

What might an Alternative to ETSU-R-97 Look Like?



Andy McKenzie & Andrew Bullmore

Hayes McKenzie —
Consultants in Acoustics



Written Paper – IoA Acoustics 2015

The screenshot displays the website for Hayes McKenzie Consultants in Acoustics. The top navigation bar includes links for About, Services, Sectors, Clients, News, Publications, and Contact. A secondary navigation bar highlights 'Our Published Papers' among other options like Latest, Our Presentations, Research, and Noise Guidance. The main content area is titled 'Our Published Papers' and lists three articles:

- What Would an Alternative to ETSU-R-97 Look Like?**
McKenzie A and Bullmore B
Acoustics 2015
ETSU-R-97 is a document that has remained unchanged since it was first published nearly two decades ago, despite suffering from heavy criticism over those years. McKenzie and Bullmore propose what an alternative procedure to the assessment and rating of wind farm noise in the UK might be, if ETSU-R-97 were to be superseded.
Posted 2015 [Download](#) ↓
- Application of AM Metrics - Case Studies**
Level T
Acoustics 2015
This paper gives some examples of a potential amplitude modulation (AM) assessment using the three metrics proposed in the IOA AM discussion document. Results are presented, discussing the analysis of noise measurements undertaken at a residential receptor location near a wind turbine site where operational and background noise periods were measured. Some of the issues involved are discussed. The objective of these metrics is a consistent quantification of the modulating character of the wind turbine related component of the noise, which can be implemented in a practical way.
Posted 2015 [Download](#) ↓
- Wind Turbine Noise Measurements - How are results influenced by different methods of deriving wind speed?**
Broneske S
Internoise 2014
With the increasing number of operational wind farms/turbines, the requirement for noise measurements required to demonstrate compliance with planning conditions is increasing as well. The British ETSU-R-97 noise limits are often set relative to measured or standardised 10 m height wind speeds and therefore the assessment of noise from wind turbines requires simultaneous noise and wind speed/direction measurements. For financial reasons, smaller and single turbine sites are often not equipped with a meteorological mast. If no independent hub height wind measurements are available, wind speed is either taken from nacelle anemometers or derived from power.

A bit of history.....

Before ETSU-R-97 – BS4142, WHO, Danish Std

The DTi/ETSU-R-97 Noise Working Group

3 EHOs, 2 Consultants, 5 Developers, 1 Lawyer,
NPL Rep, ETSU Rep

'The report was drafted in the light of the best information available at the time....The NWG therefore suggest this report and its recommendations are reviewed in two years time....'

Adopted into PPS22 (now NPPG), PAN45 (now PAN1/2011 + On Line Guidance), TAN8 (Annex), PPS18 (Companion Guide) and EN-3.

Structure of ETSU Limits

3 Important Concepts

W/S dependent 'Prevailing B/G Noise'

Lower limiting values

Quiet day-time hours

Controversy

Lower limiting values (particularly at night)

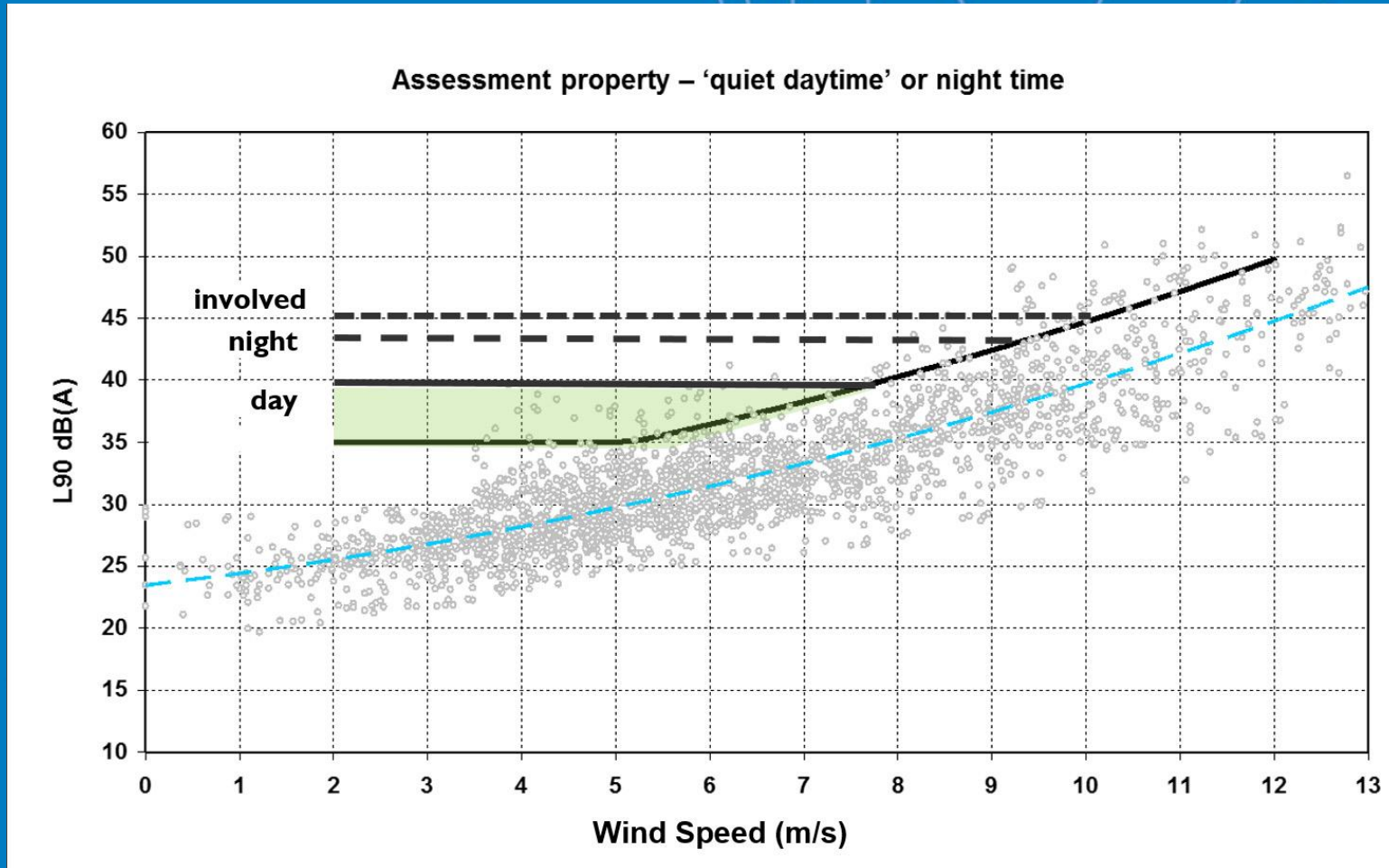
Use of 'best fit' curves

AM

Spectrum (LF)

Wind shear (later)

Structure of ETSU Limits



What has changed?

Size of turbines / wind farms

Separation distances

Evolution from rural areas

Cumulative issues

Availability of 'curtailment'

Planning policy

Acoustics guidance

Experience & understanding



Prevailing BG Noise – Largest Factor

Precise measurement location

Trees/foliage, other sources, sheltering/shielding

Most conservative position may be different at different W/S

Seasonal factors

Leaf cover, water courses, holiday r/t, agricultural, boilers

Wind speed measurement location

Use of 'actual' 10m wind, assessment of 'other' sites

Choice of 'polynomial'

Treatment of 'outliers'



Alternative Approaches to Assessment

Maximum Noise Level Approach

Alternative 1 – Fixed level unrelated to existing noise level

- Common approach internationally for many sources of noise
- Used in UK to an extent for construction and minerals
- Slightly at odds with EIA regulations but under review in RoI
- Simple but what is permissible level?!
- Would need upper wind speed limit for stall-regulated WTs
- Zoning?
- Compliance meas.??



Alternative Approaches to Assessment

Maximum Noise Level Approach

Alternative 2 – Fixed Level with adjustment for non-wind BG

- Alt 1 may be too restrictive with significant non-wind BG
- What would 'cut-off' wind speed for b/g be (5 m/s?)
- What would adjustment (margin above BG) be?
- How would 'BG' be determined (lowest, average, avg-SD)?
- BG measurement periods (day, evening, night, hourly)?



Alternative Approaches to Assessment

Noise Dose Approach

Alternative 1 – Noise Dose (No BL measurements reqd.)

- Follows from WHO night noise approach. Use L_{den} ?
- Also used in Netherlands (NL don't include WD effects)
- What would 'acceptable' dose be? Or levels of significance?
- Would need a year of wind records to calculate
- Impossible to demonstrate compliance
- Possibly better to rely on source noise verification



Alternative Approaches to Assessment

Noise Dose Approach

Alternative 2 – Noise Dose Change (requires BL meas.)

- Ticks EIA boxes very firmly
- Requires ETSU type BL/BG measurements
 - Would need to include direction factors?
 - Individual results less critical than for ETSU type assessment
- What is acceptable noise dose change? Or level of sig?
- Would also need a year of wind records to calculate
- Similarly impossible to demonstrate compliance
- Existing WFs and 'creeping background' effect
- Maybe identify change but only up to certain level

Alternative Approaches to Assessment

Variations on ETSU-R-97 Approach

Alternative 1 – Assumed BG noise curve (no BG meas. reqd.)

- Approach used in Ontario, Canada. Also Perth & Kinross
- Assumed BG curve could vary depending on terrain
 - Would need clear criteria / parameters for curve setting
 - Could result in extensive debate as to most appropriate
- Could use similar limits to ETSU
 - with need further consideration of night-time LLV
 - and day-time LLV within range
- Still based on pass/fail criterion
 - 'Degrees of impact' could be built in
 - Would need justification
- Allows 'compliance' measurements

Alternative Approaches to Assessment

Variations on ETSU-R-97 Approach

Alternative 2 – Avg BG noise curve (BG meas. reqd.)

- Approach used or agreed on occasion
- Removes location-specific ‘anomalies’
- Requires appropriate agreement with planning authority
- Would also need to review limits (as Alt 1)
- More ‘robust’ than Alternative 1
- Still subject to pass/fail criterion
- Degrees of impact could be included (as Alt 1)
- Also allows compliance measurements

Alternative Approaches to Assessment

Variations on ETSU-R-97 Approach

Alternative 3 – Stick with ETSU

- With existing lower limiting values
- With new lower limiting values
- With other modifications



Conclusions

Need for review

Balance

Changes

Size, areas, technology, planning, cumulative, understanding

Consideration of level of impact

Utility of relative-to-BG approach

Requirement for community compliance meas.

Thanks to my co-author Andrew Bullmore

Workshop later.....!

Thanks for listening



[hayesmckenzie.co.uk/publications/our-published-papers](https://www.hayesmckenzie.co.uk/publications/our-published-papers)

Hayes McKenzie —
Consultants in Acoustics

