



Massachusetts Association of Health Boards

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To: DEP, BFPR, and DOER;

These comments are submitted by the Massachusetts Association of Health Boards (MAHB). MAHB is a non-profit membership association that provides legal education and technical assistance to the 351 local boards of health across the Commonwealth. Boards of health in Massachusetts have broad legal authority to protect the health, safety and welfare of Massachusetts' residents. This legal authority has been upheld consistently by the Massachusetts Supreme Judicial Court.

The following comments are provided, not only to protect the health of abutting and nearby neighbors, but also to prevent tremendous capital waste and prevent unwarranted deforestation by developers, and to provide educational background to the drafters of the guidance document.

1. Authority of Local Boards of Health in Massachusetts

G.L. c. 111, §§ 143 – 150 gives boards of health the legal authority to regulate noisome trades. A noisome trade is defined as a “trade or employment which may result in a nuisance or be harmful to the inhabitants, injurious to their estates, (or) dangerous to the public health, or may be attended by noisome and injurious odors . . .” G.L. c. 111, § 143. It is prudent for a developer to understand the legal authority of a board of health to determine if a proposed new operation would result such a noisome trade before clearing acres of land, purchasing hundreds of very costly battery units preparing a site.

A. Noisome Trades

Under Massachusetts law, because BESS facilities may result in a nuisance, be harmful to the inhabitants, injurious to their estates, and/or dangerous to public health, a local board of

health must be a part of the process from the outset when considering a proposal to allow the siting of such a facility. Unfortunately, many boards of health and their staff, and many city and town managers, selectboards/city councils are unaware of the role that the board of health plays in siting facilities that may appear promising but turn out to be the basis of nuisance and/or noisome trade complaints once they are in operation.

No activity which may constitute a noisome trade should proceed unless the board of health, after a public hearing, has assigned a location for such facility. G.L. c. 111, § 143. These location assignments must be entered into the city or town records and may be revoked or amended with conditions when the board of health thinks it is proper to do so. *Id.*

Maintaining and operating a BESS facility, generates constant 24/7 sound, and presents a risk of toxic exposure in the event of a fire, presents risks to the public health of abutters and nearby households. MAHB respectfully submits that a BESS facility would constitute a noisome trade.

Boards of health are empowered, in fact are required to regulate these types of operations pursuant to G.L. c. 111, §§ 143-150. A “noisome” trade need not be the operation of a loud, obnoxious or noisy business.

While it is incontrovertible that a BOH may refuse to allow any site within its jurisdiction to host a BESS, subject to certain zoning regulations, a board of health is empowered to confine offensive trades or occupations to a particular part of the municipality. *Town of Lincoln v. Murphy*, 314 Mass. 16, 20 (1943). It is important to keep in mind, however, that just because a trade or business is authorized by local zoning to a site within a specific district does not mean that the business has a right to create a nuisance. “If there are reasons apart from the zoning law why the business may not be legally carried on in the district, the zoning law furnishes no protection to it.” *Marshall v. Holbrook*, 276 Mass. 341,34 (1931).

i. Procedure

Once a BOH determines that there is a potential issue which may result in a nuisance, there are certain rigorous protocols that must be carried out. The parties are all entitled to due process, as this is clearly a property right at stake for all concerned.

The board must schedule and conduct a public hearing to determine whether a BESS may cause harm to the public. If the board finds that the trade or occupation may be harmful, the record of the proceeding must support that fact. If the board finds no possible danger to the public, it must issue an order of site assignment. *American Friends Service Committee*, 30 Mass. App. Ct. at 460.

The BOH is not forced to “go it alone.” The DEP is mandated by G.L. c. 111, § 143 to give advice, if so requested, to the board of health on the site assignment. If the board issues an order of prohibition, it must be served pursuant to the provisions of c. 111, § 146. The statute provides that the “board shall take all necessary measures” to prevent any exercise of the prohibited trade or employment and attaches financial penalties for noncompliance with the order.

ii. Administrative Review

General Law c. 111, § 143 allows any aggrieved person to appeal the site assignment to DEP, which may, after a hearing, rescind, modify, or amend such assignment. The assignment of a place or building that subsequently becomes a nuisance after site assignment because it is offensive or dangerous may be revoked by order of the Superior Court after a complaint by any person. The court may order that the nuisance be prevented or removed. G.L. c. 111, § 144.

Most importantly, none of these administrative actions adversely affect the rights of an injured citizen. Anyone injured by such nuisance may institute an action to recover damages. G.L. c. 111, § 145. So even if the BESS operator successfully appeals a BOH order through the administrative process above, once that facility goes online and starts presenting noise issues to a sleepless neighborhood, the aggrieved party has two options. First, they can ask their local BOH to investigate the nuisance and hold a hearing to determine if the actions are a nuisance. The BOH still has the power to terminate the business activities if it is deemed a nuisance. And if all else fails, the party can seek counsel and file a private cause of action against the BESS operator.

iii. Judicial Review

General Laws c. 111, § 147 allows an aggrieved person to bypass administrative review and proceed directly to court under very specific circumstances upon a showing that their ‘substantial rights’ have been ‘prejudiced.’ *Leominster Materials Corporation v. Town of Lancaster*, 56 Mass. App. Ct 820 (2002). These proceedings are subject to extremely stringent guidelines making an appeal very difficult. For instance, the aggrieved party has only three days after the service of the order upon them to give written notice of appeal to the board of health or DEP and file a petition for a trial by jury in Superior Court. This is substantially different from the nuisance provisions under G. L. c. 111, § 122, *et seq.* which do not allow judicial review of the board of health’s determination except in very specific instances. The court may affirm, alter, or annul the order. G.L. c. 111, § 149.

B. Nuisance

i. Nuisance Defined

In Massachusetts, a nuisance is a “public nuisance” when it interferes with the exercise of a public right by directly encroaching on public property or by causing common injury. *Town of Hull v. Massachusetts Port Authority*, 441 Mass. 508 (2004).

ii. Board Jurisdiction

Boards of health are authorized by G.L. c. 111, § 122 to examine all nuisances which, in their opinion, may be injurious to the public health, and shall destroy, remove or prevent the same.¹ They shall make regulations for public health and safety, violations of which shall be punished by a fine not exceeding one thousand dollars.

Courts have granted wide discretion to boards of health in their determination of what

¹ Under the provisions of G.L. c. 139, § 3, the city council or the town selectmen have the same power to abate and remove a nuisance as is given the boards of health.

constitutes a nuisance.² Similarly, the issuance of a state or local permit or license does not immunize the holder from liability for nuisance which results from the permitted or licensed activity. *Lummis v. Lilly*, 385 Mass. 41, 46-47 (1982).

iii. Procedure

After the board of health has determined that a nuisance exists, it shall order the owner or occupant of any private premises, at his own expense, to remove the nuisance within a reasonable time period. G.L. c. 111, § 123. The owner or occupant is subject to a one thousand dollar penalty for every day in which they knowingly violates the order under the legal theory that there is a duty created by statute for abatement of a nuisance with an implied promise by the owner or occupant to pay it. *See, Train v. Boston Disinfecting Company*, 144 Mass. 523, 532-533 (1887).

2. Public Health Risk to be Considered in DEP/DOER Guidance Document

The noise sources in BESS facilities are primarily the cooling systems, inverters, and transformers.

A. Noise from cooling fans

Mass DEP noise policy dictates that the facility sound levels must not exceed a threshold above ambient conditions. According to one publication, “those ambient sound levels need to be established before the project is installed, or during a time when the facility is completely shut down. It is common to measure ambient sound conditions for a week or more during relatively calm weather to obtain a full characterization of the sound environment at a site. Because the noise limits are relative to the ambient site conditions, a quiet area will require a lower limit than an already noisy area.”³

Each BESS unit requires cooling fans to keep the content of the L-Ion batteries at a safe operating temperature and to prevent catastrophic fire events. The sounds from these units are similar to roof-top HVAC units in residential and commercial buildings. In one planned BESS facility in Medway, Massachusetts, there are plans for 141 Tesla Megapack batteries. One report shows that there will be over 800 fans operating 24/7 in this installation which is less than 100 feet from homes. Fans are generally louder during the peak charging/discharging times. While acoustic insulation and certain cabinet design can reduce sound emissions, the

² Even where an activity is permitted by zoning, it may be declared a nuisance and the activity abated. In *Marshall v. Holbrook*, 276 Mass. 341 (1931), a manufacturer erected a building used as a drop forge plant in which two drop hammers, or rams, struck a blow at intervals of one second. “The noise of the large hammer at a distance of one mile sounds like the pounding on a piece of steel with a hand hammer by someone in the next room with the door closed. In the plaintiffs’ houses the noise is loud and disagreeable. It is a heavy thud with a metallic clang.” *Id.*, at 343. The court held that locating his business in an area zoned for such a use gave the defendant no right to operate his plant so as to create a nuisance.

³ E. Brush, *Don’t let noise be a drain on BESS developments*, Energy Storage News, 5/20/24.

minimum ambient noise flow can still exceed 45 dBA at 50 – 100 feet.

In one case study report from Southern California, 45 models of fan configurations using custom silencers, strategic equipment orientation and a 20 foot sound wall, the sound measured 70-92 dBA at 1m from the fans, and even with all the mitigation measures in place, still measured 70 dBA at homes 100 feet away, well above the 45 dBA nighttime limits.⁴

Left unregulated, the noise from the fans would undoubtedly constitute a nuisance if homes are not at a reasonable distance from the sound generators. This would trigger action by the local BOH and could result in a closure of the facility.

B. Noise from Inverters

Inverters play a critical role in converting electricity from direct current (DC), stored in batteries, into alternating current (AC), which is commonly used in homes. They also perform the reverse process when AC electricity charges the batteries. However, this conversion process isn't perfectly efficient; a small portion of the energy is lost as heat, requiring cooling systems, such as air-cooled fans, to prevent overheating. This is one reason the units have the cooling fans discussed above. But the inverter, itself, creates an additional sound issue.

One significant source of noise during the DC-to-AC conversion is the rapid switching mechanism within the inverter. These switches change the polarity (direction of electrical flow) at extremely fast rates. AC power cycles at a frequency of 60 hertz, meaning the switches must activate twice per cycle. This rapid switching generates tonal sounds at twice the line frequency (120 hertz) and produces additional harmonics at higher frequencies (240, 360, 480 hertz, and beyond). These harmonics contribute to a characteristic buzzing noise. This buzzing sound is often more pronounced in the presence of other background noises, making it particularly noticeable—and potentially irritating—to individuals nearby.

The tonal noise produced by inverters can be a concern, especially in residential or quiet environments, as it may disrupt peace and tranquility. Manufacturers often seek to mitigate this issue by incorporating quieter cooling systems or designing inverters to minimize harmonic distortions. While innovations continue to reduce the auditory footprint of inverters, the sound remains an intrinsic characteristic of their operation for now.

C. Noise from Transformers

The sound commonly associated with transformers is a distinctive "hum". This sound is often heard near outdoor substations or a building's transformer vault. Transformers are used to alter AC voltages, either increasing or decreasing the voltage level. The cylindrical transformers on telephone poles are familiar examples that reduce the high voltage from transmission lines to a safer level for use in homes and businesses.

The transformers at a Battery Energy Storage System (BESS) facility are significantly larger than those found on telephone poles.

⁴ *BESS Noise Challenges and Solutions*, © Noise Monitoring Services, 2020

There are three sources of noise within a transformer: core noise, coil noise, and fan noise. Core and coil noise are caused by electromagnetic forces that occur twice per cycle of AC power, resulting in a primary sound source of 120-hertz or 100-hertz, along with its harmonics. Though some transformers use passive radiant cooling fins instead of fans which results in quieter operation, cooling fans mounted outside the transformer generate the third source of sound and are found on some such units.

In the Medway example mentioned above, there are plans for 71 of these units over and above the 141 Tesla Megapack batteries. Again, these are within 100 feet of homes.

D. Toxic Contents of Smoke

Local boards of health are also concerned with the effects of a runaway fire event. Rather than recite the horror stories occasioned by the catastrophic events experienced in communities hosting BESS facilities, we wish to focus on the public health risk from smoke that are unique to L-Ion battery thermal runaway fires.

When a lithium-ion battery catches fire, it releases a complex mixture of toxic and hazardous substances in the smoke. The exact composition can vary depending on the battery's chemistry, size, and how it was damaged. Batteries in BESS facilities are of the largest size and the risks are at the outer edge of the extremes. In BESS fires the toxic substances and their consequences of concern to local boards of health are the following:

i. Toxic Gases Released

1. Hydrogen fluoride (HF)
 - Highly toxic and corrosive.
 - Can cause severe respiratory irritation, pulmonary edema, and long-term lung damage.
2. Carbon monoxide (CO)
 - Colorless, odorless, deadly gas.
 - Interferes with oxygen transport in the blood.
3. Carbon dioxide (CO₂)
 - Less toxic but can displace oxygen and worsen smoke inhalation.
4. Hydrogen cyanide (HCN) (*in some batteries with certain plastics or flame retardants*)
 - Highly toxic; affects cellular respiration.
5. Sulfur dioxide (SO₂)
 - From batteries with electrolyte salts like LiPF₆; extremely irritating to eyes, lungs, and mucous membranes.

ii. Other Hazardous Substances in Smoke/Particulate Matter

1. Volatile organic compounds (VOCs)

- Includes benzene, toluene, and formaldehyde; some are carcinogenic or cause neurological damage.
- 2. Particulate matter (PM2.5 and PM10)
 - Fine particles can penetrate deep into the lungs and bloodstream, causing respiratory and cardiovascular issues.
- 3. Heavy metals and metal oxides
 - May include cobalt, nickel, manganese, lithium compounds, and aluminum oxide.
 - Neurotoxic or carcinogenic in some forms.⁵

The health hazards from these can be devastating and have long term implications. The immediate harm is eye, nose, throat and respiratory system irritation. These result in coughing, shortness of breath, or chest pain, leaving many victims with long-term respiratory damage, chemical burns, organ damage and even death in extreme cases.

In most instances orders to shelter-in-place, neighborhood evacuation, and road closures are generally implemented.

3. Questions Presented

1. What topics should the guidance address related to the public health, safety, and environmental impacts of electric battery storage and electric vehicle chargers?

- The guidance should address the need for board of health participation at every level of considering whether a BESS facility is appropriate for the area in which the developer is seeking siting;
- It should address the need for considering the intrusion of sound from any of the component parts of the BESS;
- It should address the considerations needed to minimize or remove any noisome aspects of the BESS, including setting maximum thresholds for sound and vapor intrusion;
- It should address the potential for creating a public health nuisance for those who live nearby;
- It should address the appropriateness of the location including ease of access and proximity to homes, schools, commercial establishments and gathering places in the event of a runaway fire;
- It should address the mandatory emergency preparedness issues to safeguard those within the area of dangerous impact, including adherence to NFPA standards;

⁵ "Toxic Gas Emissions from Lithium-Ion Battery Fires," *Journal of Hazardous Materials* (Larsson et al., 2017) Found significant emissions of hydrogen fluoride (HF) and carbon monoxide (CO), and documented formation of other toxic gases depending on battery chemistry. "Characterization of gases and aerosols emitted during the combustion of lithium-ion batteries" *Fire Safety Journal* (Fletcher et al., 2020). Studied emissions including VOCs, particulate matter, and metal oxides.

- It should address the need for public information as needed in the event of an emergency; and
- It should set forth a plan for termination, decommissioning, and restoring the property to its previous state at the conclusion of the use of the tract of land.

2. How can the guidance be most useful for the public, municipal officials, and the BESS and EV charger industries?

- Is must take into account the unique nature of board of health legal authority and recognize that the BOH has, perhaps, the most vital role of any municipal board or commission in the siting and operational parameters in the municipality;
- Special attention must be paid to drinking water supplies and proximity of BESS facilities to aquifers and wetlands, as well as other natural resources;
- Special attention must also be paid to the proximity of best facilities to schools, churches, parks, businesses and other gathering places having in mind the potential for devastating health results from a tragic fire event or other disaster;
- Strategies should adopt the public health axiom that we should prepare for the worst and hope for the best, and have clear and well defined chains of command for any potential disasters; and
- The Commonwealth should place a moratorium on all battery storage projects until statewide guidance and procedures have been developed or provide technical and legal assistance to municipalities struggling with existing proposals.

Thank you for providing this opportunity for input in this process. We look forward to assisting you as a resource partner as you draft your guidance and any further policies, procedures or regulations.

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