nationalgrid

Tees Dock Substation

Needs Case Summary

National Grid Electricity Transmission
Needs Case

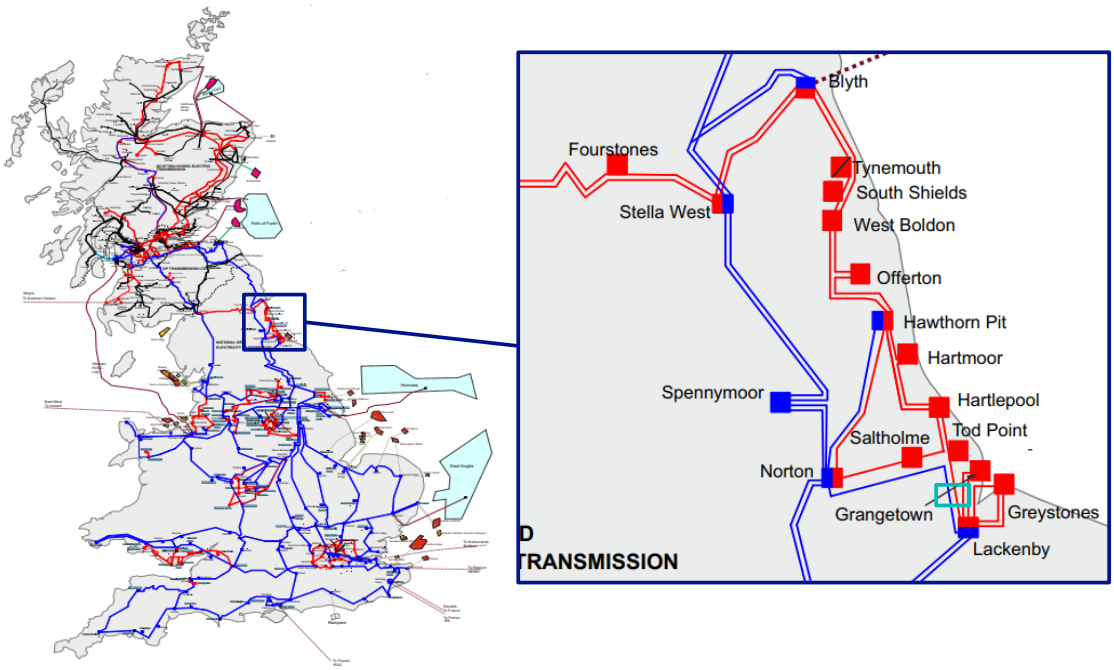
October 2026

1. Background

Tees Dock Substation is a demand-driven connection project in Teesside, North East England. It will create a new 400kV substation at Tees Dock in response to customer connection requests. The project is also expected to support the physical and economic regeneration of the South Tees area.

The site sits in the North East region of our network, where the 400kV and 275kV system mainly carries power from north to south, including renewable energy from Scotland. The new substation will initially be connected by looping in the existing Lackenby–Norton 400kV overhead line.

Figure 1: Proposed location of investment on our network



*Key: **Red** = 275kV assets, **Blue** = 400kV assets. Investment location shown in **green** box.*

This Needs Case is being submitted as part of the RIIO-ET3 Load Re-opener (LR) mechanism under Special Condition 3.18 (Load Re-opener and Price Control Deliverable) of the Electricity Transmission Licence Conditions. This submission seeks Ofgem's approval of the project's needs case, the optioneering undertaken and our preferred solution. The project's eligibility for the Load Re-opener and associated Pre-Construction Funding (PCF) was addressed through the Eligibility Letter process and is not sought through this submission. In its Draft Determinations for the May 2026 Load Re-opener window, Ofgem decided that this project should proceed via Track 3. Subject to Ofgem's approval of this Needs Case, we intend to submit a Project Assessment in line with the Load Re-opener process.

2. Investment Drivers

The primary driver is demand customer connections. This includes a customer that is designated as a Gate 2 Phase 1 connection as part of Connections Reform.[1] Other connections that previously

[1] The customer connection pipeline has been refined through Connections Reform. As part of this process, projects that did not meet the required progression criteria were reassigned to Gate 1, removing less mature projects from the near-term connection background. The remaining projects (Gate 2, which is split into Phases 1 and 2) therefore represent the current view of the most credible and deliverable customer connections.

showed the same connection site have been placed in Gate 1 under Connections Reform and are not drivers for this investment. Asset health is not a key driver.

3. Options

We undertook a structured, multi-factor optioneering process to identify a proportionate and deliverable solution in the interests of consumers. We first identified **nine longlist options** within five strategic option categories: do nothing, market-based, non-transmission whole-system, making use of existing substations, and building a new substation.

From the longlist, we **shortlisted options E-1 and E-2** following a high-level assessment against balanced scorecard criteria (see table, below): a new indoor substation on grantor land using either air-insulated switchgear (AIS) or gas-insulated switchgear (GIS). Options A–C were rejected because they could not deliver a compliant connection. Options D-1 and D-2 were rejected because the existing substations lack the space and capacity, and the works could not be delivered quickly enough. Option E-3 was rejected because of land availability, and Option E-4 because outdoor equipment within 2km of the saline Tees estuary would deteriorate faster, at a cost to consumers.

Table 1: Summary of longlist options assessment

Option	Details	Shortlist?	Preferred?
A	Do nothing counterfactual option	No – cannot deliver compliant connection	
B	Market-based solution	No – cannot deliver compliant connection	
C	Non-transmission, whole systems solutions	No – cannot deliver compliant connection	
D-1	Extension or rebuild of Lackenby substation	No – insufficient space and capacity; cannot be delivered in time	
D-2	Extension or rebuild of Greystones substation	No – insufficient space and capacity; cannot be delivered in time	
E-1	New indoor AIS substation on grantor land	✓	
E-2	New indoor GIS substation on grantor land	✓	✓
E-3	New outdoor AIS substation on other grantors' land	No – landowner unwilling to sell; compulsory purchase not compatible with timely delivery	
E-4	New outdoor AIS substation on grantor land	No – proximity to saline estuary would reduce asset life, at a cost to consumers	

4. Qualitative Trade-offs Between the Shortlisted Options

The table below sets out how the two shortlisted options compare against the balanced scorecard criteria used in our qualitative assessment.

Table 2: Qualitative trade-offs between the shortlisted options

Criteria	Option E-1: Indoor AIS	Option E-2: Indoor GIS
Engineering	**Detractor.** Technically feasible, and the indoor design protects equipment from the saline estuary environment. However, indoor AIS is used less often than outdoor AIS, so operational concerns would need to be addressed.	**Benefit.** Technically feasible, and the indoor design protects equipment from the saline estuary environment. Requires fewer long-duration outages and has ample space for a construction compound next to the site.

Environmental	**Benefit.** Built on brownfield land of lower ecological value. AIS has a lower carbon-equivalent impact than GIS.	**Neutral.** Also built on brownfield land. Uses SF6-free GIS technology, which significantly reduces environmental impact compared with traditional GIS.
Deliverability	**Detractor.** The landowner has so far only agreed to sell land for a GIS footprint. The larger AIS footprint increases the risk of compulsory purchase, which would not be compatible with contracted connection dates. Building a large climate-controlled building would add further programme pressure.	**Strong benefit.** Fits within the land offered by the landowner, so land can be bought voluntarily. This is consistent with delivering connections on their contracted dates.
Economic / consumer value	**Neutral.** AIS typically has lower capital costs than GIS. However, the large climate-controlled building needed to house AIS indoors adds capital cost.	**Benefit.** Higher upfront capital cost than E-1, but typically lower land acquisition costs due to its smaller footprint.
Consenting / stakeholder	**Detractor.** Requires a planning application, but no DCO. Seeking more land than offered raises compulsory purchase risk, and compulsory purchase typically only covers immediate needs, limiting future expansion.	**Strong benefit.** Requires a planning application, but no DCO. Early discussions with the landowner were based on a GIS footprint, including space for future expansion.

5. Quantitative Trade-offs Between the Shortlisted Options

The table below expresses the position of Option E-1 relative to Option E-2. The cost-book estimates (2023/24 prices, including contingency) allow a like-for-like comparison of the shortlisted options. To ensure we can maintain a competitive tender process and in turn protect consumer value, we have only provided cost ratios.

Table 3: Quantitative trade-offs between the shortlisted options

Measure	Option E-1: Indoor AIS	Option E-2: Indoor GIS
Cost-book estimate	0.94	1
Total capital cost over the 50-year appraisal period, including replacement	0.94	1
Net present value (cost)*	0.95	1
Undiscounted carbon and losses costs	1.05	1
Useful economic life	1	1

**Lower is better*

Option E-1 is approximately 6% lower cost than E-2 on the initial cost-book estimate and has a net present cost approximately 5% lower. Both options assume a full replacement within the 50-year appraisal period, so the whole-life capital gap stays the same. Option E-2 has c.5% lower undiscounted carbon and losses costs, mainly because of lower transmission losses. While Option E-1 performs better on cost, the cost-benefit analysis is subject to deliverability, land and consenting considerations, which favour Option E-2.

6. Preferred Solution

Based on a qualitative and quantitative assessment of the shortlisted options, **Option E-2 is the preferred option**: a new 400kV indoor GIS substation. This is because:

- It enables **timely delivery of connections**. The landowner is willing to sell land for a GIS footprint, avoiding compulsory purchase (an estimated 12–24 months). Its location within 2km of existing overhead lines also avoids the need for a DCO.
- It offers **better long-term consumer value**. Being close to both the customer's site and existing transmission lines reduces the scale of works needed, and the indoor design avoids

the faster deterioration and higher lifetime costs that outdoor equipment would face near the saline estuary.

- It supports **future expansion**. The compact design leaves room to extend the substation and add further transformers and connections.
- It uses **SF6-free GIS technology**, significantly reducing environmental impact compared with traditional GIS, and is built on brownfield land of lower ecological value.