SHET RIIO T2 Supply Chain

BAM's Response to Ofgem Draft Determinations

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ofgem

Scottish & Southern Electricity Networks

Introduction

This document is BAM's response to the OFGEM draft determinations on the SHET RIIO T2 business plan. It provides examples from BAM's past and present substation projects that demonstrate the necessity for sufficient budgets to be secured for delivery of future schemes in Scotland.

The views and opinions expressed by the writers of this report are those of the Senior Management Team within BAM Nuttall Scotland Division.

Since 2013, BAM have been a framework supplier to Southern and Scottish Energy Networks (SSEN), within RIIO T1 price control period, building and refurbishing substations across the Highland and Islands of Scotland. The substation framework brings a significant amount of business into our company, and to our subcontractors and supply chain across Scotland. Maintaining and increasing our position on RIIO T2 framework is a priority for our business. Since our first substation project at Crossaig, we have delivered 12 substations to date, in locations such as Loch Buidhe, Melgarve, Stronelairg and Stornoway. We have built relationships with local suppliers and communities and developed designs, specifications, innovations and efficiencies which have been implemented and developed further on each subsequent project.

Reduced project allowances - insufficient costs to deliver project value

From our experience, when project capital cost is reduced and risk allowances are removed, this will ultimately lead to higher costs overall, to cover the additional risk being transferred. We are finding more and more Tier 2 and below supply chain members are unable to financially afford further, and additional, risk being transferred down from Main Contractors. This could prevent local suppliers being able to engage with Main Contractors to deliver SHET RIIO T2 projects.

There are internal governance issues where the risk is disproportionate to the potential opportunity or business gain. In today's environment, this could prohibit Tier 1 Contractors from tendering on projects where market conditions are aggressive, and the risk profile has increased. Shared risk profiles with sufficient risk/reward balance, and correct project allowances, are critical for Main Contractors gaining approval to proceed with submitting tenders. Risk should be managed and mitigated by the party best able to do so, and risk provision not added to unit rates when poorly understood by the supply chain, as this will reduce value.

The challenges of building substations in remote areas of the Scottish Highlands and Islands are not comparable with other parts of the UK. The factors listed below all increase the cost of delivering remote projects. These include:

- Increased travel, deliveries and waste haulage costs
- Investigation of unknown ground conditions
- Forest removal and complex, extensive drill and blast operations
- Weather delays - including stoppages caused by high winds and heavy snow
- Concrete supply difficulties and site batching concrete set ups
- Utility provision and advanced works of long access roads to reach worksites
- Power and communications - installation and set up in remote, often mountainous, areas
- Lack of accommodation availability - requiring full camp set ups on remote sites
- Environmental constraints - including employment of specialist environment staff, working within SSI and SSSI areas, near sensitive water courses, peat management, and surface water management
- Winterisation requirements - winter working requires the need for additional back-up generators, enhanced PPE, lighting, specialist thermal working cabins, snow clearance and road maintenance (gritting)

Project example: Stronelairg substation

Stronelairg substation, part of the Stronelairg windfarm project in the Highlands, was an exceptionally challenging delivery. The site is at an elevation of 674m above sea level in the Monadhliath mountain range, situated on a plateau next to one of the highest wind farms in the UK and is open, exposed and windy. It is 20km from the nearest town of Fort Augustus and accessible only by 4x4 via a long, rough mountainous road. The programme was reduced by 6 months, to meet energisation dates, and we had to deliver the project across two of the harshest winters on record in Scotland and during the first ever Met Office Red weather warning.

Works were often restricted by the weather including 7m high snowdrifts, temperatures dipping to -30 degrees and wind speeds of up to 100mph. Pre-planning gave us time to prepare logistical elements to meet the tight programme and properly engage with our supply chain. It also allowed to review the design and produce solutions that were less susceptible to the elements and cold conditions e.g. replacing mass concrete foundations with a mini piled solution, which avoided pouring 2,000m³ of concrete and cut programme time. Strategies were adopted to deliver in exceptionally challenging circumstances. These included:

Winterisation planning - vital for the safety of all project staff and to keep delivery on programme. This included investing in specialist snow clearing equipment; plant that could operate in high winds; specialist PPE; installing emergency shelters; developing methodologies and mitigations e.g. heated grouting shelters, so we could continue to grout and concrete through freezing conditions. This video documents the extreme remoteness and access difficulties of the site: https://vimeo.com/198601472/a0738da966

Fully equipped remote accommodation camp - due to the remote location of the substation and associated weather risks, we devised and installed a temporary accommodation camp to house our workforce. The camp was fully equipped with sleeping cabins for 100 people, a canteen providing hot food three times a day, recreation room, a launderette and a fully equipped gym. 4x4s transported the site team on a short commute up the haul road to the platform.

Preconstruction costs

Preconstruction stages of a project are essential, where we work closely with SSE to define the scope, schedule and cost of the project to ultimately reduce the overall risk profile and save significant money and time On projects delivered across RIIO T1, this stage has covered crucial design decisions, innovation, supply chain engagement, advanced works for access and logistical issues, engineering efficiencies and innovations, environmental studies, risk mitigation and reduction and much more.

A preconstruction phase allows all of the project risks to be identified, managed and, where possible, mitigated prior to the price for the construction phase being agreed. This ensures price and programme for the project is predictable. There is evidence throughout the UK that this two stage bidding process provides better value for money for Clients - alongside surety of delivery costs and timescales - rather than single stage bidding, when the risks are poorly understood and the design not sufficiently mature. Leveraging preconstruction must remain a priority so we, and other Contractors, can continue to meet crucial energisation dates for the network.

Project example: Melgarve substation

An example of the critical function of preconstruction was access arrangements for deliveries at Melgarve, in the Scottish Highlands. Melgarve posed a difficult, tight programme challenge, as we had to meet the bypass energisation deadline for the scheme in March 2018, when the substation went live. This meant meeting an earlier date for the SGT delivery - large equipment weighing 105 tonnes. During preconstruction, we identified the existing access track and bridge were not capable of accommodating these loads and widths.

We undertook significant preparation for their delivery, including developing plans to:

- Reinforce and upgrade 11km of access road to the site:
  - five bridges, including the Strathmashie bridge needed reinforcing
  - building a new temporary Mabey bridge over the River Spey
  - local road improvements and widenings
- Prepare internal roads around the eventual substation complex
- Prepare offload areas within the eventual substation
- Implement environmental measures to prevent siltation of the river Spey and its subsidiaries

Melgarve substation was required for the connection of Stronelairg windfarm to the transmission network. We met the energisation date two weeks ahead of programme, despite a tight 18 month construction period and working through two harsh Scottish winters. Without this preconstruction period, these access issues would have been discovered during delivery, with significant impact to the construction programme to develop and implement a solution. This video documents operations at Melgarve and includes a section on the temporary Mabey bridge we installed, to enable the SGTs to be delivered to the remote site: https://vimeo.com/227388770

Impact on supply chain

As an experienced Tier 1 Contractor, who has worked in Scotland for the past 150 years, we have relied on our local relationships with supply chain. They have invaluable knowledge of their local market and an ability and flexibility to deliver on our behalf. There is a risk that these partners may not be able to support a new model of delivery, forcing us to bring in contractors from further afield. This will increase cost and import risk, as they do not fully understand the local market conditions and working environments, and result in less choice and reduced value for the Client. The impact on our supply chain includes:

- Discouraging and preventing local suppliers engaging with Main Contractors to deliver SHET RIIO T2 projects
- Driving the use of larger suppliers, rather than local ones, leading to increased travel and accommodation costs, carbon footprint and costs overall
- Posing a significant threat to the survival of the supply chain in Scotland - small businesses, particularly in remote areas, will fold if they lose key subcontract opportunities
- Failing to provide any benefit to the local economy through employment/supply prospects

Smaller local suppliers like Inverurie Precast and Geddes - both of whom are supplying precast and concrete to our current project at Tealing - have been invaluable to our operations throughout the Covid 19 crisis. Multinationals like Breedons put most of their staff on furlough during the UK lockdown, and could not provide us with the materials we needed to keep to programme. Both these small businesses continued to supply us throughout lockdown, providing us with a flexibility that we could not get from bigger entities.

Project example: Rothienorman substation

There are over 500 reinforced equipment foundations on the Rothienorman substation platform. Approximately 400 of them were produced by a small, local precast supplier, Inverurie Precast. Using local suppliers reduced the carbon footprint from long haul road haulage and boosted the local economy.

We wanted Inverurie Precast to use our quality systems, so we could monitor the precast process in real time on site and enable efficient handover of quality information. This involved them adopting BIM 360 Field and learning how to use it. They bought iPads and we provided access rights to the software and training on its use. A short film about upskilling the supply chain at Rothienorman can be found here: https://vimeo.com/390317756

Providing smaller suppliers with a dependable future workbank means they can commit to training and development of their workforce. This means we can fulfil our obligations as a member of the Energy Skills Accord and address the chronic national skills shortages in the civil engineering sector.

Journey to net zero - environment and reduced carbon

Many of the substations sites we deliver are based in ecologically sensitive areas of the Highlands and Islands and are protected by government legislation. Meeting these environmental requirements requires significant pre-planning post award to develop methodologies, and subsequent close engagement with statutory bodies like SEPA for approval. Once in delivery, we must factor in costs for associated mitigations and expert ecological resource. In addition, we are mandated to cut our carbon intensity by 50%, and to encourage and support our supply chain to do the same.

Environmental initiatives and innovations on site are helping us to strive towards UN Sustainable Development Goals and SSEN's Sustainability Strategy targets. These come, however, at an initial cost, until the benefits of net zero innovations become an industry norm and the costs reduce. Limiting funds overall for RIIO T2 will seriously restrict our capacity to continue developing and trialling these initiatives.

Project example: Tealing substation

We have installed an Ecosmart ZERO gate house cabin at the site - a towable welfare unit with a rooftop solar array and a battery which is supplemented by hydrogen gas fuel cell, if required. The cabin produces zero local emissions and minimal indirect emissions, compared to those requiring traditional gas oil generators. We are also using these as welfare units on another project, as they can be towed closer to operations on remote parts of a site.

The cabin provides several measurable benefits including: zero diesel consumption; no requirement to use hydrogen back-up; zero CO2 and NOx emissions, compared to traditional units; local air quality benefits; zero noise due to elimination of generator noise; and reduced combined hire, service and fuel costs.

We have also deployed one 25 tonne hybrid excavator, in additional to standard diesel-fuelled excavators at Tealing. Based on data from March 2020, we have calculated a 56% reduction in carbon emissions from one month of hybrid excavator use, as opposed to one powered by diesel.

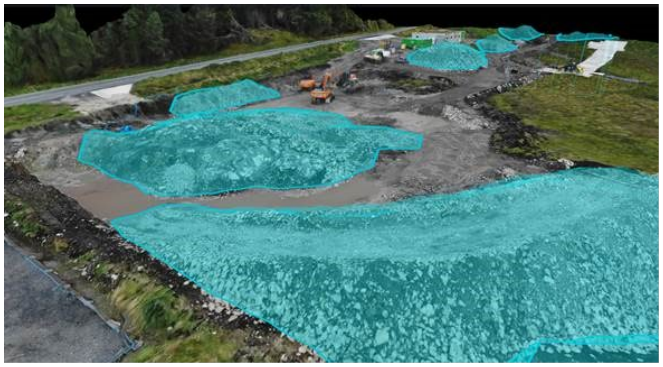
Investment for future demands - innovation

Innovation has become essential for transformation of UK civil engineering, helping to deliver value throughout the supply chain, minimise environmental impacts, meet sustainability targets - by making the best use of natural resources and minimising waste - and ultimately satisfy customers' requirements. In times of rapidly changing markets, technologies and communications, it is not a journey we can turn back on.

Driving innovation has been essential for continuous improvement in delivering substation projects across RIIO T1 substation framework. Investment in innovation is required to increase efficiencies, reduce costs and meet demanding energisation programmes. Cutting back on preconstruction allowance, and reducing project budgets overall, will stifle innovation and impact negatively on overall delivery. Across RIIO T1 framework we have invested in developing, and building on, our use of digital tools to cut time and costs, enhance the quality of delivery, increase safety and reduce carbon. This includes:

- Early application of BIM 360 Field on iPads at Loch Buidhe to digitise and consolidate quality records to control production of equipment bases in an offsite precast yard
- Detailed 3D modelling at Melgarve to improve understanding of the works and identify clashes between construction elements, to ensure operations were undertaken 'right first time'
- Use of 3D models to facilitate machine control in plant to deliver bulk earthworks and other deep dig activities at Rothienorman and Tealing

Project example: Stornoway substation



At Stornoway, we experimented using drones to assist in surveying activities. The drone is used to take geo-tagged aerials, obliques etc. to build up a fully comprehensive picture of the area. These images are then run through software that stitches the images together to form an accurate 2D map and 3D model. The resulting map/model can be used raw to extract survey information, or can be exported into a variety of file formats for further processing in common CAD software.

Processed models can be used to measure distances, areas and volumes. This is particularly useful for tracking and quantifying stockpile or cut and fill volumes on a daily/weekly basis. The application and benefits of using drones and models is growing and we see them potentially removing surveyors from the site, providing both a cost and safety benefit.

Our upcoming work for SSE in the Shetlands is going to require a significant earthworks operation. We plan to use drones to track earthworks progress for daily/weekly cut and fill quantities. Drones will also allow us to build topographical surveys, negating the need for engineer resource to be on site to undertake time-consuming grid surveys.

Supporting local communities

BAM has been delivering civil engineering projects in the Highlands and Islands for over 150 years. We employ and develop local people and businesses on our projects and, where possible, engage and assist communities. In doing so, we strive to enhance lives and create positive, transformational legacies wherever we work. Many of the substation projects we have delivered so far are based in rural locations in the Scottish Highlands. The work we do to support local communities often fills a crucial funding gap. We recognise that now, more than ever, the communities, services and organisations that surround our projects are facing huge challenges as a result of Coronavirus. We need to continue to support them through this difficult time. Cutting overall funding across the RIIO T2 framework will ultimately impact on our ability to help support local communities we interact with on these projects.

Project example: Fyrish substation

As part of our strong commitment to support, develop and engage with the local community, we undertook several activities in the area, including:

- Providing work experience opportunities on site for two senior pupils from a local secondary school
- Charitable donation to Alness Community Council to enable them to refurbish the war memorial in the town centre
- Working closely with local pupils at Ardross Primary School to build bird and bat boxes from our leftover timber
- Providing a camera to the local school to film birds nesting on the grounds
- Running a design competition with pupils at Ardross School, as they were keen to get their playground upgraded:
- We ran a competition, engaging school children to design the new playground themselves, which we then built
- Upgrading of a local school's footpaths
- Holding career talks - site engineers providing pupils with insights into a day in the life of an engineer
- Upgrading vegetable patches and greenhouses at Kiltearn School and building greenhouses with plastic bottles - we reused all the plastic bottles from site, recycling them for use as greenhouses for the school
- Donating firewood to the local bonfire event
- Using local shops and caterers to supply food for specific occasions/meetings
- Employing local people on the project, including two cleaners and an office manager

An uncertain future

We have evidenced throughout this paper that a level of investment is fundamental to achieving value out of the next price control period, so Ofgem can continue to make a positive difference for energy consumers. If budgets are cut for RIIO T2, we will be unable to deliver on many, if not all, of the aspects of project delivery listed above. The repercussions will be experienced down the supply chain, within local communities and the environment across Scotland. The innovations we have developed and delivered through the first price control period have streamlined and improved substation delivery. Similar outcomes will only be achieved for RIIO T2 with sufficient budgets and a procurement process that continues to support this model of delivery.

We have provided further supporting case studies in the following link:
https://bamnuttallprojects.withbc.com/pub/english.cgi/0/107320236?op=download_page&id=107320236

The road to Stronelairg Substation, a prime example of BAM's project delivery in remote and logistically challenging environments in Scotland.

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