



Daniel Barlow – Future Network Technologies Manager

Future Black Start Restoration from Low Carbon Technologies

IRED 2025

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01

Reason for Low Carbon Restoration

Why do we Low Carbon Restoration?

To Keep ahead of the Transition to Low Carbon Generation

New UK Standards for Restoration

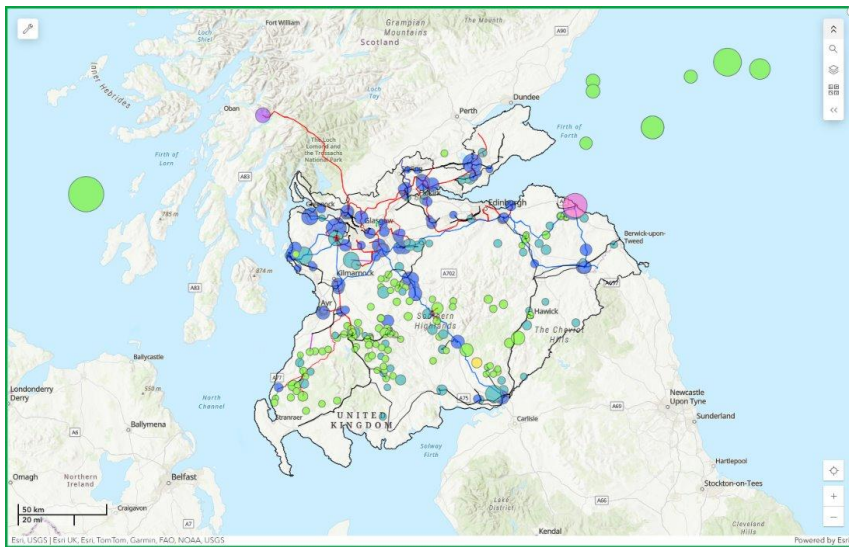
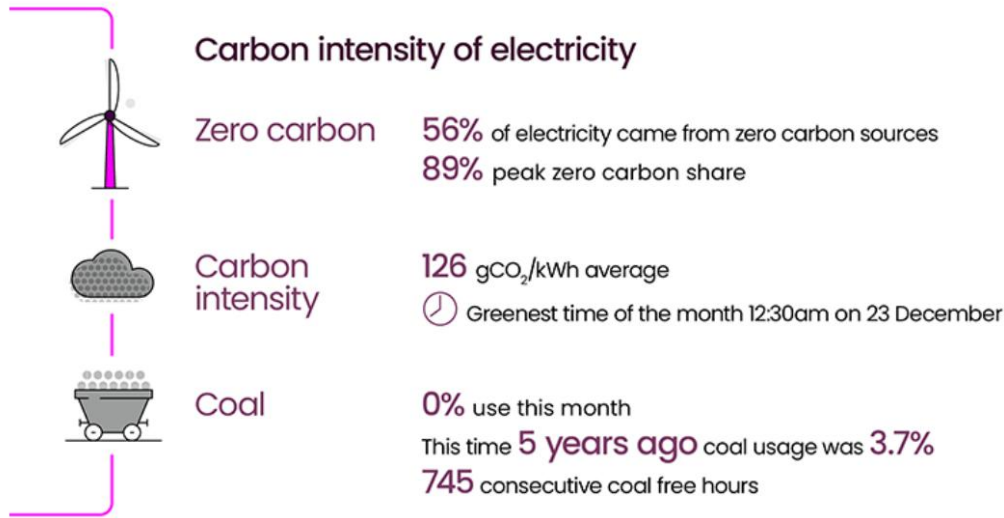
- May 24 – GC0156 ESR Standard
- NESO has new legal requirement
- **restore 60%** of demand within **24hrs**
- **100%** of demand in **5 days**

What Does it mean for Scotland?

- **Limited start up capability** due to Low Carbon Generation Transition.
- **SPT Dependant on** supply from either **NGT or SSEN** to connect generation
- **Require** to develop a market for **Restoration services**

What Does it Mean UK?

- **Most** restoration **Strategies** rely on **Hydro and / or gas**
- Plant Aging or dependency on Gas being removed
- There will be days of 100% Low Carbon Generation coming
- **Low Carbon Technologies** (Solar, Wind, BESS etc) **must** be able to **support a restoration Strategy** to stay a step ahead



Focus on Clean Power 2030

- **Wind Generation is a major generation contribution** for UK Low Carbon
- **Low Carbon** sources delivered **89%** of generation **at Peak**

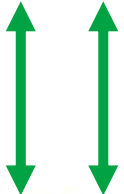
- **Future looking at 70GW of Wind Generation connected**
 - (vs, 45GW UK Demand max 2024)
 - (vs, 15GW UK Demand min 2024)
- What if it's a day off 100% Low Carbon Generation.....
- Low Carbon Technologies need to be part of the solution

*Graphics and Figures from NESO Statistics for Dec 2024

Traditional Restoration



Load



nationalgrid

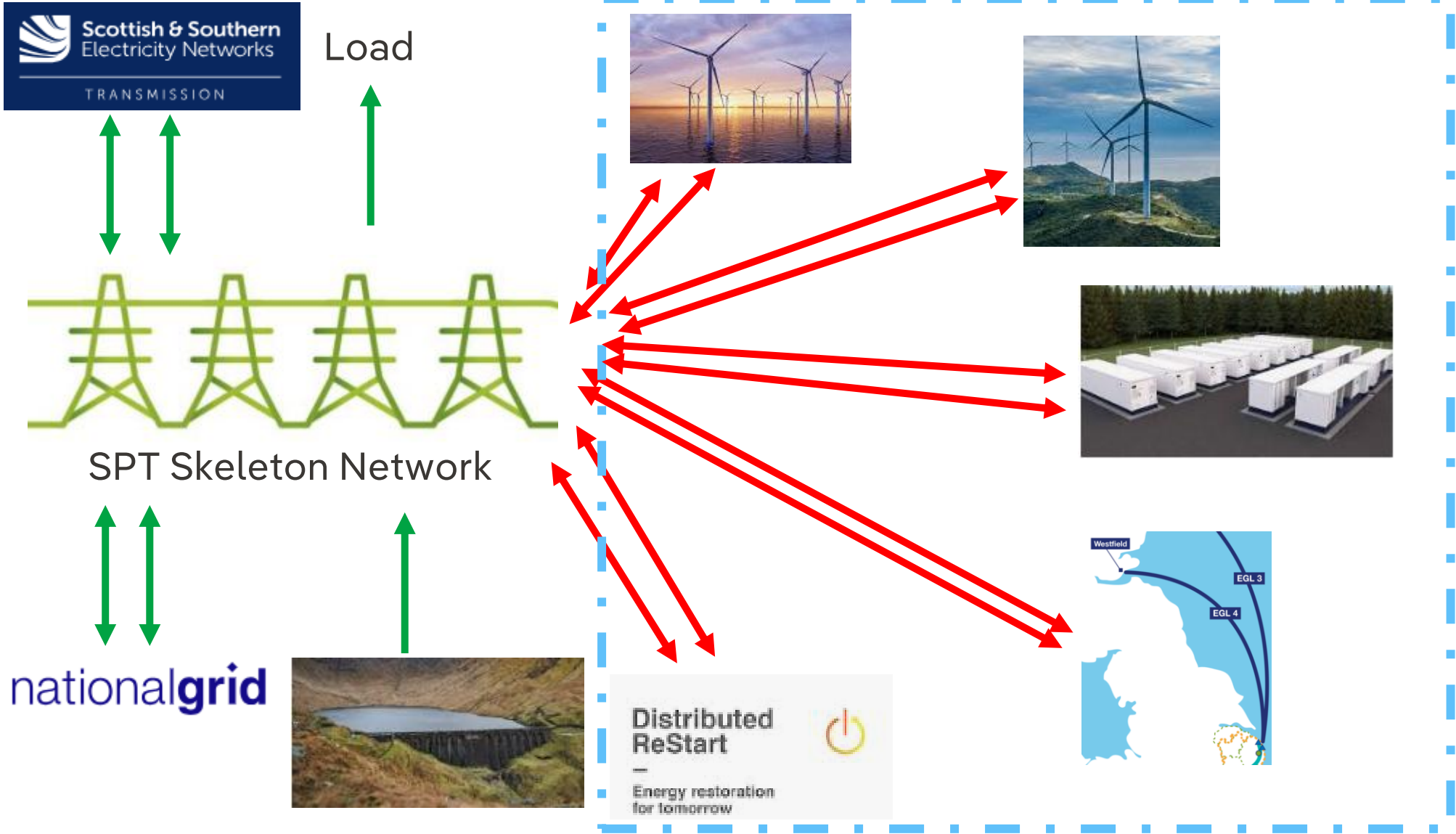


Pumped Storage



Fossil Fuel Generator

SPEN Future Restoration



02

Where it started -

Distributed Restart

Distributed Restart – Project Background

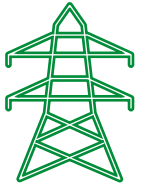


Demonstrations

Dumfries and Galloway Hydro / Biomass trials - 2022
 Redhouse BESS trials - June 2023



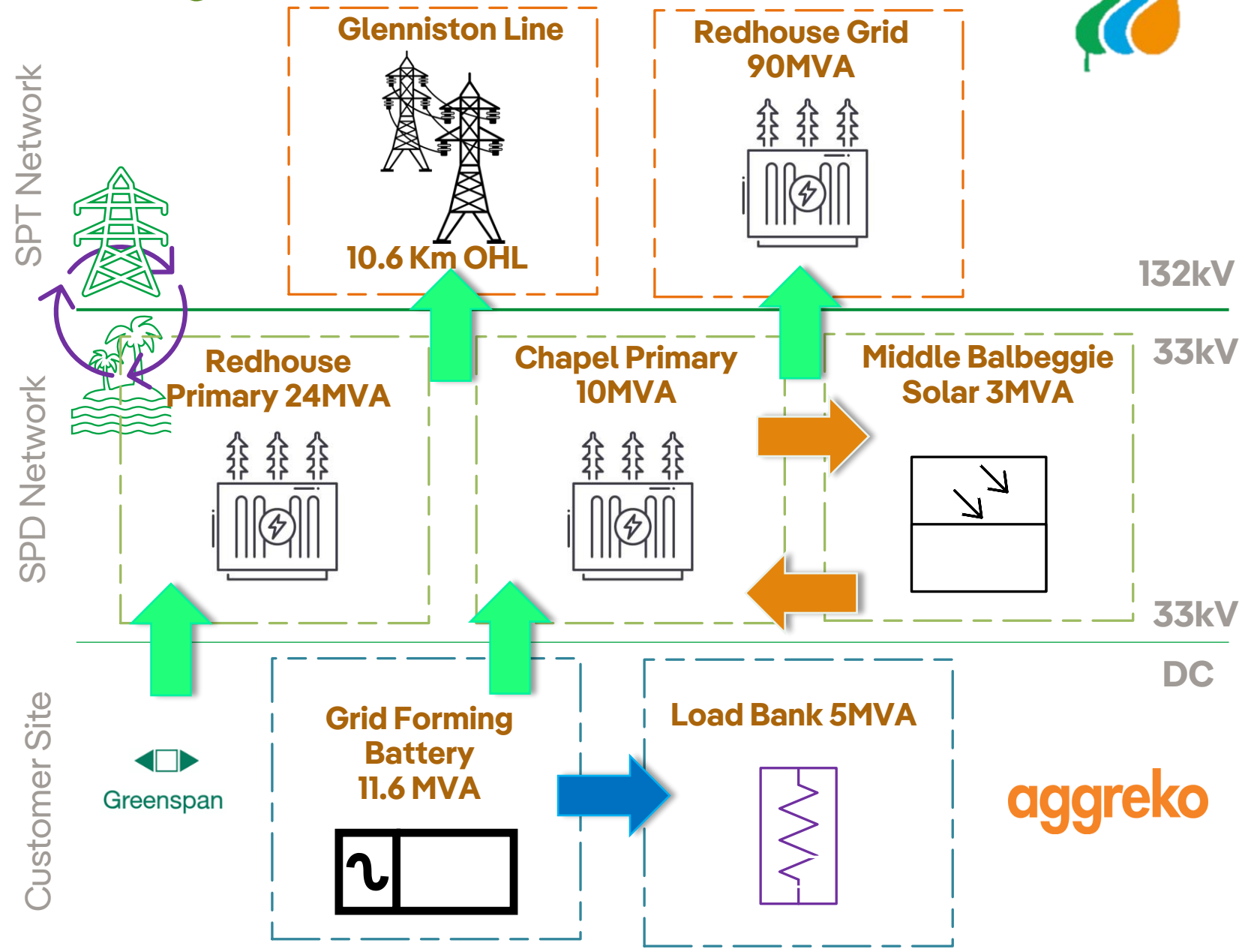
Grid Forming battery tests with **simulated** customer load



Automated start-up and **optimal** power island control under DRZC



World first tests – forefront of innovation with **no CI/CML** implications



Confidential
 Internal Use

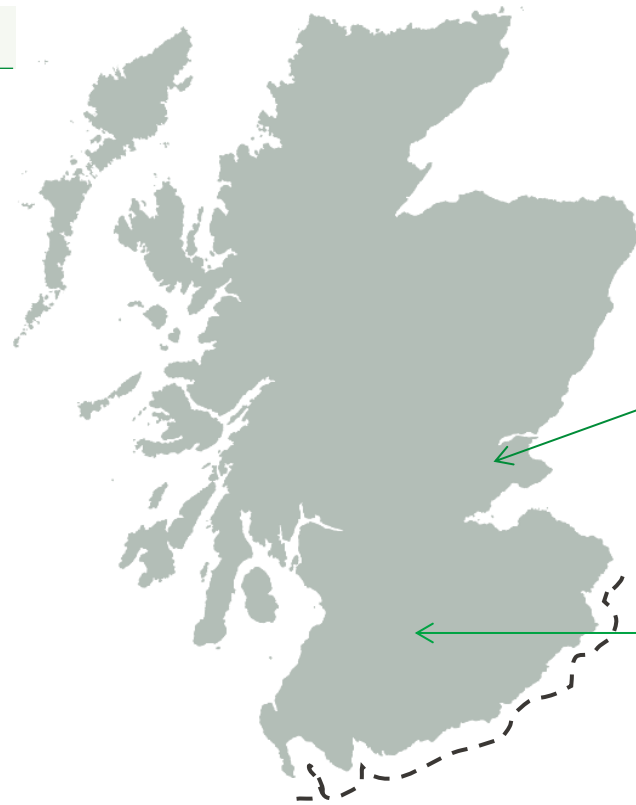
aggreko

Next Steps – Following Trials

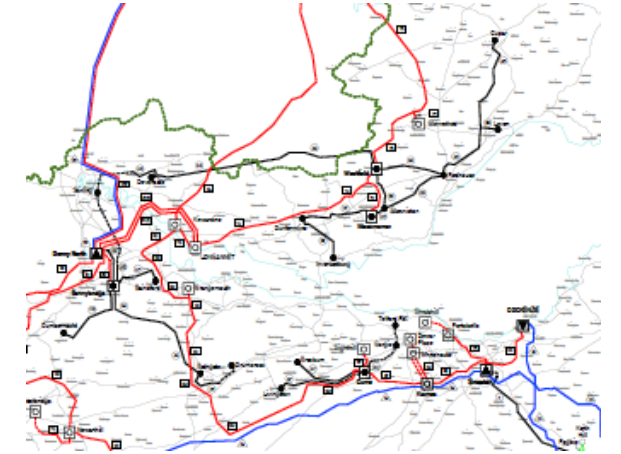
Transitioning learning into actual Distributed Restoration Zones (DRZs) via the Northern Tender



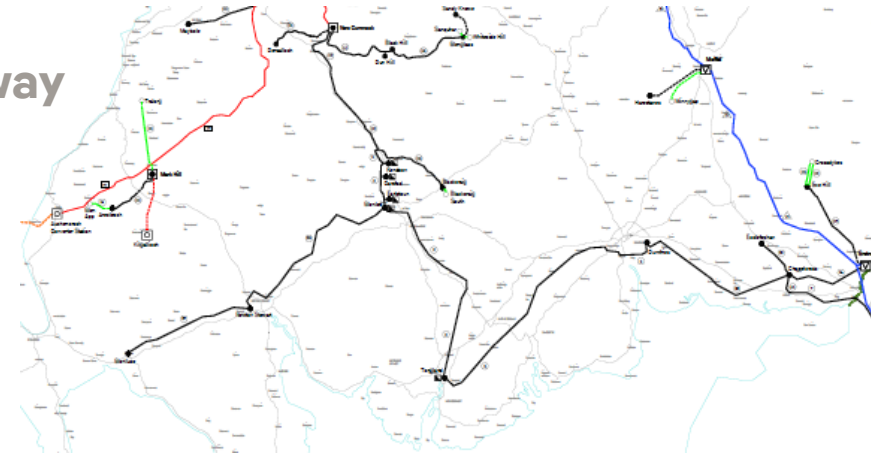
Undertaking detailed analysis on over 40 generators to enable feasible and operational DRZs by 2026 onwards



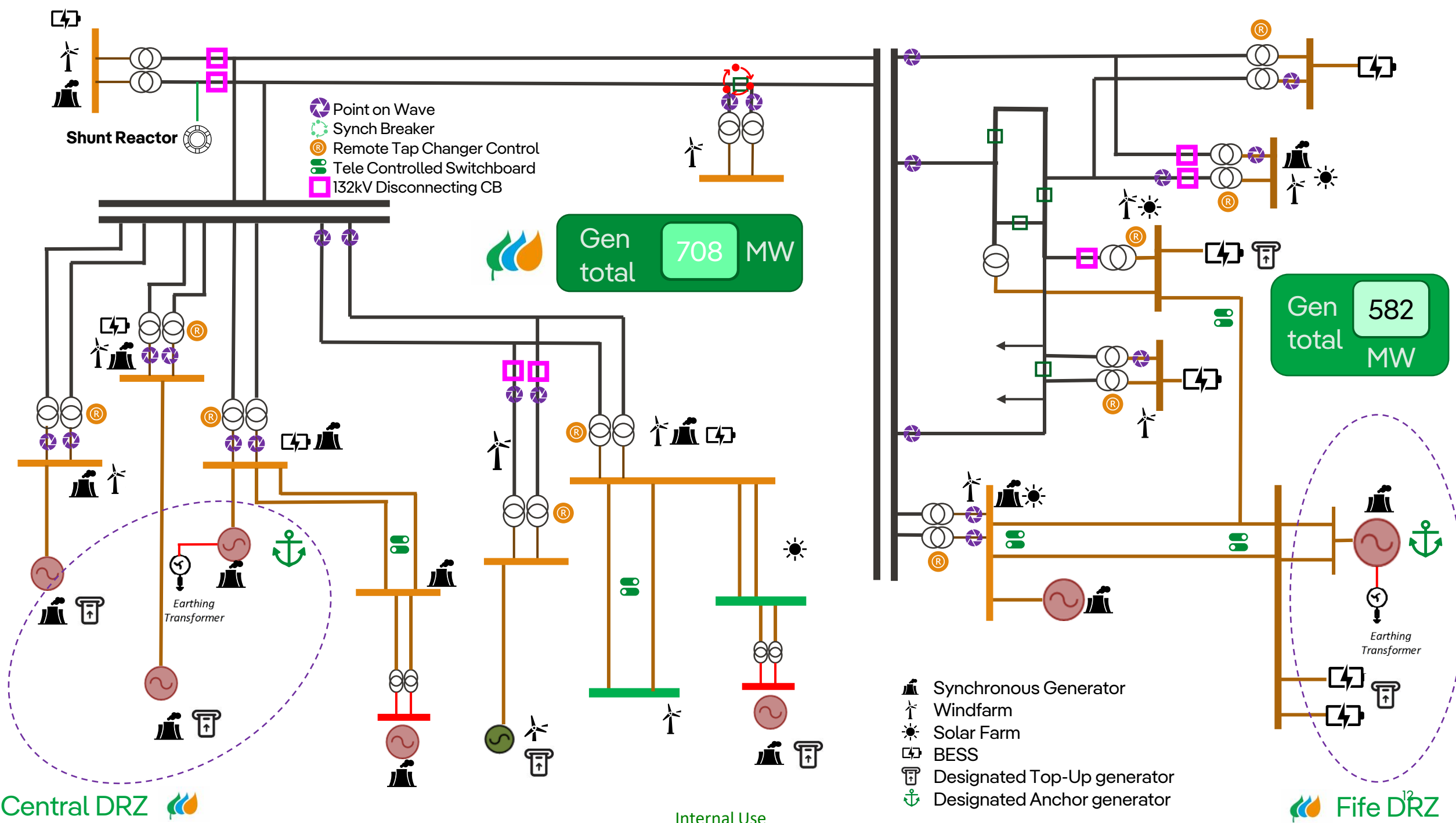
Central & Fife



Dumfries & Galloway



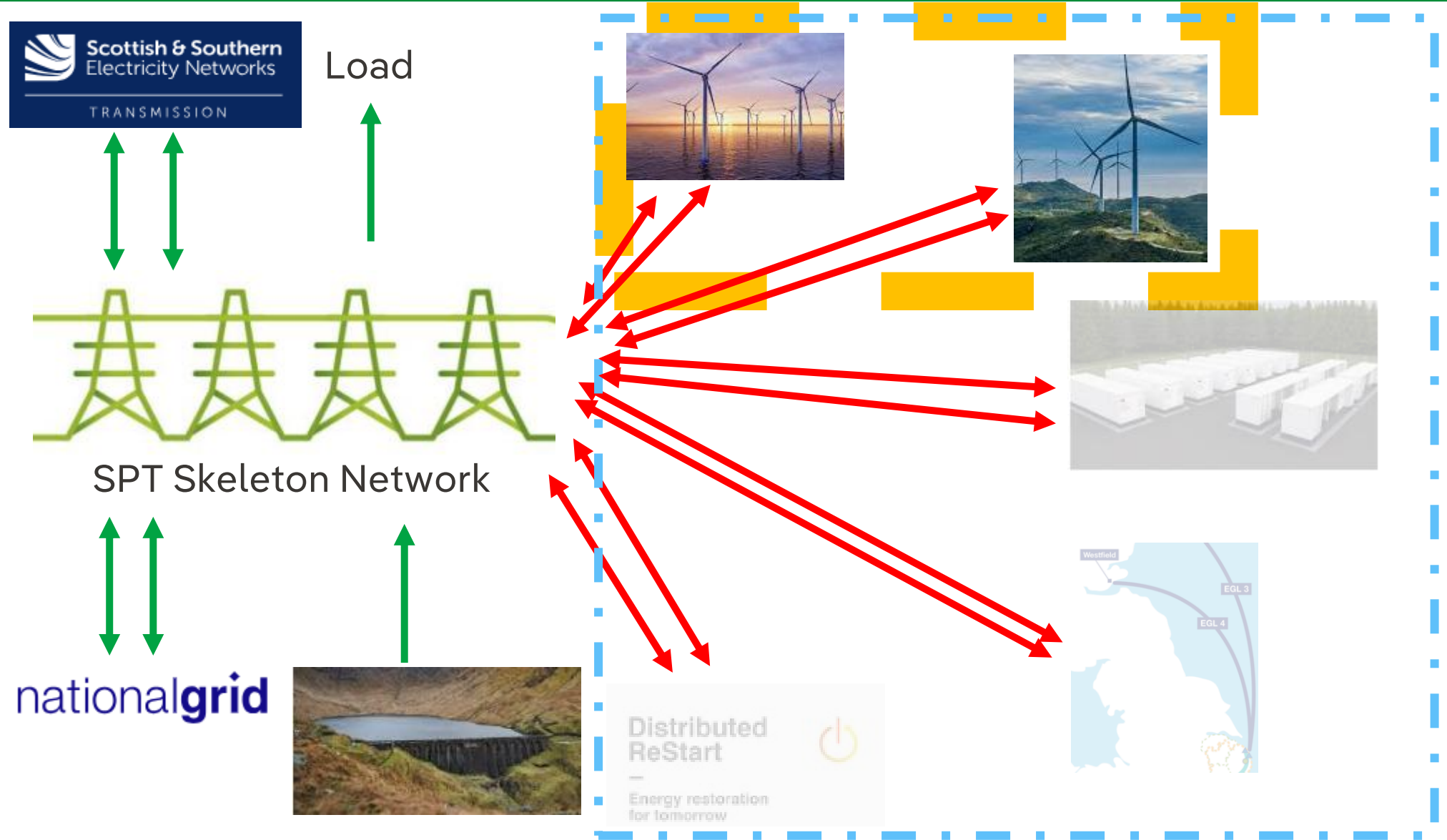
Working to ensure efficient restoration for our network on the journey to Net Zero



03

Where we are now - SIF Blade

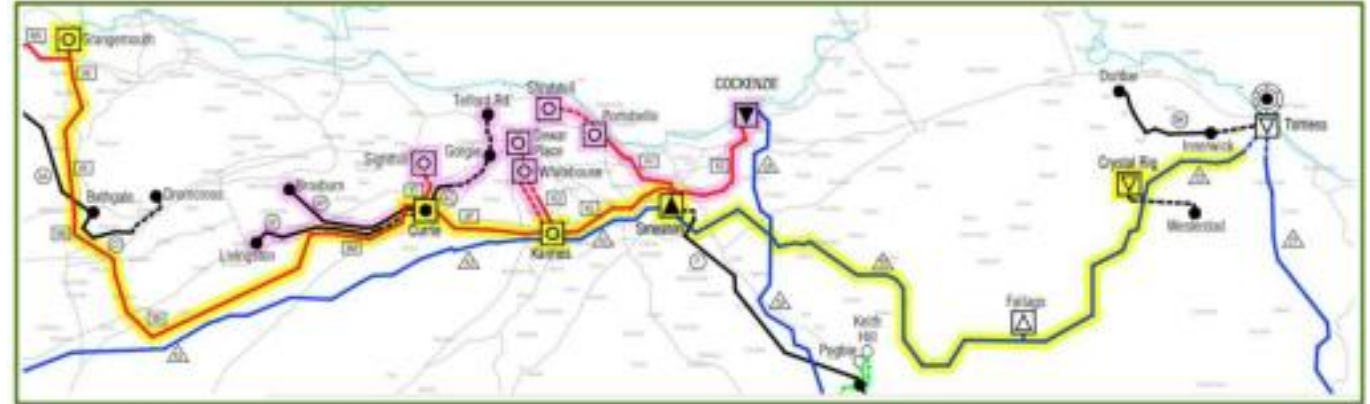
BLADE – Black Start Demonstrator Using Offshore Wind



What Will SIF Blade Deliver?

Develop **BESS Models** and **OWF models** and discussed / debated / reviewed assumptions

Work with OEMs to get most accurate picture



For the scenarios undertake **extensive EMT Studies**

Evaluate System performance

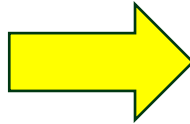
Determine issues and propose solutions

Review **Loading Step Changes**

Review proposed switching

Protection Challenges

Develop performance requirements for:
GFM Sources (BESS / OWF)
GFL Sources on initial re-energisation
Transmission System Modifications to utilise OWF



Allows a Restoration plan based on Low Carbon Technologies to **be created**, tested and prepared to **stay ahead on any issues**

SIF Blade Restoration Standard Outputs

NESO

Creates a market that can deliver costs reduction for Consumers

Provides future possible different restoration scenarios/options

OEMS

Produces an output that can be built / supported

Transmission Operators

Provides a standard that works with Network Construction / operational requirements

OFGEM

Identifies the Regulatory frameworks that require to be changed modified as we transition

Developers

Produces a product that commercially can be seen to deliver value and return

The Consortium provides an output that can be delivered from all aspects

Other System Operators

These outputs are going to be required across the worldwide to support the Low Carbon Transition

04

Whats Next.....

Keeping a step ahead of Restoration Requirements

Energy Resilience is Hot Topic Due to recent events

- **Heathrow, Spain and Portugal** have thrust resilience to the front page
- **UK has never had a national power outage**
 - Let's try and keep it that way!
- **New Legal Targets** for the What If
 - **60% back on in 24hrs,**
 - **100% restored in 5 days**
- Any **Restoration Strategy must include Low Carbon Technologies**

