

March 22, 2026

Howell Township Planning Commission
3525 Byron Road
Howell, MI 48855

To the members of the Howell Township Planning Commission,

The following information on Battery Energy Storage Systems (BESS) is being provided for consideration from the Howell Township Resident Research Committee (RRC).

BATTERY ENERGY STORAGE SYSTEMS (BESS) RESEARCH

RRC Recommendations:

Avoid lithium-ion BESS where possible and prioritize instead the use of energy storage systems like Long Duration Energy Storage Systems (LDES) that meet the following parameters...

- 1. Are manufactured domestically**
- 2. Do not utilize lithium or lead components**
- 3. Prevent thermal runaway**
- 4. Implement safety features that minimize air, water and ground contamination risks in the event of a system failure**

Please note: if lithium-ion BESS is not prohibited then it is important to require robust disaster response plans that detail public notification and evacuation protocols in the event of fire, spill, flood or other hazard and require a comprehensive BESS ordinance; lithium-ion BESS should not be permitted without well thought out regulations in place.

Battery Energy Storage System Information:

Data centers often utilize dozens of Battery Energy Storage Systems (BESS) as part of their supplemental and backup power. Google alone has more than *100 million* utility-scale lithium-ion cells across their global portfolio of data center facilities (1). They are often considered an indispensable part of the renewable energy systems that data centers utilize to help minimize their impact on carbon emissions and electrical grid strain. However, BESS are not necessarily as environmentally-friendly as they are often made out to be. As with any lithium-ion battery, they carry environmental risks and ethical concerns. From a social-ethical perspective, the raw materials used, such as cobalt and lithium, often involve unethical labor practices among other human rights violations (2). The extraction of these raw materials also involves water pollution, air pollution, destruction of ecosystems, depletion of scarce natural resources, and creation of hazardous waste in countries with minimal regulations to adequately address these issues which ultimately results in far reaching global effects (2).

Lithium-ion batteries contain a number of heavy metals (nickel, manganese, cobalt, lithium, iron, aluminum, copper, steel) and hazardous materials (PFAS, plastic components, carbon-based solvents, fluorine, etc), which are often referred to as “volatile electrolytes” (3, 4). If the battery overheats, these volatile elements pose a significant risk of thermal runaway, which is a chain reaction of uncontrolled heating which can easily lead to fires and explosions (4). The flammable nature of these units create a risk of propagation, as the heat and fire spread. The resulting fires, especially those from utility or industrial-scale BESS, come with additional, unique problems and risks. The hazardous chemical components will be released into the air through the smoke plume, and are also carried though the water used to put out the fires (which makes its way into groundwater) (4). These may be in the form of toxic gasses including the liquid electrolyte vaporization, carbon monoxide, hydrocarbons, hydrogen cyanide, sulfur dioxide, and other volatile organic compound emissions, among others (4). Aerosol emissions resulting from a fire may include the heavy metals Nickel, Aluminum, Copper, Cobalt, Manganese, and Lithium, as well as other toxic particles that may easily be inhaled (4). Water and soil are likewise contaminated with these chemicals and elements through firefighting and cleanup/disposal efforts. Another issue is the risk of reignition, sometimes even days later; BESS fires are extremely difficult to extinguish and have been known to last for several days (3, 5). Fighting BESS fires involves special training, equipment, and strategies that small towns may not have the resources for, especially with regard to a large number of BESS.

While there have been improvements in safety designs in recent years, these risks inherently remain, and the more BESS units there are, the greater the risk to the community. The US Environmental Protection Agency has compiled considerations and recommendations for communities to properly regulate and site these systems. They recommend communities consult BESS safety experts to help guide installation design; before the township considers allowing any industrial-scale BESS, this should be a priority (5). Just a year ago, a BESS fire in California resulted in an evacuation of 1,200 residents...an example of the sort of emergency response plan the township should be prepared with before industrial or utility-scale use of battery energy storage systems are installed within the township (5). One of the installation considerations offered by the EPA is for local first responders to help the community develop emergency response plans for incidents at any facility with BESS; this is the rationale behind our request for a letter from local emergency and first responders confirming their ability to respond to potential calls at a data center. If they lack the property training or equipment, the data center developer should be responsible for covering the cost of ensuring our first responders have what they need to adequately protect the community from the unique risks they bring with them. The EPA also recommends an “isolation zone” for large commercial, lithium-ion BESS, of at least 330 feet—something that the township needs to have clearly outlined in the ordinance, should BESS be permitted.

In addition to the environmental risks and ethical concerns, lithium-ion is not ideal for long-duration energy storage. It is only able to store two to four hours of energy, and that storage capacity degrades relatively rapidly, meaning the units have short lifespans (which contributes to a growing issue of how to properly recycle retired units) (6). In addition to being problematic for communities, they may not even be particularly ideal for certain industries—such as data centers—who rely on consistent, long-duration backup power supplies to either offset

their power draw from the grid, or to provide supplemental emergency backup power during grid outages.

That is where Long-Duration Energy Storage (LDES) comes in. As with all technology, there are a number of lithium-alternatives already emerging, providing additional electrochemical options that also offer improvements to the environmental risks and the power supply duration problem.

- One such alternative is sodium-ion batteries, which are far less ethically and environmentally problematic than lithium (6, 7). They do not carry risk of thermal runaway, making them a safe and viable alternative (7).
- Flow batteries, using vanadium redox, are also able to provide long discharge times and have virtually no degradation (6). They also have zero risk of thermal runaway (8). However, the electrolyte mixtures could leak and pose some risks to the environment, and they may produce toxic gases if there is an overcharging failure (9). Still, the risks posed by accidents relating to vanadium redox flow batteries are lower than that of lithium-ion batteries, especially since their primary failure is gradual (unlike lithium ion thermal runaway) and can largely be avoided and mitigated through proper monitoring and maintenance (10).
- Zinc-ion is yet another possible alternative, which is an abundant mineral which is much easier (and less expensive) to source compared to lithium (11). It can also be sourced domestically, and therefore far more ethically (12). The safety of zinc-ion battery energy storage is superior to lithium-ion as well, with no thermal runaway risk and non-toxic minerals (12). While there are some drawbacks related to corrosion and degradation, there are advances already happening to overcome these challenges, making them another viable option for long-duration energy storage (11, 12).
- A fourth potential alternative mineral for lithium is magnesium. Another abundant, cheap material, it is attracting attention for long-duration energy storage. While magnesium itself is safe, the electrolytes needed for energy storage are not as stable as sodium or zinc, posing potential community and environmental risks (13). There are already technological improvements being made, however, to help address these drawbacks (13).

Aside from other minerals, there are other energy storage systems being explored, including gravity-based and thermal systems, which harness the power of gravity and heat to store energy (6).

- Solid gravity-energy storage systems (SGES) are suitable for large applications, are highly efficient, and can store a large amount of capacity—up to several Gigawatt hours (14). This is a type of mechanical energy storage, which uses surplus power to lift a heavy weight. When additional power is required during a shortage, the energy is discharged by lowering the weight. This general technology has been used for a long time, often utilizing water or air as the “weight”. Using a solid material for weight makes the system more geographically adaptable, creates higher energy density, and is more efficient (14). This type of system carries no fire risk or health risks regarding air, ground, or water pollution, but is also not without problems of its own. These systems require a

relatively large, permanent land-use, either by erecting towers or digging underground shafts. As such, these systems also create visual and noise pollution, and carry risks associated with structural failures and mechanical hazards.

- Thermal energy storage captures heat, such as from solar or geothermal systems, and either stores it in a medium, or in chemical bonds (15). These systems can carry some health and environmental risks as well, as the phase change materials and other toxic chemicals can cause corrosion and contamination (16).

The bottom line is that there are a number of viable alternatives to lithium-ion battery storage, and while they carry variable risks and problems of their own, they are all generally considered to be substantially safer than lithium-ion. It is our hope that the township will soon address Battery Energy Storage Systems in its own ordinance, but until then, we recommend including as precise language as possible in the High Impact Land Use Overlay ordinance, to ensure whatever energy storage systems are used on large, industrial scales do not pose unnecessary risks to the community.

We would suggest limiting energy storage systems to sodium-ion and zinc-ion, but at the very least prohibiting the use of lithium-ion, encouraging domestically and ethically sourced materials, requiring zero risk of thermal runaway, and minimal risk of air, ground, and water contamination will ensure that developers carefully assess their energy storage options and select a system that works for their needs—and ours.

Sources:

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