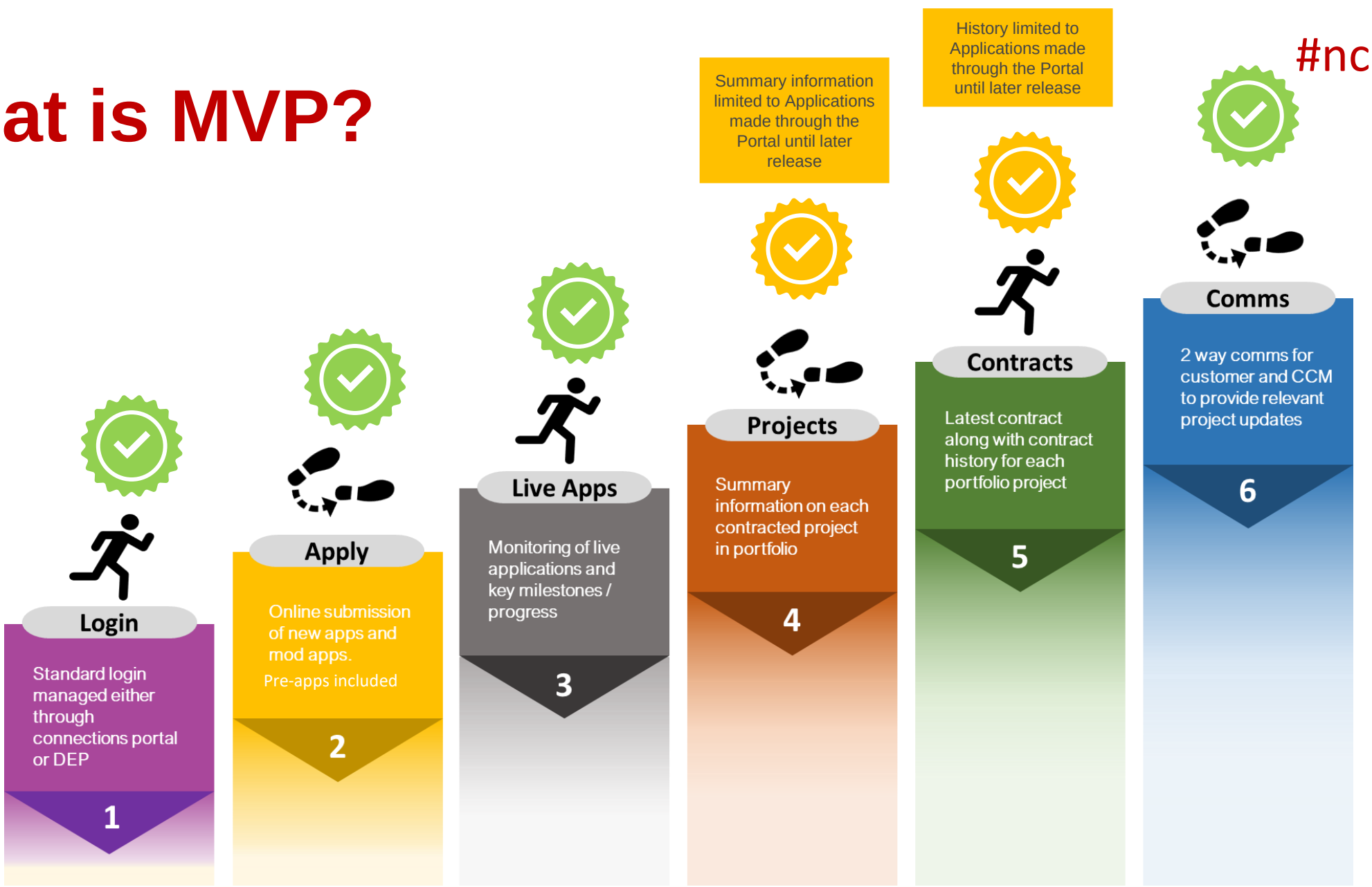

User Management

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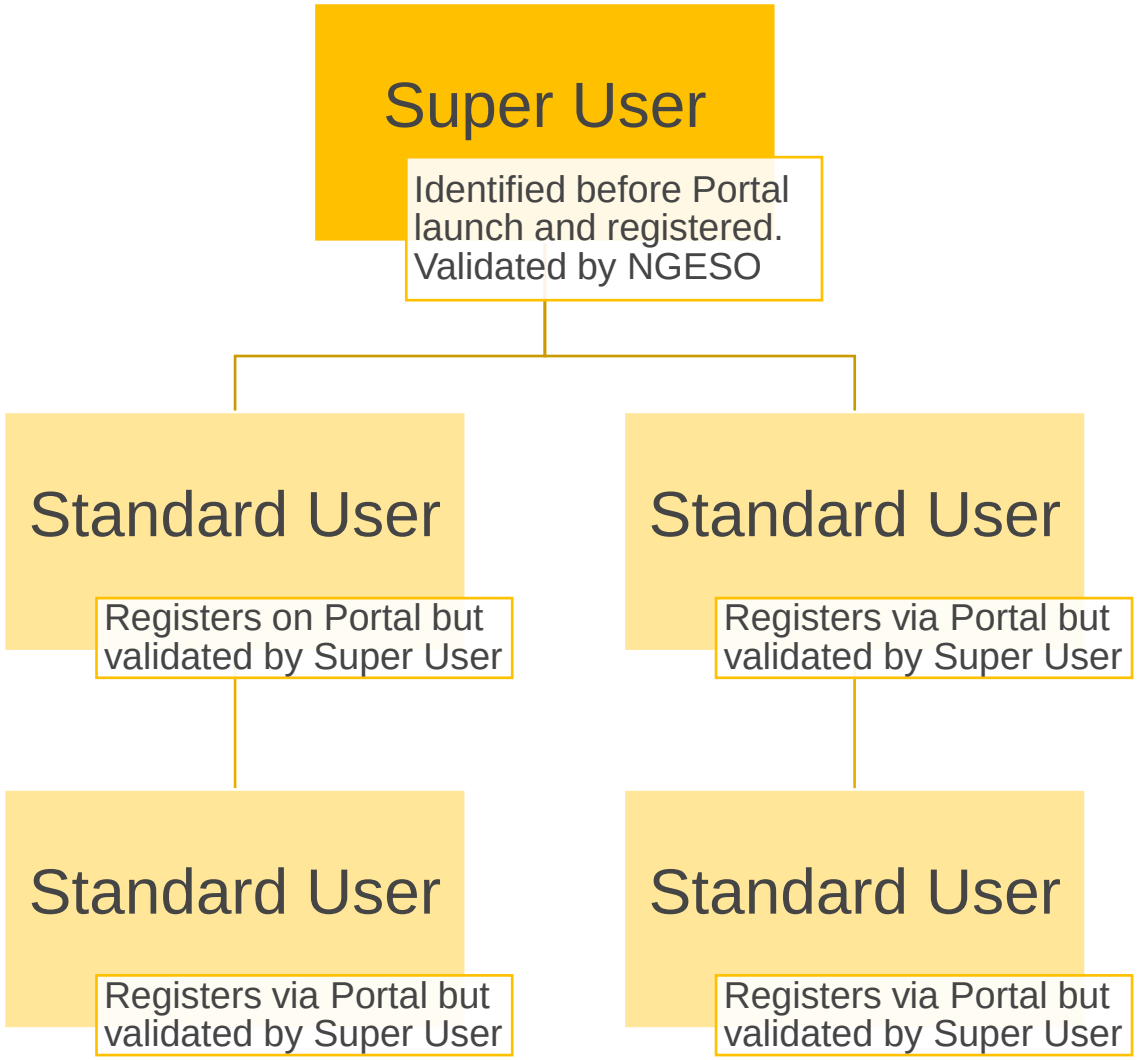
Super User Concept

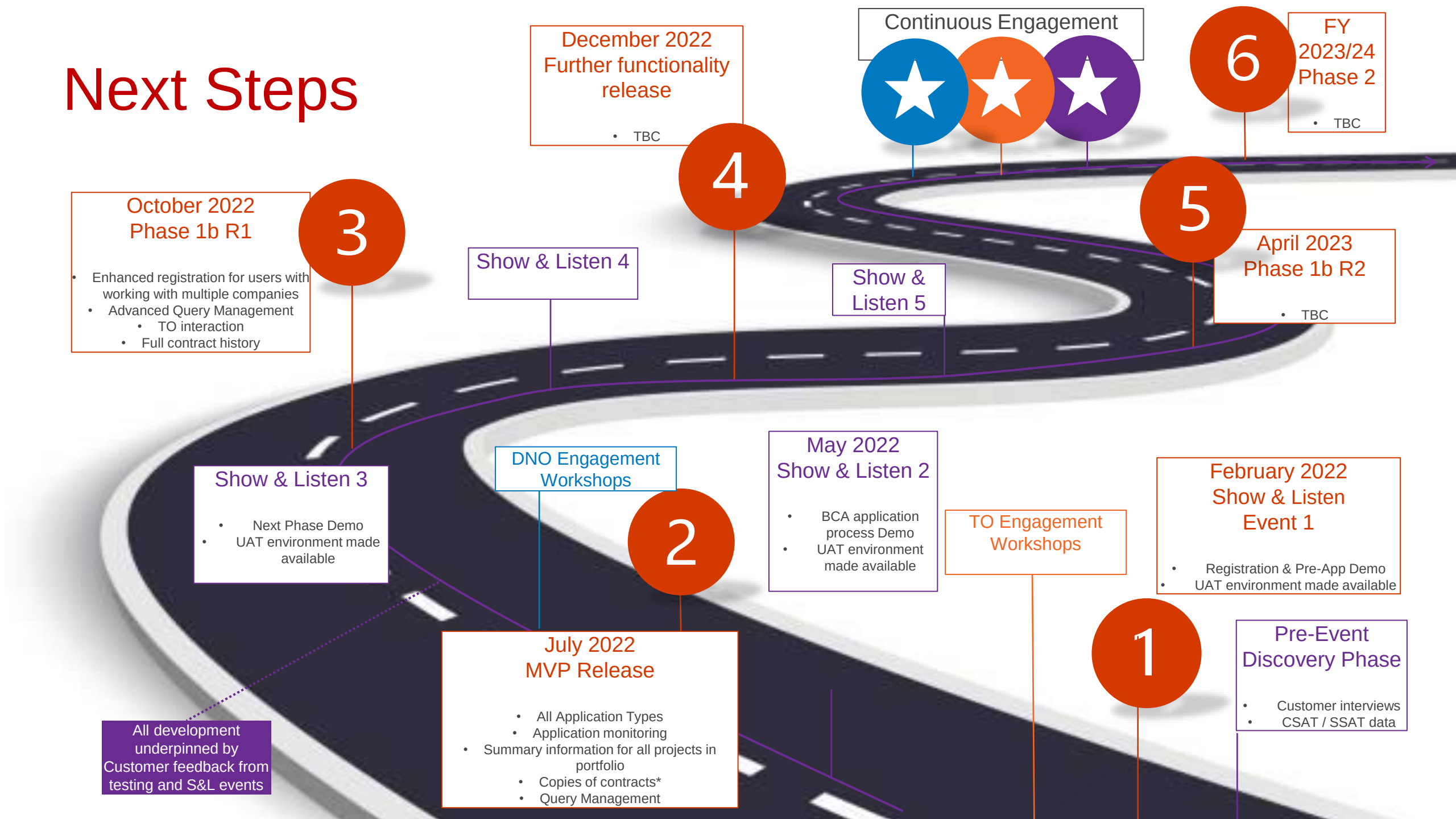
- Manages access for their company
- Can delegate Super User status if leaving role
- 1 Super User licence per company
- 4 x Standard User licences per company for MVP

We will be writing to all customers to find out your nominated Super User

Please speak to a member of the team if you wish to register a Super User today



Next Steps



Continuous Engagement

1

Pre-Event Discovery Phase

- Customer interviews
- CSAT / SSAT data

February 2022
Show & Listen Event 1

- Registration & Pre-App Demo
- UAT environment made available

TO Engagement Workshops

2

May 2022
Show & Listen 2

- BCA application process Demo
- UAT environment made available

DNO Engagement Workshops

July 2022
MVP Release

- All Application Types
- Application monitoring
- Summary information for all projects in portfolio
- Copies of contracts*
- Query Management

3

Show & Listen 3

- Next Phase Demo
- UAT environment made available

October 2022
Phase 1b R1

- Enhanced registration for users with working with multiple companies
- Advanced Query Management
- TO interaction
- Full contract history

4

Show & Listen 4

December 2022
Further functionality release

- TBC

Show & Listen 5

5

April 2023
Phase 1b R2

- TBC

6

FY 2023/24
Phase 2

- TBC

All development underpinned by Customer feedback from testing and S&L events

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- Interested?
- Want to know more?

- Sign up to future Customer Show & Listen Events
- Customer Seminars – Glasgow, Warwick, London
- Speak to the team

- gregory.hunt@nationalgrideso.com (Product Owner)
- adam.towl@nationalgrideso.com (Stakeholder Engagement Lead)
- vikas.garg@nationalgrideso.com (Technical Lead)

Regional Development Program

Kanan Ganakesavan

nationalgridESO

Regional Development Programme

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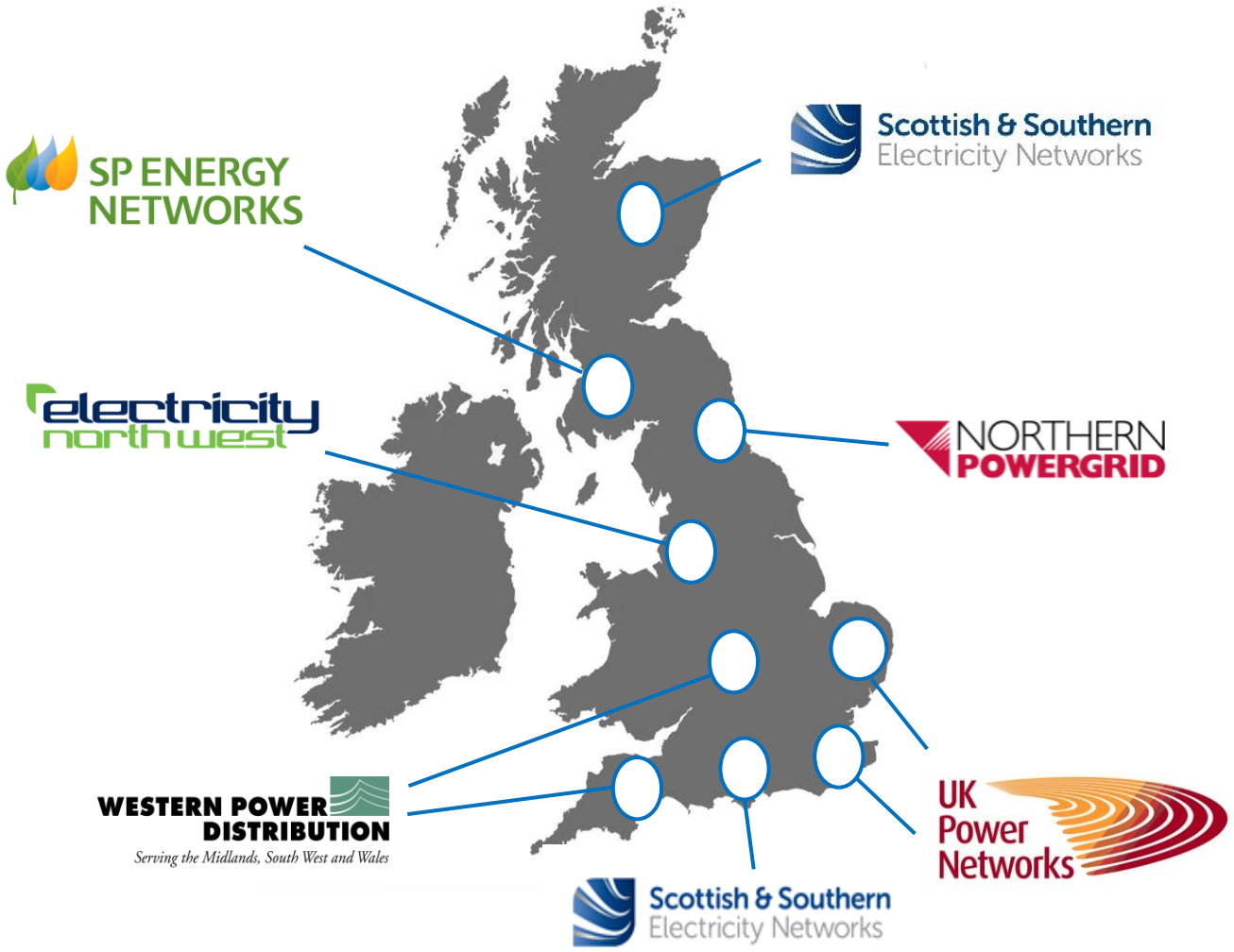
(RDP) overview

- RDPs are examinations of whole areas of the network where more distributed energy resources (DERs) might create operability challenges
- By working together, network organisations are finding ways to ‘unlock’ more capacity through non-network solutions
- RDPs are considering the use of flexibility services from DERs by developing coordinated markets, systems, processes and ways of working with distribution network operators (DNOs)
- RDPs are design by doing projects. They are informed by the ENA Open Networks project and in turn inform the project also.



RDP Solution Development Steps

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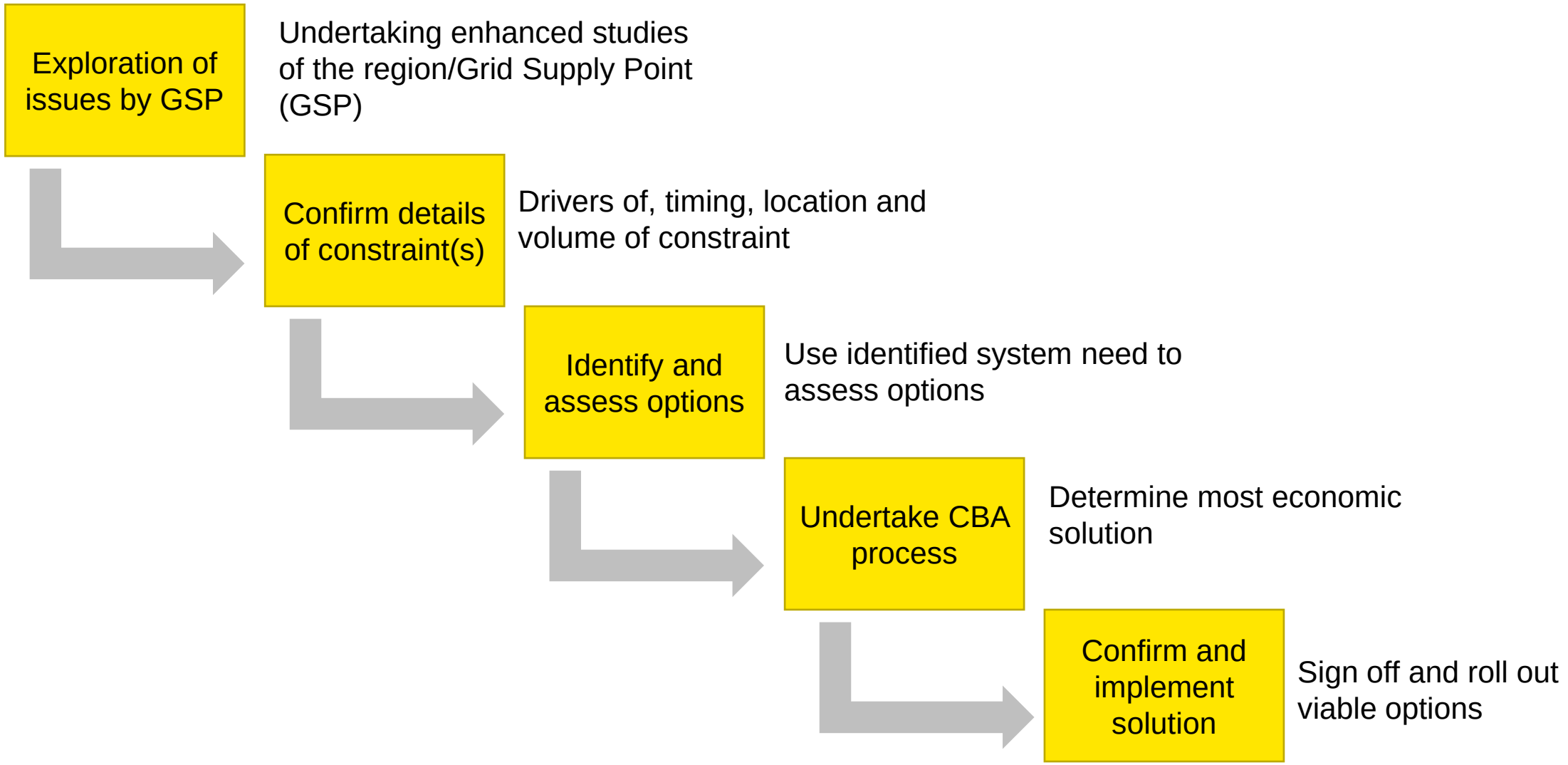

Stakeholder engagement

Projects in Delivery

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Generation Export Management Scheme (GEMS) + SPD ANM

- Project in partnership with SPT and SPD
- First application of automated dispatch technology to help manage multiple nested constraints
- Pilot site delivery aimed at Q4 2023*.

MW Dispatch

- Project in partnership with WPD (South West) and UKPN (South East)
- Development of processes, tools and systems to enable dispatch of DER for basic transmission constraint management service
- Aim to roll-out solution GB-wide over time.

N-3 Intertripping

- Project in partnership with WPD (South West), UKPN (South East) and SSEN (South Central) UKPN Phase 1 (MVP) has already been delivered
- Integration of NGET OTS, ESO SCADA and DNO SCADA/ANM systems to enable intertripping of DER under certain outage + fault scenarios.

Slido code
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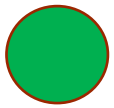
Lunch

Breakout Rooms

We will now be breaking out into roundtable discussion groups. You will be rotating rooms according to the order of the coloured dots on your name badge.

Connections – Victoria room



Codes – Wellington room

RDP – Buchanan room

Holistic Network Design

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Graham Stein

nationalgridESO

Holistic Network Design

Proposals for offshore and onshore networks designs have been shared with generation developers and with OTNR stakeholders

Draft Final Recommendations have been shared with project developers in bilateral meetings and in the form of Options Appraisal Summary Tables (OASTs).

The recommendations describe a design which contains a mix of network connection approaches including regional interconnections, local capacity sharing and radial connections.

It reflects an optimal and equal balancing of the four HND objectives of economic and efficient costs, deliverability and operability, environmental impact, and local community impact.

The design provides for the connection of 23GW of generation with a total of 50GW of offshore wind.

The final designs may differ from those represented in the following slide. Final documents will be published from the end of June.

Draft Design Recommendations

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Regional View

North Wales, North West England and West Coast of Scotland

- direct connections from the Irish Sea to coastal interface sites and regional interconnection from West of Scotland to North Wales

North Coast of Scotland

- radial connections

North East of Scotland

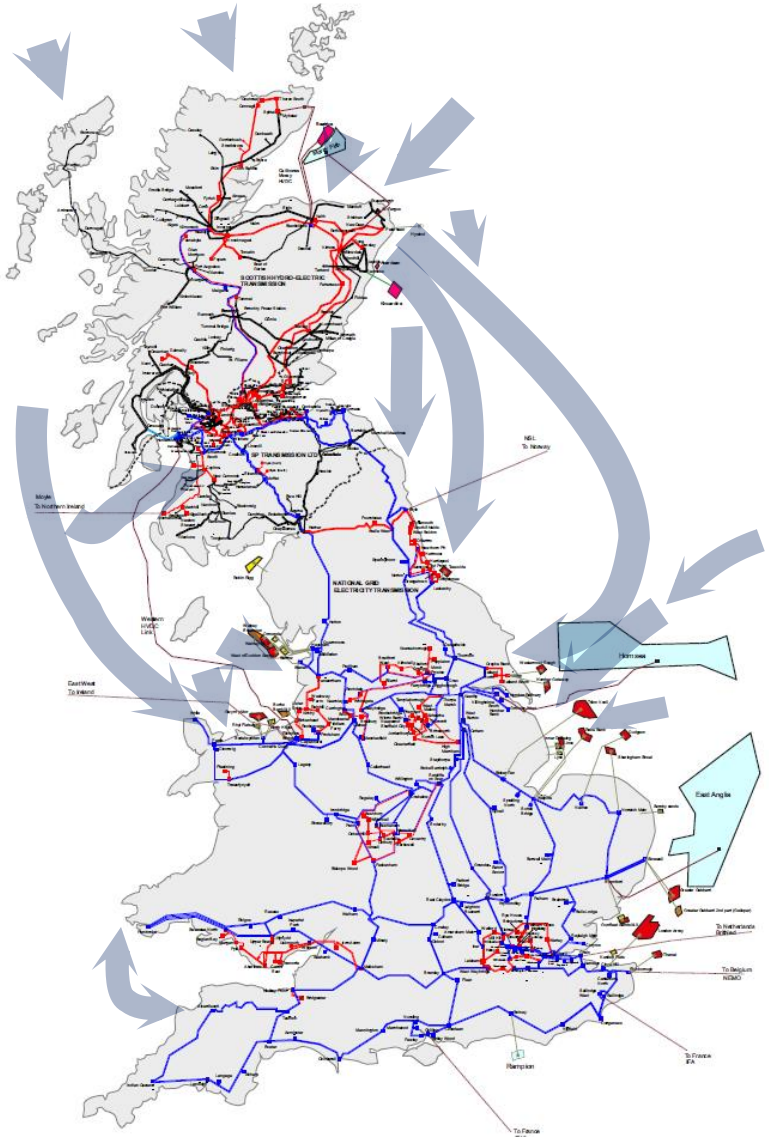
- radial connections with potential value in interconnecting to the south

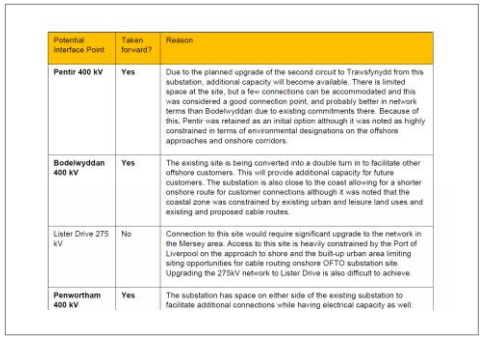
East Coast

- general value in moving move power to the south with a regional interconnection from the east coast of Scotland to the East Coast of England, and capacity sharing where sites are relatively close

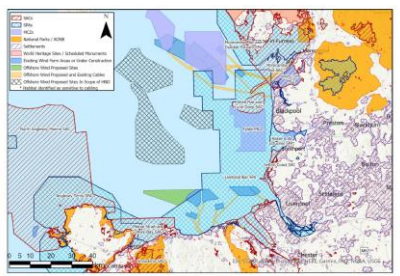
South West

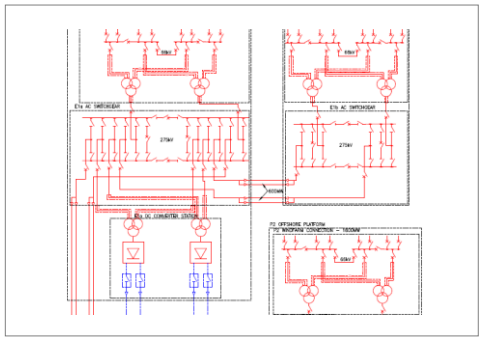
- value in linking between South Wales and the South West of England





Potential Interface Point	Taken forward?	Reason
Pentir 400 kV	**Yes**	Due to the planned upgrade of the second circuit to Trawsfynydd from this substation, additional capacity will become available. There is limited space at the site, but a few connections can be accommodated and this was considered a good connection point, and probably better in network terms than Bodelwyddan due to existing commitments there. Because of this, Pentir was retained as an initial option although it was noted as highly constrained in terms of environmental designations on the offshore approaches and onshore corridors.
Bodelwyddan 400 kV	**Yes**	The existing site is being converted into a double turn in to facilitate other offshore customers. This will provide additional capacity for future customers. The substation is also close to the coast allowing for a shorter onshore route for customer connections although it was noted that the coastal zone was constrained by existing urban and leisure land uses and existing and proposed cable routes.
Lister Drive 275 kV	No	Connection to this site would require significant upgrade to the network in the Mersey area. Access to this site is heavily constrained by the Port of Liverpool on the approach to shore and the built-up urban area limiting siting opportunities for cable routing onshore OFTO substation site. Upgrading the 275kV network to Lister Drive is also difficult to achieve.
Penwortham 400 kV	**Yes**	The substation has space on either side of the existing substation to facilitate additional connections while having electrical capacity as well.





Draft Design Recommendations

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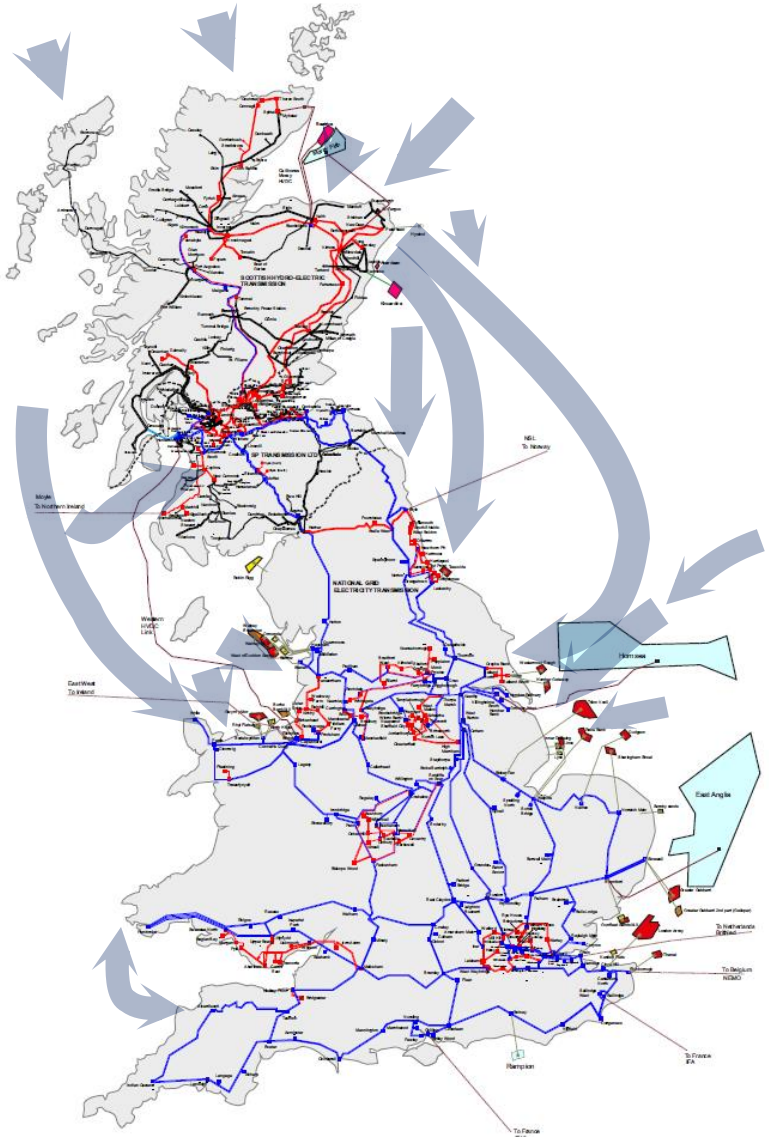
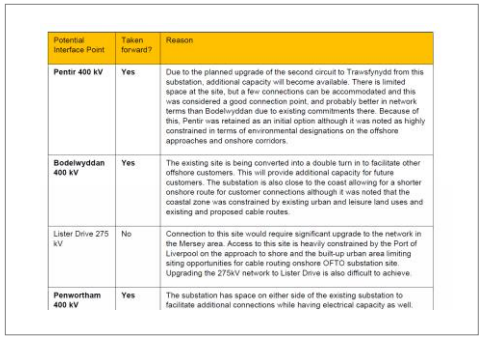
System Wide View

When compared to a uniform radial approach, the design has the potential to

- minimise the need to restrict zero carbon generation and hence minimise carbon emissions and costs
- reduce the impact on communities
- reduce overall cable impact





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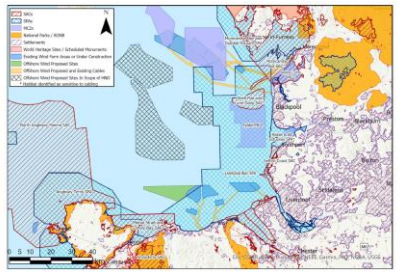

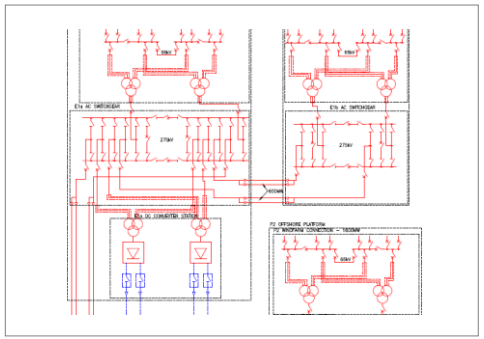

Holistic Network Design

Next Steps

Final Recommendations will be developed in May

Recommendations will be presented to OTNR in June will be published afterwards

Connection agreement amendments will follow in parallel with the next phase of design work

Look out for more information at:

https://www.nationalgrideso.com/future-energy/projects/offshore-coordination-project

Meet the panel

- Susana Neves Brooks – Customer Connections Senior Manager
- Julian Leslie – Head of Networks and Chief Engineer
- Rob Smith – Pathfinder Portfolio Development & Delivery Manager
- Graham Stein – Offshore Coordination Network Planning Senior Manager
- Steve Wallace – Network Access Planning Senior Manager

Thank you for attending today's seminar

Please provide feedback now on Slido: #ncsmay22