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ENVIRONMENTAL
Standards Scotland
Ìrean Àrainneachdail na h-Alba

23 May 2024

Case Reference IESS.24.005 – Windfarm Cumulative Effects – Decision Letter

Dear [redacted],

Thank you for submitting your representation to Environmental Standards Scotland (ESS) regarding the cumulative effects of windfarms. Thank you for your patience as I have considered the case. I have now decided that ESS will not take any further action on this case, and I explain why in this letter.

The representation

Your representation concerned the planning application and consent process for windfarms. You stated that whilst the current system allows for the assessment of cumulative impacts in relation to existing or approved developments, this is not adequate for the wind energy sector as in some areas of Scotland it is not uncommon for multiple wind farm applications to be in the system at the same time (ie concurrent applications). You were concerned that these applications do not assess the cumulative impacts of each proposed development on the environment, and highlighted in particular the potential impact on wildlife, flood risk, and 'wind theft'.

Your view is that the system was not fit for purpose as there is a legislative loophole with regard to the cumulative impacts of concurrent applications. The outcome sought was for ESS to put a halt to wind farm planning determinations, to review planning legislation and

guidance for these developments, to bring it up to date with current knowledge and ensure it is effective at preventing adverse and significant environmental impacts.

Assessment of ESS' remit, and significance of the issue
When we receive a representation, our first steps are to confirm that it is within ESS' remit, and to consider whether the case raises significant issues that could be appropriate for investigation. ESS can investigate:

- Whether a public authority is failing (or has failed) to comply with environmental law
- The effectiveness of environmental law or of how it is (or has been) implemented or applied

I determined that the representation fell within ESS' remit in that it:

- Relates to a public authority – Scottish Government
- Relates to environmental law – the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017
- Could relate to the effectiveness or otherwise of environmental law, as you alleged the current law is not effectively protecting the environment
- Did not pertain to any legislative provisions excluded from ESS' remit.

I went on to assess whether the representation met our significance criteria (if a case does not meet these criteria, we would normally not take it forward). The criteria considers whether the matter arises from a significant incident concerning the environment; raises public health concerns; is something that could seriously affect the welfare of a member of the public; concerns significant alleged neglect or systemic non-compliance; could undermine public confidence; or concerns a failure to meet international obligations.

I concluded that what you told us may raise concerns in respect of public confidence and that further enquiries were required in this regard. We therefore took the case forward to 'pre-investigation' stage. This stage involves ESS making enquiries with the public body to understand more fully the issues raised. Based on the outcome of these enquiries, the case may move to investigation or be closed.

In considering the representation, I carried out research into the legislative, policy, and scientific background:

Legislative background

The relevant legislation is the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the 2017 Regulations'). The 2017 Regulations apply in the case of applications under section 36 of the Electricity Act 1989 (for consent to construct,

extend, or operate an onshore electricity generating station with a capacity of over 50 megawatts).

Regulation 3 states that Scottish Ministers must not grant an Electricity Act consent for an EIA development,[1] or direct that planning permission is deemed to be granted in respect of EIA development, unless an environmental impact assessment has been carried out in respect of that development.

The specifics of an environmental impact assessment are at Regulation 4. In summary, the process consists of the preparation of an EIA report by the developer; consultation, publication, and notification (as required by parts 5 and 6 of the 2017 Regulations); and examination and reasoned conclusion by Scottish Ministers of the environmental information. The assessment must consider effects on population and human health; biodiversity; land, soil, water, air and climate; and material assets, cultural heritage, and landscape.

Schedule 3 of the 2017 Regulations highlights that the characteristics of the development must be considered having regard to cumulation with other existing and/or approved development. No reference is made to concurrent applications.

Scottish Government's position

My research identified that on 8 December 2023, Sharon Dowey MSP asked the following parliamentary question:

> *To ask the Scottish Government whether it will provide information on any (a) ongoing and (b) planned initiatives aimed at balancing the expansion of wind energy infrastructure with the protection of existing wind farms from the adverse effects of wind turbine shadows.*

The response of 20 December 2023 was as follows:

> *The selection of a site and the configuration of wind turbines is a matter for the wind farm developer. This process involves comprehensive analysis to ensure the most suitable placement and design for wind turbines. Developers may have to balance the benefits of a compact site, which can minimise construction cost, and the gains from maximising energy capture from greater separation distances.*
> *…*
> *Policy 11: Energy of National Planning Framework 4 (NPF4) states that potential cumulative impacts are important considerations in the decision-making process. All applications are subject to site-specific assessments.*

[1] EIA developments are large scale developments with likely significant environmental effects.

Policy and guidance

Policy 11 of the Scottish National Planning Framework 4, relating to renewable, low carbon and emissions technologies, states that project design and mitigation must demonstrate how cumulative impacts are addressed. However, it does not give specifics of what should be considered.

Two pieces of guidance identified relate to the matter of assessing cumulative impacts, and refer to cumulative impacts of concurrent applications. Points of particular importance have been underlined.

NatureScot's guidance on assessing the cumulative landscape and visual impacts of onshore wind energy developments states that 'cumulative impacts should be assessed where a proposed development involves:

- A new development in combination with one or more existing or approved but unbuilt development;
- An extension to an existing or approved but unbuilt development;
- More than one development proposed at the same time within an area; or
- Any combination of the above'

It goes on to state that 'an assessment of cumulative impacts associated with a specific development proposal should encompass the impacts of the proposal in combination with:

- Existing development, either built or under construction;
- Approved development, awaiting implementation; and
- Proposals awaiting determination within the planning process with design information in the public domain. Proposals and design information may be deemed to be in the public domain once an application has been lodged, and the decision-making authority has formally registered the application.'

It also states, 'Occasionally it may be appropriate to include proposals in an assessment which are at earlier stages of development (including at scoping), particularly where clusters of development or "hotspots" emerge, or where proposals are adjacent to one another.'

NatureScot's guidance on assessing the cumulative impacts of onshore wind farm on birds, which provides advice for developers and their ecological consultants, states: 'the order in which developments should be factored in when considering cumulative impacts is set out below:

- Developments that are already operational, and those that are consented, and likely to be built should be considered first as the impacts arising from these (once mitigation has been factored in) are unavoidable.
- Applications that have been formally submitted to a planning authority or Scottish Government but have yet to be determined, consented and built developments

applications should then be factored in. Confidential data (e.g. on Schedule I species) from such assessments will not necessarily be in the public domain.'

Finally, the Onshore Wind Sector Deal for Scotland contains a commitment from the sector that:

- From the end of 2023, we will ensure that in planning for developments close to other projects, regardless of the owners/developers involved, due attention is given to cooperation on interconnected planning and environmental considerations for the area. This will be done through joint working on topics such as operational noise, construction access, the delivery of biodiversity enhancement, habitat management plans, layout and design, and benefits for the community, where this can be achieved without undue delay to any individual project.

Recent planning applications

I reviewed applications that had recently been made to the ECU to determine the level of information about cumulative effects contained within the EIA reports and consultation responses. A high-level sample review of EIA reports showed that cumulative effects of other operational, consented, and proposed wind farm projects are taken into account. In many cases this also includes cases that are in the scoping stage, which is prior to the application being formally submitted. Of the cases I reviewed, chapters of landscape and visual amenity, hydrology (including flood risk), and ornithology all specifically considered the cumulative impact of applications that had not yet been consented.

'Wind theft'

I asked ESS' Senior Environmental Analyst to carry out a review of the literature around 'wind-theft'. Key points of that review were as follows:

- Wind theft is a colloquial term for the wake caused by wind turbines reducing wind speeds downwind of them, which leads to reduced wind turbine power production downwind.[2]
- Within a wind farm, power can decrease due to the drop in wind speed caused by the wake. Measurements in a study of two 70-80 turbine farms in Denmark suggest a 40% drop in power production may occur depending on wind angle behind the first row of turbines. The drop in power production remains constant throughout the farm

[2] Pryor, Sara C., Tristan J. Shepherd, Patrick J. Volker, Andrea N. Hahmann, and Rebecca J. Barthelmie. "'Wind Theft' from Onshore Wind Turbine Arrays: Sensitivity to Wind Farm Parameterization and Resolution." *Journal of Applied Meteorology and Climatology* 59, no. 1 (January 2020): 153–74. https://doi.org/10.1175/jamc-d-19-0235.1.

after the second row of turbines.[3] Greater drops, of around 55%, have been observed in the USA.[4]

- The effect is not limited to turbines within a wind farm – it also exists between wind farms although at a smaller scale. In adjacent farms in the USA, farms immediately downwind suffered 5% drops in power generation due to wake.[5]
- While several studies looking at wake within farms have been identified, only three examining the impact of wake between farms have been found. The studies themselves acknowledge that the topic of wind theft has not been widely examined by academics.[6]
- No Scotland specific studies have been identified. The terrain around the USA study location is largely flat for hundreds of kilometres, a landscape not present in Scotland. Hilly terrain may alter the impact of wake compared to the flat terrain around the farms in the USA study or the sea around the offshore farms considered off Norway by Finseraas et al – no studies have considered this and are monitoring the impact of wake in idealised conditions. A lack of Scotland-specific information makes it difficult to determine the losses caused by wake here. No evidence has been found detailing the impact of wind farms that are not adjacent to each other. The effect of wake on wind farms kilometres downwind of others is therefore unknown.
- Several studies have highlighted a lack of legislation regarding wind theft both at a national and international level.[7,8,9] In Scotland, wind theft is a matter for wind farm developers to consider themselves rather than refer to legislation or national guidance.[10]

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[3] Barthelmie, R. J., and L. E. Jensen. "Evaluation of Wind Farm Efficiency and Wind Turbine Wakes at the Nysted Offshore Wind Farm." *Wind Energy* 13, no. 6 (May 25, 2010): 573–86. https://doi.org/10.1002/we.408.

[4] Pryor, S C, T J Shepherd, R J Barthelmie, A N Hahmann, and P Volker. "Wind Farm Wakes Simulated Using WRF." *Journal of Physics: Conference Series* 1256, no. 1 (July 1, 2019): 012025. https://doi.org/10.1088/1742-6596/1256/1/012025.

[5] Lundquist, J. K., K. K. DuVivier, D. Kaffine, and J. M. Tomaszewski. "Costs and Consequences of Wind Turbine Wake Effects Arising from Uncoordinated Wind Energy Development." *Nature Energy* 4, no. 1 (November 26, 2018): 26–34. https://doi.org/10.1038/s41560-018-0281-2.

[6] Finseraas, Eirik, Ignacio Herrera Anchustegui, Etienne Cheynet, Cristian Guillermo Gebhardt, and Joachim Reuder. "Gone with the Wind? Wind Farm-Induced Wakes and Regulatory Gaps." *SSRN Electronic Journal*, 2022. https://doi.org/10.2139/ssrn.4294614.

[7] Finseraas, Eirik, Ignacio Herrera Anchustegui, Etienne Cheynet, Cristian Guillermo Gebhardt, and Joachim Reuder. "Gone with the Wind? Wind Farm-Induced Wakes and Regulatory Gaps." *SSRN Electronic Journal*, 2022. https://doi.org/10.2139/ssrn.4294614.

[8] Horst, Dan van der, and Saskia Vermeylen. "Wind Theft, Spatial Planning and International Relations." *Renewable Energy Law and Policy Review* 1, no. 1 (2010): 67–75. http://www.jstor.org/stable/24324588.

[9] Pryor, Sara C., Tristan J. Shepherd, Patrick J. Volker, Andrea N. Hahmann, and Rebecca J. Barthelmie. "'Wind Theft' from Onshore Wind Turbine Arrays: Sensitivity to Wind Farm Parameterization and Resolution." *Journal of Applied Meteorology and Climatology* 59, no. 1 (January 2020): 153–74. https://doi.org/10.1175/jamc-d-19-0235.1.

[10] Scottish Parliament. "Question Reference: S6W-23719." Written question and answer: S6W-23719 | Scottish Parliament Website, 2023. https://www.parliament.scot/chamber-and-committees/questions-and-answers/question?ref=S6W-23719.

Consideration

Taking all of the above into account, I considered your concern that current practice does not take into account cumulative effects of concurrent applications, and therefore is ineffective at protecting the environment in relation to wildlife, flood risk, and wind theft.

The 2017 Regulations state at Schedule 3 that cumulative effects of consented and built developments must be taken into account in the EIA, but makes no mention of concurrent applications. However, whilst the matter of concurrent applications is not legislated for, as demonstrated by the review of applications that have recently been determined by the ECU, concurrent applications are taken into account when carrying out environmental impact assessments.

Whilst the NatureScot guidance relating to landscape and visual impacts is not directly relevant to the environmental issues you raised, it suggests that there is a general understanding of cumulative impacts in cases where there are multiple developments concurrently going through the application process. There is also guidance specifically for considering the cumulative impact of concurrent applications in relation to birdlife.

Therefore, whilst environmental legislation does not specifically address the matter of concurrent applications, the evidence suggests that in practice these effects are taken into consideration. This is particularly the case in relation to birdlife and flood risk, which are two areas you highlighted.

The issue of wind theft was less clear, as my research did not identify that this is something that is taken into account in the application and consenting process for wind farms.

Whilst there is some limited research confirming farms adjacent to one another can result in decreased power generation, as highlighted above the studies have been in areas that are not directly comparable to the Scottish landscape. There is little evidence that wind theft is an issue in Scotland, or that wind theft is the reason behind wind farms/turbines being built at a larger scale.

The Scottish Government's position is that it is for developers to weigh the costs and benefits in relation to site and configuration. The recent Onshore Wind Sector Deal provides a commitment from the sector that they will cooperate between developers on interconnected planning and environmental considerations for the area. This may include consideration of the issue of wind theft – given the commercial impacts, if wind-theft is having, or is likely to have, a major impact on a farm's efficiency or energy production, developers will be considering this.

Conclusion

I have considered the issues raised in the representation around effectiveness of the law in protecting the environment. My review has concluded that current practices take into account

the cumulative effects of concurrent wind farm applications sufficiently and there is no evidence of environmental failing or harm in this case. On that basis, no further action will be taken by ESS in respect of your representation.

I appreciate you may find this response disappointing, but I hope my explanation reassures you that we have fully considered whether there are any potential systemic issues raised by your representation. If there is anything in this letter you would like to discuss, please do not hesitate to contact me.

Yours sincerely,

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