

# Year Round Monitoring of Low Frequency Noise in Harsh Climate

*Antti Leskinen*

*APL Systems Oy*

*Roy Hjort*

*APL Systems Oy*

*Kari Saine*

*Wärtsilä Finland Oy*

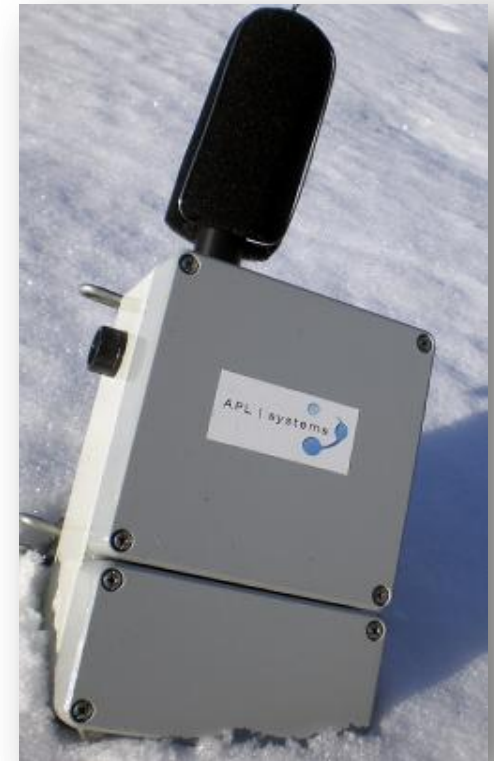
*Zengxin Gao*

*Wärtsilä Finland Oy*

APL Systems provides:

- Long term noise monitoring services
- On-line full –spectrum -monitoring services
- Reports

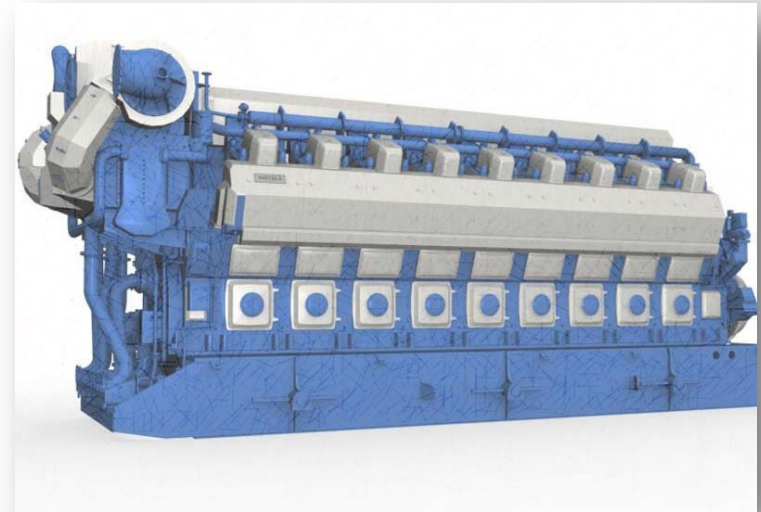
We have worked with private and public industries for years, giving us a very good perspective of what our clients need.



# Diesel engines and wind turbines?

## Mutual Challenges:

- Low frequency Noise:
  - Environmental issues
  - Fault detection →
- Need for long term monitoring



## Mutual solution:

- Aures technology developed in cooperation with Wärtsilä by APL Systems
- Continuous measurements
- Enables quick reactions to noise events

# A-weighting vs. Linear values

## A-weighting

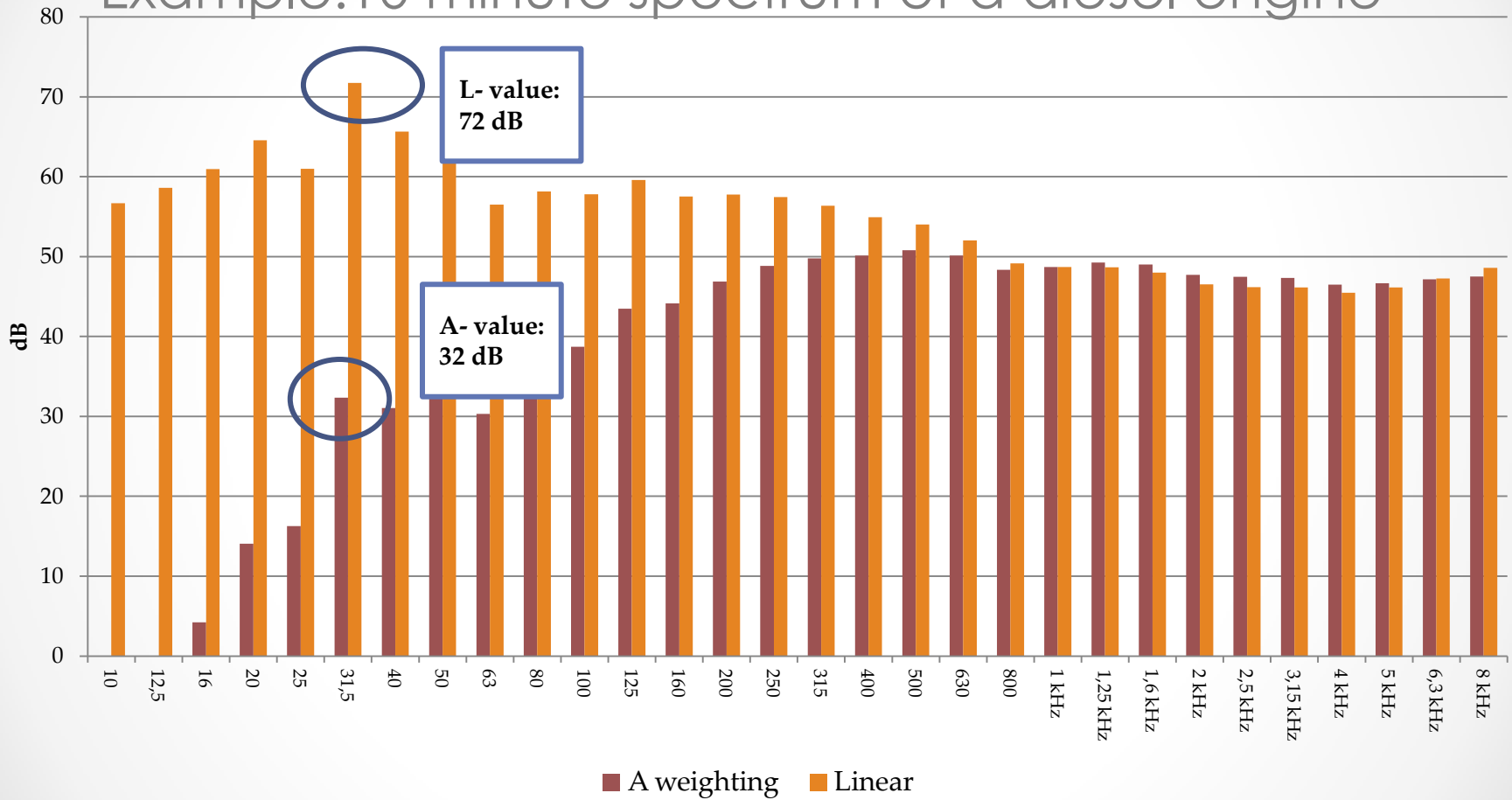
- the most commonly used curve in the measurement of sound pressure levels
- widely adopted for environmental noise measurement
- standard in many sound level meters
- cuts out low frequencies

## Linear values

- no curve applied to measurements
- also known as Z- or ZERO frequency-weighting
- low frequencies represented as they were measured
- **Key factor in finding out what is really going on in the lower frequencies**
  - Wind park operation
  - Surroundings of the wind park

# A-weighting vs. Linear values

Example: 10 minute spectrum of a diesel engine



# LFN : Breaking Down the Numbers

## Number of warnings (no action) at A5 in 2013

Trigger	A5
P1 1/3 oct	1285
<b>P3 Leq(A)</b>	<b>78</b>
P3 1/3 oct	245
P10 Leq(A)	24
P10 1/3 oct	45
Seagulls*	514
Wind**	269
<b>Sum</b>	<b>2460</b>

\* Trigger set at 16 Hz band to notify of wind

\*\* Seagull catcher set at 2,5kHz band

## Number of alarms (action required) at A5 in 2013

Trigger	A5
P1 1/3 oct	108
<b>P3 Leq(A)</b>	<b>6</b>
P3 1/3 oct	20
P10 Leq(A)	1
P10 1/3 oct	3
<b>Sum</b>	<b>138</b>

# Aures' Benefits to Wind Parks (1/2)

## Feature

- **Noise level monitoring**
  - Measurement point situated e.g. at a near by resident's yard
  - Monthly reports
- **Fault detection**

## Benefits

- Constant readiness (data available 24/7/365) to communicate with different stakeholders including neighbours, wind park developers, investors, public authorities
- Sound data (A-level and linear) easily and quickly available
- Detailed data over long period
- 1/3 octave bands
- Narrow band analysis available for fault detection

# Aures' Benefits to Wind Parks (2/2)

## Feature

- Automated alerts



## Benefit

- Quick reaction to changes in noise levels
- Optimization of production
  - turbine production taking into account:
    - wind speed
    - wind direction
    - time of day
    - Etc.





*Thank You!*

*Tack !*

*Kiitos !*

*Tak !*

*Takk !*

**APL Systems Oy**

**[www.apl.fi](http://www.apl.fi)**

**[antti.leskinen@apl.fi](mailto:antti.leskinen@apl.fi)**

**+358-400-544 917**

**See us in stand 18**