



6th December 2017

**Dumfries and Galloway
Developer Forum**

Welcome and Introduction

Gareth Hislop

- Introduction – Gareth Hislop
- NGET Update – Julian Leslie
- Design Update – Diyar Kadar
- IRM Bid – Deborah MacPherson
- KTR Project Update – Colin Brown
- Questions – Gareth Hislop

Aim

- Provide an on the progress we've made in creating the non-build solution.
- Ask for your input on the solution.
- Provide an update on the KTR project.

Dumfries and Galloway Forum

Julian Leslie

Head of Network Capability – Electricity

James Kerr

Scotland Connection Contracts Manager

Matthew Rivett

GB Connections Assessment Team

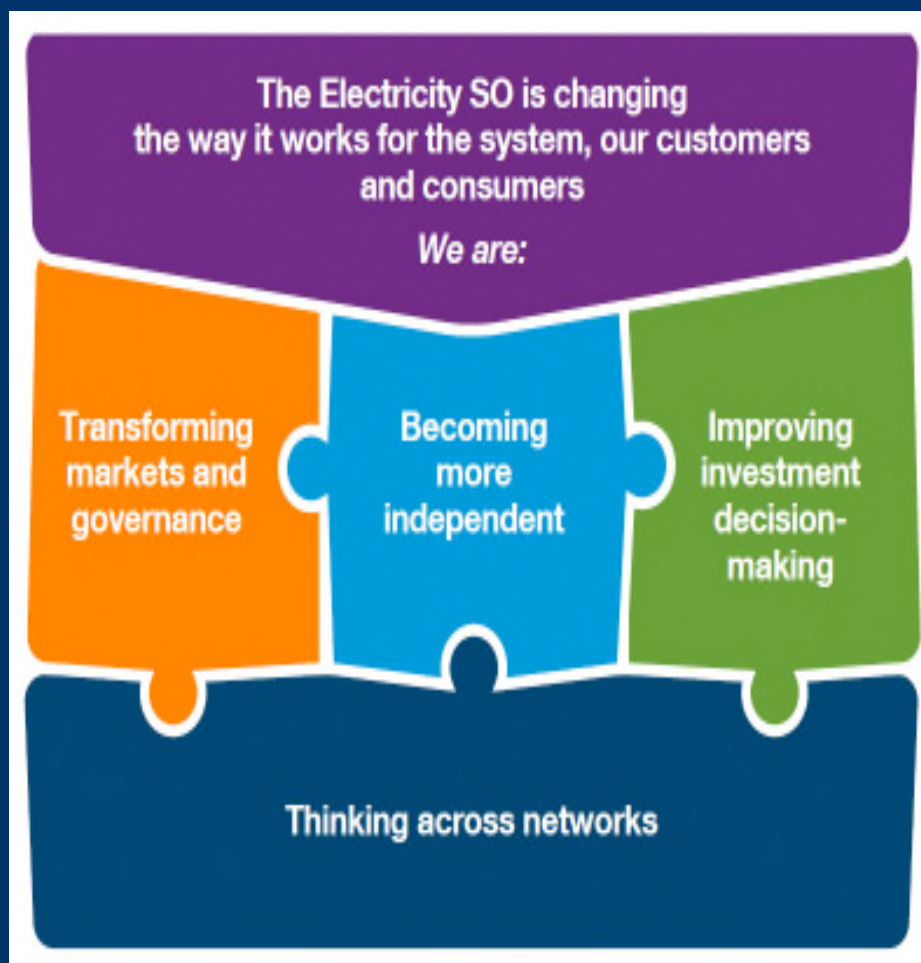
GB System Operator



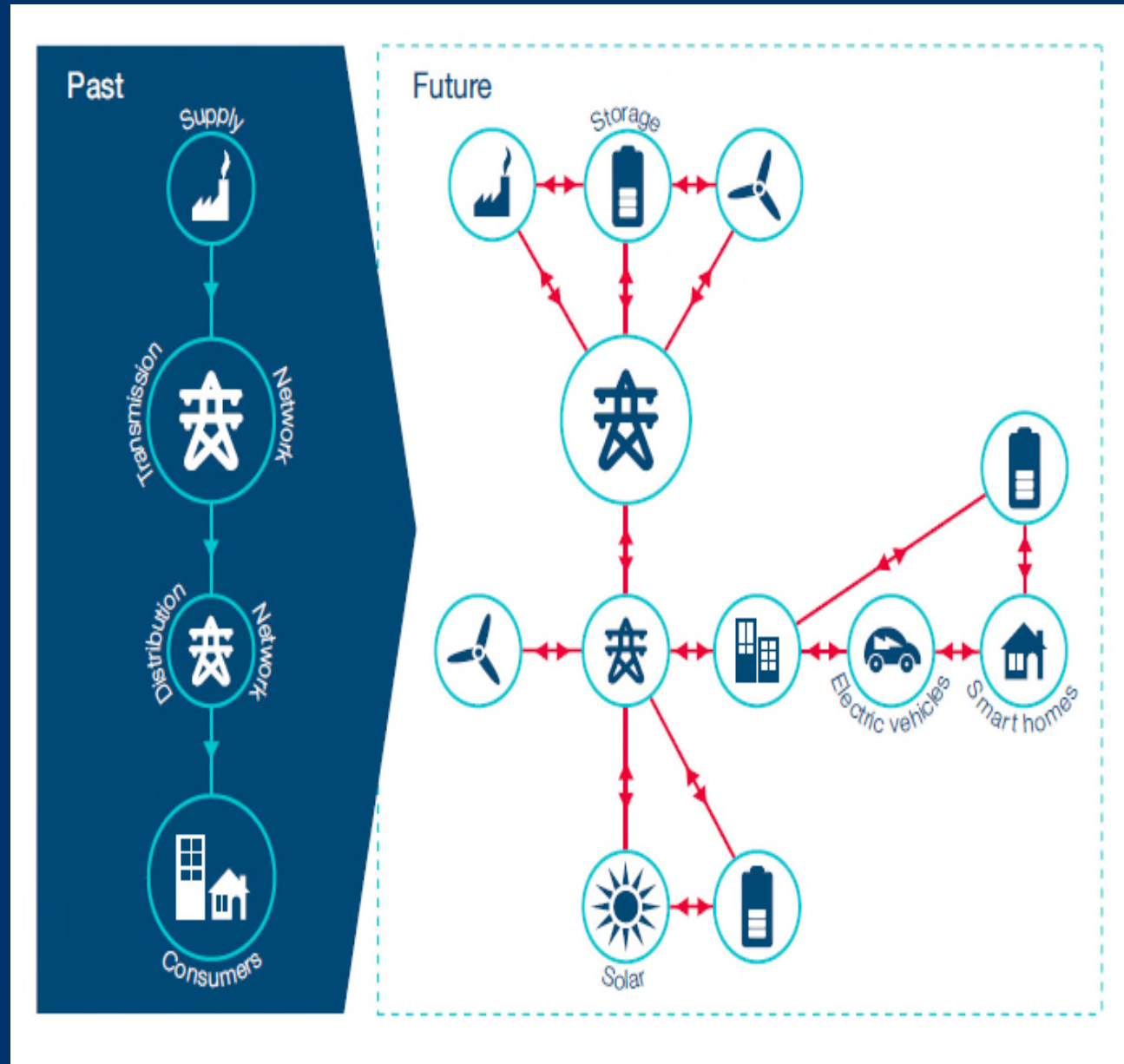
Agenda

- **Enhanced GBSO Role**
- **Journey to-date**
- **Network Management**
- **Overview of 5 options shared**
- **Key Developer feedback**
- **Explanation of solution taken forward**
- **Detailed Design – Requirements**
- **Example scenario**
- **Anticipated timeline**
- **Next steps**
- **Q & A**

Future Role of the System Operator



Future Role of the System Operator



Future Role of the System Operator

New challenges to enable efficient connection processes, network management and system operation

Shifting from T-connected to D-connected generation

- Visibility & Controllability
- Market Opportunities
- Balancing Services Opportunities

Balancing operability (non-build) vs investment in assets (build) solutions

- Getting the most out of existing assets
- Realising the value of flexibility
- Efficient trade-off with asset build

Focusing on regional issues, and associated solutions

- Understanding 'whole system' capability
- Clearly articulating regional system needs
- Encouraging innovative solutions

Strategic Wider Works

- **Cost Benefit Analysis concluded it was more economic and efficient to pay constraint costs, as opposed to building reinforcements**
- **Recommendation not to proceed with major build options**
- **Solution recommended end-of-life asset replacement**
- **As a result, we updated connection agreements in January 2017 to remove works that are not proceeding**
- **Presentation of high level options to manage network in November 2016. Further discussion with Developers held in June 2017**
- **Feedback taken away and responses provided**

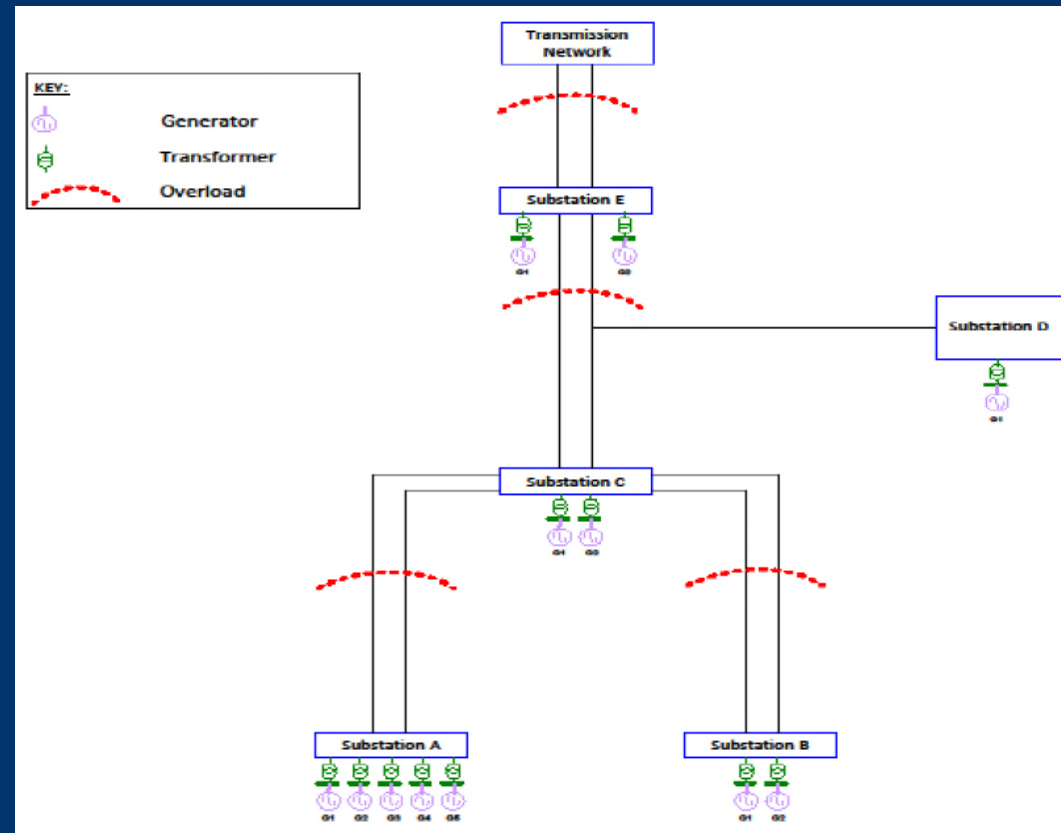


Network Management

The Problem: The generation contracted position in the D&G area, will result in overloads under certain conditions at different local boundaries as shown.

The Solution: To avoid system overload it is proposed to reduce generation rather than build infrastructure to meet peak demand. This is calculated through Cost Benefit Analysis (CBA) as being more economic for the consumer.

The Challenge: 5 alternative scenarios were presented that proposed different mechanisms to reduce generation and protect the network. The feedback you provided will highlighted issues, benefits and blockers to help us identify which solution(s) we should develop further.



Strategic Wider Works
Decision

Development of Options

Detailed Design

Deployment of Solution

Options Presented

- **Option A – Balancing Mechanism (BM) only**
 - Solely manage via BM
- **Options B – Commercial Inter-trips + Balancing Mechanism (BM)**
 - Inter-trips used on larger sites, BM to manage small imbalance
- **Option C – Commercial Contracts + Balancing Mechanism (BM)**
 - Contracts used for most constraints, BM to manage small imbalance
- **Option D – Active Network Management (ANM) + Balancing Mechanism (BM)**
 - Automated instructions, faster than the BM
- **Option E – Innovative Solutions e.g. storage, demand**
 - Other solutions



Key Developer Feedback

If a developer is not part of the BM, can they still opt in? How would this work?

What equipment would need to be installed on the Developers side?

Will the system be able to achieve a smooth ramp-back of generation? How can this be achieved with Solar?

100% - 20% of output can generally be quite quick however, 20% to 0% can be strenuous on machines.

BM User requirement costs may make smaller parties not keen on participating.

How would all parties be managed to ensure compliance with commercial intertrip contracts?

Hard trip and re-energisation is a big problem. It can also affect manufacturers warranties. Preferred option would be to eliminate hard trip completely.

Is there an option to create two 'Last in, first off' (LIFO) queues of access – one for T and one for D customers?

Strategic Wider Works Decision

Development of Options

Detailed Design

Deployment of Solution

Preferred option

- **Development of a Generation Export Management Scheme (GEMS)**

Key Features

Participation from transmission and distribution connectees

Interaction with other SO systems

Ability to instruct different types of plant.

Economic dispatch based on connection conditions and commercial arrangements

Pre-fault dispatch ahead of real-time

Post-fault de-load

Programmable boundary limits (network capability)

Distribution Interface

Strategic Wider Works Decision

Development of Options

Detailed Design

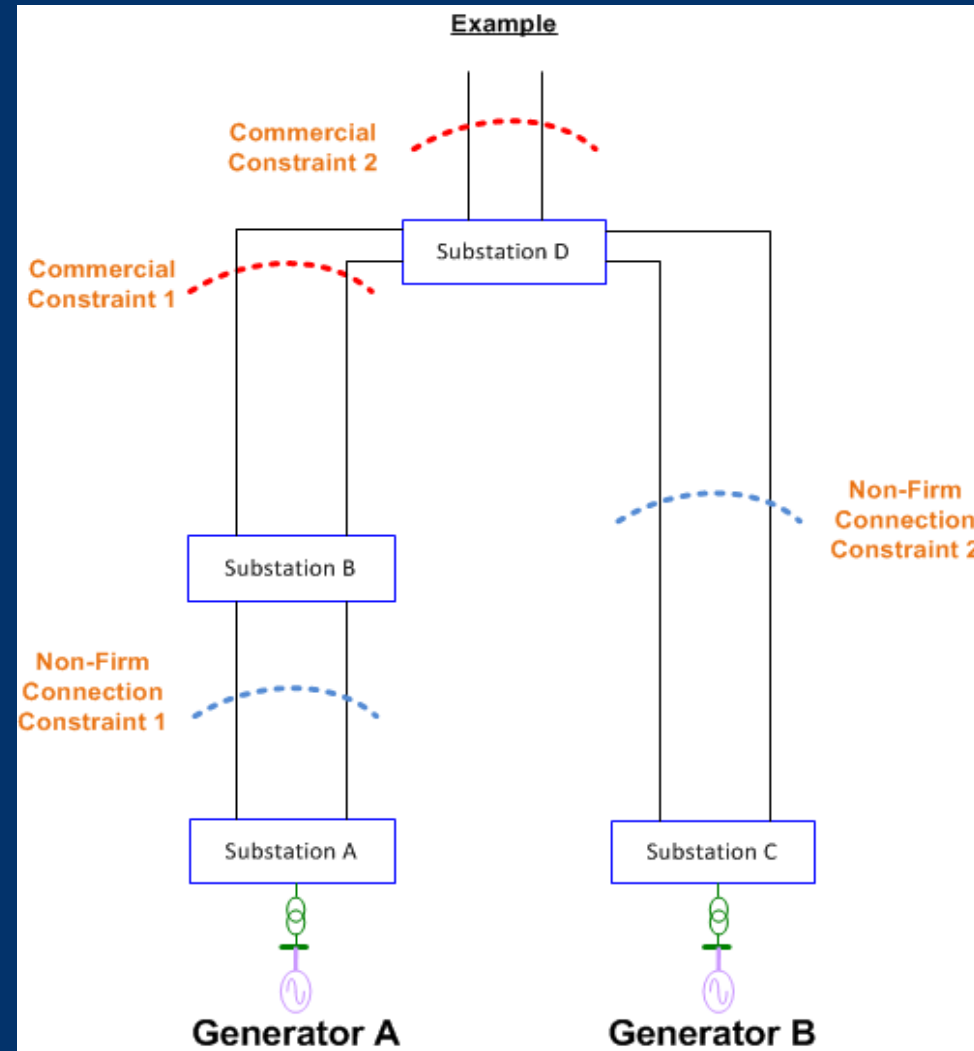
Deployment of Solution

Detailed Design

- **Further work is now being undertaken between National Grid and Scottish Power to determine the detailed design requirements**
- **As a result of this work, the following requirements have been identified:**
 - **Obligation to provide a form of ‘visibility and control’ which will allow interaction with GEMS**
 - **Update to connection agreements to reflect both connection conditions and commercial conditions**
 - **Interactions with individual Developers to understand potential plant capabilities, operating regimes and control structures**



Example Connection Conditions



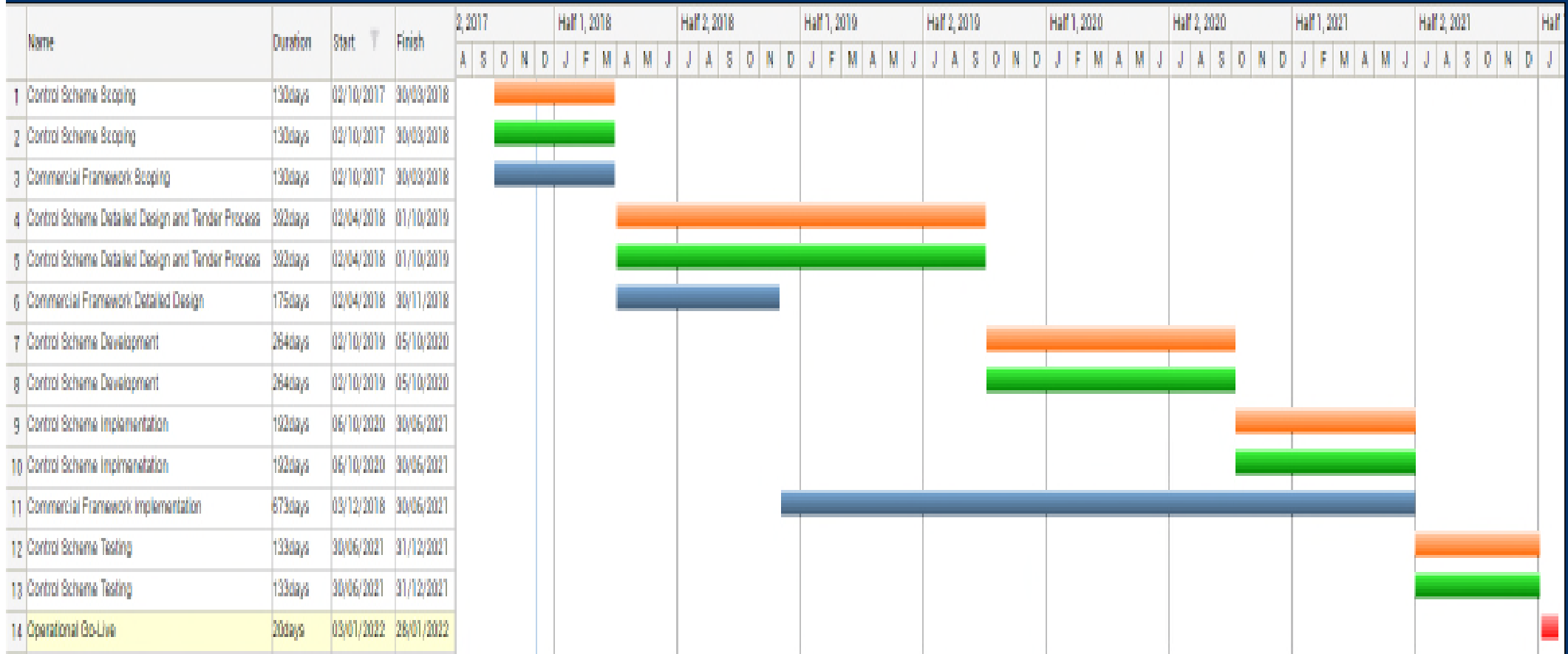
Strategic Wider Works
Decision

Development of Options

Detailed Design

Deployment of Solution

Deployment of Solution



Next steps

- Continuation of the scoping and design of the Generation Export Management Scheme
- Work through the details of providing 'visibility and control' for different connectees
- Engage with individual Developers (likely during portfolio review meetings) to answer specific queries
- Start to understand technical plant capability, control structure and operating regimes
- Provision of more information to individual parties about how the commercial framework and settlement will work

Q & A

- Any questions?
- Representatives from National Grid and Scottish Power will be available for individual questions



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D&G Developer Forum

SPT System Design

Diyar Kadar

ANM – Our approach

ENA ANM Good Practice Guide Definition

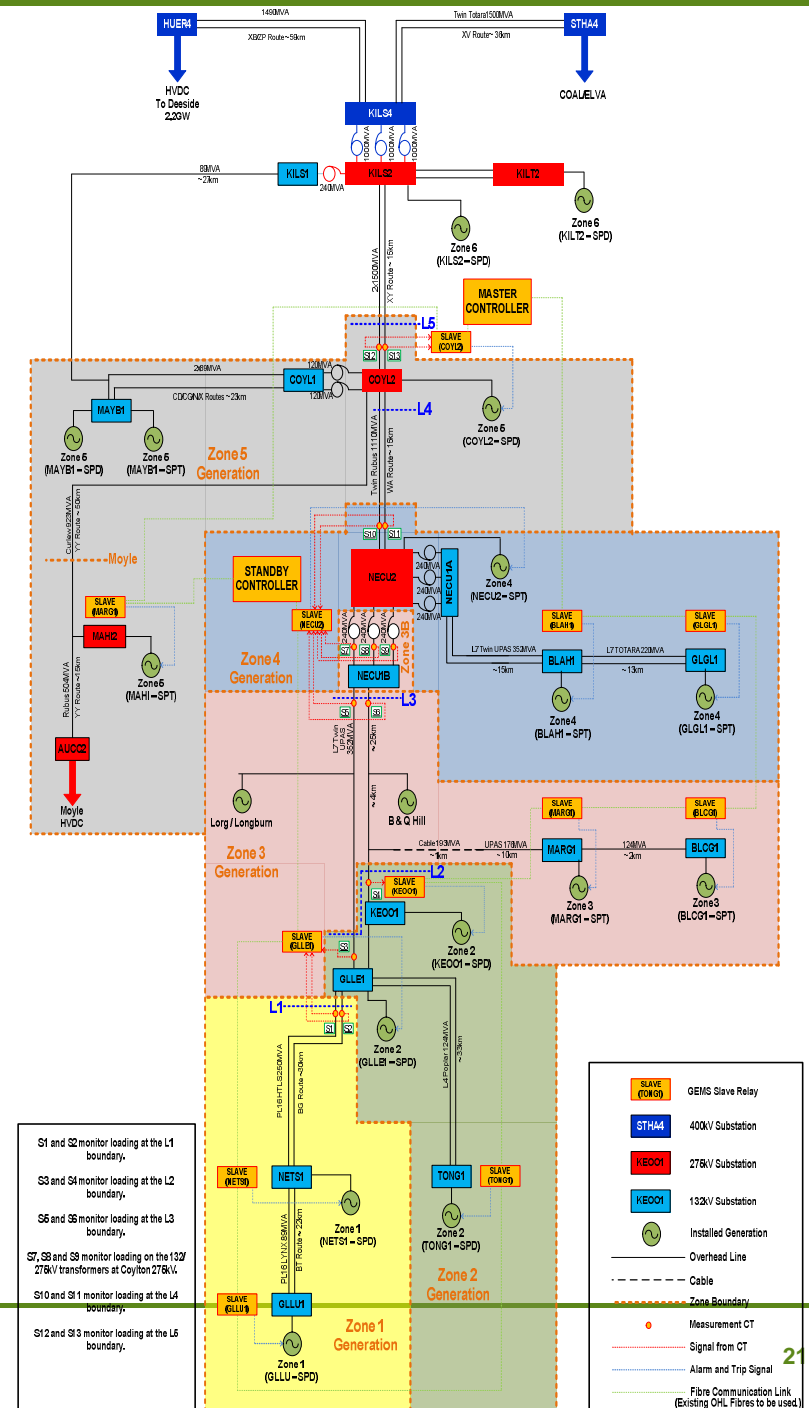
- *“Using flexible network customers autonomously and in real-time to increase the utilisation of network assets without breaching operational limits, thereby reducing the need for reinforcement, speeding up connections and reducing costs.”*

ENA ANM Good Practice Guide

- *“ANM should only be used on radial elements of the network, where its impact on network operation can be easily understood”*
- *“On more complicated meshed transmission networks, the effect of ANM actions are thought to be too complex and unpredictable to implement safely”*

Network Under Consideration

| High level Requirements |
|---|
| Ability to monitor multiple network boundaries |
| Utilisation of pre-fault and post fault limits |
| Multiple stack selection |
| Flexibility in scheme selection (Commercial, LIFO, ...) |
| Scalable and configurable |
| Reliable and robust (redundancy in design) |
| Control and visibility |
| Speed and dependability |
| Potential interaction with SO systems |
| Interface with Distribution IRM scheme |
| Standards and protocols |
| Utilisation of pre-fault and post fault limits |
| Standards and protocols |





Transmission Summit
30th November 2017

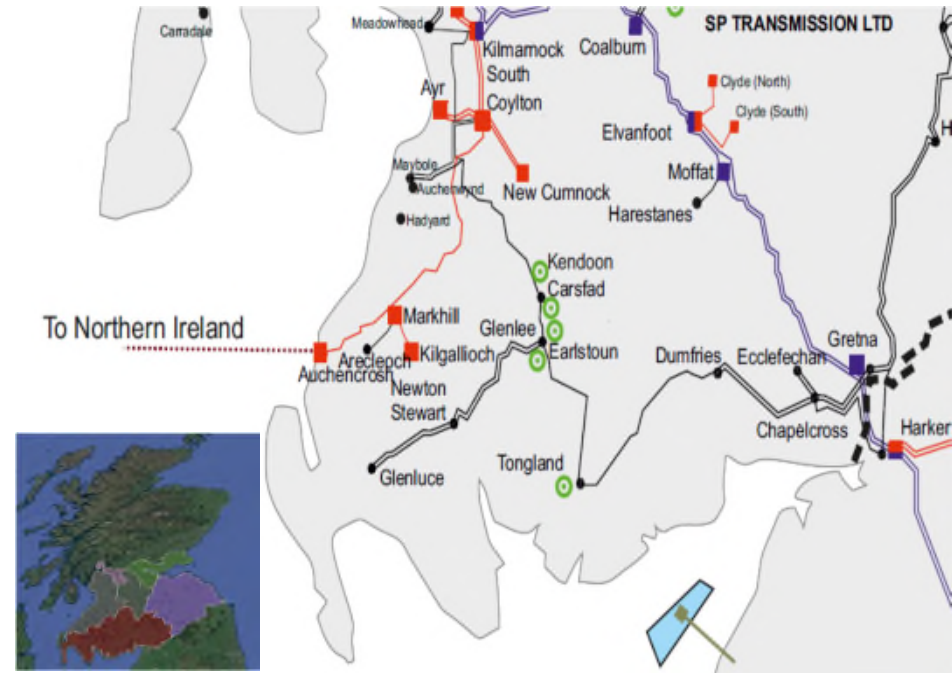
Dumfries & Galloway Smart Zone

Deborah MacPherson
Lead Commercial Analyst
SP Energy Networks

Dumfries & Galloway – Distribution award 2017

Design & Deliver:

- First multi GSP ANM Scheme of this scale in the UK
- First geographical ANM Scheme designed to alleviate transmission constraints
- First ANM Scheme designed with capability to interface with the GBSO in real-time



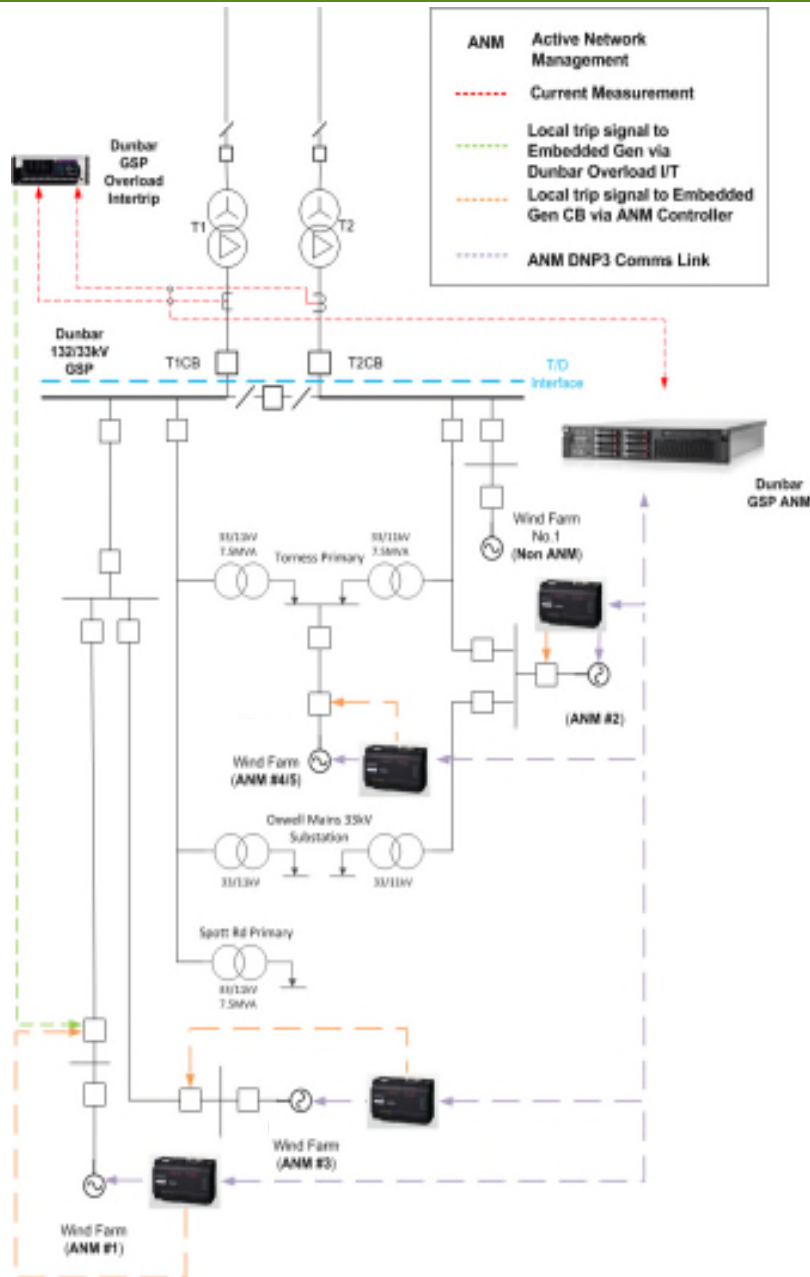
Outstanding Opportunity for SP Energy Networks

- Only successful IRM bid in UK (2017)
- **£8m award** allows wide scale ANM on Distribution and Transmission Networks in D&G
- Funded to deliver an industry leading ANM project, wider in scope and ambition than any project to date
- Building the capability and skills required for future flexible networks
- **Scalable ANM solution for SPEN and other IBE networks**

£8m
award

Paving the way towards becoming a DSO

Dumfries & Galloway – Operational Architecture



Significant increase in complexity



Scale

11 GSPs

Interaction

SO/TO interface

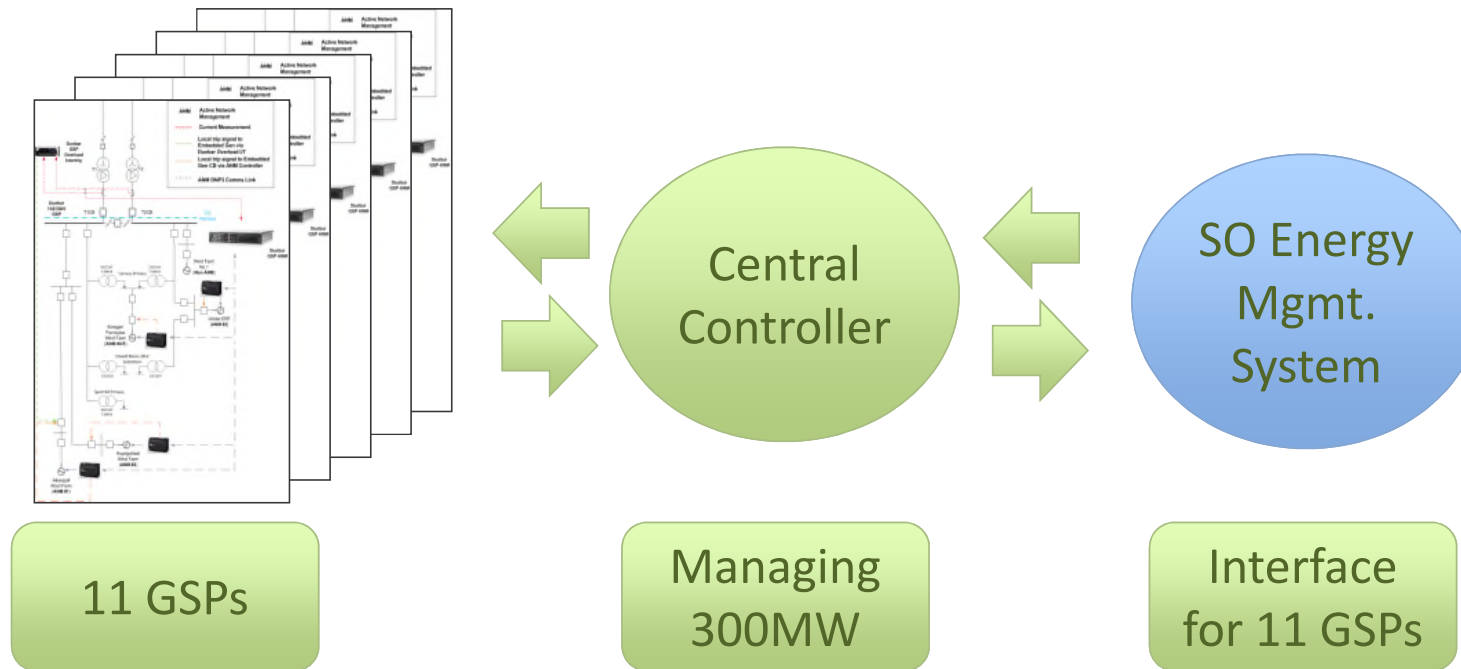
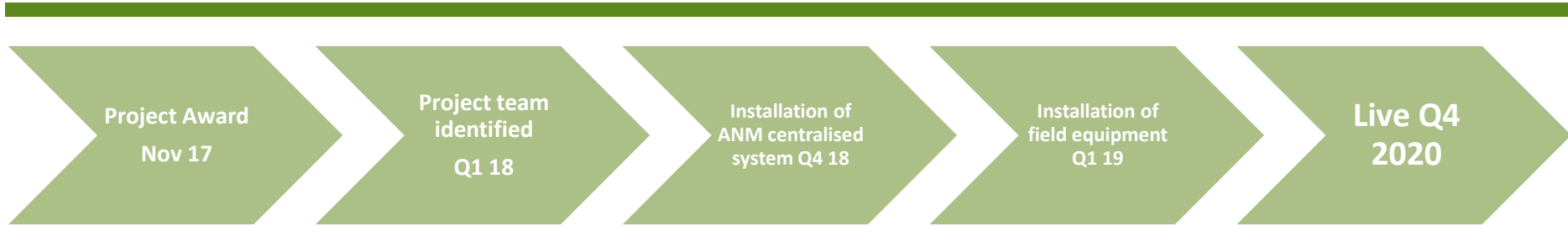
Volume

Up to 300MW

Future Proofing

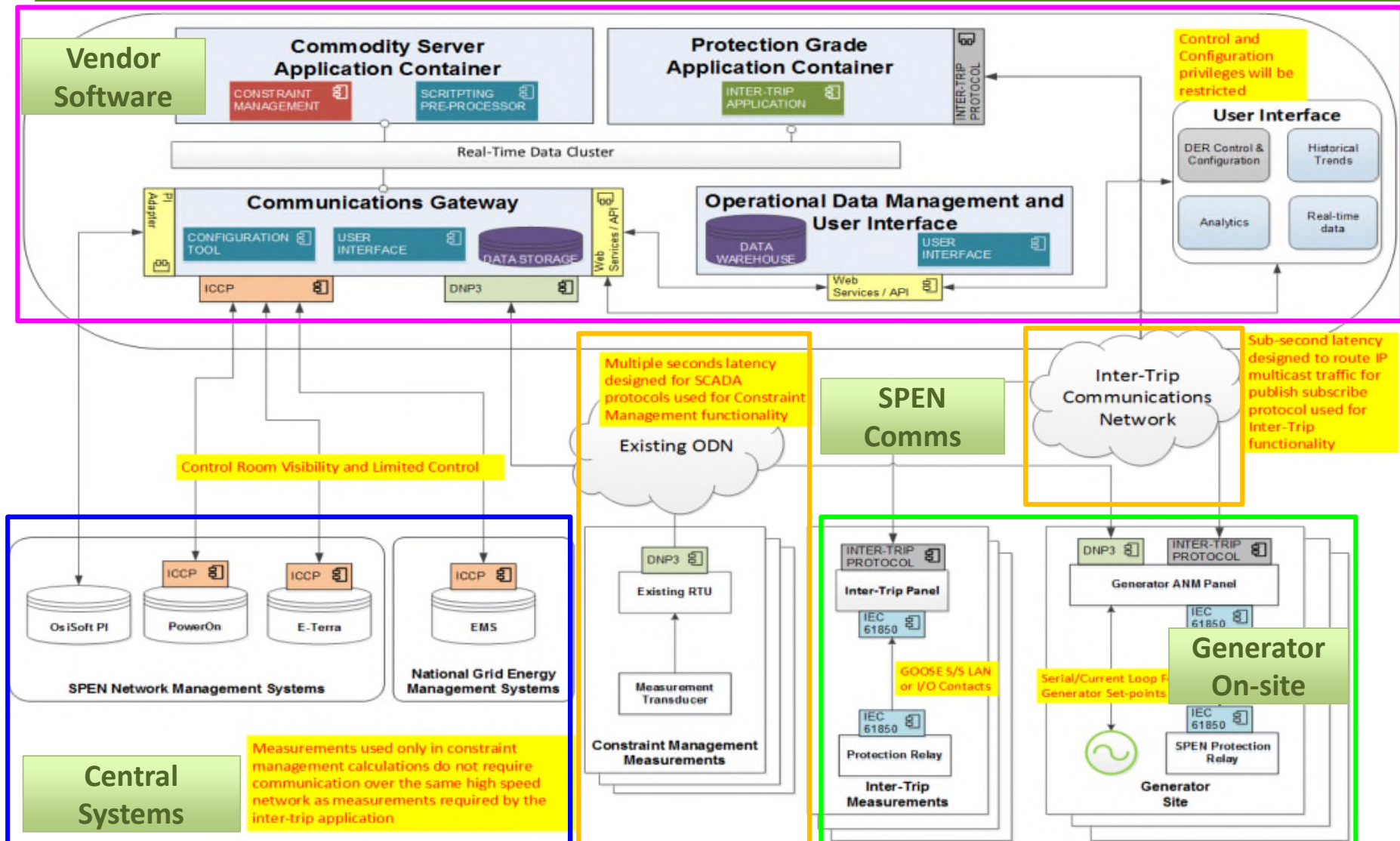
- Central controller not capped on MW that it can control
- Further 500MW identified across 13 GSPs as potential future ANM managed capacity
- Functionality built in to notify customers of curtailments

New System complexity



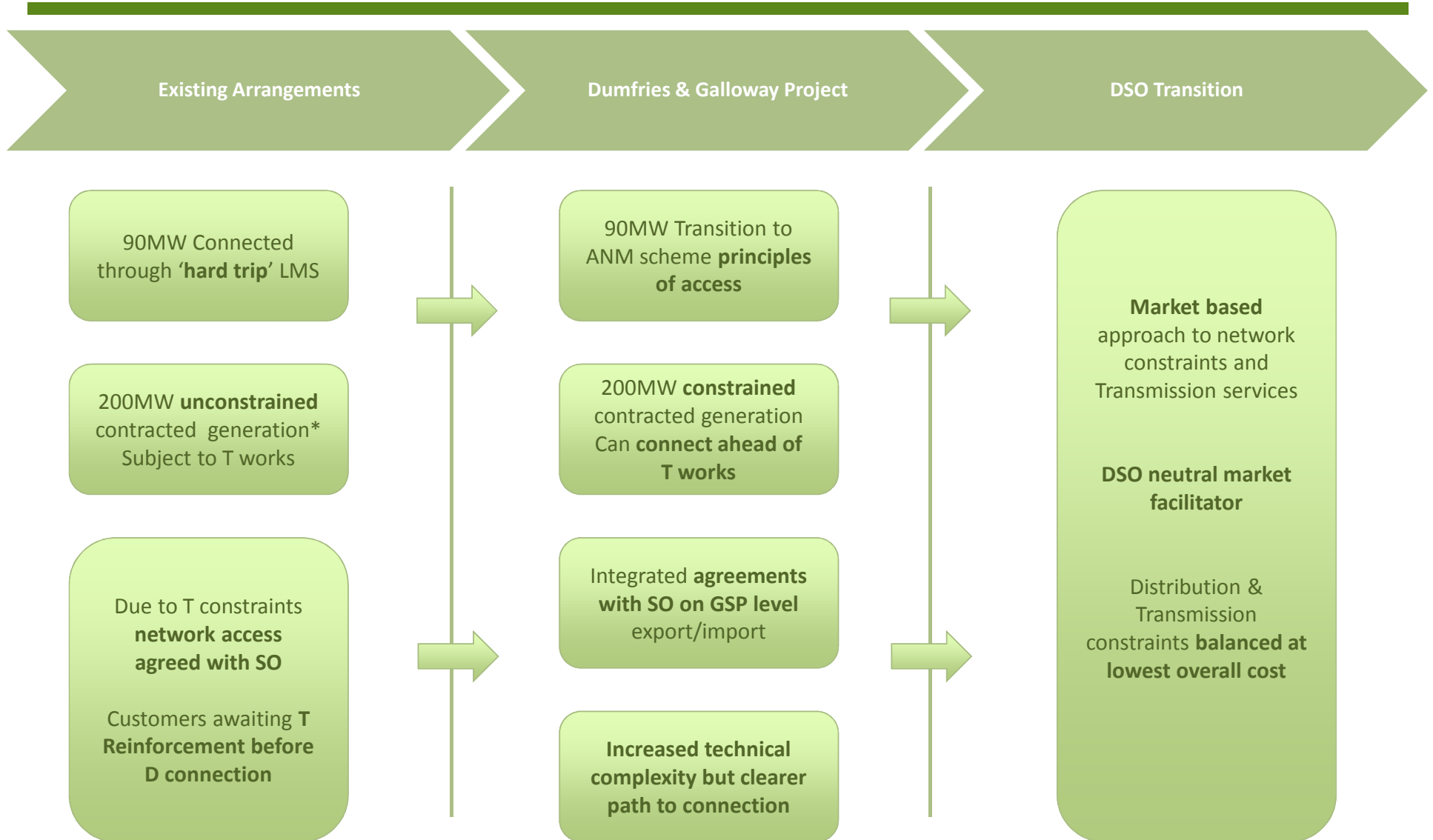
- Complex ANM managing 11GSPs across each other and across T-D boundary
- Managing principles of access across 11GPs in real time co-ordinating with SO

Dumfries & Galloway – IT Architecture



Central Controller – most cost effective solution if ANM deployed at scale

Dumfries & Galloway – Commercial Arrangements



Commercial arrangements at the heart of the Dumfries & Galloway

Summary

- Wide scale ANM solution covering entire Dumfries & Galloway area
- Complex interaction with Transmission SO to manage network constraints on a real time basis
- Solving network challenges through innovation and paving the way towards a DSO



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SPT Development

Colin Brown

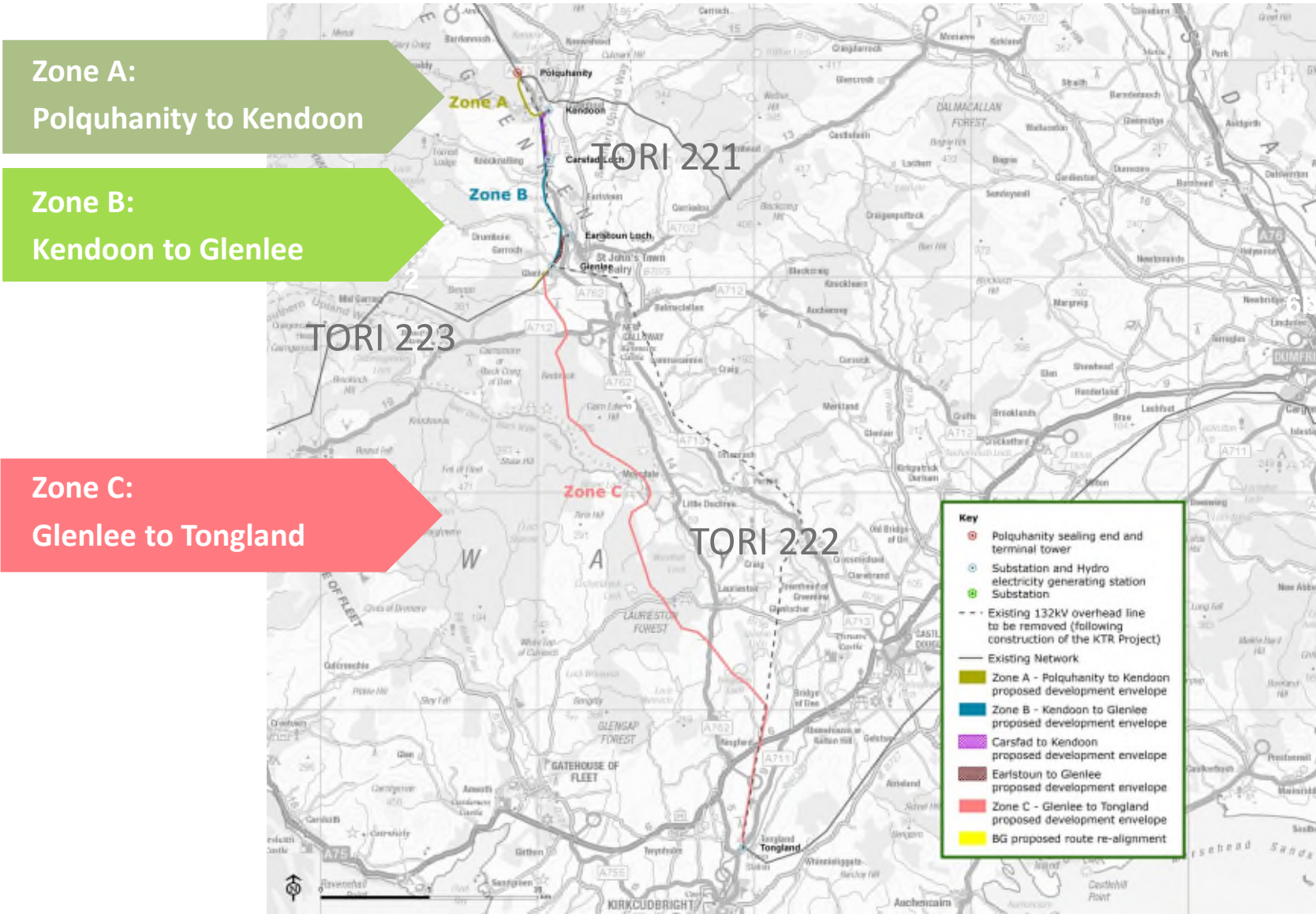
Agenda

- Recap on KTR project scope and completion dates
- Progress since last forum
- Next steps

Kendoon to Tongland Reinforcement (KTR) Project

- Kendoon to Tongland Reinforcement (KTR) project is being delivered through the following TORIs:
 - Kendoon to Glenlee Reinforcement (TORI 221)
 - Glenlee to Tongland Modernisation (TORI 222)
 - Glenlee to Newton Stewart Reinforcement (TORI 223)
 - New Cumnock SGT2B (TORI 213)
- Estimated completion by 2023
 - TORI 213 will be completed by 2022
- A combination of these TORIs will allow all existing generation contracted in D&G to connect as planned and provide some headroom for new generation
- New commercial and operational arrangements will be developed to manage wider system constraints

Kendoon to Tongland Reinforcement Project



Glenlee substation extension



- First stage of works at end of 2018/2019 is to extend Glenlee 132kV substation
- Extension approx. 90m x 40m
- Pre-construction surveys undertaken
- Discussions with landowners ongoing

Desktop engineering & field based surveys



Pulling position /working area

Accesses



Preferred routing

Environmental field based surveys



Environmental field based surveys



EIA: Scoping

- Scoping report (April 2017)
- Scoping Opinion (Oct 2017)



General Scoping Opinion

- Single EIA to cover all KTR Project
- EIA will include decommissioning of N and R routes – topics scoped out
- Removal of ‘S’ route subject to separate application
- EIA to consider ‘alternatives’ and ‘non committed’ mitigation
- Generally content with proposed scope of EIA

3rd Round of Public Consultation

- Public consultation on Preferred Routes for Kendoon to Tongland Reinforcement (KTR) project started in November 2017 and will run to January 2018
- Route alignments, including suggested tower and pole locations
- Potential locations for temporary construction accesses and working areas
- Removal of line in some areas
- Any other issues, suggestions or feedback people may have



Use of 3D visualisation model

- 'Earlstoun to Glenlee' VIDEO here

Next Steps

- Complete 3rd round consultation in January 2018
- Glenlee planning application submission – January 2018
- Extension works at Glenlee end 2018/2019
- Submission of Section 37 applications in early 2019
- Construction from 2020
- Completion 2023

Questions?

