Sound Permitting for Small-Scale Wind Projects
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Importance of Sound Issues

- Vary from project to project
- Can have significant effect on project planning
- Require study, regardless of turbine size
- If unaddressed, can lead to legal action
**Typical Decibel Sound Levels**

- **Quiet Rural Neighborhood** - 40 dBA
- **Suburban Neighborhood** - 50 dBA
- **Noisy Highway** - 65 dBA at 50 feet
- **Construction equipment** - 80 dBA at 50 feet
When are wind turbines annoying?

- Perception varies by person – usually 35-50 dBA
- Varies according to background; more noticeable with quiet background
- Generally more annoying than steady sound, due to time-varying character
State Noise Regulations

- NH, RI, PA – none
- Maine – 50 dBA and 45 dBA in quiet areas
- Connecticut – 45 dBA residential, 55 commercial
- New Jersey – Octave Band (50 dBA total)
- New York – SEQR guideline Leq +6 dBA
- Vermont – Act 250 guideline 55 Lmax
Local Noise Regulations

- Vary from municipality to municipality; often none in place
- Specific sound threshold or increase
- Local board uncertainty on procedures
- Can change during permitting
Factors Affecting Wind Turbine Sound Levels

- Equipment power and age
- Distance to receptors
- Ground and terrain conditions
- Wind and meteorological conditions
Distance Attenuation:

-6 dB for every distance doubling
Turbine Sound Level
Screening Distances

- **Beyond 1000 feet** – usually not a problem

- **500 - 1000 feet** – may have problems, depending on turbine size/location

- **200 – 500 feet** – usually a problem, except for small turbines

- **Under 200 feet** – almost always a problem
Computer Sound Level Modeling

- Estimation of sound levels from future operations; worst-case analysis (downwind, blowing 8 m/sec)

- Incorporate measured turbine sound and wind operating conditions

- Terrain, ground effects included

- Can estimate effects of potential mitigation measures
Sound Measurements

- **Short term** - few nearby residences/property lines
- **Long term** one – three days under correct wind conditions
- **Affected by seasons and weather conditions**
On Site Wind Monitoring

Important for determining right sound monitoring conditions
Sound Compliance Permitting Study: Scituate, MA

- Two potential turbine locations on site
- Three turbine makes examined: which are in compliance?
- Background established during times with appropriate wind levels, snow off ground; one residence long term, other locations monitored
- Massachusetts limit: 10 dBA over background
- Local turbine sound limits enacted during program-changed to match MA DEP regulations
Typical Background Sound Levels

3 Day Period Sound Levels and Wind Speeds at Scituate, MA
Wind Turbine Sound Modeling Results
Sound Mitigation Measures

- Moving turbine locations
- Specifying quieter equipment
- Installing double-paned windows
- Give abutters power from turbines
- Reduce number of turbines
Sound Level Impact Implications

- *Project permitting delays/increase cost*
- *Legal action/settlements-can be expensive!*
- *Delay/halt future projects*
Thank You!

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