Development of a Low Profile High Capacity Single Circuit 132kV Design

SSEN Transmission Engineering
EaSTS—Earthed Steel Trident Structures

• Developed by SSEN with Energyline as designer
• Project Kickoff January 2022
• Project Brief – to create a stronger version of 132kV trident pole structures
• Offgems Network Innovation Allowance (NIA) funded project – designs will be published via the smarter networks portal
Key Opportunities

• Connections consistently requested at higher altitudes above 350m
• Connections increasing to 200+MVA
  ◦ Forces use of steel lattice or cables
• Creosote banned from market from 2025 (potentially 2029)
  ◦ Lack of products/infrastructure for wood pole treatment
Steel Low Profile High Capacity Single Circuit 132kV Design

- **Key Deliverables**
  - High strength steel design for High Altitudes
  - Construction methodologies with minimal access work, direct embedment of Structures
  - Similar appearance to existing trident
Earthed Steel Trident Design

- Design basis of 100m span at 500m altitude with upas Conductor
- Totara and Rubus Feasible at lower altitudes
- Current cost estimates of approx. £700k/km
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- Same shape as wood pole Trident
- Standard structure heights 9m/11m/13m/15m/17m
- Steel poles rather than wood
- Underslung OPGW to provide earthing continuity
- Installed with the same construction techniques and plant
Next Steps

• Type Testing
  • Structure testing & Foundation testing
• Identification of projects for use
  • High altitude connections of up to 200MVA
  • Lower altitude connections of up to 270MVA
• Publish Results, Designs, Models and Specification on Smarter Networks Portal
Aberarder Windfarm Connection

• 75 MVA Wind farm connection at approx. 600m altitude approx. 5km circuit length
• Was planned for single circuit NeSTS/Steel Lattice Structures
• Redesigned with Low Profile structures with Upas offering a potential saving of 55%* of project costs

*Based off per km costs of £700k/km for steel trident and £1.7m/km for steel lattice towers.
Kergord – Yell Overhead Line

• 220MVA 18km circuit required
• Capacity not possible with standard conductors
• Two potential options
  ◦ Use a high novel composite conductor
  ◦ Use underground cable
• EaSTS option approximately 76%* cheaper than the cable option & uses standard apparatus

* Based off per km costs of £700k/km for steel trident and £3m/km for steel lattice towers.
Questions and Discussion