S. & D. Garritt Ltd.

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REPORT

of

SOUND MEASUREMENTS ON EVOCO 10 WIND TURBINE

for

EVOCO ENERGY LTD.,
ST. PEG'S MILL,
THORNHILLS BECK LANE,
BRIGHOUSE,
WEST YORKSHIRE
HD6 4AH.

Date of measurements: 16th October 2009

Date of report: 19th October 2009

1.0 Introduction

Evoco Energy Ltd. commissioned this measurement of sound levels to be taken during normal operation of an Evoco 10 turbine installed at Evoco Energy's Test Site 2. The method of test was essentially informal and was intended to provide preliminary information on sound levels under operating conditions specified by the client rather than conforming to any prescribed test method.

2.0 Sound Measurements

Sound levels were measured outdoors at the Evoco 10 installation at Evoco Energy's Test Site 2 during the morning of 16th October 2009. Measurement positions were used at 1.2m height above ground level at 3m, 25m, 60m and 100m from the base of the turbine tower in the downwind direction. The wind speed was monitored at a position directly upwind a distance between 2 and 4 times the rotor diameter from the base of the turbine tower.

All measurements were taken using Bruel & Kjaer 'Investigator' precision sound analyser type 2260 serial no. 2409281 for which current calibration certificates are held. A full set of sound descriptors and sound frequency spectra were taken for every measurement and are stored on disk for later recall if required. Results are shown below of the time-averaged (L_{eq}) values since these are likely to be the most useful for comparison with other test data. Downloads from the sound level meter are given on the attached sheets showing the one-third octave sound frequency spectra of L_{eq} values in graphical form.

Distance from Turbine Base	**Sound Pressure Level Site Results dB LA_{eq}**
3m	64.9 dBA
25m	58.7 dBA
60m	53.9 dBA
100m	48.4 dBA
Ambient / background with turbine stationary	45.2 dBA

The average wind speed for the duration of the tests was measured at 5.0 m/s with a maximum of 8.1 m/s.

3.0 **Summary of Results**

After subtracting the LA_{eq} sound levels caused by sources other than the turbine, which were mainly from distant road traffic noise, the overall sound levels to the nearest decibel from the turbine alone were:

Distance from Turbine Base	**Sound Pressure Level Turbine Alone dB LA_{eq}**
3m	65 dBA
25m	59 dBA
60m	53 dBA
100m	46 dBA

The sound emitted by the turbine audibly consisted of contributions from the resonance of the tower at a low-mid frequency and from the blades at high frequencies. Comparison of the results on the attached frequency spectra against the background sound levels quantifies these as being:

Tower resonance

Occurred at 125 & 160 Hz:

160 Hz was 24 dB above background at 3m
125 Hz was 14 dB above background at 25m
160 Hz was 11 dB above background at 60m
125 Hz was 9 dB above background at 100m

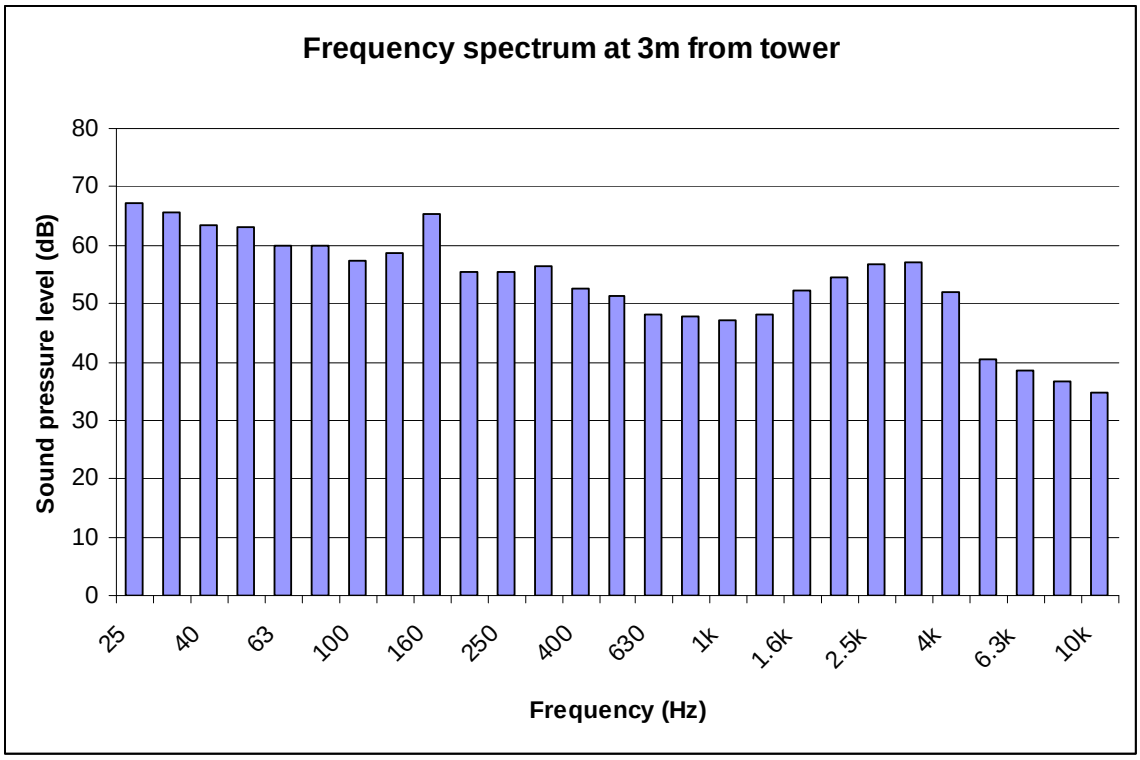
Sound frequency of tower noise appeared to vary with rotor speed.

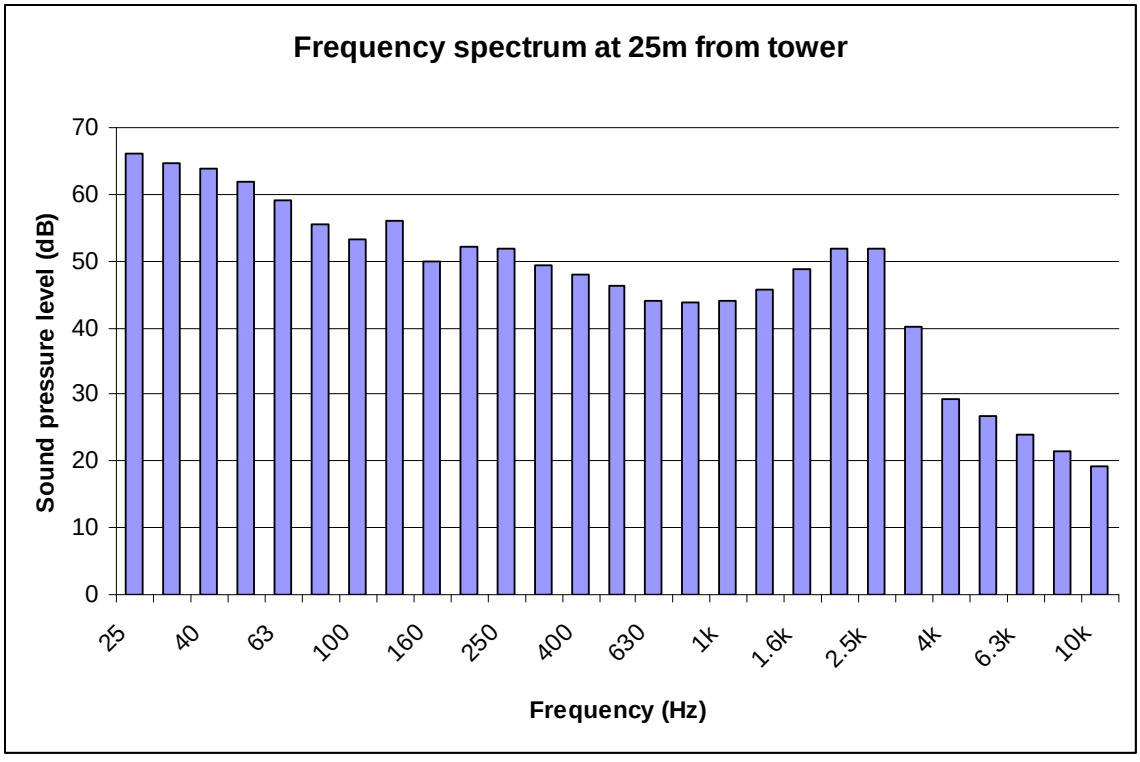
Blade Noise

Occurred at 1.6 to 4 kHz. At these frequencies blade noise was:

up to 32 dB above background at 3m
up to 25 dB above background at 25m
up to 19 dB above background at 60m
up to 14 dB above background at 100m

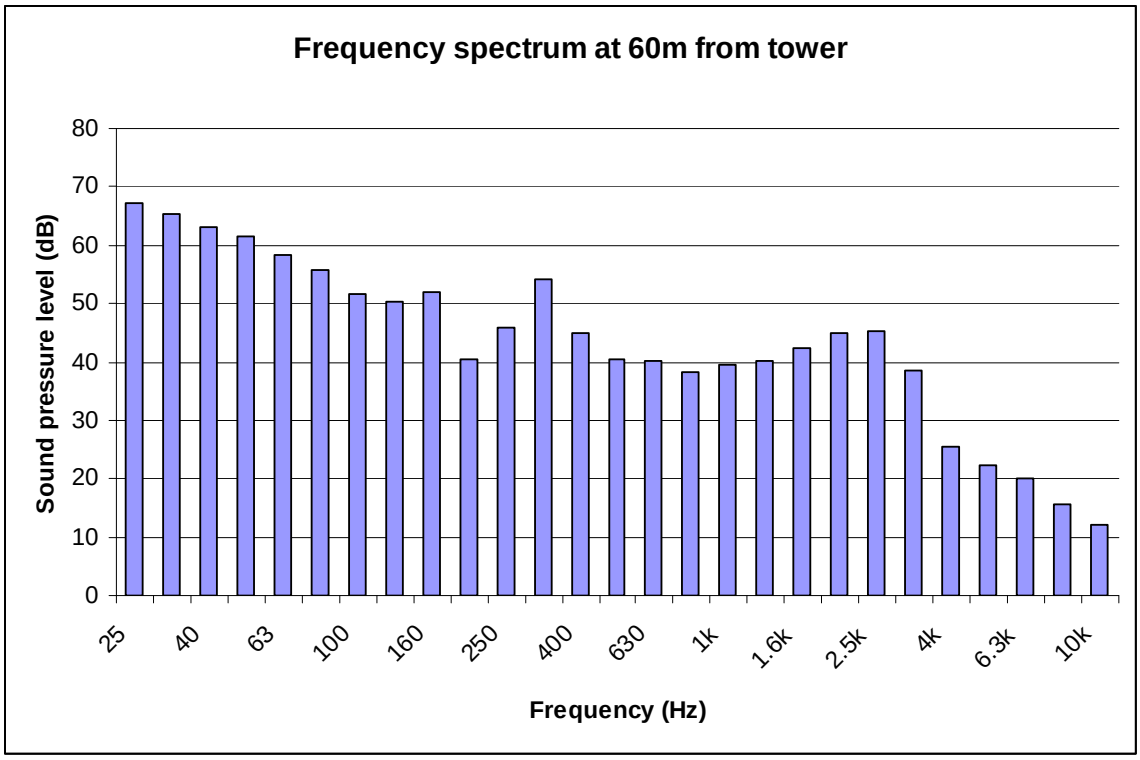
Evoco 10 Turbine

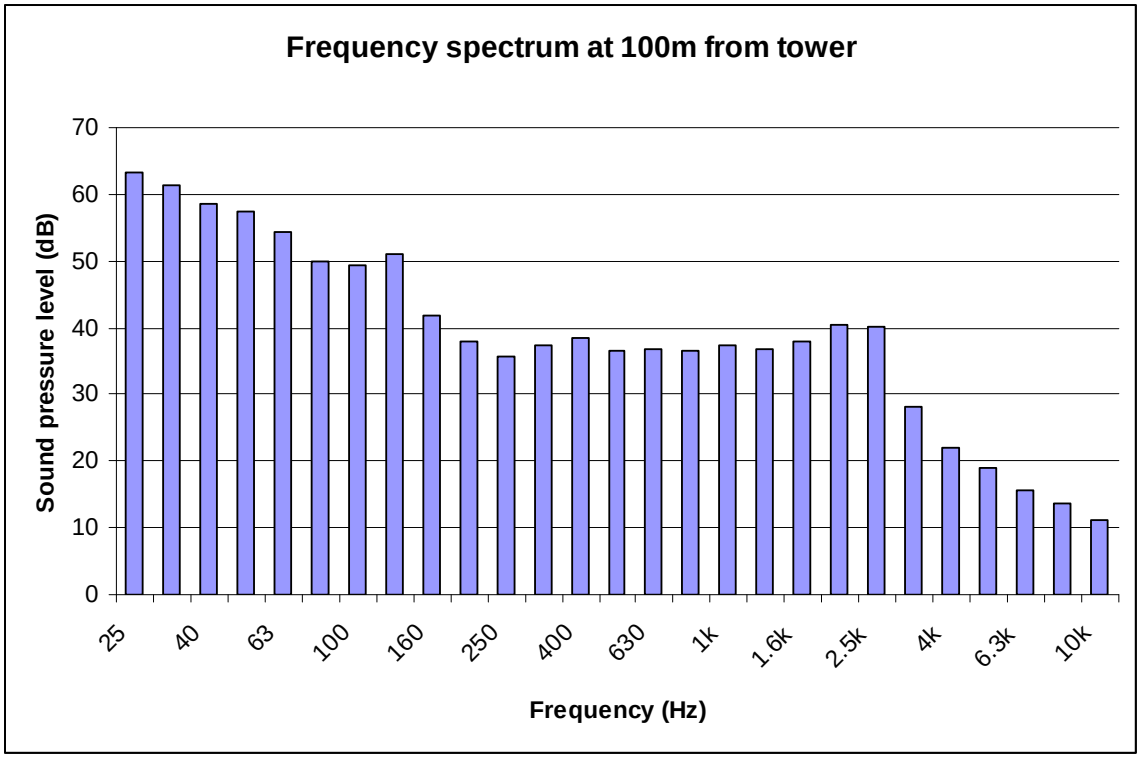




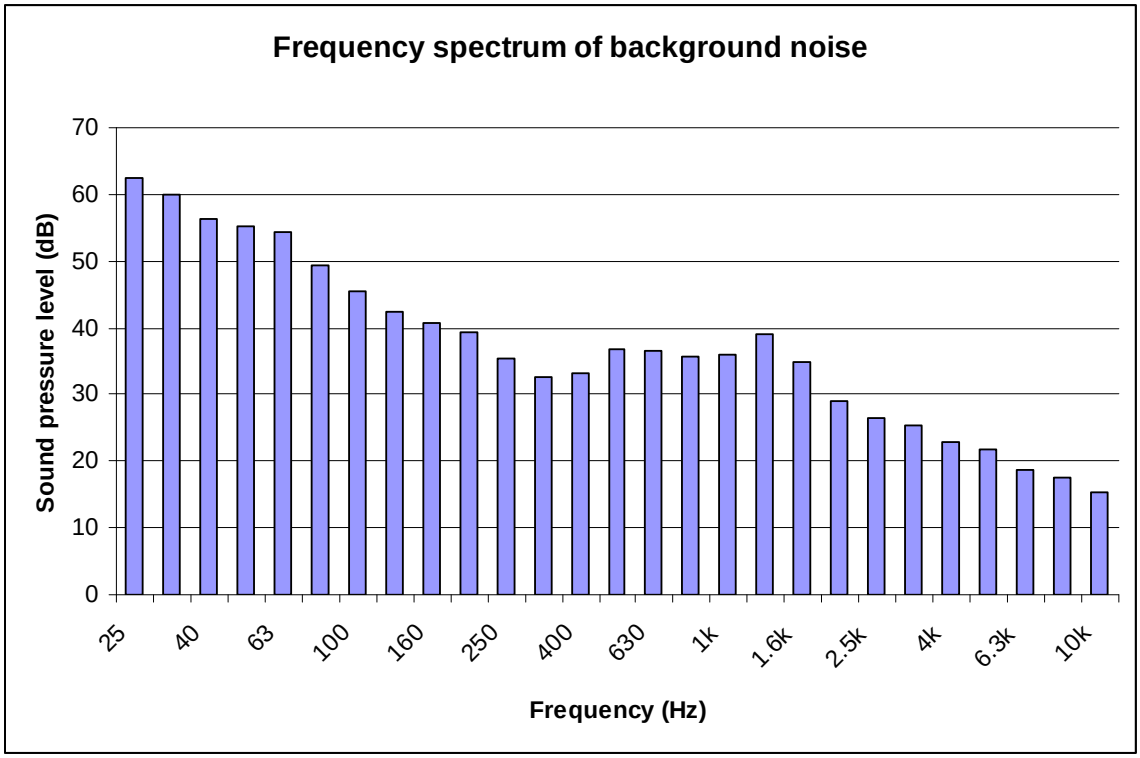
All values dB linear, LL_{eq}. Average wind speed 5.0m/s.

Evoco 10 Turbine





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