

Tom Ferguson, Ph.D.
Energy Storage Programs Manager, Renewable and Alternative Energy Division
Massachusetts Department of Energy Resources
100 Cambridge Street, 9th Floor, Boston, MA 02114

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RE: Mid to Long Duration Energy Storage Systems - written comment follow up to August 29th Microsoft Teams Meeting with Thomas Ferguson, Christopher Mason and Joanne Bissetta (sp?)

Joyce Eichacker's Comments on installation of BESS in the State of Massachusetts.

Supporting / Reference documents attached:

1. STPB-JH-1 [Hinckley Testimony and Exhibits].pdf
2. STPB-MTP-1[Puchovsky Testimony and Exhibits].pdf

These two expert witness testimony documents have been submitted to the Energy Siting Board regarding Cranberry Point BESS on behalf of Save the Pine Barrens and contain information relevant to Air quality and safety and Risks and Hazards related to BESS.

Benefits of Battery Energy Storage Systems? (BESS)

In order for solar energy to work within our existing framework (the GRID), it is my understanding that BESS systems are being looked upon as necessary to solving the inconsistency issues inherent to Solar Energy production creating challenges for those managing the grid. BESS will store energy produced by solar until it is needed, allowing the grid to draw from a consistent source of energy, ultimately eliminating the need to switch to fossil fuel sources when solar energy production can't meet demand.

In theory, this makes a great deal of sense. But the devil is in the details and our concerns lie within those details.

Why NOT BESS – or Why we should be concerned:

At a high level, BESS systems are the current panacea to our energy solution problems. While honing into the details, however, we are able to identify concerns that MUST be addressed before moving forward and “encouraging” – **or worse, requiring** towns to site BESS. Below are concerns we feel need to be addressed before rolling out BESS across Massachusetts

When BESS systems work, they work well. When they fail – they can fail catastrophically.

1. The state needs more data / to set standards:
 - a. We need to CLEARLY Understand failure rates across available BESS systems – studies by independent groups (no self-reporting), the CAUSE of the failures, and the expected

results/impacts of the failures. BESS systems are still in their infancy, and have fewer standards and forms of guidance than other industries.

- b. The State should define what it feels is an acceptable failure rate and what level of impact / possible loss of life it is willing to accept PRIOR to moving forward with any installation of multi-container systems.
 - c. Safety Equipment, Foam, and Training: Host towns need to be prepared. The State must identify who will be responsible for paying for necessary equipment/materials to manage a runaway thermal event/fire: Suppression Foam, protective gear for the town as well as neighboring/supporting towns (more than one fire department will likely be called in), and training. Any required updates and replacements should also fall to the State or the BESS applicant/owner/operator.
 - d. There are several battery systems currently available – Lithium-ion have some advantages. However one significant disadvantage of LI batteries is the possibility of thermal runaway. Failures differ from each manufacturer AND battery type. The state should assess details from mild to worst case scenarios and continue to keep abreast of the data as battery systems evolve. What are the tradeoffs from one battery type vs another? This information should be used to drive standards and policy. **We are not there yet!! The industry is not there yet -it is still young!**
 - e. Once BESS standards are set, information should be SHARED with Towns so they can stay abreast of this technology. What do permitting boards need to look for when reviewing and project? Ideal siting criteria should be shared.
2. THERMAL RUNAWAY - The attached Puchovsky document points out that The National Fire Protection Association (“NFPA”) ESS Safety Fact Sheet identifies thermal runaway, stranded energy, toxic and flammable gas generation and deep-seated fires as key hazards associated with ESS installations. This is the greatest threat / concern we have with BESS – particularly because there are too many unanswered questions:
- a. In the event of thermal runaway – there can be an explosion. If so, how high/far will the fireball reach, and how far will material fly? Are systems designed to withstand explosions? If so, how have they been tested? We need to be able to TRUST the data.
 - b. What chemicals and gasses will be released – not just from the batteries, but the from wire coatings to insulation material, etc. (each manufacturer will have different components) and how far can these toxic gasses travel given various weather conditions? What harm do they cause?
 - c. How will the smoke/fire/gasses/Chemicals affect abutters downwind? What are possible impacts to health and human safety? Severe injury? Loss of Life? The answers to this will differ with each BESS and technology used. THIS IS CRITICAL!!
 - d. The attached testimony documents both state that SCBA gear is required for emergency personnel – but what about the abutters downwind from the plume? WHO and HOW will they be protected? How far from the closest home/farm should BESS be sited and will that guarantee no loss of life? What are recommended distances to homes and why? And can any buffer truly be effective or do they give the appearance of protection??
 - e. What about livestock and water supplies?

- f. If more than one battery container system is on site, what are the chances that the failure of one will cause other battery container systems to fail? What can be done to prevent a chain reaction from occurring?

3. **Volunteer permitting boards need guidance.**

The importance of the attached Hinckley and Puchovsky testimony documents can not be understated. These two testimonies show that Data submitted by Cranberry Point Energy Storage LLC, a BESS applicant, was missing critical information or glossed over - from component data to safety testing to emergency planning in the event of failure and fire.

- g. It should be noted that these two **experts** in their field reviewed the applications – and found them lacking significant detail necessary for (these experts) to make decisions. **NOW GIVE THIS SAME DATA to a small town permitting board** or even a civil engineer hired to peer review the applicant - neither qualified to peer review this type of data – and they will be “wowed” or more likely, overwhelmed by the submitted data and perhaps will be **uncomfortable denying the project** due to pressure from the state (ie – Dover Amendment) and or the applicant who threatens to sue. IF the Cranberry Point project did not receive the pushback it did...and was ultimately permitted, the citizens would now be at risk and certainly, emergency services would be woefully unprepared.
- h. This is a significantly higher stakes version of what has taken place with Solar installations across the state. Application submissions CONSISTANTLY lacked data – INTENTIONALLY – because small town, volunteer, permitting boards (rural towns are where most of utility scale solar is sited) are not familiar with the intricacies of various regulations and requirements and don’t even know to look or ask for certain information. (ie, How much land will be open at once? Why soil types are important, what do soil test results mean and how can they be manipulated, how these results relate to stormwater design, how stormwater data can be manipulated based on these soils and other data, the difference between infiltration basins and detention basins, why they should not be used during construction (but are anyway), why the core material used in basin BERMS is critical (and why applicants and builders use shortcuts)... Etc etc. You get my point. Mistakes made permitting solar installations impact stormwater, abutter land, and are mostly **material in nature – and can usually be fixed**. Mistakes made permitting a BESS COULD impact lives, drinking water sources, livestock, and livelihood and are more likely chemical in nature – and can be catastrophic.

The fire chief of any small town may understand the need and require a HMA (Hazard Mitigation Assessment), EOP, and ERP. The chief MAY know of NFPA 855 – which is a key regulatory document addressing the design, construction, installation, commissioning, operation, maintenance, and decommissioning of stationary energy storage systems, and the storage of lithium metal or lithium-ion batteries. But will he be able to identify what is missing from an application? Again, the industry standards are not yet fully developed. We can not rush into this until we are CERTAIN that the risks don’t outweigh the benefits.

4. We are aware that the State is ANXIOUS to move forward with BESS to stabilize the grid and move quickly off fossil fuel reliance, BUT WE ARE NOT THERE YET! I Repeat that because it is important!
 - i. The Hinckley Testimony notes that **failure risk is not Zero**, that Thermal runaway brings risk of fire and release of pollutants and such an event could release air pollutants at levels that workers and emergency responders at the Facility would need to wear SCBA equipment, and the safety distance of 650 feet suggested – could not be verified.
 - j. *Publicly available data on BESS reliability is limited and inconsistent, and much of the recorded information was collected in highly controlled and fixed conditions. Due to the variability of real-world use, this data can be unhelpful in determining actual risk.* (from Baker Risk Systems)
 - k. It is irresponsible for the State to allow any BESS to be sited until it fully understands HOW a catastrophic failure (by each type of BESS system) will impact any given community – and what Emergency Services EQUIPMENT and TRAINING will be necessary to address fire or explosion. **We cannot rely on the applicant to be forthcoming** and we cannot rely on volunteer permitting boards to be able to properly vet the data without guidance and support. That leaves us with a gap in data resulting in possible increased risk to the community.
 - l. Across the state, battery systems already exist, (one or two containers of lithium-Ion batteries) sited WITH/AS PART of existing solar installations. These slipped right in. Towns were ill prepared to permit these, yet allowed them in anyhow. Applicants submitted limited info – the less info submitted, the fewer questions triggered – and told towns these were very safe despite having very little information to prove it. Permitting boards across the state have and continue to feel pressure from applicants AND the state (again, DOVER amendment, fear of lawsuits) to permit solar installations AND the battery systems. It is not clear they can deny the battery system and continue to be unwilling to risk a law suit. The results: In the event of failure, small towns with existing battery systems are NOT equipped and will have to stand back and watch the batteries burn. What toxic gasses/chemicals will be carried with the plume remains unknown. **Now large scale**, standalone (not attached to a solar installation) **BESS systems** (over 25, up to 150 containers!) **are being proposed, currently with NO** guidance from the state. Cranberry Point is one, another is being floated by Charleton/Sturbridge. There are likely more. The State, if allowing these to move forward without fully understanding the risks or offering guidance, is asking Towns to assume risks they also do not fully understand. This is a big ask. Volunteer permitting board members will have to make a decision that could possibly take lives.

5. **Model Bylaws / guidance / related regulation:** In the recent past, the state encouraged towns to adapt its “model solar bylaw” which proved to be woefully inadequate. The framework was helpful, but the content short. Further, in general, model bylaws are not permitting guides. Small towns with volunteer boards are not accustomed to permitting 25-150 acre large scale projects – and frankly could have used some solid guidance to get through the permitting process, stormwater review, etc of the 1st two solar projects that came before them! We need to do better with BESS model bylaws and guidance. Some things to note:

- a. The model solar bylaw had a heavy-handed industry influence – reducing common sense regulatory controls that the town could have used to help it with permitting.
- b. Towns were told early on that they could NOT deny projects. We were not clear what we could push back on, or what to watch out for. For instance, it would have been useful to know from the first project on (vs the 4th..) that we should have required weekly site visits by a representative of the town (paid for by the applicant) to ensure no more than 5 acres are open at once, and those 5 acres should be stabilized before opening up the next 5 acres, that construction stormwater is in place and maintained, that construction basins are capped, etc. We should have been told that we should become intimately familiar with EPA's construction general permit and Stormwater Regulations in addition to 310CMR 10 and land law. We should have been encouraged to hold boundaries (but were afraid to)..and say no, you can NOT build to within 25 feet of all 4000 linear feet of wetlands on the property... and we should have been given some advice about thing to look out for – such as the land under drip edges, especially on steep slopes, needs to be stabilized and perhaps reinforced, and that no matter how “good” the soils are, they still need to modeled as poor, etc etc, etc.
- c. MASS DEP, DCR and other authorities under DOER had created regulations or polices (ie, solar related stormwater) to reduce the impact of regulatory obstacles which ultimately backfired. State foresters were approving forest cutting plans knowing full well the site was being permitted for solar installation and the land would not remain in forestry. We CANNOT replicate this type of “support” when it comes to BESS systems!! Some of the issues and resulting blowback continue to plague towns and certainly have added to MASS DEP's enforcement backlog. Solar stormwater regulations state that solar panels can be modeled as “pervious” when plugging in data to determine post stormwater because the land under the panels is still “open” and pervious. **As it turns out, this type of modeling has created LONG TERM issues** – Panels, of course, are NOT pervious. They create a 3-D watershed. Panels gather water, which falls with force and erodes the soils under the drip edge. Further, this gathered water does not act the same as drops of rain...its forceful and fast - and does not infiltrate evenly under the panels in a gentle manner as models predict, but rushes straight down hill – ending up in the basins instead of in the ground. The forceful water erodes the soils. Further, basin sizes are based on this inadequate model. DEP has been made aware of this flaw but has does nothing to change or mitigate these decisions. **THIS kind of willful blindness cannot be allowed with ANY BESS standards and permitting guidance – the risks are too great. Building in leniency to spur fast growth is short sighted, and with BESS, it could be fatal.**
- d. During the permitting process, we found it challenging at best to obtain accurate information about the composition of the components used in the proposed solar panels. Not unlike the application for Cranberry point, information was short on details. Could we deny the applicant if we did not receive this information (Dover amendment, law suit threats). The Safety Data Sheets (SDS) given only addressed external components – never internal components as requested. Could soils be contaminated in the event of panel breakage or fire? (the answer is yes). Not ONE applicant ever mentioned that throughout the year they would apply a PFAS heavy solution to prevent

spotting after rains/to prevent dust and dirt from sticking to the panels. We found out this was taking place by accident. Moving forward, we need rock solid information before making decisions about BESS, and if we don't receive the information requested, Towns should know they are empowered to say no. Many small towns may need guidance on what information they need (or their peer reviewer needs) to make informed decisions.

- e. Along with the Model solar bylaw, The State recommended that towns require a \$45K decommissioning (paper) bond. It turns out that that was industry driven and was beyond woefully inadequate. In 2019, the cost to load and simply SHIP panels (ie, already staged/stacked/ready to ship) was quoted at ~\$36 per panel by multiple sources. At the time of the quote, a 5MW site would have approximately 40,000 panels – that is just shy of \$1.5 MILLION DOLLARS to SIMPLY SHIP the panels to be recycled or disposed of. Add to that the cost to dismantle panels and frames, conduit, fences, stormwater infrastructure, inverters and pads, the disposal of all these materials, plus earthwork and site stabilization (grasses/plantings) and the total to decommission increases to \$1.75M - \$2M. We received pushback from the state and solar applicants – stating it is too much, unreasonable. Turns out it wasn't too much and we weren't being unreasonable. We simply did our homework. And we were vindicated....
- f. The National Renewable Energy Lab on behalf of the Environmental Protection Agency wrote the following and published in 2021: (<https://www.nrel.gov/docs/fy21osti/78678.pdf>) – and they determined that costs associated with decommissioning a solar facility runs approximately \$400K per MW DC to decommission a project – or \$2Million per 5MW site. It turns out that we were spot on.
- g. It would behoove The STATE to slow down, design a realistic plan and offer guidance based on actual research and not industry wish lists. Any guidance moving forward should include WORST CASE SCENARIOS – runaway thermal, improper disposal of batteries and possible abandonment of multi unit BESS. Without that level of planning, towns will be asked to take on risks that could be devastating – and be unaware that they are taking on risk. Research based planning is key. Without it, we may repeat the past costly mistakes: Because the State's decommissioning guidance was ill informed/researched, many towns will now be at the mercy of solar owner/operators willingness to do the right thing at project end of life. They very well may choose to walk away instead of spending \$2M to decommission/dismantle their retired projects, and realistically - what is their incentive to drop \$2M to decommission/dismantle? Towns across the state are likely to be stuck with abandoned facilities. Armed with a meager \$45K paper bond per project, \$1,955,000 short of actual costs, what can the towns do but let them sit? Without proper BESS planning, we could find ourselves in a similar situation, strapped with old batteries/hazardous waste. Towns rely on the state's recommendations to be complete and accurate, especially when Town's are not allowed to deny or "unreasonably regulating" solar.
- h. Related to decommissioning: DISPOSAL. The State's renewable energy goal relies heavily on solar installations – yet there is NO plan in place for panel disposal – and many of the early installations will be retiring within 10 years. The Town of Warren

ALONE has close to **1.5 million panels!!** How many panels are installed across the state? 100 million? WHERE WILL THEY GO WHEN THEY ARE RETIRED! I bring this up because we have pushed forward with the plan to lead with Solar Energy without laying out the details. When asked at a MACC conference, DOER representatives cavalierly stated that someone will step up with recycling plans! It's been 5 years, and still, no plan in sight for disposal or recycling. Panels are SHORT TERM. They are essentially disposable. We cannot duplicate this lack of planning and forethought with BESS. We will be adding more waste – with no plan! to the ever-expanding future pile!

- i. **Incentivize** proper disposal: We cannot be this unprepared when moving forward with BESS systems. Lithium-Ion Batteries lifespan is shorter than solar panel lifespan – they will need to be swapped out **at least** twice during a solar facilities life span. What will we do with this toxic waste? How can towns be sure the material is disposed of properly and not buried somewhere on site? (We can require receipts...but we will need to incentivize this - a battery cash bond will likely be necessary to ensure batteries are disposed of properly). Not all towns will even think to require this unless its built in to the model bylaw...)

6. **SMART program / Incentives**

- a. If SMART or another incentive program is created for BESS – a team of sharp attorneys should be tasked to think through how these incentives support negative behavior. IF a loophole exists – IT WILL BE FOUND and used.

Applicants for most utility scale solar projects were/are investment firms. This is important – because investment firms are looking for a return on investment, nothing else is important and this fact continued to rear its ugly head with most of the 12 projects permitted in our town. And since their motivation to play in the solar arena is intricately tied to the incentives offered by DOER, we need to look closely at the incentives to ensure they can't be manipulated. Some of the SMART incentives should be tightened up. As with any incentive program, the more you understand the rules, the easier it is to find ways to game the system. Here is one of the most problematic shortfalls in the incentive program that we found: We have one project that is now online – although it shouldn't be. The electrical inspector signed off on the final inspection, but the building inspector did not because stormwater is incomplete, the site is not stable, the 150 setback was not adhered to (instead, they cut trees up to 25 feet from most boundaries - which is why we need someone on site each week – you can't take your eyes off of some of these guys!!). I could go on - but the point: DOER does not require the project be signed off by the building inspector – ultimately, the SITE work can be over 50% **incomplete** and yet with just the electrical inspectors sign off, DOER will pay out the incentive, (in this case, \$2.5 million) leaving the town in a lurch with minimal leverage. Until they find a buyer, they do not have incentive to stabilize the site or complete stormwater. They simply do not care. They are in less of a hurry to find a buyer...and they have a bit of a buffer to invest in other projects.

7. Noise pollution. One Battery storage container is noisy – and the sound travels! Put 25, 50, 100 in one location? Acceptable levels should be discussed and guidelines set – but not by industry

insiders. Towns will want to know: How many decibels a single unit BESS produces, how much this increases with additional container/units, what frequency range is the sound from BESS systems? What distance must be traveled before reducing the noise to 30dB? 20dB? 10dB? Will communities be expected to tolerate an increase in sustained noise? By how much?

8. Other considerations Towns will be interested in:
 - a. What constitutes an ideal siting location (and why?).
 - b. Does the State see the short-term goal of quickly installing BESS, with increased profits to installers (on inexpensive land – aka RURAL land) outweigh the big picture of utilizing forest to sequester carbon, cool land/water, filter water, and keep land in agriculture so produce/meat can be sourced locally and to utilize energy to ship food across the world? IF YES, what is the criteria used?
 - c. How can the siting of BESS be more equitable (environmental/social justice)– so the burden (and risk) is shared across communities and not carried by the State’s poorer communities (that offer inexpensive land/greater profit).
 - d. Assuming there is at least ONE thermal runaway event in the state, where are the “best” (or least bad) locations to site BESS to avoid groundwater contamination, respiratory hazards/loss of life, and injury due to explosion?
 - e. Considering the extreme conditions that can be brought about by a runaway thermal event, and the likelihood that poor and rural towns will be targeted to site BESS, what precautions will be implemented to ensure that host communities’ health and safety is protected/prioritized?
 - f. Is there a model that assumes an acceptable level of injury or deaths in order to sustain energy production/transmissions? If so, please elaborate. This is not glib. If the risk of thermal runaway is anything but ZERO, we need to consider the implications – which includes loss of life.

In close, there is much that can be learned by reviewing the rollout of Solar – what worked and especially, what did not. I’d encourage the DOER to obtain feedback from permitting boards (planning/ZBA/Conservation Commissions) as well as Solar advisory committees from across the state, perhaps focusing on towns that currently host the most/the largest utility scale solar facilities – they have the most experience and will have the richest feedback. (Add Warren and Charleton to this list!). Rely on independent experts to review and offer realistic assessments of BESS’s pros and cons that can be used, in concert with feedback from Towns, to create guidance and policy. Industry wish lists and boilerplate language should be avoided – if not avoided, minimized. With the current trajectory for renewable energy relying heavily on Solar, BESS seems to be the necessary next step. Those of us in the trenches implore you to proceed with informed caution.

Joyce Eichacker
Chair, Warren Conservation Commission