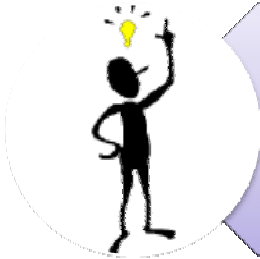


7. ENTSO-E Balancing Pilot Projects

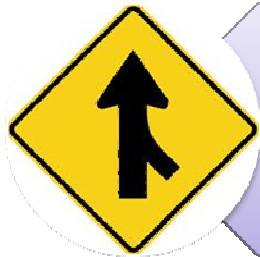


Graham Hathaway – National Grid
JESG | 4 February 2014

Purpose of Pilot Projects



To enable learning for Network Code Implementation



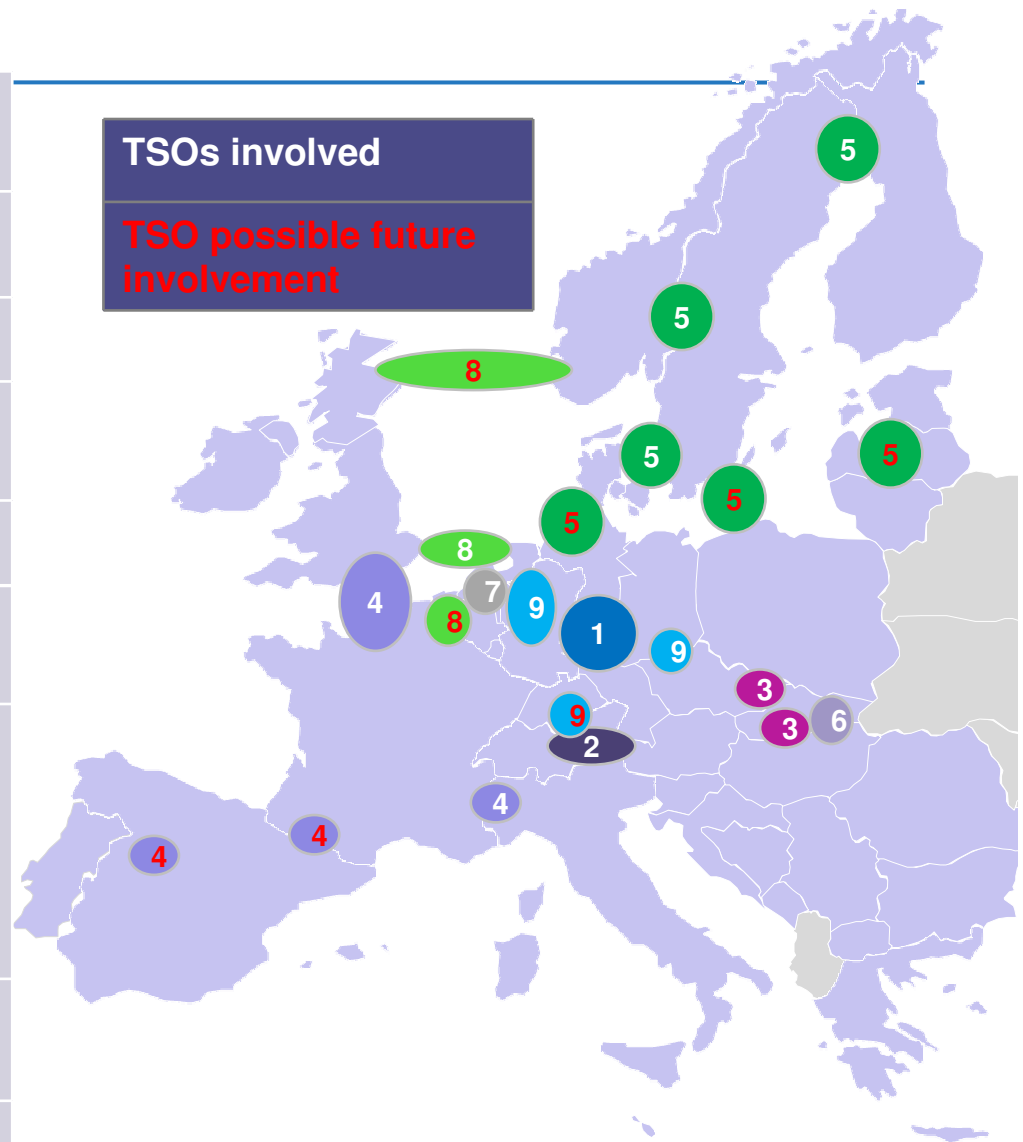
To expand and merge when appropriate for cross border harmonisation



To complement the steps towards the final target model

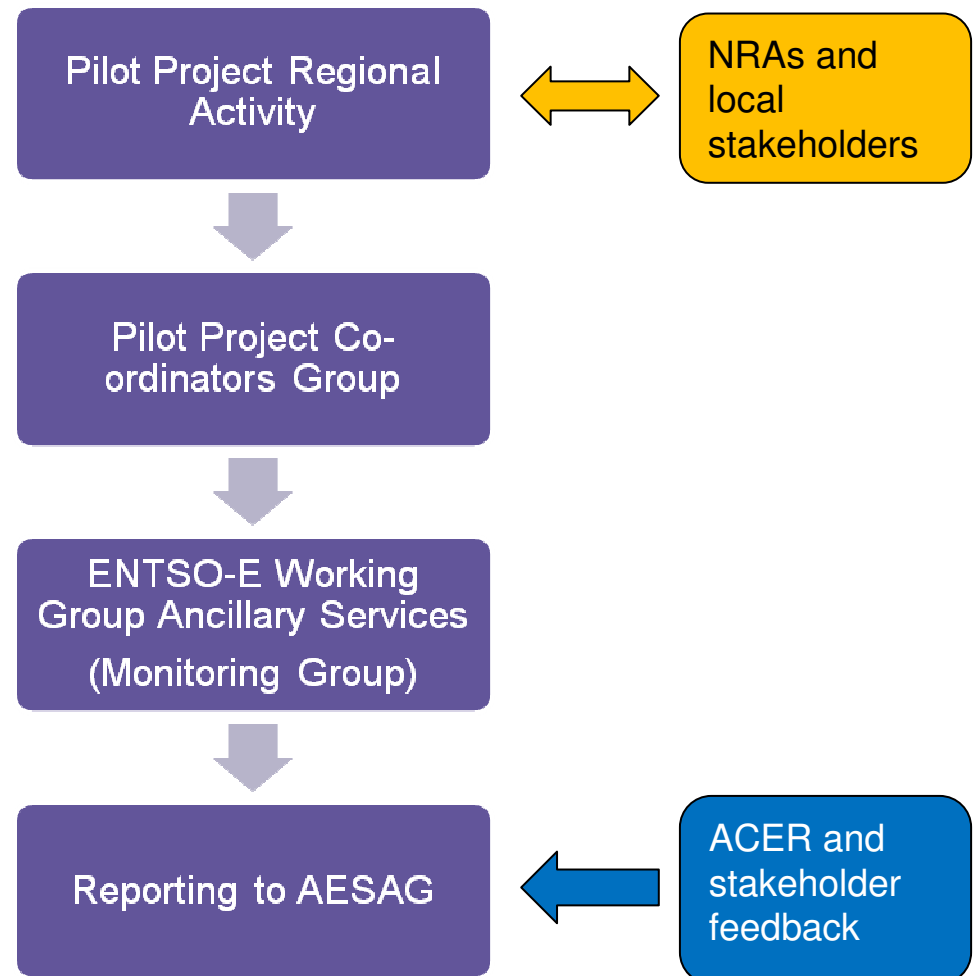
The Pilot Projects

1	CMOs for mFRR and aFRR with real Time Flow Based congestion management
2	Cross-border market for FCR based on TSO-TSO model
3	E-GCC
4	TERRE: Trans-European Replacement Reserves Exchange
5	Development of the Nordic RPM
6	Cross-border balancing market (between SEPS and MAVIR)
7	Design and evaluation of a harmonised reactive balancing market with XB optimisation of Frequency Restoration while keeping control areas, bid zones, and Regulatory oversight
8	BritNed / TenneT / National Grid Balancing Services
9	IGCC Imbalance Netting, aFRR-Assistance and Flow-Based Congestion Management.



Coordination of the Pilot Projects

- Projects are managed locally
- The co-ordination of the projects and process groups is managed by ENTSO-E
- Cross border regulatory co-operation is essential
- Stakeholders involved at local and European level



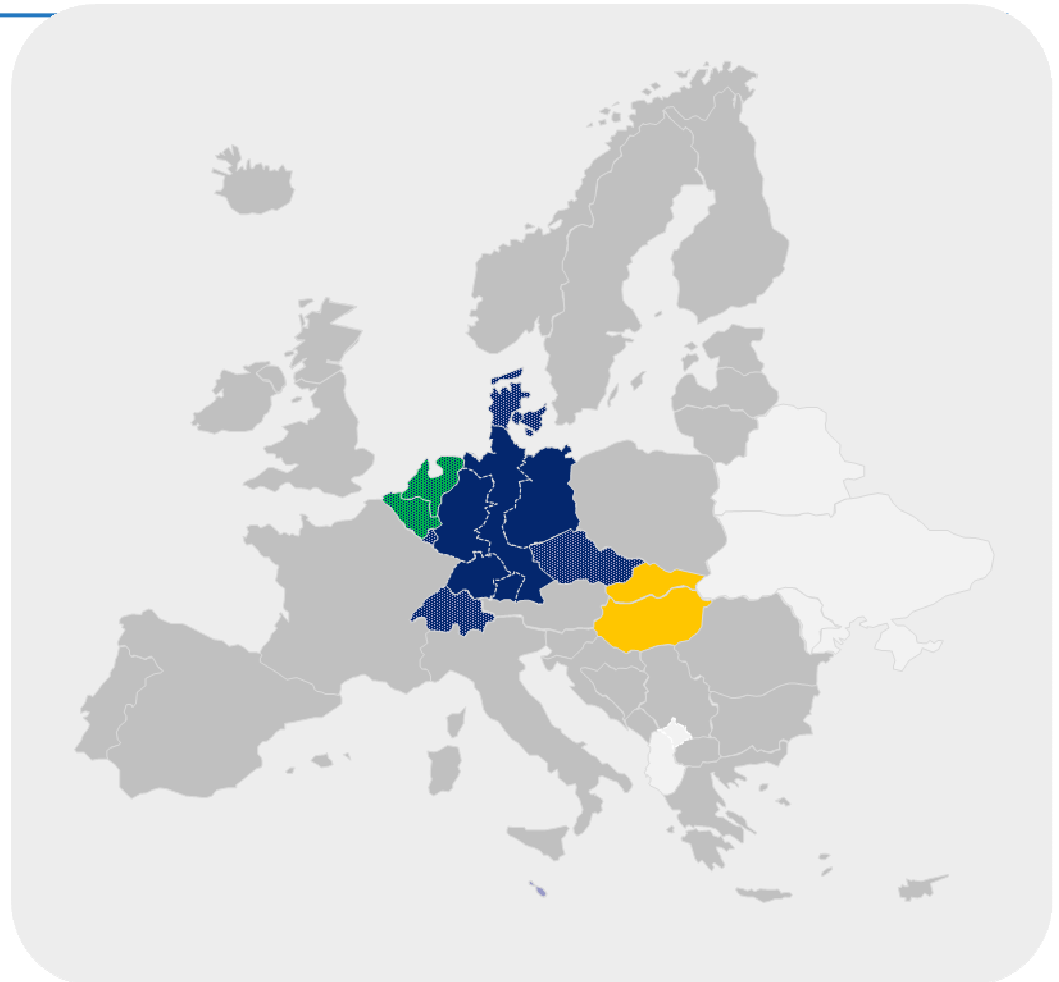
Automatic Frequency Restoration

Project 1 - CMOs for mFRR and aFRR with real Time Flow Based congestion management

Project 6 - Cross-border balancing market

Project 7 - Design and evaluation of a harmonised reactive balancing market with XB optimisation of Frequency Restoration

Project 9 - IGCC Imbalance Netting, aFRR-Assistance and Flow-Based Congestion Management



Frequency Containment Reserve

Project 2 - Cross-border market for FCR based on TSO-TSO model

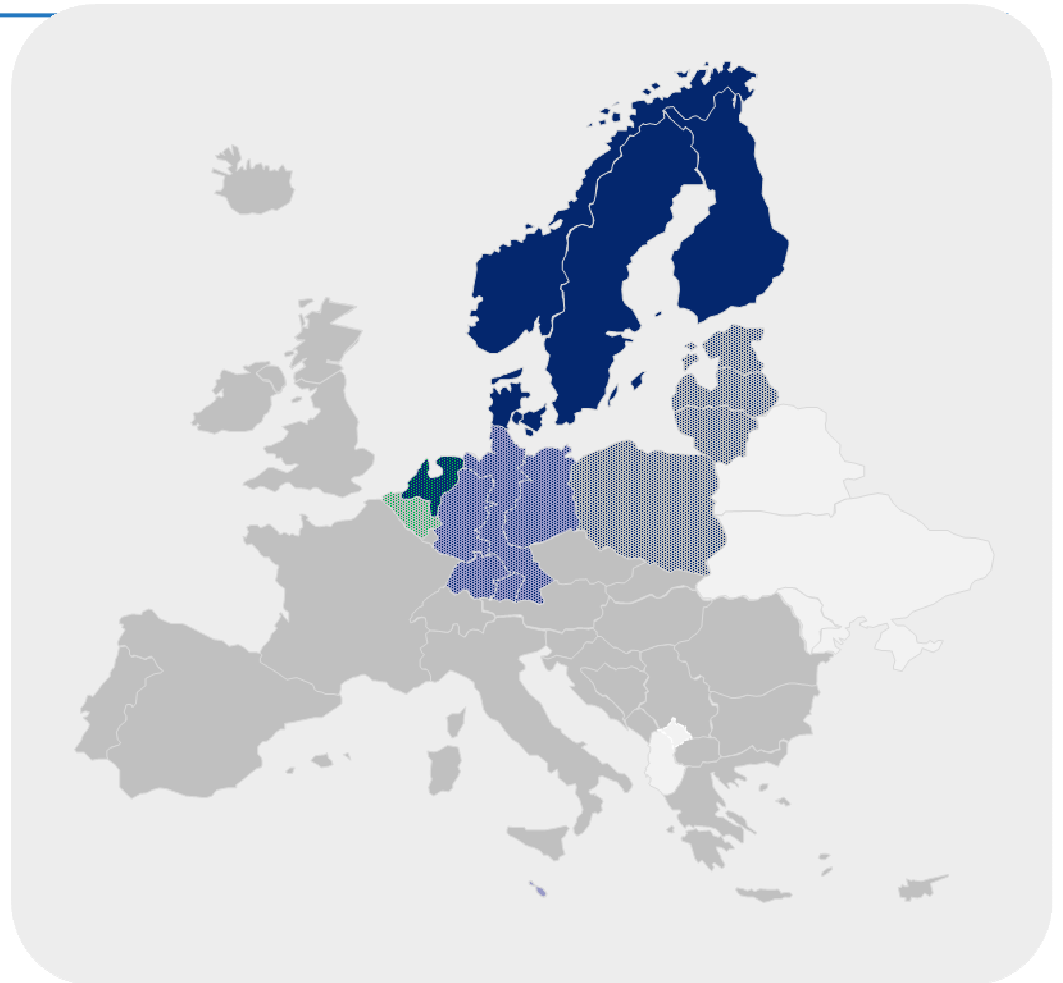


Manual Frequency Restoration

Project 1 - CMOs for mFRR and aFRR with real Time Flow Based congestion management

Project 5 - Development of the Nordic RPM

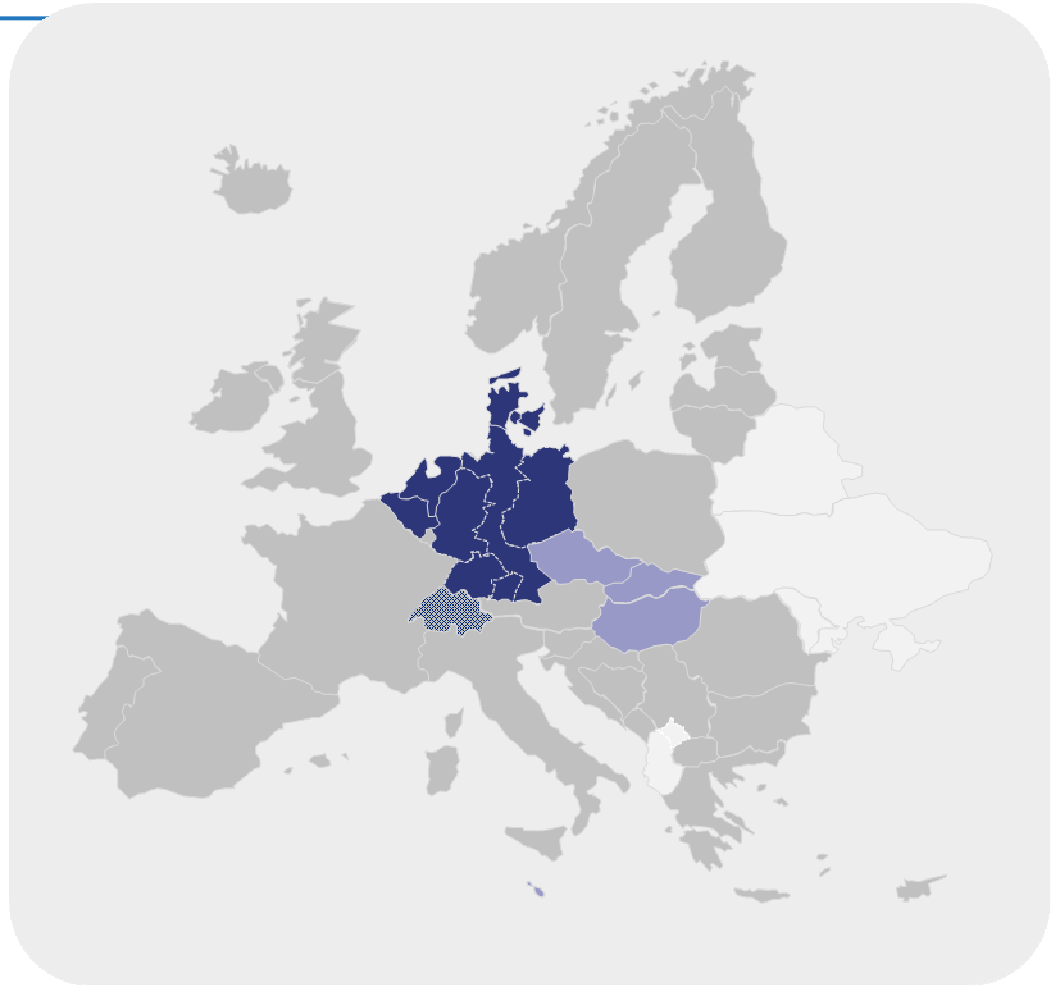
Project 7 - Design and evaluation of a harmonised reactive balancing market with XB optimisation of Frequency Restoration



Imbalance netting

Project 3 - e-GCC

Project 9 - IGCC Imbalance Netting, aFRR-Assistance and Flow-Based Congestion Management



Replacement Reserves

Project 4 - TERRE: Trans-European Replacement Reserves Exchange

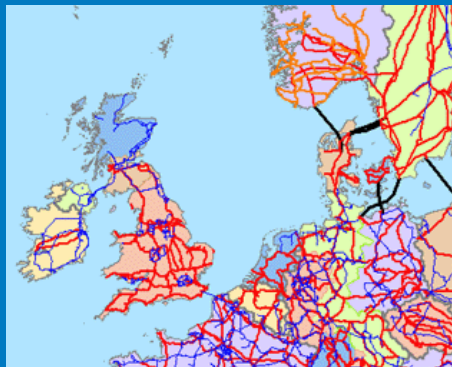
Project 6 - Cross-border balancing market

Project 8 - BritNed / TenneT / National Grid Balancing Services



Pilot Project 4 – Replacement Reserves

“TERRE (Trans-European Replacement Reserves Exchange)”



Graham Hathaway

Balancing Energy for RR (Future)

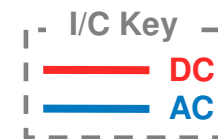
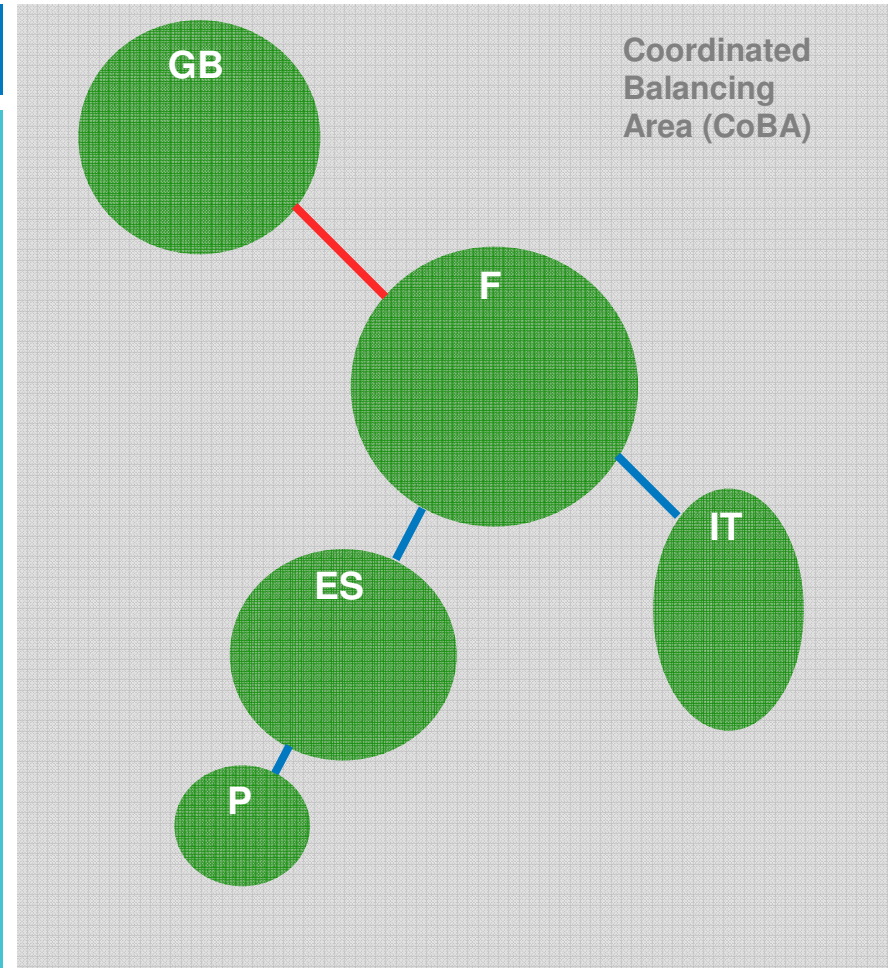
Project TERRE

Extension of current BALIT arrangement between GB and France

Current proposal assumes involvement from: GB, France, Italy, Spain and Portugal

Transfer of Balancing Energy on a TSO-TSO basis for RR

50MW blocks (Standard Product)



Reminder: RR definition

REPLACEMENT RESERVES (RR)

- Objectives: TSOs need replacement reserves (RR) to prepare for further imbalances in case FCR / FRR has already been activated up to a certain extent, e.g. when market participants have no possibility (neutralisation lead-time) or not the necessary information to compensate by themselves their forecast uncertainties on load, renewable generation, etc. This amount needed and the time window during which the TSO is restoring the balance on behalf of the market players is highly depending on the market design of each country.
- Replacement reserves are activated manually and centrally at the TSO control centre in case of observed or expected sustained activation of FRR and in the absence of a market response. TSO can also use RR to anticipate on expected imbalances.
- Means: Replacement reserves depend on reserve providing units made available to the TSOs, independently from FCR or FRR.
- Hierarchy: It is used to release FCR and FRR or to prevent its activation in normal operation.

TERRE – Key Points (1)

- The project will re-engineer the existing cross border balancing energy service (CBB) for (a) compliance with Balancing and other codes and (b) greater liquidity by extension to other regions.
- The service will be based on Replacement Reserves and will operate on a probabilistic basis. This will be after gate-closure of the Intra-Day market in the last hour ahead of real-time on a rolling hourly (or other to be defined) basis.
- A common gate closure will be agreed on a multi-lateral basis and the TSOs will form a Coordinated Balancing Area within the provisions of the Balancing code (NC EB), operating a multi-lateral Common Merit Order.

TERRE – Key Points (2)

- A Memorandum of Understanding (MoU) will be developed across the parties, along with all appropriate legal contracts, financial considerations and operational protocols.
- The multilateral XB CBB platform ownership should be shared equally/pro-rata across the participating TSOs as well as development costs incurred.
- The economic benefits of cross-border integration represent an opportunity for TSOs to gain access to a wider pool of balancing resources and enhance the liquidity of the balancing markets across Europe to the benefit of Europe as a whole.

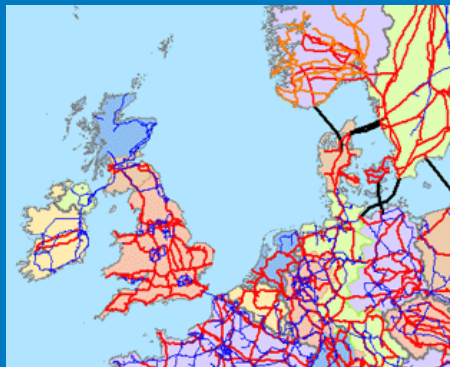
Timescales

- Timescales for the project are expected to be:
 - **Jan 14 to July 14: MOU**, design of the solution, selection and negotiation of policy options, functional and non functional specs.
 - 2014: Approval (NGET, ENTSO-E, ACER, EU), tech specs, call for tenders, appointment of IT provider)
 - 2015: Build TERRE IT solution, integration with TSOs Operational Systems
 - 2017 onwards: TERRE Go-Live

Current Status and Next Steps

- Memorandum of Understanding (MoU) and the Non Disclosure Agreement (NDA) which cover the design phase will be signed off shortly.
- Design Phase will commence and is sub-divided
 - Part A TERRE Product
 - Part B Matching Process
 - Part C Financial Issues
 - Part D Timing and Scheduling
 - Part E Available Transmission Capacity
- More details to follow.....

Pilot Project 8 – Replacement Reserves



Graham Hathaway

Introduction

- BritNed
 - 1000MW merchant interconnector between England and Netherlands
 - Went live on 01 April 2011
 - Owned 50:50 between National Grid and TenneT

Aim

- Pilot 8 is between TenneT, Britned and National Grid
- Assess how two different market areas can provide a mutually beneficial balancing service
- Test the feasibility of ACER targets, against two fundamentally different market models
- Develop a Cross Border Balancing Energy Exchange service through a TSO-TSO trading function or common platform
 - Demonstrate economic efficiency
 - Harmonisation of balancing products

GB System Operation

Day Ahead

- Constraint management contracts
- Forward trading

Intraday

- Parties trade through power exchanges
- Pre gate closure trading

Gate Closure

- Operation of the Balancing Mechanism for residual balancing

TenneT System Operation

Day Ahead

- Constraint Management through RESIN
- Market restriction to parties

Intraday

- Constraint Management through RESIN = smaller vol
- Parties self balance

Gate Closure

- Automatic Generation Control
- Incident Reserves

Initial option proposed

- Replacement reserves: ≤ 1 hour ahead
 - TSO determines requirement
 - TSO forecasts or provides fixed imbalance prices
 - TSO assesses forecast/fixed price against existing merit order for despatch
 - Despatched closer to real time
 - Reserve requesting TSO charged via imbalance or fixed price

Challenges experienced

Market Differences

- TenneT do not have a proactive balancing regime
 - Constraint actions are taken at day ahead
- Settlement periods
 - GB – 30 minute
 - TenneT – 15 minute
- TenneT are prohibited by their licence to enter into commercial arrangements which may affect their consumers

Cross Border Balancing – Pilot Project 8

Pricing

- Fixed prices cannot be given for CBB
 - Service would rely on settlement of imbalance
 - May require NGET to forecast imbalance prices
- Any actions that change the volume of energy will impact on imbalance prices in the Netherlands
 - This is at an unknown value

Next steps

- Impact assessment on each TSO:
 - System operation
 - Impact on imbalance prices
 - System changes
 - Quantified benefit
- Further comparison of markets
- Development of further proposals

Questions?

