ANNEX 26: COST IMPACT OF MOORSIDE NUCLEAR POWER STATION

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1. Executive Summary

1.1 Background

NuGen are proposing to build a new nuclear power station near to the existing nuclear reprocessing plant at Sellafield, Cumbria. NuGen have submitted a modification application to National Grid Electricity Transmission (NGET) to commence the formal application process for a connection to the transmission network. NGET and Electricity North West are preparing a modification offer for approval by NuGen.

At present there is insufficient capacity at Sellafield on our network to connect the power station. The size of the station technically precludes connection at 132kV and significant reinforcement of the NGET transmission network will be required to facilitate the connection.

The reinforcement of the transmission network will significantly affect our existing distribution network in Cumbria.

2. Connection proposal

2.1 NuGen

NuGen is a UK nuclear company owned by GDF Suez and Iberdrola. NuGen are proposing to build a new nuclear power station on the west coast of Cumbria, near to the existing Sellafield reprocessing plant. The new site has been named Moorside.

NuGen have confirmed that the Moorside nuclear power station will have an export capacity of 3.6GW and use the Westinghouse AP1000 reactor.

NuGen are currently in the development phase of the Moorside project. It is NuGen's intention to complete the development phase in 2015; after which they intend to announce their formal decision to proceed with the project, or not.

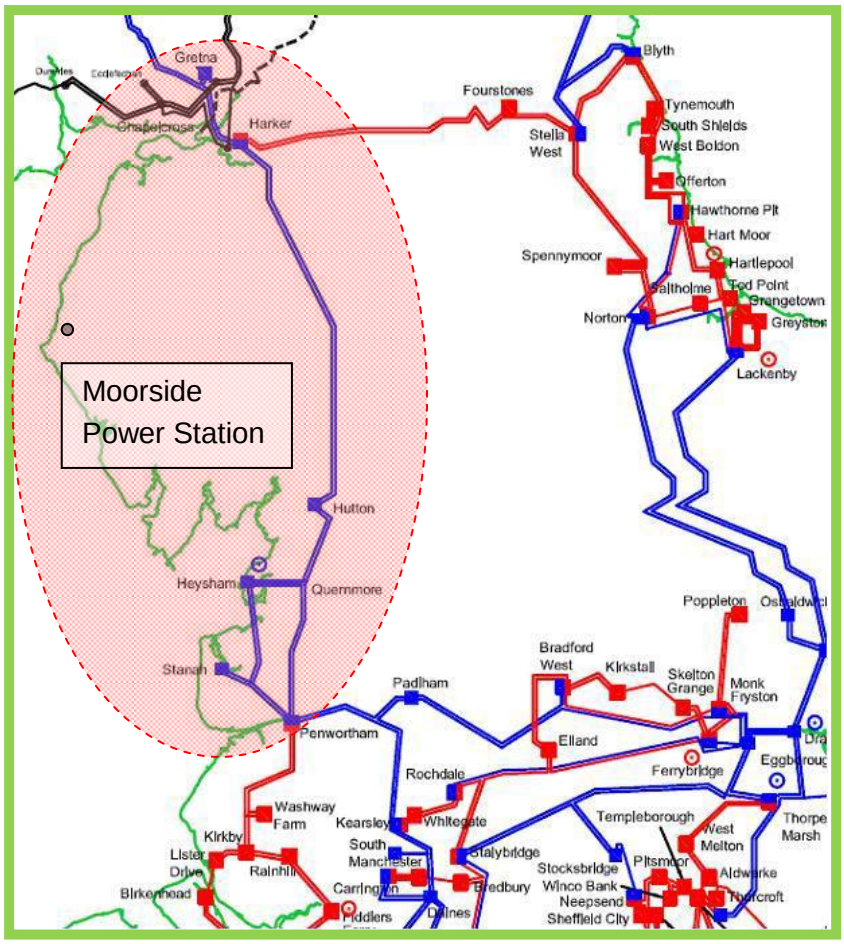
If NuGen proceed with the project construction is likely to begin in 2016-17. The target date for station operation is 2023 however construction and commissioning supplies would be required before this date.

2.2 National Grid Electricity Transmission (NGET)

NuGen have requested NGET to quote for the provision of (up to) a 3.6GW export capacity connection to the transmission network at Moorside.

The figure below shows the NGET transmission assets in the north of England and the location of the new power station. Due to the absence of transmission assets on the north west coast of Cumbria, the transmission network will require both extension and reinforcement in order to provide the required connection.

As the power station is nuclear, a minimum of four circuits are required to connect to the power station to provide the required level of safety resilience.



The NGET connection project (separately from the power station) is a major infrastructure project and will therefore require the consent of the Planning Inspectorate.

As part of the planning and consents process NGET have been engaging with local stakeholders over a three-year period to understand the constraints to establishing transmission circuits/ assets and to optioneer solutions.

Should NuGen confirm the power station project, NGET intend to apply to the Planning Inspectorate for consent in 2016. Construction is anticipated to commence in 2017. Completion is required for 2022 to allow operation in 2023.

2.3 Transmission Connection Options

The optioneering process undertaken by NGET in co-operation with us and regional stakeholders has been wide-ranging and has considered overhead lines, underground cables and subsea cables; AC and AC/DC solutions have also been considered.

Following consideration of the many options, on 22 October 2012, NGET announced that they are considering the following three options:

NGET Option 3

This option consists of a double circuit 400kV overhead line from Harker to Moorside and a double circuit 400kV overhead line from Moorside to Quermore, near Lancaster.

NGET Option 4a and 4b

These two options consist of a double circuit 400kV overhead line from Harker to Moorside and a double circuit subsea connection into the Fylde area from Moorside by one of the following methods:

Option 4a: A double 400kV circuit to Barrow and from Barrow across Morecombe Bay via a new tunnel.

Option 4b: Construct an AC/DC converter station at Moorside and a DC/AC converter station on the Fylde coast. Connect the converter stations via two DC subsea links.

2.4 Effect on Our Distribution Network

The above options represent our best view of the current status of the NGET optioneering process. All likely options will have a significant impact on our 132kV network. It is anticipated that much of our network in the line corridor will be affected to a greater or lesser degree. The lower voltage networks may in some areas need to be undergrounded where they are near to the proposed transmission lines or undergrounded for visual amenity if mandated as part of the consent proposal.

In undertaking their route corridor analysis NGET have identified that the overhead line routes that have the least visual impact are already occupied by Electricity North West 132kV lines. To secure planning consents for their 400kV transmission lines NGET will have to locate the lines in the best position aesthetically. This is expected to necessitate the removal of a significant proportion of our 132kV tower lines in Cumbria. To maintain existing customer supplies, NGET will have to construct new Grid Supply Points (GSPs) to feed our local networks.

It is estimated that approximately 214km of 132kV overhead line will have to be dismantled; to be replaced by three GSPs (Lindal, Sellafield & Seaton) and approximately 95km of 132kV cable.

In addition, there is significant expenditure associated with maintaining supplies whilst NGET completes its construction works. This involves the undergrounding of our overhead lines adjacent to the new 400kV lines and construction of temporary 132kV lines in order to facilitate dismantling of 132kV tower lines ahead of transmission energisation.

The removal of this amount of overhead line will affect our communications provision in the area as we will lose many of our fibre optic circuits used for protection and system management. These will have to be replaced with equivalent technology.

The changes to our distribution and communications networks will precipitate significant work to secure appropriate consents for our new assets.

It is likely that some of the assets that would be dismantled under the NGET connection option would have warranted replacement in any case in the RIIO-ED1 period. Therefore, a secondary effect to us is the impact on the asset replacement and maintenance programmes in RIIO-ED1. This represents a saving in capital expenditure; however remedial intervention will be required to ensure the security of the assets whilst NGET establishes their assets. In order to facilitate the necessary 132kV line outages, elements of our scheduled maintenance work will need to be brought forward. We anticipate that if this project goes ahead we would need to agree alternative secondary deliverables to as part of the RIIO-ED1 Output requirements. At this stage, we do not predict that this project will have a material impact on our primary outputs, with the potential exception of customer satisfaction and complaints which we cannot fully quantify at this point in time.

NGET has also discussed with environmental stakeholders and local planning authorities the undergrounding of existing overhead lines to mitigate the visual intrusion of the new transmission lines. This may include the undergrounding of a number of 132kV, 33kV and HV overhead lines that cross the river Eden to the northwest of Carlisle.

Whichever option NGET decide to progress, there will be a significant impact on our 132kV overhead line network as much of it will need to be dismantled to make way for the transmission assets needed. The figure below shows the scale of the potential effect of option 3 on our 132kV network.

Early indications are that the majority of our 132kV overhead line network within the indicated area will need to be dismantled to make way for the transmission assets. New GSPs are proposed for Lindal, Sellafield and Seaton. It is anticipated that a 132kV circuit connection to Barrow, Roosecote, Egremont, Siddick and the offshore windfarm Robin Rigg will be provided from the appropriate new GSP. In addition, if we establish a new BSP at Millom (132/11kV) this will need to be connected to one of the new GSPs or another new GSP dedicated to it.

2.5 Completing Table CV9b

The 'best view' solution is still in the development stage and it will be heavily influenced by stakeholders and the requirements imposed by the formal planning process. The implications of the nuclear site licence conditions for the existing customer Sellafield Limited will also be a key factor in the final project design.

For the purpose of completing of Table CV9b it has been assumed that NGET will develop a solution consistent with Option 3 above. It should be noted that this does not imply that this will be NGET's chosen solution. It should also be noted that site licence considerations for Sellafield Limited have not been included at this stage, pending more detailed construction programme planning details being made available by NGET. The table commentary for CV9b provides further detail on the programme timescales.

For the purpose of completing the exit charges table, we have assumed that all changes are driven by NuGen's connection application to NGET and hence we have included no Moorside-related exit costs in CV108.

Our discussions with NGET indicate that three additional Grid Supply Points will be established, namely Sellafield, Seaton and Lindal.

We have not included the associated costs in table C34 as the Moorside connection is not is our Best View submission. We have outlined below our estimate of such costs together with their associated profile should the connection proceed. In this event these would be actual additions to C34 as part of the uncertainty mechanism. Appendix 1 provides the detailed breakdown of the costs.

Year	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	RIIO-ED1
Cost (£m)	0.0	0.0	0.0	0.0	7.1	7.1	7.2	7.3	28.8

Whilst NuGen may make a parallel connection application to Electricity North West for site construction supplies we do not forecast that this would trigger the need for reinforcement of at GSP level.

We continue to undertake discussion with NGET to understand the impact on our network and to agree cost apportionment principles. In developing our forecast we have assumed that North West customers would only pay for the on-going assets that they use and benefit from, for example replacing old assets close to end of life with brand new ones or any change in reliability as a result of the project. We have assumed that North West customers would not pay for any 400kV assets, any dismantlement costs or any temporary or enabling works. Any works to be undertaken by us but not funded by North West customers have been categorized as Non-Trading Rechargeables (NTR) for the purposes of this forecast and are assumed to be fully funded by NGET (income reported as customer contributions in template).

Our project costs are therefore detailed under two broad categories; Regulatory Asset Value (RAV) and NTR. Costs detailed as RAV are associated with the provision of new Electricity North West distribution network assets ie substations, switchgear, line and cables. Costs detailed as NTR are associated with the dismantlement of existing distribution network assets, diversions (incl. undergrounding of existing overhead lines), erection and removal of temporary circuits and engineering support to NGET.

Associated costs detailed in the table include:

- Wayleave/consent – costs incurred in acquiring all necessary wayleaves/ consents.
- Fibre communications – costs incurred to maintain IT&T fibre communications links and telecommunications links.

2.6 Costing methodology

In pricing the work required to complete our component of the Moorside connection we have carefully considered each element of the scheme scope and determined the value by utilising current market costs, consistent with the unit rates detailed in table CV3.

Market testing of the unit rates on which the costings are based has been undertaken via analysis of competitively tendered projects and comparison with actual costs from similar projects undertaken by our framework contractors.

It is of note that as outlined above the scope of work remains subject to very significant variation and hence our costing work is at this stage indicative only.

Given the scale of the required work, many elements of the programme would be competitively tendered as a means to test the market, searching for spare capacity from both local and national contractors. The rationale behind this dual approach was to validate current framework arrangements against a changing and competitive market place ensuring that the rates proposed are the most cost efficient available.

The total programme value is the summation of the direct build cost, together with a forecast of the extra indirect costs which are required. As with the direct costs assessment, we have reviewed our indirect costs element and a separate bespoke forecast has been included aligning to the particular requirements of the project.

By utilising rates comparable to our asset replacement forecast (CV3) and a bespoke assessment of indirect costs we consider the costing approach for Moorside project will be highly competitive, and offers value for money.

Appendix 1 – breakdown of potential future Exit Rate charges

Figures are in outturn prices		Total Charge 2015/ 2016	Total Charge 2016/ 2017	Total Charge 2017/ 2018	Total Charge 2018/ 2019	Total Charge 2019/ 2020	Total Charge 2020/ 2021	Total Charge 2021/ 2022	Total Charge 2022/ 2023	Total RIIO ED1
Lindal	Electronics associated with SGT1	0	0	0	0	11,347	11,333	11,310	11,276	45,266
Lindal	Electronics associated with SGT2	0	0	0	0	16,610	16,590	16,556	16,507	66,264
Lindal	Electronics associated with SGT3	0	0	0	0	22,015	21,988	21,943	21,879	87,825
Lindal	Non-Electronics Associated with SGT1	0	0	0	0	13,937	14,111	14,284	14,456	56,787
Lindal	Non-Electronics Associated with SGT2	0	0	0	0	13,937	14,111	14,284	14,456	56,787
Lindal	Non-Electronics Associated with SGT3	0	0	0	0	13,937	14,111	14,284	14,456	56,787
Lindal	180 Double Busbar Bay	0	0	0	0	193,309	195,722	198,122	200,507	787,660
Lindal	280 Double Busbar Bay	0	0	0	0	183,705	185,998	188,279	190,545	748,526
Lindal	380 Double Busbar Bay	0	0	0	0	192,086	194,485	196,870	199,239	782,679
Lindal	H10 Double Busbar Bay	0	0	0	0	313,908	317,827	321,724	325,596	1,279,054
Lindal	H20 Double Busbar Bay	0	0	0	0	313,908	317,827	321,724	325,596	1,279,054
Lindal	H30 Double Busbar Bay	0	0	0	0	313,908	317,827	321,724	325,596	1,279,054
Lindal	SGT1 400/132kV 240MVA	0	0	0	0	365,242	369,802	374,337	378,842	1,488,224
Lindal	SGT2 400/132kV 240MVA	0	0	0	0	365,242	369,802	374,337	378,842	1,488,224
Lindal	SGT3 400/132kV 240MVA	0	0	0	0	365,242	369,802	374,337	378,842	1,488,224
Lindal	SGT1 400kV 240MVA Cable 100m	0	0	0	0	78,471	79,451	80,426	81,393	319,742
Lindal	SGT2 400kV 240MVA Cable 100m	0	0	0	0	78,471	79,451	80,426	81,393	319,742
Lindal	SGT3 400kV 240MVA Cable 100m	0	0	0	0	78,471	79,451	80,426	81,393	319,742
Lindal	SGT1 132kV 240MVA Cable 100m	0	0	0	0	26,157	26,484	26,809	27,131	106,581
Lindal	SGT2 132kV 240MVA Cable 100m	0	0	0	0	26,157	26,484	26,809	27,131	106,581
Lindal	SGT3 132kV 240MVA Cable 100m	0	0	0	0	26,157	26,484	26,809	27,131	106,581
Sellafield	Electronics associated with SGT1	0	0	0	0	11,347	11,333	11,310	11,276	45,266
Sellafield	Electronics associated with SGT2	0	0	0	0	16,610	16,590	16,556	16,507	66,264
Sellafield	Non-Electronics Associated with SGT1	0	0	0	0	13,937	14,111	14,284	14,456	56,787
Sellafield	Non-Electronics Associated with SGT2	0	0	0	0	13,937	14,111	14,284	14,456	56,787
Sellafield	180 Double Busbar Bay	0	0	0	0	193,309	195,722	198,122	200,507	787,660
Sellafield	280 Double Busbar Bay	0	0	0	0	183,705	185,998	188,279	190,545	748,526
Sellafield	H10 Double Busbar Bay	0	0	0	0	313,908	317,827	321,724	325,596	1,279,054
Sellafield	H20 Double Busbar Bay	0	0	0	0	313,908	317,827	321,724	325,596	1,279,054
Sellafield	SGT1 400/132kV 240MVA	0	0	0	0	365,242	369,802	374,337	378,842	1,488,224
Sellafield	SGT2 400/132kV 240MVA	0	0	0	0	365,242	369,802	374,337	378,842	1,488,224
Sellafield	SGT1 400kV 240MVA Cable 100m	0	0	0	0	78,471	79,451	80,426	81,393	319,742
Sellafield	SGT2 400kV 240MVA Cable 100m	0	0	0	0	78,471	79,451	80,426	81,393	319,742
Sellafield	SGT1 132kV 240MVA Cable 100m	0	0	0	0	26,157	26,484	26,809	27,131	106,581
Sellafield	SGT2 132kV 240MVA Cable 100m	0	0	0	0	26,157	26,484	26,809	27,131	106,581
Seaton	Electronics associated with SGT1	0	0	0	0	11,347	11,333	11,310	11,276	45,266
Seaton	Electronics associated with SGT2	0	0	0	0	16,610	16,590	16,556	16,507	66,264
Seaton	Non-Electronics Associated with SGT1	0	0	0	0	13,937	14,111	14,284	14,456	56,787
Seaton	Non-Electronics Associated with SGT2	0	0	0	0	13,937	14,111	14,284	14,456	56,787
Seaton	180 Single Busbar Bay	0	0	0	0	94,185	95,361	96,530	97,692	383,769
Seaton	280 Single Busbar Bay	0	0	0	0	94,185	95,361	96,530	97,692	383,769
Seaton	SGT1 400kV Connection	0	0	0	0	434,925	440,355	445,755	451,119	1,772,155
Seaton	SGT2 400kV Connection	0	0	0	0	434,925	440,355	445,755	451,119	1,772,155
Seaton	SGT1 400/132kV 240MVA	0	0	0	0	365,242	369,802	374,337	378,842	1,488,224
Seaton	SGT2 400/132kV 240MVA	0	0	0	0	365,242	369,802	374,337	378,842	1,488,224
Seaton	SGT1 400kV 240MVA Cable 100m	0	0	0	0	78,471	79,451	80,426	81,393	319,742
Seaton	SGT2 400kV 240MVA Cable 100m	0	0	0	0	78,471	79,451	80,426	81,393	319,742
Seaton	SGT1 132kV 240MVA Cable 100m	0	0	0	0	26,157	26,484	26,809	27,131	106,581
Seaton	SGT2 132kV 240MVA Cable 100m	0	0	0	0	26,157	26,484	26,809	27,131	106,581
Total		0	0	0	0	7,066,412	7,153,187	7,239,390	7,324,925	28,783,914