

APPENDIX 2 – PA P-value Supporting Information - This appendix is in support of National Grid Electricity Transmission's (NGET) response to question 3 of Ofgem's consultation on the BTNO Project Assessment (PA) with respect to disallowing the request for a P70.

Summary of our response - We do not agree that P50 is an appropriate basis for funding ASTI projects. A P50 assumes a symmetric distribution in which the median approximates the expected (P-mean) outturn. However, the ASTI portfolio exhibits material positive skew, meaning P-mean sits above P50 and in some cases significantly so. Ofgem has never, to our knowledge, made a formal, reasoned decision that funding for ASTI projects should normally be set at P50, and this is not stated in LOTI or ASTI guidance. In fact, the ASTI Guidance explicitly requires assessment of "efficient... risk contingencies,"¹ implying case-by-case evaluation.

Ofgem has also set a precedent for moving away from P50 on three ASTI projects. We note that Ofgem's rationale for doing so for Eastern Green Link 1 and 2 was those projects having 'greater risk exposure than a conventional transmission project due to the challenging timescales, supply chain environment and deployment of novel technology' much of which holds true for BTNO and other ASTI projects. In addition, Ofgem's rationale for approving P70 on Yorkshire Green was that the P70 value as a % of total project cost benchmarked well; the P70 level of funding for BTNO as a % of total project cost is lower than that of Yorkshire Green.

Evidence also confirms asymmetry. Ofgem's financeability and cost of capital analysis in T3 implicitly assumes that each additional project with project-specific funding is given allowances at the expected value (or mean average) outturn. NGET's T3 Business Plan sample shows mean outturns of [REDACTED] vs a median of [REDACTED]; Reference Class Forecasts (RCF) show higher mean uplifts (e.g., BTNO 11% vs P50 6%; HWUP 20% vs P50 12%). As Ofgem has noted to NGET in conversation, much of the external evidence on setting project costs focusses on budgets (which should be delivered within), rather than allowances. However, there is some evidence on how target costs – of which allowances are a form – should be set. We note the Stewart Review of HS2² stated that for future infrastructure projects "*I would suggest that generally P70 is a better number for the Target Cost and P95 for the total funding envelope.*"

Our view is reinforced by the fundamental shift in the delivery environment, where complexity, supply chain constraints, challenging interfaces, and accelerated timelines mean risk is inherently asymmetric. Just as the HS2 experience has shown, an ability to maintain trust-based, agile decision-making is critical to avoiding schedule delays that later require recovery at significant cost.

We recognise that ASTI has helped mitigate some delivery risk across the ASTI portfolio. The introduction of the COAE and Delay Events (DE) is welcome, but our risk-funding assessment deliberately excludes risks defined as COAE or DE. We also note that Early Construction Funding has mitigated many supply-chain risks, but again this is reflected in our analysis when preparing risk-funding submissions.

We want to avoid regulatory decisions becoming part of the critical path, where delays in funding certainty cause schedule slippage, reduce float, or force us into sub-optimal but lower-risk solutions just to stay within a PA envelope. This is particularly relevant to our HDD proposal for BTNO. **Ultimately risk funding should not leave NGET disproportionately penalised for choosing lower-cost, faster solutions that carry higher delivery risk but benefit consumers.**

Conclusion and way forward - For these reasons, we believe P50 is the wrong basis for ASTI risk allowances. A fair approach requires funding at the expected value (P-mean) including correction for unknown risks or, as a pragmatic proxy, at an agreed P-value above P50 (e.g., P70–P80), with additional protections for consumers that we can discuss further with Ofgem. Alternatively, allowances could be set at the QCRA mean plus an adjustment for unmeasured risk, calibrated using RCF.

For BTNO, we would be willing to accept funding at the updated QCRA mean, on the basis that the potential alternative proposals are developed quickly for future ASTI projects, including HWUP and Sea Link. We also stress the need for closer, trust-based engagement with Ofgem, given that regulatory timelines now materially shape delivery schedules and risk. We propose continued joint work to establish a sustainable, evidence-based funding approach that protects consumers while ensuring TOs are properly funded to deliver this accelerated, interdependent portfolio.

Detailed Response

¹ Paragraph 4.35 of the [Accelerated Strategic Transmission Investment Guidance And Submission Requirements Document](#)

² [The HS2 Experience: major transport projects governance and assurance review](#)

We are not aware that Ofgem has ever made a formal reasoned decision that allowances for ASTI projects should normally be funded at P50 or that any evidence has ever been presented by Ofgem (or any other party) that doing so is fair in the general case. A default to P50 risk allowances does not appear in Ofgem's LOTI or ASTI guidance, conversely Ofgem's ASTI Guidance states, "*The PA Decision determines the detailed output to be specified in the PCD, as well as the efficient allowance to deliver the project, including the efficient costs of construction, risk contingencies, project management and any other elements of delivery.*"³ This gives a clear indication that efficient risk contingencies will be assessed at PA. Ofgem's in-practice approach to risk provision for ASTI projects to date has been aligned to this, with consideration in each case of setting allowances above P50 if it is justified by the project in question. We do not understand why this approach has been changed or what the evidence for change is.

A fair approach to risk

The risk contingency allowance for each individually funded TO project (including but not limited to ASTI projects) should be fair. For this to be the case, the TO must be funded for the expected outcome cost. This will result in TOs being properly funded – neither underfunded, risking financeability, or overfunded, meaning consumers overpay. In line with this approach, **Ofgem's financeability and cost of capital analysis in T3 implicitly assumes that each additional project with project-specific funding is given allowances at the expected value (or mean average) outturn.**

We recognise that assessing the expected value outcome for projects can often be challenging and that in some cases an approximation may have been required. Ofgem's historic approach to project-specific contingency funding has been to provide allowances at the median average, as approximated by 50th percentile of the known risks as assessed using a Monte-Carlo approach to give a QCRA P50. We recognise that mathematically the median or QCRA P50 may be a suitable proxy for the expected value or mean outturn where the distribution of risks is symmetric, as in such circumstances the mean and median converge to the same value. Practically, the approach of using the QCRA P50 is also relatively straightforward to implement because – as the last result in the more likely half of the risk distribution – the QCRA P50 outcome is primarily influenced by more frequently seen risks which are thus easier to quantify; accordingly, the QCRA P50 is likely to be a high quality estimate of the real median outcome.

We note that Ofgem's favouring of the QCRA P50 to set contingency allowances dates back to at least early RIIO-T1, where expertise on the assessment of risk for SSENT's Kintyre-Hunterston SWW project was provided to Ofgem by Pöyry⁴; in this case, **the rationale to fund at P50 appears to have been that in this case all risks above P70 had been passed to the supply chain and that there was a "relatively symmetric distribution of risk for this project"**. The latter part of this rationale aligns with our expectations; P50 is a good proxy to set a fair contingency allowance where the distribution of risks is expected to be fully symmetric. We believe this has been likely been the case when funding a portfolio of similar projects with well understood risks and without time pressure – these criteria held for most historic network company delivery, but do not hold in the general case today.

Moving forward to today, **an assumption of a symmetric distribution no longer holds true in all cases**, including in the context of the ASTI portfolio of projects. We explore this further below. As such, the facts no longer support an assumption that QCRA P50 will always set a fair contingency allowance.

This move away from symmetry is unsurprising given the fundamental shifts in the nature of the works TOs are performing:

- The majority of TO spend has shifted from asset maintenance to asset replacement and new build. In this **context, TOs' financial stability and financeability will rest heavily on fair funding for project delivery** and it is not safe to rely on historical assumptions or approximate rules of thumb.
- Whereas in the past TOs' primary focus was replacing assets or building substations, which could be delivered by a single contractor, TOs are now building complex schemes involving multiple different types of assets delivered by different specialists (including: tunnelling, underground cable laying, undersea cable laying, tower erection, substation manufacture, construction and installation, HVDC converter manufacture, construction and installation, HVDC cable manufacture, HVAC cable

³ Paragraph 4.35 of the ASTI Guidance

⁴ [Kintyre-Hunterston SWW Needs Case](#)

manufacture). This both brings **additional risks to be managed (e.g. interface risks)** and means **that less risk can be fully passed through to our supply chains**.

- **We are being asked to deliver a portfolio of assets under significant time constraints, which will change our risk exposure.** This will bring costs of mitigating time as well as cost risks and place significantly more constraints on mitigations. This may significantly increase the cost of risks that materialise, as we seek to find mitigations that are fast rather than ones that are only low cost. Because we design schemes to avoid high probability high impact risks, this will primarily impact on lower probability high impact risks and further skew the risk distribution away from the median point.
- Collectively, with ASTI and likely successor schemes, TOs are not just delivering individual schemes but a portfolio of schemes that collectively take power generated by renewables in and around Scotland and off the (primarily East) coast of England to where sufficient existing network capacity exists in central and southern England. **This is the first significant upgrade to the UK's main transmission grid since privatisation and has required us to drive a step-change in the UK's capacity to construct network assets.** Because of this, we are unavoidably working with a primarily new workforce with limited experience of transmission development and construction (though, in many cases, extensive experience elsewhere). For the same reason, we see a supply chain with stretched capacity and in such circumstances our suppliers are unwilling to take on so much risk (and do not need to in order to win sufficient work).

These are fundamental shifts in what we are doing as TOs – from a focus on asset maintenance to radical expansion of the network. These factors will interact and will inevitably shift the shape of our risk profile as well as the total level of risk. This means that, even if each physical activity we carry out on site is similar to historical activities, historic assumptions as to how to quantify risk and fund contingency cannot be assumed to hold and will need to be revisited.

This raises the question: **if the QCRA P50 can no longer be relied on to set a fair contingency allowance, how can one be set?** This is a challenge because the expected value or mean is influenced by all potential project outcomes and less likely outcomes can be very difficult to fully identify and quantify (c.f. the median outcome which only requires full assessment of risks impacting on first half of the distribution, or the 70th or 80th percentile which are not significantly influenced by tail risks). As a result, whilst we can calculate a mean from QCRA, it is not normal practice to focus on quantifying tail risks and QCRA analysis generally excludes the extreme parts of the distribution from its outputs.

Working with Frontier Economics, who have provided a separate expert paper containing more details, we have identified two options:

1. **Set allowances at a P-value above P50, e.g. QCRA P70 or QCRA P80**, in the manner suggested in the original submission for BTNO PA. This approach uses expertise and history to set a proxy for the unmeasurable risk. This can readily be applied to our projects, once a P-value target can be agreed. We already exclude the impacts of the risk provisions Ofgem has put in place (COAEs, Material Scope Changes) from our risk analysis.
2. **Set allowances at the QCRA mean plus an adjustment for unmeasured risk.** Assessing the mean is difficult and has not been the focus of our QCRA to date (to be clear, this does not mean we do not understand our tail risks, just that we have not focussed on quantifying them for QCRA analysis, because they are unlikely to meaningfully shift the P50, P70 or P80 outcomes). As such, our current QCRA are not yet suitable for the calculation of the mean of known risks; however, we can deliver improved views given time; however, this is a complex process and may take up to six months to complete. We know some unmeasured risk will always exist; to that end, Frontier suggest using RCFs as a reference point for assessing the likely impact of unmeasured risk.

We have also engaged Oxford Global Projects to identify case studies of how similar problems are tackled elsewhere. From this, we note that normal practice in most parts of industry and government is to use a P-value.

As Ofgem has noted to us in conversation, much of the external evidence on setting project costs focusses on budgets (which should be delivered within), rather than allowances. However, there is some evidence on how target costs – of which allowances are a form – should be set. In particular, we note the **Stewart Review of HS2⁵ stated as a learning for future infrastructure (not limited to HS2 or to**

⁵ [The HS2 Experience: major transport projects governance and assurance review](#)

rail) ***“I would suggest that generally P70 is a better number for the Target Cost and P95 for the total funding envelope.”***

In light of this, NGET’s preference remains to set contingency allowances in line with an agreed P-value above P50. However, we would also be willing to accept a position where contingency allowances are set based on the QCRA mean plus an adjustment for unmeasured risk.

For BTNO, given the relatively low size of the project relative to NGET’s Transmission Infrastructure business (although the project is large by most measures) and the lack of development of alternate approaches, NGET would be willing to accept funding at the QCRA mean of an updated assessment, once produced. We would accept this only on the basis of alternate approaches being developed rapidly for the following ASTI and other large projects (including not accepting it for HWUP).

Evidence of asymmetric distribution of risk outcomes

We have examined a number of sources for evidence of the asymmetry in risk outcomes. Examples identified include:

- NGET’s performance across the sample used in our T3 Business Plan of historic capital projects delivered (or then expected to be delivered) in T2. The unweighted average outturn (or forecast outturn) spend on these projects was ██████⁶ whereas the median outturn was only ██████.
- RCFs, for example for BTNO with a RCF P5-95 mean uplift of 11% versus a P50 uplift of 6% and HWUP with a RCF P5-95 mean uplift of 20% versus a P50 uplift of 12%.
- This asymmetry is not unique to our industry. Various government documents describe this shift, including the DfT’s: *“The P(mean), which tends to be higher than the P50 due to the positive (right-tailed) skew of a typical cost distribution, is the level which should be used in economic appraisal.”*⁷

⁶ In our T3 submission, this data was re-weighted by asset class to match the T3 portfolio to produce a weighted average of ██████

⁷ [TAG unit A1-2 scheme costs - GOV.UK](#)