The French approach to noise assessment

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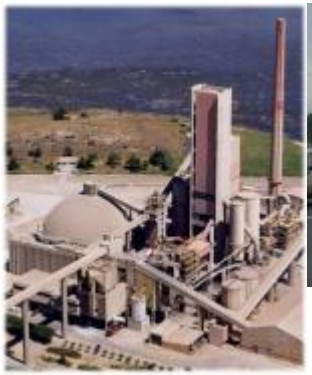
GAMBA Company

- French company specialising in engineering, research development and training,
- 50 employees, working in all domains of acoustics relating to buildings, environment and industry, and of course in wind farms,
- 5 locations : Toulouse, Paris, Marseille, Angers, Rodez

What we will talking about ...

- Windfarm noise : a specific approach
- French regulation and standard
- Noise impact studies
- Noise measurement control

A specific approach



OUTDOOR PROPAGATION

- distance
- atmospheric absorption
- meteorological conditions
- relief effect

BACKGROUND NOISE

- local noise emission
- faraway noise emission

Regulation :
Ambiant noise –
Background noise

The new french regulation : ***Installations classified for the environmental protection (ICPE)*** **- since august 2011**

Limit values

To windfarm neighbours, there's no infringement when :

- **either** ambiant noise < 35 dB(A) ,
- **or** for ambiant noise > 35 dB(A), when the emergence no exceeds :

3 dB(A) for night-time period (10 PM to 7 AM)

5 dB(A) for day-time period (10 PM to 7 AM)

The new french regulation : ***Installations classified for the environmental protection (ICPE)* - since august 2011**

Limit values

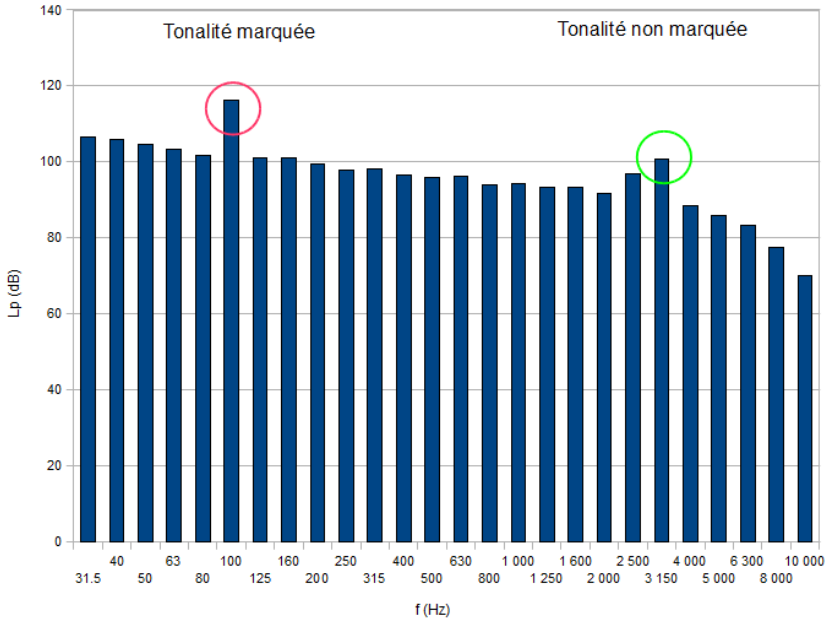
Near the windturbines (d=1.2(h_{hub}+r))*, there's no infringement when maximum ambiant noise no exceeds :

- 60 dB(A) for night-time period (10 PM to 7 AM)
- 70 dB(A) for day-time period (10 PM to 7 AM)

The new french regulation : ***Installations classified for the environmental protection (ICPE)*** - since august 2011

Tonality criteria

To the neighbours, tonality duration should not exceed 30% of night-time or day-time period



Third octave band	from 50 to 315 Hz	from 315 to 8 KHz
emergence	10 dB	5 dB

French standard : NF S 31-114

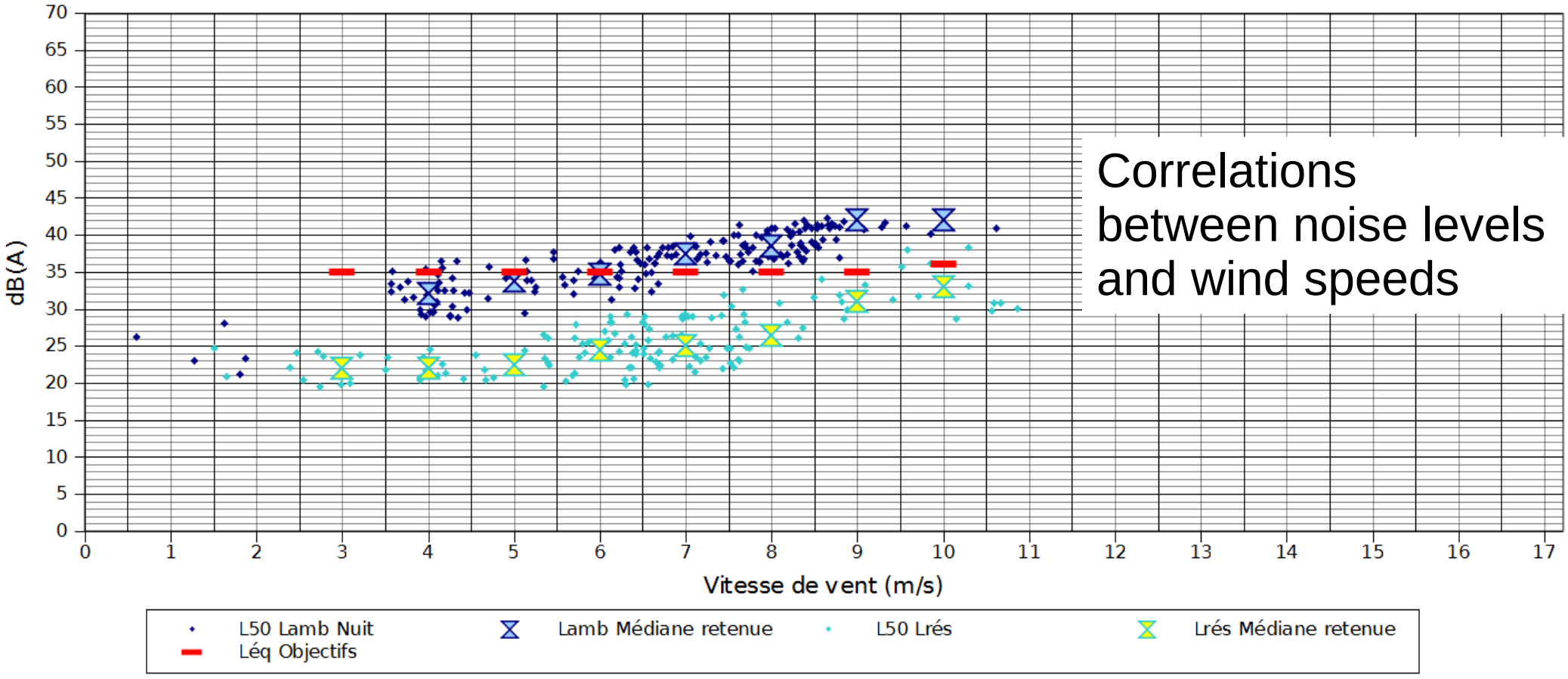
Still in project since 2004 … but almost finished

The workshop consists of :

- Wind turbine developers
- Acoustic engineers
- State representatives

French standard : NF S 31-114

- Specific standard only for windturbine noise measurements



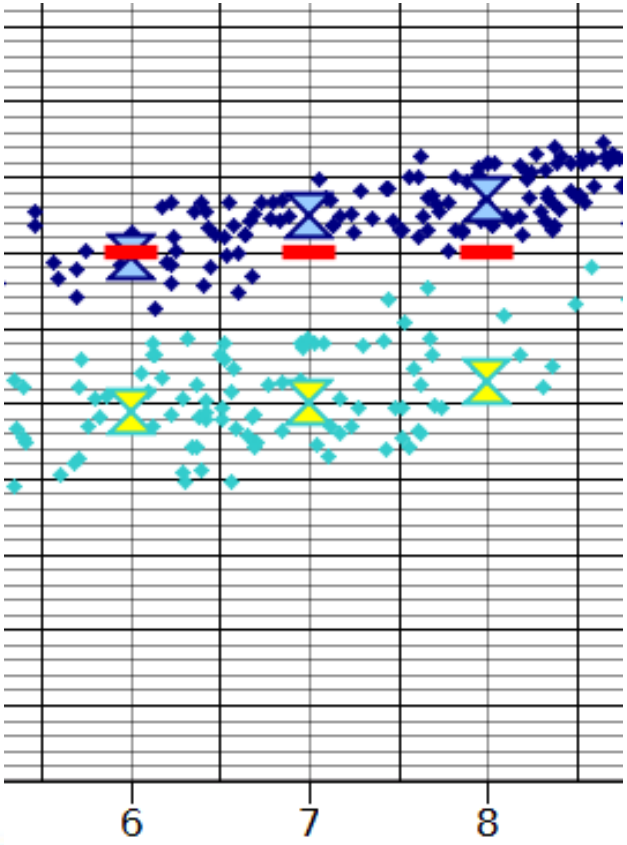
Correlations between noise levels and wind speeds

French standard : NF S 31-114

Analyzes for references classes Cr : set of conditions held to characterize a homogeneous acoustic situation and to determine the neighbourhood noise exposure, in a representative way

- Day, night, evening, end of night
- Seasons
- Wind direction
- Specific human activities (harvests, farming activities, trafic road, ...)
- ...

French standard : NF S 31-114



- Statistical analyzes :

Selected values for each integer wind speed : noise samples median and average wind speed samples

- Noise indicator : L50, 10mn averaged
- Wind speed values : 10mn averaged and standardized according to IEC 61400-11
- At least, 10 values for each integer windspeed to valid a median value

French standard : NF S 31-114

Displays calculation rules for uncertainties : Type A (samples) and type B (metrology)

Uncertainties taking into account in the regulatory analyzes

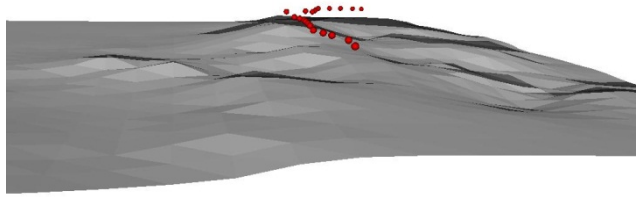
Impact studies methodology

Measurement operations

- between1 and 2 weeks
- among neighbours, outdoor
- for specific wind directions (main directions)

Impact studies methodology

Noise prediction



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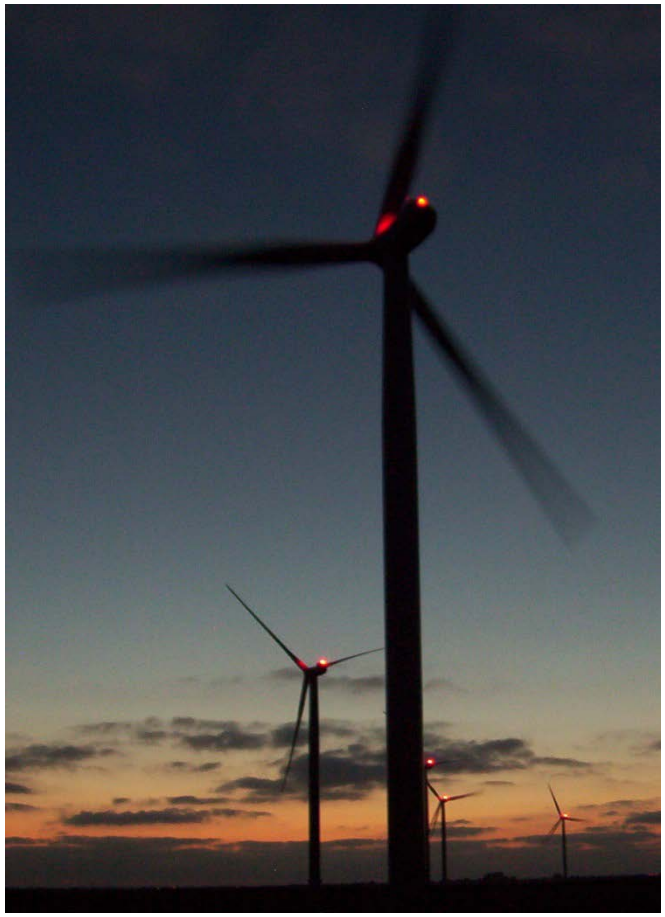
- Topography
- Atmospheric absorption
- Wind and temperature gradients
- Wind direction
- Ground effects

Impact studies methodology

Reduction modalities



For a wind direction and a reference classe

	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s
WTG1						
WTG2						
WTG3						
WTG4						
WTG5						

standard mode
reduced mode
stop

Noise control measurements

Measurement proceedings

- According to NFS 31 114 standard
- Stop and start alternation every 1 or 2 hours
- Duration campaign : 7 to 10 days
- Cost of production loss

Noise control measurements

Feedback : comparison of the noise prediction for the wind farm with the Control measurements

- Background noise : less than +/- 3 dB(A) between initial studies and after control measurements (3 to 5 years)

- Noise prediction : generaly +/- 3 dB(A) between measure and calculation for same weather conditions

Conclusion

- French regulation needs a specific approach
- New standard NFS 31 114 aims to bring a response
- Long time measurements depending on meteorological conditions are a good way to noise impact assessment

Thank you for your attention !