Hayes McKenzie Partnership Ltd. / Success Story

Acoustic consultancy streamlines noise impact studies using Triton

Hayes McKenzie use Triton for two- to four-week noise surveys essential to the process of permitting wind turbines in the United Kingdom, and in compliance studies on working wind farms.

CUSTOMER PROFILE

Hayes McKenzie Partnership Ltd. is a consultancy practice covering all aspects of acoustics, noise, and vibration. Led by Andy McKenzie and Malcolm Hayes, the firm — with nine consultants working out of offices in England and Wales — have been industry leaders for over 20 years in the field of noise from wind turbine developments, ranging from small-scale single turbines to multi-megawatt sites with hundreds of turbines. As well as providing advice and measurement services to developers, manufacturers and local planning authorities on over 700 sites in the UK and overseas, the practice has been responsible for, or contributed to, a number of government research projects.

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<th>Founded:</th>
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<td>Headquarters:</td>
<td>Salisbury and Machynlleth, United Kingdom</td>
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<td>Employees:</td>
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<td>To learn more:</td>
<td><a href="http://www.hayesmckenzie.co.uk">www.hayesmckenzie.co.uk</a></td>
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Noise studies have been a part of the wind industry in the United Kingdom for decades and are used both to measure the noise near existing wind facilities and to assess the potential impact of proposed facilities. In a predevelopment noise study, an acoustical consultant measures background noise levels at selected residential houses near the proposed site to derive noise limits for the nearest residential dwellings. Predicted noise levels from the proposed wind farm, usually for downwind conditions (wind blowing from the turbines towards the residences), are then compared to the derived noise limits.

Requirements in the United Kingdom

“Noise assessments are mandatory for wind farms and are also a very important part of the process for many smaller sites,” says Sylvia Broneske, senior consultant at Hayes McKenzie. Compared to North America, “It’s more populated here and people are living closer to wind turbine developments.”

The national government policy still refers to guidelines prescribed in 1996 by the Energy Technology Support Unit (etsu) of the UK’s Department of Trade and Industry, known as etsu-r-97. “The UK Institute of Acoustics is currently working on a Good Practice Guide to the application of etsu-r-97. That’s not going to be issued by the government, but it will be a help for acousticians in implementing etsu-r-97 with current best practice,” says Broneske.

“For noise environments which have a low background noise a fixed noise limit is applied, which is 35 to 40 dB LA90 during the daytime hours, and a higher night-time limit, 43 dB LA90. The lower daytime limit is there to protect the people when they’re outside in areas of their property where they are most likely to enjoy their amenity,” says Broneske. “The night-time noise limit allows for attenuation of the noise experienced inside and is therefore higher.”

In addition to the fixed noise limit, for areas with higher background noise, the guidelines allow a margin of 5 dB above the prevailing background noise measured at a neighbouring property.

Ingredients of a Noise Study

For a noise study, the acoustician needs information about wind conditions on the site, data from the turbine manufacturer about the variation of the sound power level with wind speed, and the distance from the neighbours to the turbine. Predicted noise that will be added by the turbines at the wind speeds measured on site will be compared to background noise levels monitored at neighbouring properties.

Typically, Hayes McKenzie’s clients are developers who require a noise study for an environmental impact assessment. Armed with a preliminary layout of the wind farm and a knowledge of the nearest residential properties, the firm makes an initial prediction of the noise levels nearby and uses this prediction to choose representative locations for a background noise study. At the same time as they monitor background noise on these properties, they measure the wind at a location in the middle of the proposed wind farm.

Synchronizing the background noise level with the wind data they have measured, Hayes McKenzie is able to produce plots of the background noise level at each wind speed. This data is used to derive the applicable noise limits. Predicted noise levels based on sound power level provided by turbine manufacturer at those wind speeds are used in the assessment of the noise impact of the proposed wind farm on the properties where the noise study has been conducted.

Improving the Certainty of Wind Measurement

Uncertainty about the wind speed at a site was one reason Hayes McKenzie began using a Triton in its studies rather than relying on 10-meter-high met tower measurements. Broneske says: “Previously it was assumed to be correct to reference wind speeds to measurements at 10 meters height. This caused problems where tall wind turbines with hub heights of 60, 80 meters or higher were planned, because of the extrapolation of hub height wind speeds from the 10 meter height measurements. Using the Triton allows us to relate background (or other) noise to hub height wind speed more reliably than basing it on a derived speed from lower heights. Without using an adjustment for site-specific wind shear, a simple extrapolation from a 10-meter high wind speed measurement may result in a substantial error.”

Hayes McKenzie has owned one Triton for a year and half. Because the firm sometimes had more projects than they could work on with their first Triton, they were able to rent additional Tritons on flexible terms from Dulas, a Triton representative in the UK. The firm is so satisfied with Triton as a standard method of measuring wind that they have purchased a second unit. Broneske says that the Triton provides a much greater certainty about the wind speed profile than short met masts.
Having a standard way of measuring wind speed quickly, and with more certainty, greatly reduces the burden on acoustic specialists and their wind developer clients. “It’s brilliant,” says Hayes McKenzie founding partner Andy McKenzie.

Streamlining the Planning Process
Triton significantly speeds up the planning process. Broneske says: “A 10-meter mast was easy to use because you don’t need planning permission — one person could put it up on his or her own. The uncertainty caused by extrapolation was a problem that wasn’t known to that extent fifteen years back. You need planning permission for higher met masts and that can already be a lengthy process.” In addition to eliminating permitting delays, the Triton has a lower visual impact on the surrounding areas. “Although it’s not normally Hayes McKenzie that gets the feedback, there have been problems with, for example, tall masts being cut down by angry residents and things like that,” says Broneske.

“Triton is easily installed — you just drive there, push it off the trailer, and you’re happy. It’s all much easier than with a tall mast.”
Dipl.-Ing. Sylvia Broneske, MIOA VDI Senior Acoustic Consultant Hayes McKenzie Partnership Ltd.

SkyServe Wind Data Service also helps the firm conduct their studies efficiently, says Broneske. “Data is available online which allows us to see when enough data has been collected for a good noise assessment — that is, all wind directions and the required wind speed range have been covered as well as possible.”

Flexibility and Ease of Use
Being able to offer Triton as part of the noise monitoring service has helped Hayes McKenzie better serve its clients. “An advantage is that it’s flexible, and we offer short-term rental programs tailored to the period the noise survey takes. So the client only has something for the duration of the noise study, and they don’t have anything permanently installed,” says Broneske. Broneske has herself personally installed the Triton on several locations, and also has experience putting up 10 meter masts. “Triton is easily installed — you just drive there, push it off the trailer, and you’re happy. It’s all much easier than with a tall mast. Our new Triton is even easier to install — it stays on its trailer!” she says.

Other Variables
Certainty about the wind speed is just one variable that acoustical consultants must wrestle with. As Hayes McKenzie’s liaison with manufacturers on source sound power level data, Broneske has expertise in deciphering the turbine data and understanding what the real impact will be on surrounding communities. “There is a standard for determining the amount of noise, or sound power level, generated by the turbines, but there is no common approach on what values the manufacturers present or how they warrant the data. We try to treat all the models the same way.” To arrive at a confident estimate of sound power level, Broneske says that the acoustician must take as many turbine test reports as possible from the manufacturer, and then calculate a confidence level to add to the averaged sound power level per wind speed. This provides added assurance that the turbine will not exceed stated sound power levels.

Reducing the Burden on Wind Developers
Given the large number of variables that must be dealt with in a noise study, having a standard way of measuring wind speed quickly with more certainty greatly reduces the burden on acoustic specialists and their wind developer clients. We asked Andy McKenzie, one of Hayes McKenzie’s founding partners, how the company likes their Triton. He said simply: “It’s brilliant.”

Through the combined expertise of Vaisala, a global leader in atmospheric observation, and Second Wind, a global leader in remote sensing technology and data services for the wind energy industry, we offer an integrated suite of wind measurement solutions.