Christian County
Planning & Development Department
Staff Report

Request for Permission to Establish a Public Utility Land Use

HEARING DATE: February 27, 2024

ENCLOSURES:

Letter from the Applicant
Project Description
Corporate Overview Presentation
Maps
Site Plan
Draft conditions/requirements

The Question at Hand

Shall the County Commission authorize the establishment of a battery energy storage system at the 33.57 acre site located on the north side of Old Prospect Road just west of Elk Valley Road?

What are Battery Energy Storage Systems (BESS)?

Energy storage for electricity generation

An energy storage system (ESS) for electricity generation uses electricity (or some other energy source, such as solar-thermal energy) to charge an energy storage system or device, which is discharged to supply (generate) electricity when needed at desired levels and quality. ESSs provide a variety of services to support electric power grids. In some cases, ESSs may be paired or co-located with other generation resources to improve the economic efficiency of one or both systems.

ESSs are not primary electricity generation sources. They must use electricity supplied by separate electricity generators or from an electric power grid to charge the storage system, which makes ESSs secondary generation sources. ESSs use more electricity for charging than they can provide when discharging and supplying electricity. Because of this difference, EIA publishes data on both gross generation and net generation by ESSs. Gross generation reflects the actual amount of electricity supplied by the storage system. Net generation is gross generation minus electricity used to recharge the storage system and the electricity consumed to operate the energy storage system itself. Net generation from ESSs is reported as negative in EIA data reports to avoid double counting the generation from charging sources for ESSs and the generation from ESSs. The difference between gross and net generation varies widely by type of ESS.

U.S. utility-scale energy storage systems for electricity generation, 2022

Storage system	Number of plants and of generators	Power capacity MW	Energy capacity MWh	Gross generation MWh	Net generation MWh
pumped-storage hydro	40–152	22,008	NA	22,459,700	-6,033,905
batteries	403–429	8,842	11,105	2,913,805	-539,294
solar-thermal	2–3	405	NA	NA	NA
compressed-air	1–2	110	110h	NA	57
flywheels	4–5	47	17	NA	0

Data source: U.S. Energy Information Administration, *Preliminary Monthly Electric Generator Inventory* (Form EIA-860m) and *Power Plant Operations Report* (Form EIA-923), February 2023

Note: Includes facilities with at least 1 megawatt (MW) of total nameplate capacity operational at end of 2022; MWh is megawatthours; NA is not available.

Most of the largest ESSs in the United States use the electric power grid as their charging source.

Major uses and benefits of ESS

Balancing grid supply and demand and improving quality and reliability—Energy storage can help balance electricity supply and demand on many time scales (by the second, minute, or hour). Fast response (ramping) ESSs are well suited to provide ancillary services for electric power grids to help maintain electric grid frequency on a second-to-second basis. Power quality is an important attribute of grid electricity because momentary spikes, surges, sags, or outages can harm electric equipment, appliances, and other devices powered by electricity.

Peak electricity demand shaving and price arbitrage opportunities—Charging an ESS during periods of lower electricity demand and discharging an ESS and using or selling the electricity during higher demand periods can help to flatten daily load or net load shapes. Shifting some or all of electricity use from peak demand periods to other times of a day can reduce the amount of higher-cost or seldom-used reserve generation capacity, which can result in overall lower wholesale electricity prices. The stored and discharged electricity may be sold at a premium (arbitrage) above the price or cost of the charging electricity or it can be used to avoid using or purchasing higher-cost electricity.

Storing and smoothing renewable electricity generation—Energy storage can provide greater and more effective use of intermittent solar and wind energy resources. Pairing or co-locating an on-grid ESS with wind and solar energy power plants can allow those power plants to respond to supply requests (dispatch calls) from electric grid operators when direct generation from solar and wind resources is not available or limited. Alternatively, an ESS can help solar and wind power plants avoid reducing or curtailing generation when the availability of those resources exceeds electricity demand or power transmission line capacity or as required by grid operators. ESSs also allow for storing and using renewable energy where there is no access to an electric grid (an off-grid system).

Deferring electricity infrastructure investments—Localized pockets of increasing electricity demand sometimes require electric utilities to upgrade existing or build new, expensive substations, and power transmission and distribution lines. ESSs at strategic locations on the

grid can help utilities to manage growing electricity demand at lower cost than upgrading or expanding electric grid infrastructure.

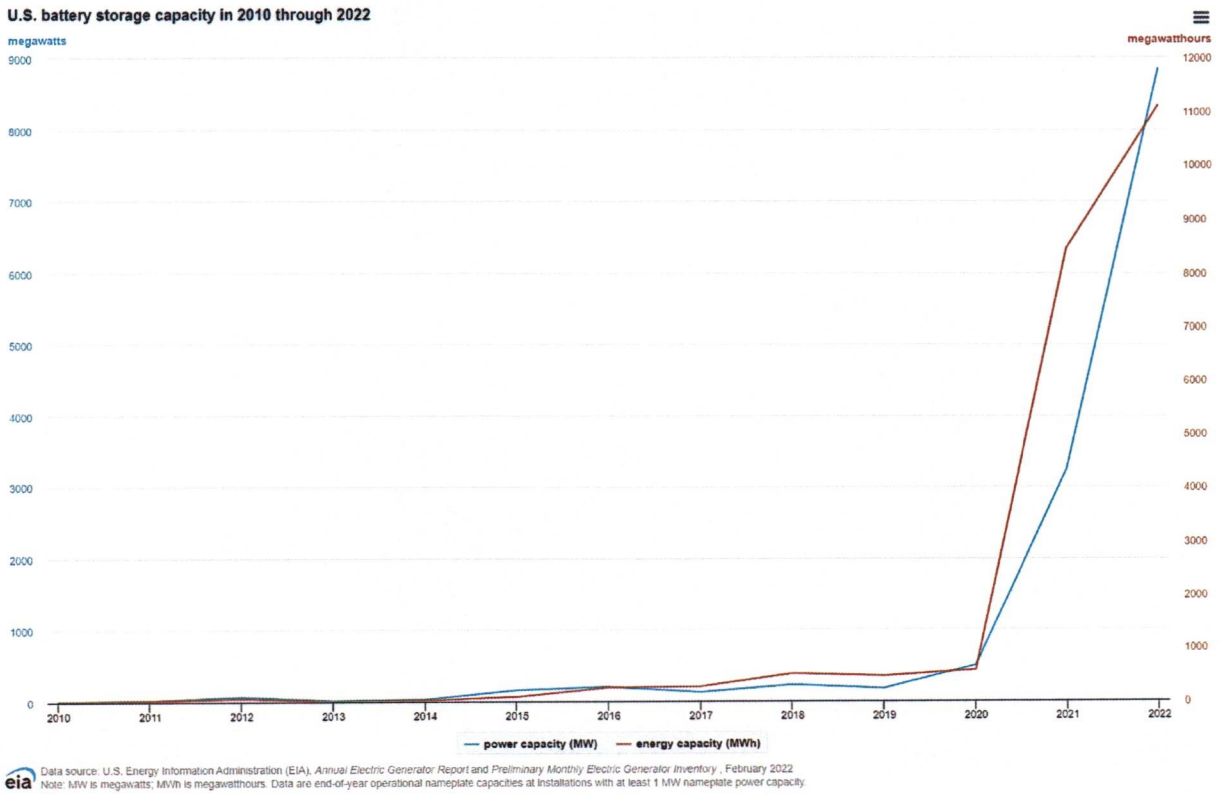
Back-up power—An ESS owned by on-grid electricity consumers can provide emergency back-up electricity during grid outages.

Reducing end-user demand and demand charges—Commercial and industrial electricity consumers can deploy on-site energy storage to reduce their electricity demand and associated demand charges, which are generally based on their highest observed levels of electricity consumption during peak demand periods. An ESS can also be used by participants in utility demand-side management (DSM) programs.

Integration with microgrids—ESSs are being integrated into microgrids that supply a relatively small geographic area or customer base to provide some or all of the uses and benefits of electricity storage listed above. A microgrid ESS may be isolated from a larger grid, or it may be connected to a larger grid with automatic isolation (disconnect) from the larger grid during grid supply interruptions.

Battery energy storage systems

As of the end of 2022, the total nameplate power capacity of operational utility-scale battery energy storage systems (BESSs) in the United States was 8,842 MW and the total energy capacity was 11,105 MWh. Most of the BESS power capacity that was operational in 2022 was installed after 2014, and about 4,807 MW was installed in 2022 alone. Power capacity ratings for individual batteries of operating BESSs range from less than 1 MW to the 409 MW Manatee Solar Energy Center in Florida, which began operating in November 2021.



Of the 39 states with utility-scale BESSs in 2022, California, Texas, and Florida had the most installed BESS power and energy capacity. Their combined percentage shares were 83% of total BESS power capacity and 80% of total BESS energy capacity.

Power and energy capacity and gross electricity generation of U.S. battery energy storage systems in selected states, 2022

State	Power capacity (MW) Percent of total	Energy capacity (MWh) Percent of total	Gross generation (MWh) Percent of total
California	4,738–54%	4,726–24%	2,086,196–72%
Texas	2,087–24%	2,078–19%	268,209–9%
Florida	538–6%	528–5%	203,606–7%
all other states	1,488–17%	3,773–34%	355,794–12%
U.S total	8,842	11,105	2,913,805

Data source: U.S. Energy Information Administration, *Preliminary Monthly Electric Generator Inventory* (Form EIA-860m) and *Power Plant Operations Report* (Form EIA-923), February 2023.
Note: Capacities are nameplate. Includes facilities with at least 1 megawatt (MW) of total operational nameplate capacity at the end of 2022; MWh is megawatthours.

Types of energy storage batteries

BESSs use different types of batteries with unique design and optimal charging and discharging specifications. The majority of U.S. utility-scale BESSs use lithium-ion batteries, which have performance characteristics such as high-cycle efficiency and fast response times favorable for grid-support applications.

Small-scale battery energy storage

EIA's data collection defines small-scale batteries as having less than 1 MW of power capacity. In 2021, U.S. utilities in 42 states reported 1,094 MW of small-scale battery capacity associated with their customer's net-metered solar photovoltaic (PV) and non-net metered PV systems. The capacity associated with net-metered systems accounted for about 71% of total small-scale battery capacity.

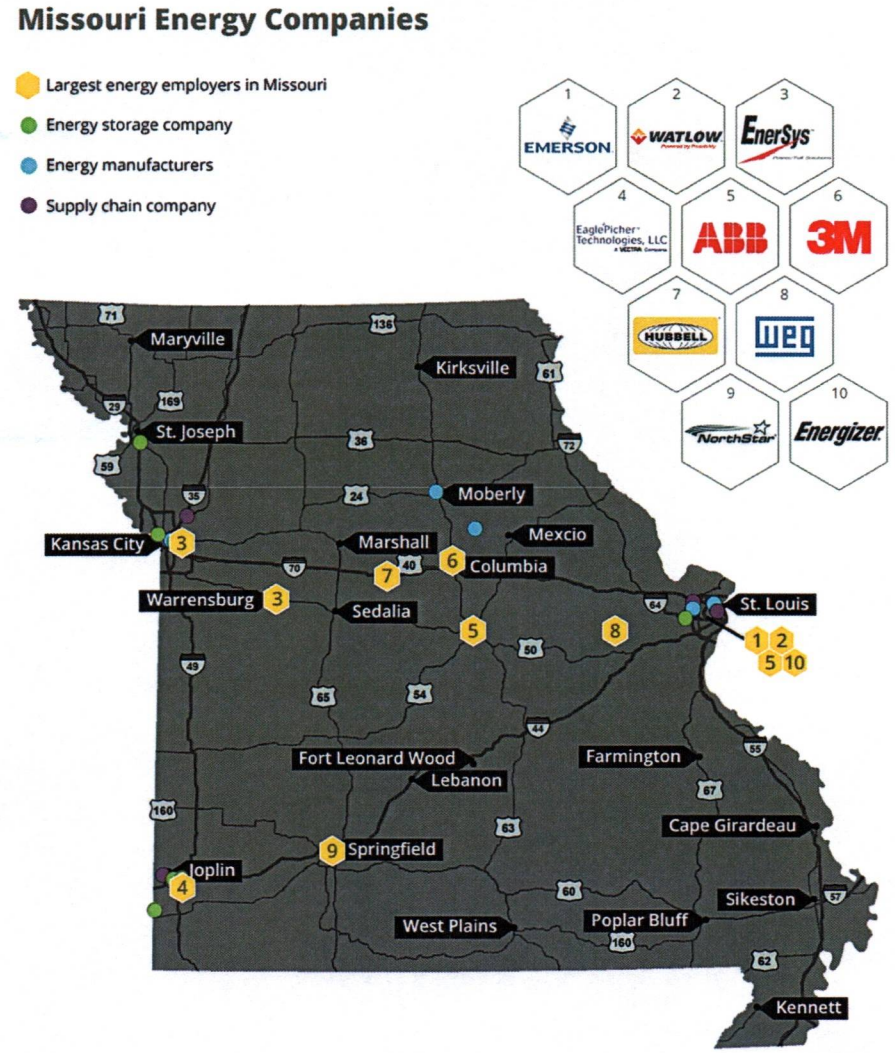
This technology has been initially established on both the eastern and western regions of the US and is now being deployed at an increasing rate throughout the country. Some examples in Missouri include:

In 2017, City Utilities deployed the Cox Battery Energy Storage System in partnership with Northstar Battery. This is a smaller scale version of what is proposed in Christian County.

Ameren Missouri announced in 2023 that it will be adding 800 MW of battery storage, including 400 MW by 2030 – five years earlier than previously planned – with an additional 400 MW of battery storage by 2035. This represents a total potential investment of $1.3 billion through 2035.

A project similar in scale to the Christian County proposal is being developed in the Kansas City area.

The Missouri Partnership has been promoting the State as a place for energy investment for a long time. The map below indicates multiple energy storage companies throughout the state in St. Joseph, Kansas City, St Louis, and Joplin.



Legal Authority

A battery energy storage site, commonly referred to as BESS, is not specifically identified as a principal permitted use in any of the County's zoning districts. There are however, many other activities not specifically contemplated within our Regulations with respect to a particular zoning district.
The fact that this proposed use is intended to store energy to be later utilized by citizens served in the area clearly places it within the realm of a "public utility".

The General Provisions portion of our Zoning Regulations provides guidance appropriate to this circumstance. Article 4, section 4 of the County's Zoning Regulations titled "Public Utilities" states the following:

"Nothing contained in these Zoning Regulations shall prevent the location, erection, construction, reconstruction, change, alteration, maintenance, removal, use or enlargement of any building or structure of any public utility, whether publicly or privately owned, or the use of land by any public utility for the operations of its business as may have been or may hereafter be specifically authorized or permitted by a certificate of public convenience and necessity, or order used by the Public Service Commission, or by permit of the County Commission."

This provision of our Zoning Regulations is modeled after the enabling legislation found in section 64.620.3(3) RSMo.

In this case, the applicants, Black Mountain Energy Storage have not been issued a certificate of Public Convenience and Necessity by the Public Service Commission and we are therefore left with the second option identified in our Regulations which is the pursuit of a permit from the County Commission.

If the County Commission feels this is an acceptable location for the placement of the proposed facility, an Order can be issued, formally "permitting" or authorizing the development.

As part of such an Order, the Commission may also wish to attach certain conditions which are intended to mitigate potential issues related to compatibility with neighboring properties, future development plans, environmental concerns, etc.

This approach and process of permitting is supported by precedent. In June of 2015, the County Commission also addressed the question of allowing the establishment of a large-scale solar farm to the west of Nixa. The process resulted in a successful development with no legal challenges.

The Project

Black Mountain Energy Storage intends to develop a 75 megawatt x2h Battery Energy Storage System (BESS) south of the city limits of Ozark.
The BESS will interconnect directly to the existing substation giving it the ability to charge and discharge electricity to and from the grid.

Visually, the BESS will primarily consist of metal, climate-controlled structures filled with lithium-ion battery modules. These structures are approximately 8 feet in height. The facility will also require a small substation, less than 45 feet in height, to be located near the current substation.

A preliminary site concept plan has been provided by the developer and is attached to this report. It is understood that changes may be required to comply with any conditions associated with a potential approval of the project.

A project of this size requires significant advanced planning. The applicant has estimated a proposed construction start in Q1 2026 with facility operation to begin in Q1 2027.

The projected cost of this project is $100 million, and it is anticipated that it will create 100-150 construction jobs. Following the completion of construction, activity at the site would be limited to monthly periodic visits by a small maintenance staff.

The applicant has a recorded purchase agreement in place since August 2023.

The Proposed Site

The site consists of 33.57 acres of mildly rolling terrain with elevations varying 40 feet within the parcel.

The site contains large open areas utilized for hay as well as other smaller portions populated with trees.

The parcel does not contain any areas of mapped floodplain or known sinkholes. The site does, however, contain two small ponds which are considered wetlands which should not be disturbed as part of the development.

The subject parcel is compact and contiguous on three sides with a parcel containing a substation owned by Empire Electric.

The site plan calls for the area of development within the subject parcel to occur northwest of the existing substation and to utilize approximately 8 acres. This places the developed area 750 feet from the closest existing home to the southwest and 2,300 feet from the existing homes to the east. In both cases this is a greater distance than from the location of the existing power substation.

The applicant has provided copies of the following studies which were performed relative to the site:

- Phase I Environmental Site Assessment
- Wetland Delineation and Threatened & Endangered Species Habitat Report
- Cultural Resources Technical Memorandum

The Phase I ESA presents a very thorough examination of the site. It did not, however, identify any Recognized Environmental Conditions (RECs), HRECs, or CRECs present at the site.

The Wetland/Endangered Species Report confirmed the existence of two ponds which are considered wetlands.

This report also referenced a US Forestry and Wildlife tool which suggests there may be certain threatened, protected or endangered species which are associated with the area including the Gray Bat, the Indiana Bat, the Northern Long-eared Bat, the Tricolored Bat, the alligator snapping turtle, and the monarch butterfly. Given that the southeast portion of the Project site is

wooded and that there are multiple larger forested areas surrounding the site, the study recommends that the proposed BESS is constructed
outside of the limits of the wooded area to avoid potential impacts to these species.

The report also identified numerous migratory birds which are protected under various Acts which could potentially visit or nest at the site.
To avoid potential impacts to migratory birds, a nest survey should be conducted if any tree removal is to occur within the nesting seasons of the identified species.

The Cultural Resources assessment concluded that due to no cultural findings along with the absence of any NRHP sites or SAL sites, consistent with the standards and
guidelines of Section 106 of the NHPA, and the Missouri SHPO, the Sabertooth BESS Project is recommended for no further archaeological investigations, and it is report's recommendation that the project proceed to construction.

Site Development Plan

Development of the site will require clearing and grubbing as needed to prepare the area for placement of the battery modules and needed access.

The individual battery modules are housed in metal structures which each have individual HVAC and fire suppression systems. Each module is also connected to a monitoring system which is designed to send alerts if maintenance is needed or if dangerous conditions are likely.
The impervious coverage added to the site will be approximately 4 acres which equates to about 12% of the total 33.57 acres.

A description of the individual modules indicates an approximate height above grade of 8 feet.

The applicants site plan calls for 6-8 foot tall chain link fence around the perimeter of the site, set back from the property line or adjoining right of way in order to allow a buffer area which will be planted with coniferous trees such as red cedar in those areas where existing buffering vegetation is not already present. Staff recommends adding a requirement for 3 strands of barbed wire to be atop the fencing which surrounds the substation.

Access to the site is to be provided by a 24 foot wide gate located at an access point from Old Prospect Rd. This point of access would need to be approved by the Selmore Special Road District in terms of its location and construction specs.

Issues of Possible Consideration

<u>Stormwater Management</u>

Based on the information provided, the amount of impervious coverage being added to site is significant. The site plan provided by the applicant indicates the presence of a detention basin to the north of the developed area. The applicant would be required to provide a stormwater management plan in accordance with the County Regulations and to then construct whatever improvements are called for based upon the runoff calculations. These improvements would need to either be completed prior to the issuance of building permits or have their completion guaranteed by an appropriate means of financial security.

Soil and Erosion Control

The area to be cleared or grubbed is substantial and will require that the developer obtain a Soil and Erosion Control Permit through the County as well as MoDNR. This will be accompanied by a Stormwater Pollution Prevention Plan (SWPPP) which will be reviewed by the County Engineer and monitored for installation and maintenance of BMPs for the duration of the permit.

Buffering

The height of the individual battery energy storage units is approximately 8 feet. The developer has incorporated the placement of a vegetative buffer into the site plan which would provide a visual barrier at the ground level. The natural contours of this large site would however leave portions unobscured at a distance. It would be advisable for the Commission to include specific conditions regarding buffering as part of any Order granting approval of the project.

Decommissioning

Staff recommends that the County Commission articulate in any approval, the developers' obligation to remove the system at the end of its useful life as well as a financial guarantee to do so. It may be advisable to include a condition regarding removal as part of any Order granting approval of the project which specifies that if the equipment remains dormant and unused for 24 consecutive months, the equipment must be removed.

Compatibility

The parcel currently lies undeveloped, adjacent to the existing substation, agriculturally and quiet with little maintenance other than haying as needed.

Following development, the site would be expected to remain quiet, with little to no activity or vehicular trip generation other than occasional routine maintenance. Visually, the low-profile battery modules would not be expected to obscure any views or otherwise be a distraction. The modules and their individual HVAC units are known to consistently generate a small level of sound. Staff believes the combination of buffering and physical separation distance would make any noise inaudible from the property lines.

Safety (Fire Hazard)

The potential for fire exists with almost any type of new development. The National Fire Protection Agency has developed best practices and strategies which would be implemented by local first responders in order to minimize the impact of any type of fire event. The local Fire Chief is familiar with practices and guidelines specific to this type of facility.

The potential for fire exists with almost any development and in nature for that matter. Certainly, the owners of these types of facilities are very motivated to do whatever they can to avoid a fire just as any homeowner would be. The battery storage units are equipped to remotely monitor temperatures and detect any suspect gas release 24/7 which would provide warning prior to a fire event in order to respond in advance.
This does not eliminate the possibility of a fire, but it does greatly reduce the probability.

Expect questions to be raised regarding "off-gassing". Off-gassing occurs when volatile organic compounds, or VOCs, are emitted into the air as gasses from products or processes. Some are harmful by themselves, including some that cause cancer. In addition, some can react with other gases and form other air pollutants after they are in the air. Some types of VOCs are more dangerous than others. Benzene is known to cause cancer and found in tobacco smoke, oil and gas, and vehicle exhaust. Polycyclic aromatic hydrocarbons (PAHs) can also cause cancer and are released when coal, oil, and gas are burned. Butadiene is found in gasoline engine exhaust and cigarette smoke and can cause cancer too. Long-term exposure to high levels of VOCs has also been linked to liver, kidney, and nervous system damage. Short-term exposure to VOCs may include symptoms such as dizziness, headache, irritation to the eyes, nose, and throat, nausea, and loss of memory.

No off-gassing should occur except in a failure event, as during normal operations the batteries are completely solid with a contained paste-like electrolyte, so off-gassing and leakage will not occur even if physically damaged unless there's a more extreme event. What research I've seen indicates that other than very near the source during a fire, the gasses that would escape in a fire or other failure are not considered more concerning that any typical fire event that would result in an emergency response.

Risk of chemical leakage into groundwater is another concern which will be brought up. Once again, this scenario would be most likely linked to a fire. As with any type of fire, the water being used to suppress the fire would mix with burned material/chemicals and potentially leach into the ground. Current best practices are pointing toward the use of water only for cooling adjacent equipment, structures, and vegetation to prevent propagation rather than aiming to directly extinguish the fire. Additionally, to minimize this risk, sites are designed to route water to a detention basin where the potentially contaminated water can be contained until remediation or disposal can take place.

The most notable fire event involving BESS in the US occurred on April 19, 2019, in Surprise, Arizona at a facility which experienced a thermal runaway event. The BESS was equipped with a clean agent suppression system but was not provided with deflagration venting or explosion prevention systems. The fire department responded and took no immediate action due to a lack of information concerning the system and the event. While a HAZMAT team attempted to enter the BESS to survey the scale of the event, an explosion occurred, seriously injuring four firefighters. The "McMicken"
Event Technical Analysis and Recommendations report (Arizona Public Service, 2020) identified five contributing factors that led to the incident:

- Internal failure in the battery cell initiated thermal runaway.
- The clean agent fire suppression system was incapable of stopping thermal runaway.
- The facility lacked thermal barriers between battery cells; this lack of barriers allowed the thermal runaway event to cascade to adjacent cells.
- Without a means to ventilate the enclosure, the flammable off-gases from the batteries concentrated.
- The emergency response plan did not include extinguishing, ventilation, or entry procedures.

This event marked a shift in BESS hazard mitigation, and the lessons learned have led to improved standards in design, operation and emergency protocols which greatly reduce the likelihood of a fire event and also avoid certain dangers by guiding the way events are responded to.

Health Concerns

Utility scale installations of this type of infrastructure and technology often bring questions related to possible adverse health effects. In this case the concerns include the use of lithium-ion batteries, noise, electromagnetic field (EMF) exposure for those living near the site and containment and effects of a fire incident. Staff has researched these issues and found the following:

- Information to date does not indicate a public health burden from the use of lithium-ion batteries operating under normal conditions. While more information is needed to understand the toxicity of lithium-ion chemistries, there is not likely to be a completed exposure pathway to the general public if the battery systems are well maintained and monitored, and secured, such as by fencing around the installations.

- Batteries themselves do not produce electromagnetic fields (EMFs). The wires connecting the batteries to the source of power used in charging the batteries, and the wires connecting the batteries to the electric grid will produce EMFs during the discharging of the batteries. The science around EMF and possible health concerns has been extensively researched, with tens of thousands of scientific studies published on the issue and many government and medical agencies weighing in on the issue. The weight of scientific evidence does not support a causal link between EMF and health issues at the levels typically encountered by most people.

- Some components of a battery installation and its operations produce noise. Battery systems are operationally silent, but the heating or cooling systems required by the systems may have a noise rating of less than 70 A-weighted decibels (dBA). The anticipated noise level at the project boundary should be less than 55 dB. This noise level is below the existing ambient noise level of residential neighborhoods. The sound level will drop further as a function of distance from the project boundary and be less than 40 dB (the sound of water on a window) at 100 ft away.

Property Values

No research was found specific to the impact of BESS facilities and property values. It should be noted that the presence of an electric substation on the adjoining property will remain as a taller and more significantly visible development in the area. Ensuring that buffering is established in areas not already populated with existing trees would be a worthwhile consideration.

Comments

Ozark Fire Department

Staff met with the Ozark Fire Department on multiple occasions to discuss this project and any potential concerns or requirements. Overall, the fire department felt this project could be a reasonably safe addition to the community but also offered the following comments citing specific needs:

- The site will need to have adequate water supply available in reasonable proximity to the installation. This may require one or two wells with appropriate water storage.

- Because this will be a secure and gated site, the Fire Department will require a KNOX box or similar means of emergency access.
- Consideration should be given to a fire/emergency plan specific to the site and installation as well as specific training for this type of potential fire incident.

City of Ozark

We have spoken with the Ozark Planning Director about this project and he had no objection to the proposal.

Building Inspections

Development of this project would be subject to applicable inspections under the County's adopted Building Regulations.

Selmore Special Road District

The location and specifications for access to Old Prospect Rd. will need to be approved by Selmore Special prior to the issuance of any construction permits.

Staff has received numerous emails and questions regarding this proposal with copies of the written correspondence attached. Many of the emails contained similar themes, assumptions and questions. The section below attempts to generally address the majority of these concerns with information collected during our research.

BESS Fact vs Fiction

Technology concerns:

Lithium-ion batteries don't last long

FACT: Their lifetime can be up to 10-20 years

Lithium-ion batteries won't work well in our climate extremes

FACT: They will, but they need some of the same conditions as we do (shelter, temperature regulation etc.)

These batteries can't be disposed of safely

FACT: Recycling of these batteries is a normal established process in this industry

These systems are only needed or appropriate in dense population centers.

FACT: They are needed everywhere for resilience, grid stability, integration of renewable energy etc.

Fire safety concerns

These batteries are cheaply made and are likely to catch fire.

Fact: Energy storage system fires do happen but are rare. Advances in technology, safety standards, and fire/building codes have and will continue to mitigate fire safety risks.

Batteries are bought from reliable sources, to meet quality standards not just at lowest cost.

There are not adequate safety standards in place for these systems.

FACT: Safety standards have evolved to directly address BESS and are already in place.

You can't use water to extinguish a lithium-ion BESS fire.

FACT: Water is not an effective means by which to extinguish this type of fire. It is used however to isolate the fire and limit the spread by cooling adjacent structures or vegetation.

These systems are unmonitored; no one is paying attention if something were to happen.

FACT: These facilities are equipped with sophisticated Battery Management Systems (BMS)

A BMS constantly monitors the system (down to the cell level) to ensure normal operating parameters. In the event of an incident, a BMS will notify key personnel and even automatically trigger hazard mitigation measures through HVAC or shutdowns to minimize or avoid incident.

Local first responders/firefighters are unprepared to respond to an incident involving BESS.

FACT: Firefighters and responders are trained on a regular basis, as to managing overheating, fires and electrical hazards.

System specific training and incident response plans would be provided by the developer for local responders.

Environmental concerns:

BESS will pollute the environment; if firefighters use water on a system, that will produce toxic runoff.

FACT: Water is not the recommended substance to be directly used on a lithium-ion battery incident. However, if water is used, like with many other types of fires, first responders may need to implement firewater collection strategies.

In the event that a fire incident does happen and if polluted water is not fully contained, the surrounding soil would be tested, and any areas of contamination would be removed and replaced with new soil.

These batteries produce toxic gases and will negatively affect air quality in the surrounding community.

FACT: Lithium-ion BESS do not offgas or produce emissions during normal operations.

These batteries produce excess noise.

FACT: For this scale of installation, the only noise produced is from HVAC systems or inverters. The distancing proposed in the site plan is expected to mitigate any potential noise issues for neighbors.

Insufficient analysis has been done to avoid potential impacts to the nearby environment.

FACT: The project developer has provided the County with a Phase I Environmental Site Assessment (354 pgs), a Wetland Delineation and Threatened & Endangered Species Habitat Report (54 pgs) and a Cultural Resources Technical Memorandum (15 pgs) which provides specific recommendations for site development.

Recommendations

If the County Commission chooses to issue an Order of Approval, staff would suggest that the conditions listed within the attached Exhibit "A" draft be included as part of such an Order as well as any other conditions the Commission deems appropriate.

Todd M. Wiesehan, Director
Christian County Resource Management Department

This report was prepared following many months of staff research to understand this industry and the areas of best practices, hazards, lessons learned and site design. The following is a partial list of the many references which contributed to the content in this staff report:

The Energy Storage Industry in Missouri https://www.missouripartnership.com/wp-content/uploads/2018/03/Energy-Solutions.pdf

Advancing the Battery Storage Industry in Missouri https://naseo.org/Data/Sites/1/andy-popp.pdf

2021 International Fire Code https://codes.iccsafe.org/content/IFC2021P1/chapter-12-energy-systems

New York State Battery Energy Storage System Guidebook https://www.nyserda.ny.gov/All-Programs/Clean-Energy-Siting-Resources/Battery-Energy-Storage-Guidebook

Missouri utility looks to energy storage to extend life of substation https://energynews.us/2018/04/27/missouri-utility-looks-to-energy-storage-to-extend-life-of-substation/

Preventing Pollution from Fire Fighting Run-off https://static.aviva.io/content/dam/document-library/risk-solutions/aviva_preventing_pollution_from_fire__fighting_run-off_lps.pdf

Siting and Safety Best Practices for Battery Energy Storage Systems
https://dnr.maryland.gov/pprp/Documents/PPAD-BESS-2022-01-Report.pdf

Ohio Department of Health Battery Energy Storage Summary and Assessments https://odh.ohio.gov/know-our-programs/health-assessment-section/media/summary-batteries

Considerations for Government Partners on Energy Storage Siting & Permitting https://cleanpower.org/wp-content/uploads/2023/03/Storage_SitingPermitting_March-2023.pdf

Battery Energy Storage Hazards and Failure Modes https://www.nfpa.org/News-and-Research/Publications-and-media/Blogs-Landing-Page/NFPA-Today/Blog-Posts/2021/12/03/Battery-Energy-Storage-Hazards-and-Failure-Modes

Battery Hazards for Large Energy Storage Systems https://pubs.acs.org/doi/10.1021/acsenergylett.2c01400

National Fire Protection Association ESS Fact Sheet https://www.nfpa.org/forms/energy-storage-systems-safety-fact-sheet

Li-ion Tamer GEN 3 (System-Wide and Scalable Solution) https://liiontamer.com/products/generation-3/

Grid-Scale Battery Storage: Frequently Asked Questions https://www.nrel.gov/docs/fy19osti/74426.pdf

Best Practices and Considerations for Siting Battery Storage Systems https://emp.lbl.gov/publications/best-practices-and-considerations

Hazard Assessment of Lithium Ion Battery Energy Storage Systems FINAL REPORT
https://www.nfpa.org/education-and-research/research/fire-protection-research-foundation/projects-and-reports/hazard-assessment-of-lithium-ion-battery-energy-storage-systems

Energy Storage Safety Strategic Plan U.S. Department of Energy https://www.energy.gov/oe/articles/energy-storage-safety-strategic-plan-december-2014

Guide: Energy Storage Systems: Based on the IBC®, IFC®, IRC® and NEC®
https://sustainableenergyaction.org/resources/icc-ess-guide/

Lithium ion battery energy storage systems (BESS) hazards
https://www.sciencedirect.com/science/article/pii/S095042302200208X

The Ultimate Guide to Fire Prevention in Lithium-ion Battery Energy Storage Systems
https://safety.supplynet.com/sites/default/files/2021-05/36405_03_Xtralis_Li-ion_BESS_Ultimate_Guide_A4_IE.pdf

Four Firefighters Injured In Lithium-Ion Battery Energy Storage System Explosion – Arizona
https://cdn.bfldr.com/D35SAQ1Q/as/m7chrn9wg6kxbq39k3bc/Four_Firefighters_Injured_in_Lithium-Ion_Battery_Energy_Storage_System_Explosion_-_Arizona

US Energy Information Administration - Electricity explained *Energy storage for electricity generation*
https://www.eia.gov/energyexplained/electricity/energy-storage-for-electricity-generation.php