Norwell Solar Farm Steering Group

Application by Elements Green Trent Limited for an Order Granting Development Consent for the Great North Road Solar and Biodiversity Park – project ref. EN010162
Unique Number -[redacted] (Our ref: NSG/2)

Deadline 1 Proposed Battery Energy Storage System

Executive summary

Purpose

The report critiques the necessity and environmental justification for a proposed second Battery Energy Storage System (BESS) associated with the Great North Road (GNR) Solar and Biodiversity Park. It assesses national and local need, environmental impact, and the contribution of the BESS to climate change mitigation.

Key Findings

1. National Necessity

• Overcapacity: The UK's current and planned BESS capacity (100 GWh pipeline as of July 2025) already exceeds government targets by more than 260% for 2030 and 240% for 2035.
• Regional Context: In the Midlands, planned capacity (17.1 GWh) is four times the 2030 regional target (4.3 GWh).
• System Impact: As BESS projects proliferate, most will recharge overnight when grid demand is low — typically relying on gas-fired generation, not renewables.
• Green Energy Replacement Risk: If BESS reduce reliance on imported electricity from France and Norway (both largely low-carbon), they could inadvertently replace clean imports with UK gas-generated electricity, worsening carbon outcomes.
• Conclusion: Nationally, there is no genuine necessity for another large BESS project, as approved capacity already exceeds targets and contributes limited net environmental benefit.

2. Local Necessity

• Existing Infrastructure: A consented 340MWh Staythorpe BESS and a newly approved 600MWh SSE BESS at Averham already provide significant local storage.
• Grid Capacity: The GNR solar array (800 MW AC) is sufficiently supported by existing BESS infrastructure; additional storage offers no clear grid-balancing need.
• Financial Motivation: The proposed second BESS (880 MWh) appears

commercially driven — capitalizing on low overnight power prices — rather than addressing genuine system or community need.

3. Environmental and Climate Impacts

• Embodied Carbon: Estimated lifecycle emissions from manufacturing, transport, installation, and decommissioning exceed 1.36 million tCO_2e.
• Operational Scenarios: Under realistic decarbonization forecasts, the project would be responsible for a net increase of 600,000–1,000,000tCO_2e over its lifetime and therefore contributing to global warming.
• Land Use and Ecology: Construction would industrialize rural land, reduce food production, increase HGV traffic, and elevate risks of ecological harm and public safety incidents.
• Conclusion: The proposed BESS would be responsible for increased overall greenhouse gas emissions and degrade local environmental quality, undermining its claimed contribution to climate change mitigation.

4. Overall Conclusions

• The UK BESS consented pipeline already exceeds its national and regional BESS capacity targets.
• The GNR BESS provides no additional grid security or environmental benefit.
• Its overnight charging patterns will likely increase dependence on gas-fired generation, offsetting any green advantages.
• Construction would be responsible for significant carbon emissions and local environmental damage.
• The project’s rationale appears financial, not functional or ecological.

Final Position of the Norwell Solar Farm Steering Group

The proposed second BESS at the Great North Road Solar and Biodiversity Park is unnecessary, environmentally damaging, and counterproductive to national decarbonization goals. Approval cannot be justified except on private financial grounds.

1 Introduction

1.1 The Great North Road Solar and Biodiversity Park, for the sake of brevity will be hereinafter be referred to as the GNR project/proposal. The Group note the submission of the Outline Fire Safety Management Plan but the public health and ecological threats of this BESS will be dealt with in a later report. It is also recognised that the Applicant has previously been successful in obtaining planning permission at an uncontested TCPA appeal for another BESS close by. The Applicant has explained that that BESS will probably indirectly receive the output from the GNR arrays. There are no published plans to connect that BESS to any other generating renewable energy station.

1.2 There is the clear potential for this second BESS to cause harm to the local area. Forgetting for now the associated CO_2 emissions associated with the construction and global transportation of this industrial plant (addressed in section 4 below), there will be harm associated with the Landscape and Visual Impact, the further loss of agricultural land but most worrying the potential for serious ecological harm and risk to public health. It is not intended to evaluate here the adequacy of the Outline Fire Safety Management Plan. That will be done once the National Fire Chiefs Council has updated its 2024 BESS guidance.

1.3 Given the dangers and negative impacts, close examination is required of the necessity for this part of the development. A further report will scrutinise the measures proposed to safeguard the environment, the local population, on-site workers and first responders. Below where sources are from a third party non governmental website, this will be shown with an asterisk. The URLs for these are listed in the Appendix.

2 National Necessity

2.1 The Applicant justifies the need for this part of the GNR project principally along two lines. Firstly, that it will contribute to overall net zero targets by assisting in the reduction in the use of fossil fuels. And secondly, that the BESS is required to cope with potential excess generation by the arrays. Its relevance to the national picture will be addressed first.

2.2 The Department for Energy Security and Net Zero's (DESNZ) Clean Power Action Plan 2030 sets out the Government's National BESS targets.

2.3 To gauge how well the country is likely to meet those targets, each quarter, the Renewable Energy Planning Database (REPD) provides a detailed National record of all known BESS schemes in the UK that are operational, under construction, or have secured planning consent (but have not yet been implemented). These three categories are classed together as **"Deliverable".**This database also quantifies BESS schemes for which planning applications have been submitted and are awaiting determination – classed as **"Pending"** schemes. Adding these two categories together gives the **"Total Known Pipeline"** figure.

2.4 The National BESS targets are shown below:

Government Targets	**Total GWh**
2030 National BESS target	27.1 GWh
2035 National BESS target	28.7 GWh

2.5 The REPD then illustrates the actual position with regard to the BESS Pipeline as at July 2025:

National BESS capacity (July 2025)	**Total GWh**
Deliverable BESS capacity	57.4GWh
Pending planning applications (awaiting decision)	42.6GWh
Total Known Pipeline	100.00GWh

2.6 Excluding the Pending applications, it can be seen that the Country is already going to hugely exceed the targets for BESS capacity. It is accepted that it is likely that not all projects in the Pending category will succeed in gaining planning consent. If they did, the pipeline would deliver an excess of 269% over the 2030 target capacity and 248% over the 2035 target.

2.7 But as some projects will not be successful in the planning process, other new projects, not included in the above figures, continue to flood in. The pipeline continues to expand. In the first six months of 2025 alone, planning permission was granted for 81 new BESS projects, adding a further 5.79 GW of capacity to the deliverable queue. This is more than 20% of the Government's entire 2030 target delivered in just half a year.

2.8 It is assumed The GNR project will fall within the NESO East Midlands area. The REPD assists in a similar way with the Government's BESS targets on a regional level.

Government's Midlands Region BESS targets	**Total GWh**
2030 Midlands Region BESS target	4.3 GWh
2035 Midlands Region BESS target	4.9 GWh

2.9 This is to be compared to the actual pipeline position:

BESS capacity Midlands Regions	**Total GWh**
Deliverable BESS capacity	7.27GWh
Pending planning applications	9.87GWh
Total Known Pipeline Midlands BESS	17.14

2.10 It is clear that there is already going to be extensive additional capacity above the Midlands targets. However, these figures do not represent the full picture. The REPD figures only capture those projects which are at or beyond the formal planning stages. The Transmission Entry Capacity (TEC) register reveals substantial activity in the pre-application stage. In September 2025, the TEC Register showed 1135 energy storage system projects in scoping. Their combined storage capacity is shown as 336GW! The GNR scheme will not appear in the Register as it will not connect to the Grid, only to the Staythorpe BESS which is on the Register. The storage size quoted for that BESS varies between 360MW (TEC) and now 340MW in the Applicants Chapter 15 Climate Change The planned combined storage capacity of the 2 GNR BESS is 1.22GW (a quarter of the total 2035 target for the whole of the East and West Midlands).

2.11 To fully understand the implications of this, there is value in examining how the GNR BESS units are likely to be utilised. The first scenario takes place on a sunny summer weekday. Starting at 10pm the night before, it is likely that the BESS will have been largely discharged, given the high demand earlier that evening.

2.12 Currently, when demand falls to around 20GW nationally, power generation from gas is currently lowered and the price per MWh drops significantly. Once the BESS is operational, it can be fully recharged during the night using electricity from the Staythorpe Power Station sub-station. This of course is largely not green energy but can assist in the grid balancing objective. Wind generation can supplement imported, biomass and nuclear power to virtually cover the normal 20GW required nationally at night if the wind speeds are there. However, it is more common for gas generation to provide significant night-time generation. As more BESS become operational, the marginal increase in demand on the grid can only be met by greater gas generation. The majority of the new and additional night-time additional electricity needed to recharge the batteries will be fossil fuel generated.

2.13 Having recharged during the night, at around 6.30am, when demand quickly rises, and consequently the MWh price also rises steeply, the BESS can be called upon to help meet the big rise in demand.

2.14 It being a summer day, there will be a gradual increase in power generated by the GNR arrays. The next surge in demand is expected at teatime and the evening. So on a sunny day, the BESS can be recharged with solar power and once that is completed, the panels can export direct to the grid.

2.15 Staff for the Applicant stated that initially, they thought that they could achieve one full cycle a day. A cycle is where the BESS is recharged during the day from the arrays and then discharged most likely during the tea-time peak. It is understood that consideration is now being given to one and a half cycles per day. Whichever is achieved, the process has now run 24 hours with the BESS exhausting its power storage by evening time. to meet the high early evening demand.

2.16 The second example would be a winter's day with less daylight hours, bad weather and low irradiance. In this case, there is very low generation from the arrays. However, the BESS can contribute by recharging cheaply overnight using excess (and mainly gas produced) generation capacity via the Staythorpe Power Station sub-station and discharging during the next peak demand period. Given how prices moved during the day, it may well be even profitable to recharge during the daytime from the grid, with a view to a second discharge in the evening.

2.17 It seems clear that BESS utilisations have the potential to assist with grid balancing as they start to come online. According to National Grid's data, there has been a gradual decline in national annual demand, though since 2023, it has slowly started to creep up again.

2.18 During this same period, there has been a steep reduction in power generation from fossil fuels. This has necessitated, save for the pandemic period, a rise in the need for imported electricity from abroad. At the moment, this supply is crucial for the Grid to meet its peak demand periods.

2.19 The second possible benefit from BESS deployment nationally is its potential ability to reduce curtailment, especially in areas with significant wind generation. This will hopefully reduce the wasteful eye watering curtailment payments and increase green energy production as less turbines are ordered to temporarily cease generation. That argument however is not being advanced here specifically. To do so would necessitate curtailment data which so far has not been submitted. Curtailment occurs when the electricity wind turbines generate exceeds the capacity of the transmission network to carry it. So BESS storage would need to be close enough not to have to rely on the constrained network. For instance, wind curtailment in Scotland occurs on a regular basis but given the distribution network limitations, an empty BESS near Newark cannot assist. Paragraph 86 of the *7.2 Statement of Need (Planning)* APP-324 states that *"BESS are typically provided close to renewable sources of energy, to store up surplus energy, to balance the supply particularly during peak* *demands."*

2.20 So on the face of it, it all seems a good idea. National energy security may be improved, potentially reducing demand from foreign feeder countries (known as interconnectors). In a minority of cases, there are potential efficiencies in generation from renewables with less curtailment. The latest TEC Register shows there to be 104 energy storage systems in scoping, under construction, with or awaiting planning consent, all of which are specifically designed to link to offshore and onshore wind generation. Their combined capacity would be just over 15GWh and if approved would greatly assist in reducing curtailment.

2.21 However, there are also big downsides to building a huge number of BESS across the country, especially in inland areas with lower wind generation. According to National Grid's data, summer months see an average national daytime demand around 26-28GW. In the winter this can rise to around 35-38GW.

2.22 Already, the total known BESS pipeline is 100GWh but in reality, noting the number of projects such as GNR (then in pre-application and not included), that number is likely to increase dramatically. It is not an unfair assumption that once online, all these BESS will seek to recharge overnight, ready for the morning peak demand period.

2.23 Though some will be able to recharge using increased night time wind power in the mix, there will inevitably be higher overnight overall demand which will need to be met from other generating sources. As more wind dedicated BESS come online, (as per 2.20 above), it is likely that they will also take advantage of lower night-time demand and reduce overnight grid supply from wind power. It is argued that the only realistic solution to meeting all this higher overnight demand from this wave of new solar BESS is by increasing the normally low night-time generation from gas. Nuclear power generation is constantly around the 4-5GW level, bio-mass around 2GW and hydroelectric under 1GW so they could not fill the gap, having little or no flexibility or headroom.

2.24 There is a strong argument that the underlying economics of all the BESS projects soon to come online actually rely on continued long term increased night-time gas generation. This hugely undermines the project's green credentials.

2.25 One seemingly potential benefit may well be the reduction in, or complete removal of the need for interconnector imports. This would seem at first glance to have balance of trade advantages. But of course, these would be mitigated by a probable increase in imported gas. This also has its own energy security risks.

2.26 The UK's two biggest interconnectors are France and Norway. According to RTE*(accessed 01/11/25), France's generating capacity in May 2025 consisted of 11% fossil fuels and 89% nuclear or renewables. On a typical summer's day, the morning peak period in France is supplied by well over 90% nuclear and renewables. As demand drops during the day, that can rise to 99% low carbon generation. The energy this country imports from France is overwhelmingly non fossil fuel generated.

2.27 Our second biggest foreign supplier is Norway. According to *Low Carbon Power* * *accessed 01/11/25)*, 98% of Norway's' power is generated from low carbon sources, with over 88% from hydroelectrics and over 9% from wind.

2.28 According to National Grid data* (accessed 25/07/25), these two countries supplied the UK with 10.6% of its electricity needs over the last year. On page 13 of Chapter 15 Climate Change, the Applicant makes what many might see as a flawed assumption that the " *BESS, on the other hand, is assumed always to displace gas generation (at peak times)*". With one of the Government's energy targets being achieving energy security and a desire to reduce energy imports, many commentators believe that it is far more likely that over time it will be the interconnector imports which will be reduced. If the future need for their low carbon contributions is significantly reduced or even eliminated because the UK had 100GWh of BESS energy on tap for the morning peak, then on those mornings the UK would be replacing green imported energy with largely UK gas generated power.

2.29 The Applicant has confirmed in their papers that the BESS will be recharged during periods of low demand and clearly that will be via the Staythorpe Power Station sub-station.

2.30 They state on page 10 of Chapter 15 of the ES – Climate Change (6.2.15) APP-058 the following:

> *" Gas is used to generate electricity only in times of peak demand, when other sources(renewables, nuclear, import from abroad) are insufficient."*

> *" the BESS would also be charged from the grid when there is excess, cheap electricity available on the grid, i.e., not from gas."*

2.31 The above quotes give the impression that the BESS will draw from the grid when electricity is not produced by gas and that during the lowest demand periods, no gas is used to produce electricity. This is incorrect. The data below is sourced from National Grid. Figure 1 below shows generation by source nationally for the previous 24 hours on 24/7/25

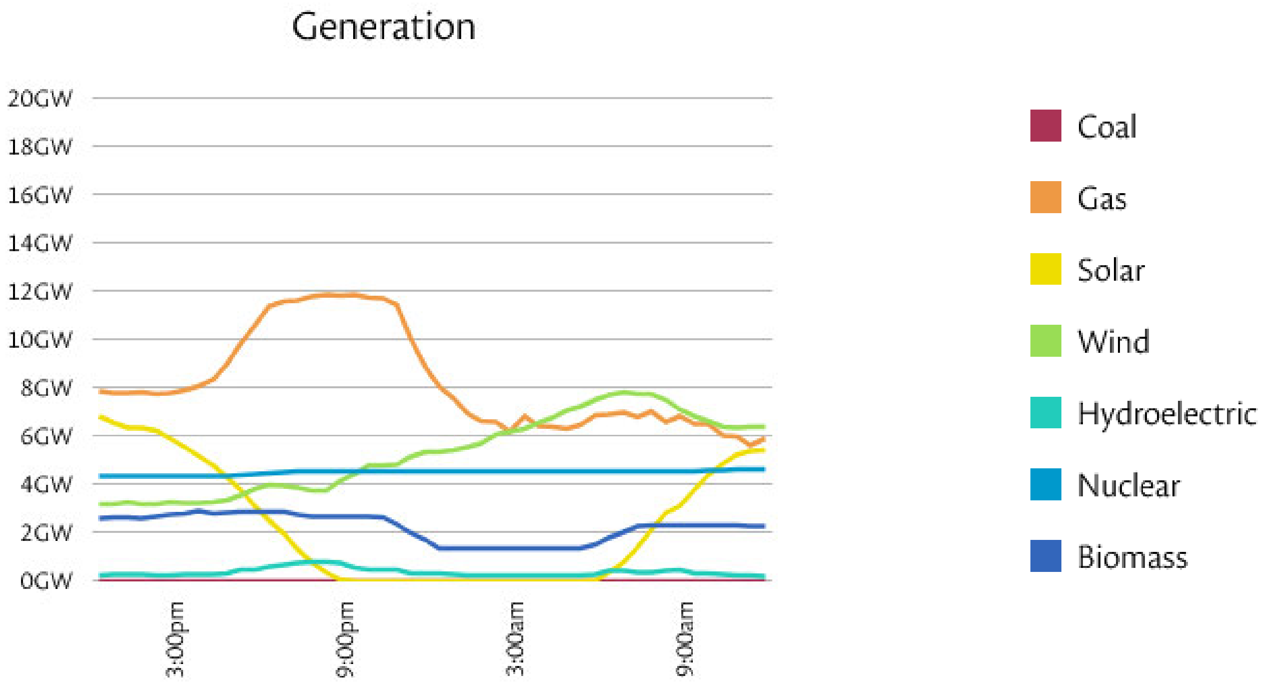

Figure 1 (source grid.iamkate.com)

2.32 During the night, clearly there is no solar generation. During this 24 hour period, there was little hydroelectric generation. At the moment, nuclear remains pretty constant 24/7 at just over 4GW. Demand overnight for this period never dropped below 20GW and consequently, gas generation never dropped below 5GW.

2.33 The above generation profile was not unique to that one 24 hour period. Below is the data from the following day. In this period, overnight gas generation had to be higher due to the fact that there was less wind generation.

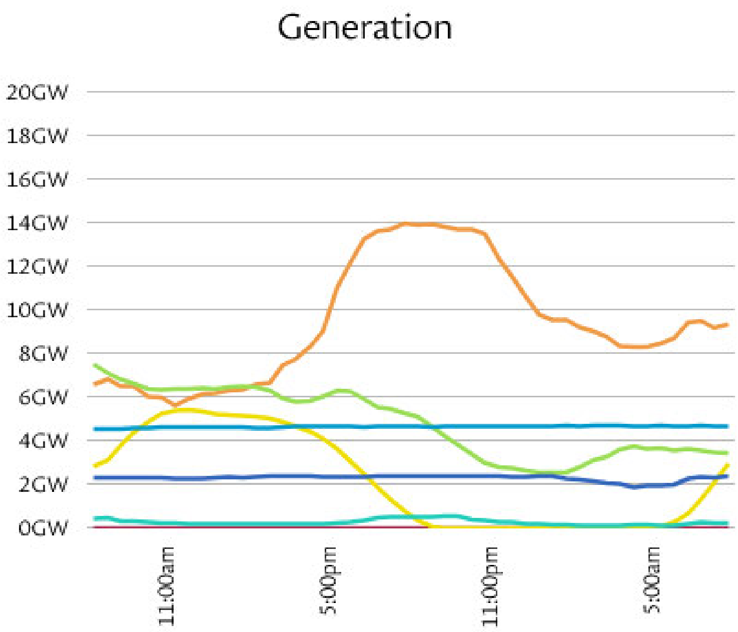

Figure 2

2.34 The above snapshot data (captured on 25/07/25) shows that gas generation never dropped below 8GW during the night. There is an argument that these days are not representative of a typical night-time generation profile for the UK. Normally one could expect greater wind generation, especially during the Autumn and Winter nights when of course the solar generation is the same as in summer nights. However, the average night-time demand is also higher in Autumn and Winter months.

2.35 This is an evolving market. According to the Government's REPD data (April 2025), there were 124 operational BESS sites with a capacity of

2.6GW. However, this is likely to be an underestimate as facilities with a capacity below 1 MWh that went through the planning system prior to 2021 were not recorded. Clean Power 2030 states that there is 4.5GWh of battery storage capacity currently in Great Britain, the majority of which is grid scale The overwhelming majority of these projects would be charging overnight from the grid. If they were doing this during the night pictured above, it is pretty clear that they added to the demand that had to be met mainly by gas generation. The other generation sources had no flexibility to meet that demand.

2.36 If one casts back to the national BESS pipeline figures (2.5 above), there is already another 52GWh (approximately) of BESS projects that have been approved or are under construction. The overwhelming majority of these, once operational, will seek to charge overnight. That large increase in demand will have to be met from one of the above generation sources.

2.37 Set against that prediction, it is worth noting the following quotes from the Department for Energy Security and Net Zero's report "Energy Trends. UK January to March 2025"

> *"Gas demand increased in Quarter 1 2025, up 8.5 per cent on Quarter 1 2024. This was driven by increased gas demand for electricity generation, as well as an increase in domestic (household) and services demand in part due to colder temperatures compared to the same period last year."*

> *"Hydro generation fell by 19 per cent on last year caused by very dry conditions; 2025 saw the driest Quarter 1 since 2013. Generation from solid biomass, municipal solid waste, and biogases all saw modest decreases resulting in an overall decrease for bioenergy of 4.1 per cent compared to Quarter 1 2024."*

> *"The largest decrease in generation came from onshore and offshore wind which were down by 12 per cent and 14 per cent respectively, broadly in line with the fall in average wind speeds"*

2.38 Given the predicted significant increased demand for overnight charging associated with the 48GWh of BESS projects soon to come online, it is pretty clear how that extra demand will have to be met.

2.39 Of the two peak demand periods, it is true that all these projects may well deliver UK produced renewable energy during the evening peak period if they are recharged during the day for instance by solar plants. This increased delivery to the grid will provide the opportunity to reduce this country's evening reliance on imported renewable and gas generated energy.

2.40 However, increased overnight demand due to widespread BESS recharging can only be met at the moment by increased gas generation. Given that the Applicant already has a consented BESS and that the competent planning bodies have already approved far more BESS capacity than the Government's targets require, there is a strong argument that there is no necessity on a national level for yet another very large addition.

3 Local Necessity.

3.1 The Applicant has helpfully reconfirmed that the combined arrays will have a theoretical peak output of 1120MWp or 800MW AC (5.1.11 Section 42 Applicant Response Table). At this stage, it is not intended to scrutinise the validity of calculations relying on these figures. That has been done under separate cover.

3.2 The MWp figure is a theoretical figure, measured at power output as it leaves the panels. Grid scale solar panels list their theoretical peak output (Wp). This output is measured using Standard Test Conditions (STC)* (various sites accessed in September). To compare like for like, the STC is defined by the International Electrotechnical Commission. The standard test parameters are 1000Wm3 of solar irradiance, module temperature 25°C, an Air Mass of 1.5 and zero wind speed. Such measurements are completed in laboratory conditions. These conditions correspond to the irradiance and spectrum of sunlight incidence on a clear day upon a sun-facing 37°-tilted surface with the sun at an angle of 41.81° above the horizon. They approximately represent solar noon near the spring and autumn equinoxes in the continental United States, with surface of the cell aimed directly at the sun. Lower irradiance, different panel tilt and sun azimuth angles, or lower/higher temperatures would reduce the output just as would dust, pollutants or minor possibly non visible manufacturing defects.

3.3 These conditions are rarely encountered in the real world, especially in the East Midlands.

3.4 To combat lower power generation in the real world, developers 'overplant' the arrays. Overplanting a solar farm involves installing more panels than the rated MWp suggest is necessary for producing the capacity (in DC terms) that the site is authorised to export to the grid (in AC terms). Not surprisingly, the Applicant states their intention to overplant.

3.5 The Applicant states in their Grid Connection Statement (Paragraph 2 APP-331):

> *"The Applicant has secured a grid connection agreement with the National Energy System Operator (NESO), permitting the export and import of around 800 megawatts (MW) (AC) of electricity via the 400kV National Grid Staythorpe substation."*

3.6 This brings one to a potential benefit to a solar farm with a BESS compared to one without. It is theoretically possible in the early years of operation that an overplanted solar farm could generate slightly more AC power than agreed with the NESO. In such cases, excess power could be diverted to a BESS in order to rigidly stick to the connection agreement figure. The first weakness in this justification however centres on the word *'around'* in the above quotation. This implies that the NESO would not cap imported power if the panel export direct to grid was at say 830MW AC.

3.7 This justification is further undermined by the fact that the Applicant will have its already consented Staythorpe BESS on hand anyway should over generation occur and there is a short term need to cap export.

3.8 How likely over generation will be depends on the degree of overplanting. The Applicant's "*7.14 – Concept Design Parameters and Principles*" report APP-329 does not inform on this, just the maximum land take for the panels. However, paragraph 76 of the *7.2 Statement of Need (Planning)* APP-324 states that there is an overplanting ratio of 140%. This calculation appears to be 1120MW DC being a figure 40% higher than 800MW AC. The DC figure means aggregate MWp for the panels according to paragraph 87 of the Statement of Need. Therefore, the Applicant has calculated that if the panel choice is for 650Wp units (as suggested on page 14 of TA A15.1), then 1,723,076 panels will be required. What is known is that the real world conditions in which these panels will operate will be very different to the STC conditions. The difference in the MW figures between DC and AC presumably takes into account the expected East Midlands performance of the panels compared to their STC ratings, coupled with allowances for power loss at the inverters, transformers and over the lengthy cable runs. To a degree it is academic. **The only important figure is the 800MW AC that leaves the development.**

3.9 The final point regarding local necessity concerns local capacity. Bearing in mind the huge projected excess in BESS storage approved nationally, the same will also happen in the Staythorpe/Averham area. The Applicant can be forgiven for not taking this fully into account as it is probably the case that the majority of their papers were written prior to planning permission being granted for the SSE BESS at Averham this Spring.

3.10 That BESS has been designed to have a storage capacity of 600MWh and will link with the Staythorpe sub-station. This means of course that planning has now been granted for 2 BESS sites in the same small area with a combined storage capacity of 940MWh. It is virtually certain that both will charge during the daytime from their respective solar arrays and discharge during the evening peak demand and high price period. And they will replace the 940MWh from the substation during the night. It is strongly argued here, given the current 'gold rush' in BESS construction nationally, that will provide a sufficient grid balancing capability. The proposal for another 880MWh of storage in the same area it is argued is driven by financial motives as opposed to national or local need.

3.11 Recharging a BESS overnight is much cheaper than at most other times in a 24 hour period. But, save for a few exceptional cases, one still has to pay for it. The net price a developer will receive for electricity exported to the grid is set by a figure called the strike price as part of a contract for difference agreement with the Low Carbon Contract Company (LCCC).

3.12 If the market price per MWh is below the strike price at the time the grid is fed by a solar array or a BESS, then the difference up to the strike price is compensated for as a subsidy to the generator. If the market price is higher, then the developer pays back the difference above the strike price.

3.13 Therefore, profitability is governed by volume and purchase price, not sale price. The marginal cost of producing 500MWh from a solar array is tiny. However, one is very much in the lap of the gods when it comes to generation. One relies on the weather. The one thing a developer can do in order to maximise profit is to maximise storage capacity and ensure it is bought at the cheapest price. It is argued here that that is the motivation behind the proposed second 880MWh BESS. It will not bring down bills or is necessary for the grid.

4 Contribution to Countering Global Warming

4.1 The construction of this large BESS in this open countryside results in the loss of arable land, including some BMV land. It is industrialisation of the countryside, reducing food production and requiring an increase in food imports. There is a negative landscape visual impact. There is a large negative impact on landscape character. There is an increased risk of environmental damage and danger to wildlife and public health associated with a thermal runaway. Its construction will lead to an increase in HGV traffic on local roads.

4.2 The BESS of course does not generate renewable energy. The Applicant justifies its inclusion in this project by producing figures for emission avoidance as a result of the grid requiring less generation from gas during peak demand. There is value in analysing how much greenhouse gas emissions are needed to reduce those peak emissions.

4.3 The Group are submitting a detailed reworking of the Applicant's greenhouse gas (GHG) and solar generation calculations under separate cover (our references NSG/1 and NSG/4). The figures below are drawn from that submission. Where applicable, they include the replacement units with the BESS batteries needing to be replaced every twelve years. This is discussed in the NSG/1 report. Below are the major emissions attributable to this BESS.

Material or component	tCO_2e
880,000kWh of Battery Cells embodied carbon (emissions factor sourced from Appendix APP-285 page 2. 300%replacement)	1,253,120
Cells HGV transport emissions	1,981
Cells sea journey emissions	8,390

Cell decommissioning	2,119
Transportation of 1,107 Containers for cells from China	7284
BESS Inverters (emissions factor sourced from Appendix APP-285 page 4)	71,840
BESS Inverters transportation (sea from the Port of Shanghai)	1,943
BESS inverters (HGV)	1091
Inverter decommissioning	359
Estimated 2.5km of paladin security fencing around the BESS.(sourced and estimated from Outline LEMP A5 1.2 sheet 2)	214
Paint for that fencing	4
Estimated 800m of palisade fencing around BESS substation(sourced and estimated from Outline LEMP A5 1.2 sheet 2)	86
Paint for that fencing	2
Concrete (220 4MWh units x 15m²x 300mm plinths – 990m³ 2,475t) plus estimated 80 tonnes for substation foundations and concrete for fencing	267
Concrete delivery (distance from Appendix APP-285 page 19)	92
Substation steel embodied carbon (400t sourced from Appendix APP-285 page 7 but using galvanised steel)	1,084
BESS and Substation tarmac (1.3km, sourced and estimated from Outline LEMP A5 1.2 sheet 2. Specifications are from Page 9 of the Appendix A15)	146
Tarmac delivery	68
Storage/Steel containers (Applicant estimates a maximum of 754 containers for the project. The BESS cells figure above is a MWh pure calculation for the chemical batteries. Minimum 220 2 tonne containers for the cells, plus estimate 5 more containers for varied use at the BESS. 225 containers@ 2 tonnes each-450t).	1219
Paint for containers	18,680
Total	**1,369,989**

Table notes.

The actual emissions total will be higher than the above total. Several constituent parts have not been included. These include some steel container transportation and decommissioning, loading/unloading of HGVs and ships, aggregate for tarmac road base, access tracks and plinth bases, geotextile membrane for tracks and substation (required under National Grid specifications), the substation grid transformer and mineral oil, workforce related emissions, diesel to power generators and construction machinery, cabling, firefighting water storage, fire suppression systems and security fence gates. The HGV cell transportation figures are likely to be higher given the predicted weight of the cell units.

Once the Applicant publishes more specification details for those areas where the Group have had to estimate or not include, these totals can be revised.

The assumption is that there will no longer be a need for the BESS substation which with the proposed design is needed to step up the inverted battery discharge to 132kv for onward transmission to the second BESS. Instead, the 132kv from the panels will route directly to the Staythorpe BESS.

4.4 As previously mentioned, the Group have recalculated the Applicant's figures and submitted them under separate cover. This included totals for solar generation and gas emission avoidance attributable to the BESS. The first BESS calculation used the highly unlikely scenario where the evening peak CO_2 factor is pegged at the 2026 level for 40 years. In this scenario, there is a predicted saving of 1,917,007tCO_2e and so compared to the BESS production emissions above, there is a reduction in attributable CO_2 emissions. The Applicant agrees however this scenario is unlikely.

4.5 However, because this scenario is highly unlikely, the Group used a possible future scenario which is rather pessimistic about decarbonisation, compared to Government targets. If this played out, then **the BESS would lead to a net increase in GHG of 594,903tCO_2e** (775,086 -1,369,989tCO_2e).

4.6 The third scenario was based on modelling by the Department for Energy Security and Net Zero in its 2023 publication "Valuation of energy use and greenhouse gas emissions". In those circumstances, **the net increase in GHG attributable to the deployment of the BESS would be 1,072,383CO_2e.** (297,606 – 1,369,989tCO_2e).

5 Conclusions

5.1 When faced with the suggestion of not being allowed a second BESS, some might expect some developers to say, its removal would make the project unviable. This assertion needs challenging. Minimum target return on investment is not a development consent material consideration. If a company cannot make a profit from an 800MW solar farm with a 340MW BESS, then it is probably in the wrong business.

5.2 In summary, and forgetting for now any landscape, ecological or public safety concerns (as these will be addressed under separate cover), there is a necessity argument in favour of any wind dedicated BESS which will reduce/eliminate curtailment on a very regular basis. That argument is not being advanced in support of the GNR Project. The proliferation of new BESS will dramatically increase the nightime demand on the grid which can only be met in the medium term by increased generation from imported gas.

5.3 The arguments in favour of more and more BESS, designed to rely principally on overnight charging from gas power stations, are therefore far weaker. Given that planning permission has already been granted for a BESS for the GNR project and another BESS nearby, a third is not necessary. In addition, it will possibly have another negative impact on climate change by replacing imported green energy each morning with power mainly generated overnight from fossil fuels in the UK.

5.4 Though there is still a national need for more thoughtfully sited solar arrays, there is no national need to import even more BESS infrastructure from China. The country will far exceed its 2035 target, just with the existing deliverable planning consents.

5.5 Given the likely improvements in national infrastructure, the most likely prediction is that the construction and operation of this BESS will be responsible for significantly higher GHG emissions than it will save, thereby adding to global warming. These higher emissions would be in the region of 600,000-1,000,000 tonnes of carbon dioxide. Adding this fact to the other negative impacts mentioned at 4.1 above, its approval cannot be justified, except for private financial reasons.

Norwell Solar Farm Steering Group.

Appendix
*URLs of Sources.

Page	Company/Organisation	URL
9	RTE	[redacted]
9	Low Carbon Power	[redacted]
9	National Grid data	[redacted]
13	Standard Test Conditions	[redacted]
		[redacted]
		[redacted]