The Pros and Cons of Community Noise Equivalent Level (CNEL)

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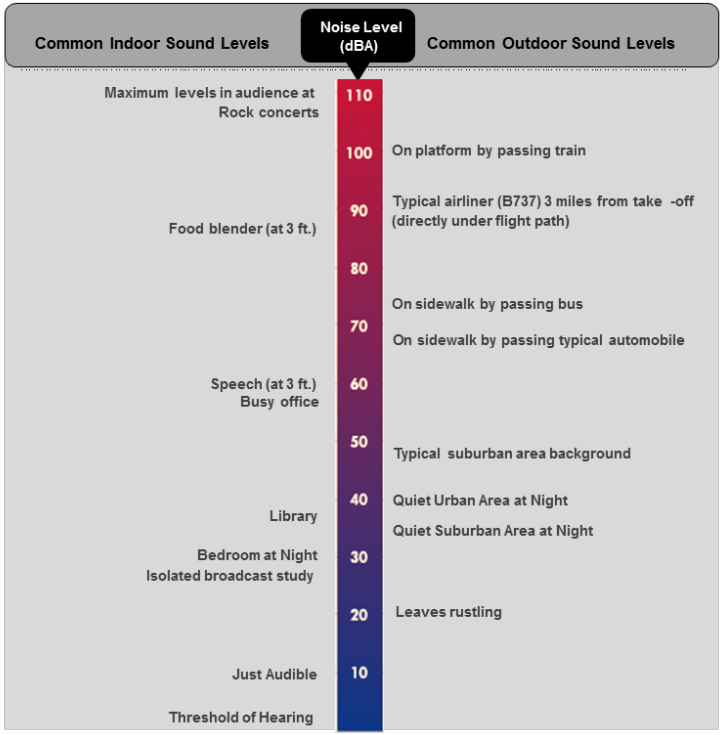
Cons of CNEL

- Not a level you hear!
- Complicated.

  $= \langle SEL \rangle + 10 \times \log_{10}(N) - 10 \times \log_{10}(86400)$

- An “average”?
  - Based on average daily events, runway utilization, track utilization, etc.



Pros of CNEL

- Accounts for the way our ears hear
  - A-weighting
- Is based on measured single events (even the modeling!)
- Accounts for when events occur
  - Evening and nighttime penalties
- Accounts for the numbers of events
  - 3 dB per doubling/halving
- Accounts for our cumulative exposure during a 24-hour period
- Does not contain the word ‘average’ in its name
- Simpler than the metrics it replaced – CNR, NEF
- And....

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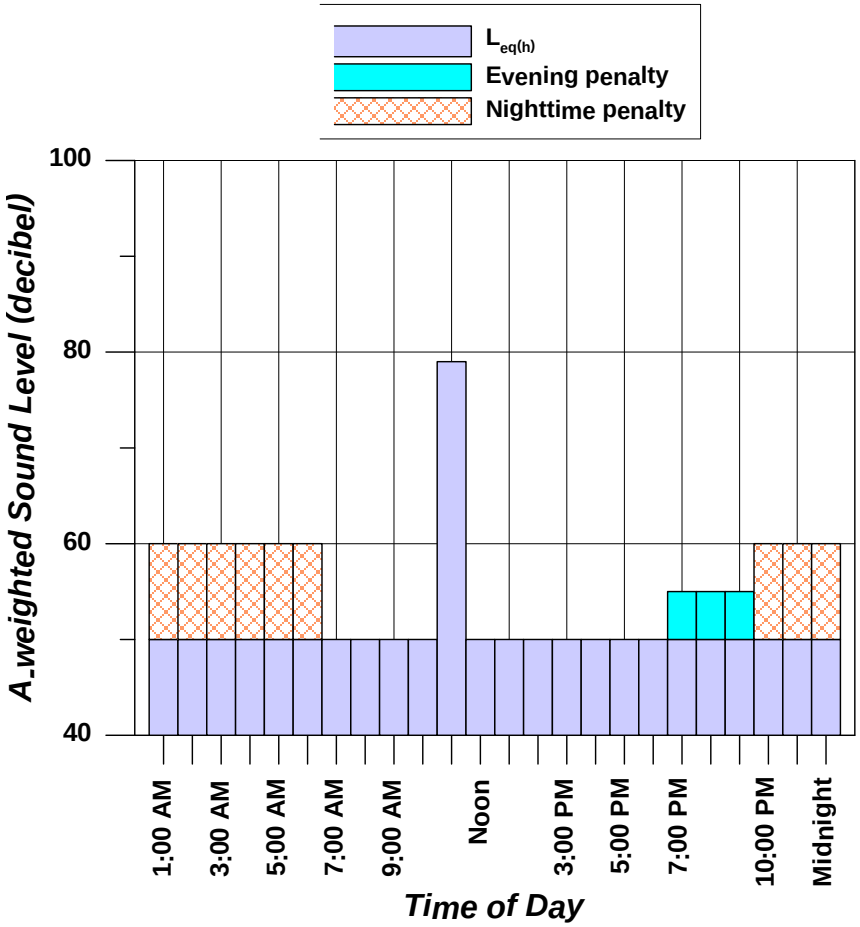
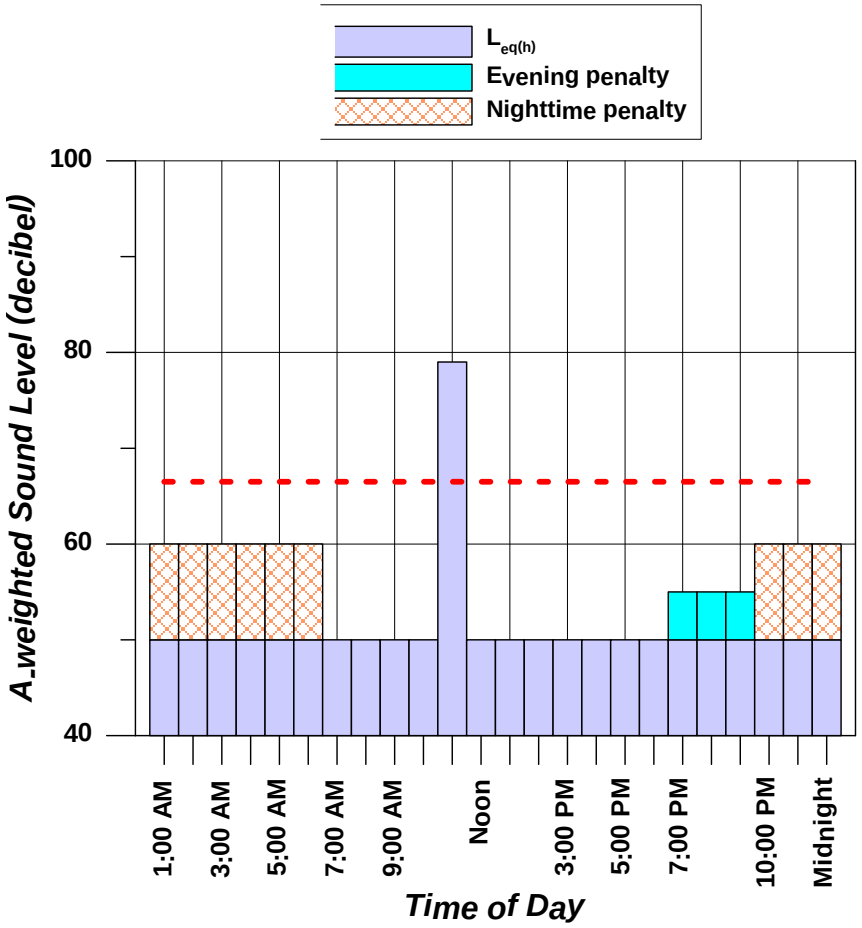
Hypothetical Time History

- What do you think is the CNEL of this?

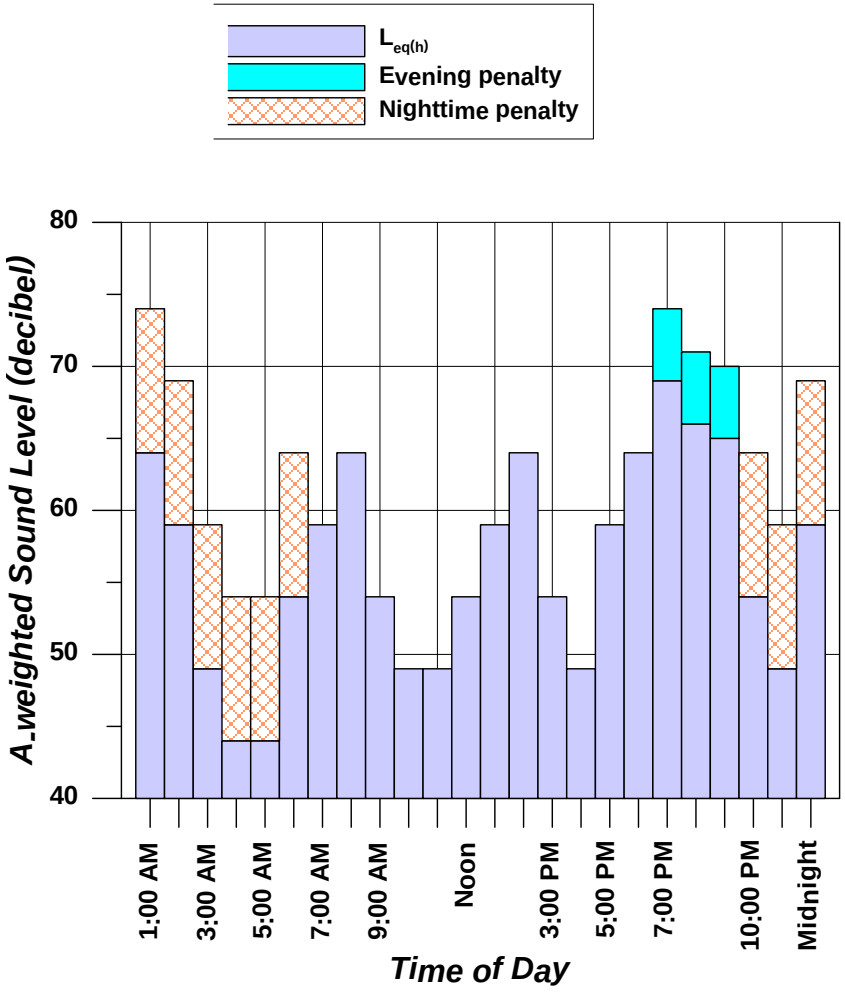


66.5 dB CNEL!

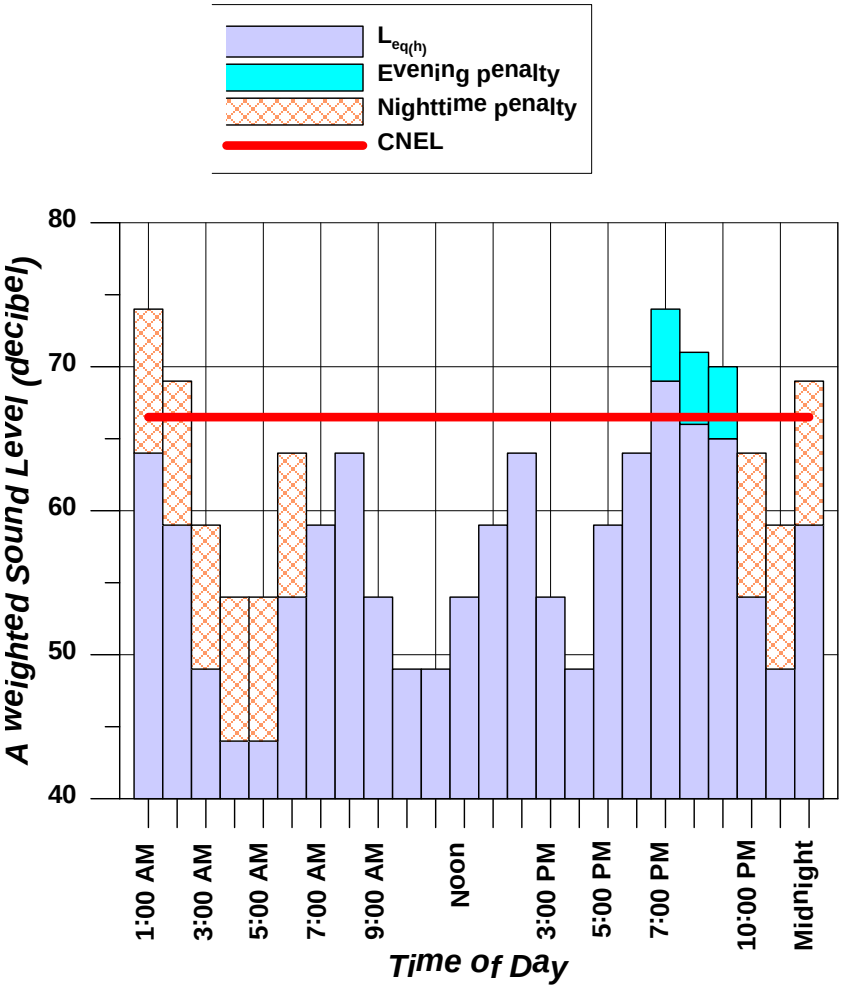

$L_{eq(h)}$
Evening penalty
Nighttime penalty
100
80
60
40
A_weighted Sound Level (decibel)
1:00 AM
3:00 AM
5:00 AM
7:00 AM
9:00 AM
Noon
3:00 PM
5:00 PM
7:00 PM
10:00 PM
Midnight
Time of Day

More accurate time history

- What do you think is the CNEL of this?

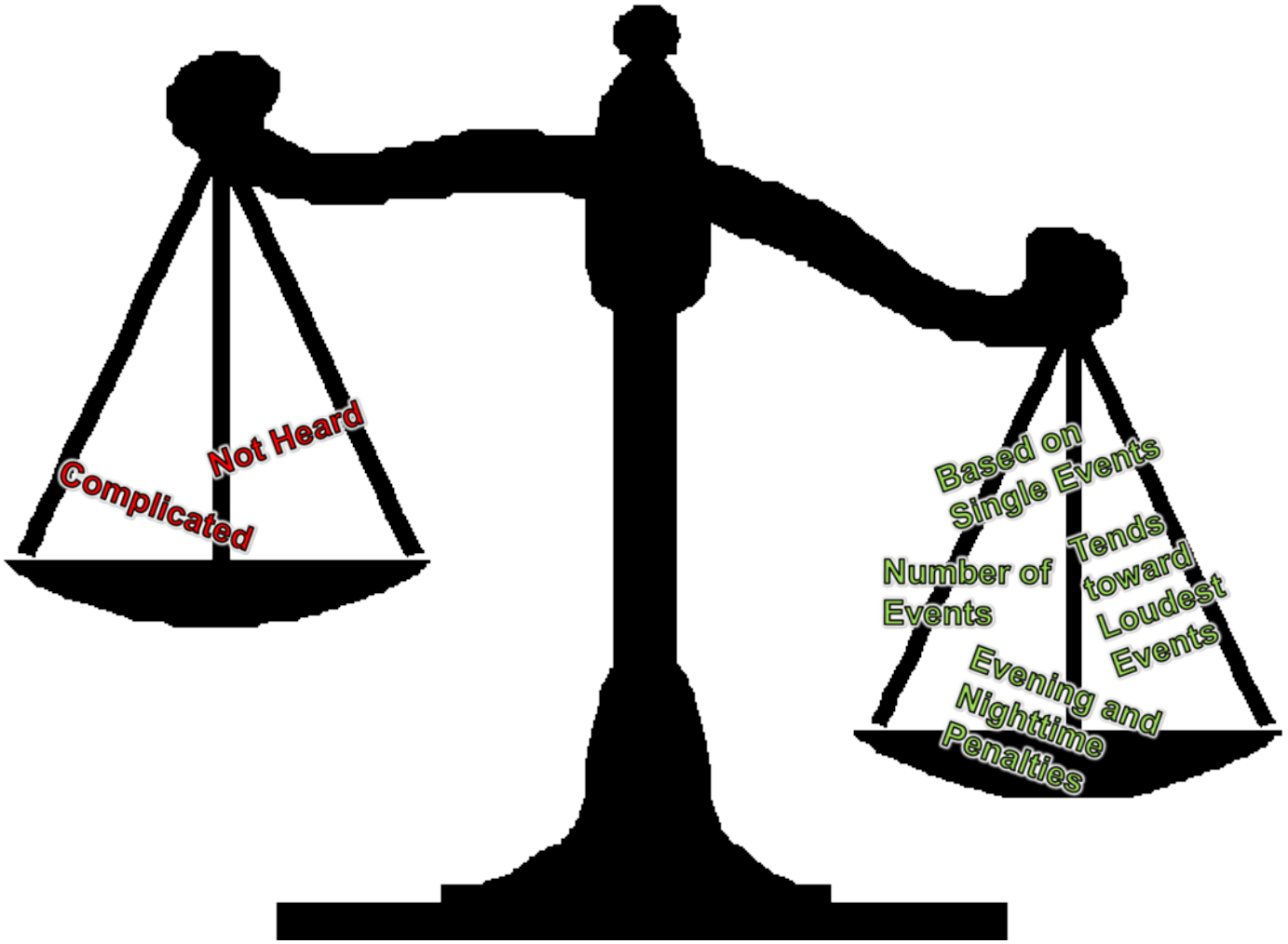


66 dB CNEL



- CNEL tends toward the 'loudest' single events (thanks to the logarithmic math)

Summary


Not Heard
Complicated
Based on Single Events
Number of Events
Tends toward Loudest Events
Evening and Nighttime Penalties