GOOSE CREEK
SOLAR PROJECT

FREQUENTLY ASKED QUESTIONS ON

BATTERY ENERGY STORAGE SYSTEMS

General Q&A

Why are batteries needed?

As the U.S. energy landscape evolves to more renewable energy sources such as wind and solar generation and less conventional fossil fuel generation, energy storage will play an essential role to stabilize the grid. The electric grid works by matching supply and demand at every moment for the grid to function reliably. Energy storage systems store excess energy in times of low demand to be used later when it is needed, especially during peak demand hours and in times of emergency or grid outages. Storage helps to place energy on the grid when it is needed, instead of only when it is being produced when the wind is blowing or the sun is shining.

Why is energy storage important?

Energy storage fundamentally improves the way we generate, deliver, and consume electricity. Energy storage helps during emergencies like power outages from storms, equipment failures, accidents or even terrorist attacks. But the game-changing nature of energy storage is its ability to balance power supply and demand instantaneously – within milliseconds – which makes power networks more resilient, efficient, and cleaner than ever before. *(ESA, 2019)*

How is energy storage useful of a grid-scale?

Energy storage is needed on a grid-scale for three main reasons:

1. When charged with renewable energy like solar, energy storage delivers firm, flexible, clean energy and capacity.
2. Energy storage can store energy in times of excess production and discharge that energy when it is needed.
3. Co-locating solar and batteries at the same site helps to smooth the power supplied by the intermittent solar output and enables the two systems to share some hardware components, which can lower costs rather than having them at different sites.
4. Co-location can also reduce costs related to site preparation, land acquisition, labor for installation, permitting, interconnection, and developer overhead.

How does an energy storage system work?

In the most basic explanation, an energy storage system charges by taking AC power from the grid or co-located generation facility and converting it to DC power to store in batteries. The system will automatically stop charging once the battery is at full charge. When there is an energy need on the grid, the system discharges energy back to the grid by converting the energy from DC back into AC.

Is energy storage technology safe?

Yes. Energy storage has been a part of our electricity grid since the 1930s and has a safety record that is similar or better than other electricity generation, distribution, or management methods. Energy storage facilities have multiple layers of protection and monitoring systems in place to help mitigate any unsafe conditions. Additionally, these facilities are secured with perimeter fencing around the entire site to prevent unauthorized access.

Are battery systems cost-effective?

Yes. Battery energy storage costs continue to decline as the production and supply chains increase efficiencies. Energy storage is at an attractive cost to utilities and other energy users, as evidenced by large increases in grid-scale energy storage installations over the last several years. Energy storage system costs are forecast to continue to fall, with increasing demand, which will lead to an increasing number of installations throughout the U.S.

Is energy storage clean?

Yes. Energy storage has no direct emissions. It requires no pipelines. Its systems typically require a minimal footprint. It recycles electricity. Energy storage will also help cut emissions as it takes more of the load off traditional fossil-fuel based generation. *(ESA, 2019)*

Why here?

We site energy storage facilities to maximize benefits to the grid and to customers.

Stand-alone storage facilities are typically closer to electrical load and/or connected to the bulk transmission system (transmission lines/substations) in order to service energy users efficiently.

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How efficient is battery storage?

Battery efficiency is a key metric used to select batteries for a project – the batteries we use have a "round trip efficiency" of 90-95% or greater (5-10% losses when charging and discharging the batteries). There are some additional losses when charging and discharging the battery due to other system component losses.

Fire & Safety Q&A

What about thermal runaway and fires? What is the likelihood of a battery fire?

Lithium-ion cells rarely experience failure leading to fire, however modern codes and standards such as NFPA-855 and UL-9540a require several independent preventative features to be included to minimize the risk of fire. With all these features in place and fully operational, the likelihood of a fire is reduced even further. These features include a battery management system, remote monitoring, gas detection, ventilation, and in some installations, fire suppression.

How does the battery's control system help prevent fires?

All energy storage systems come equipped with a battery management system (BMS) that continuously monitors sensors for temperature, voltage, and current at the battery module level. If the sensors determine a failure is at risk of occurring, the BMS will automatically shut down the battery and alarm until the issue is resolved. The sensor groups also issue a failsafe 'heartbeat' signal, ensuring the system will shut down if communication to the sensors is lost.

How will offsite personnel know if an incident has occurred onsite?

Remote monitoring will occur over the lifetime of the battery, ensuring that personnel are remotely notified of problems via alarms as soon as they occur.

How will our local fire department be prepared or trained to handle a fire situation at a battery storage system?

An emergency response plan will be developed which will provide detailed response procedures. This plan will be reviewed by the local Fire Marshall and fire department, and training will be conducted to familiarize the local responders with this plan.

In the event of a fire, what is contained in the smoke?

Smoke from any fire can be hazardous to humans, and therefore people should avoid contact with smoke or take measures to reduce their exposure. We are not aware of any data that suggests battery fire smoke is any more or less toxic than residential, commercial, or industrial fires.

In a public report documenting the aftermath of a battery fire in Victoria Australia, air quality monitors were deployed within 1.2 miles of the site at locations where there was potential impact to the community. According to the report, "The EPA monitors confirmed "good air quality in the local community" after the incident," and "the gasses were found to be comparable to the smoke you would encounter in a typical Class A structure fire and do not contain any unique, or atypical, gases beyond what you would find in the combustion of modern combustible materials." (VBB Fire Independent Report of Technical Findings 1.25.2022)

What does a developer do to work with the local fire protection personnel to prepare for a new energy storage system?

In addition to the measures mentioned above, emergency signage, emergency operations plans and training are provided in conjunction with local fire services to ensure the hazards are communicated and planned for. An emergency response plan will be developed which will provide detailed response procedures. This plan will be reviewed by the local Fire Marshall and fire department, and training will be conducted to familiarize the local responders with this plan.

What are the steps in a typical fire safety plan for a battery storage system?

A fire safety plan is an extensive document that will be approved by the Fire Marshall and will include site equipment and hazard overview and map, list emergency contacts, document the proper reporting and response procedures, describe the location and descriptions of alarm indication, signage, and emergency switches, describe the fire protection and firefighting equipment, and list required personal protective equipment (PPE) and safety data sheets.

Technical Q&A

How do these batteries compare to the batteries in my phone or computer?

All batteries accept, store, and release electricity on demand. Batteries use chemistry, in the form of chemical potential, to store energy.

The batteries used for grid-scale applications are similar to the lithium-ion batteries in your phone or laptop computer, except they are much larger and monitored closely on a 24/7 basis by trained professionals. Grid-scale battery systems utilize the same types of battery cells found all around us but incorporated into a state-of-the-art grid-scale resource. Grid scale batteries are rechargeable, and the heavy-duty design of grid-scale batteries allows them to be charged and discharged daily for decades.

How long do batteries last?

Batteries can last twenty years or more depending on their usage. They will undergo some degree of degradation over their lifetime, where they will experience reduced capacity—similar to how a cell phone battery loses charge capacity over time.

Is the power stored as AC or DC?

The energy is stored as DC and must be converted to AC to be sent to the grid.

Does electricity go straight from the panels to the batteries?

It is possible to design a system where electricity flows directly this way (DC Coupled); however, typically, the locations of solar and storage often involve placing power conversion equipment between the solar and batteries (AC Coupled).

The energy produced by the solar panels can flow directly to the batteries if the electrical grid does not have the demand to use the energy being produced, thus storing the energy for a later time.

Are they sustainable?

Yes. Energy storage batteries have a useful life of approximately 20 years and will require repowering later in the project lifecycle. The original batteries will be removed and recycled for continued use in other applications.

How does energy or battery storage work with solar?

The solar panels absorb the energy created by the sun, creating direct current electricity. The energy battery charges in times of excess energy production and discharges when energy is needed. Energy storage helps to balance the grid, creating a more reliable and stable transmission and distribution system. Clean, reliable energy is delivered to commercial, industrial, and residential customers.

What maintenance do batteries need? How often?

Annual maintenance is conducted that involves visual inspections, various system checks and tests, and cleaning and adjustment as required.

What type of batteries will be used?

Generally, all projects will use lithium-ion batteries, which are sealed rechargeable batteries that are ideally suited for decades worth of use. Grid-scale battery systems utilize the same type of battery cells found all around us incorporated into a state-of-the-art grid-scale resource. These rechargeable batteries are monitored closely on a 24/7 basis by trained professionals. Their heavy-duty design allows the grid-scale battery systems to be charged and discharged daily for decades.

How much electricity do they produce?

They produce the same power (MW) as equivalent solar facilities. The energy (MWh) produced is based upon the power and duration: energy = power x time. The nameplate energy rating will generally be based upon a 1 to 4-hour duration depending on the projected use case. For example, a 50 MW x 4-hour system can deliver 200 MWh in a single charge.

Environmental & Impacts Q&A

Do batteries leak?

Lithium-ion cells do not leak electrolytes during normal operation like some ‘flooded’ lead-acid batteries used in substations and UPS equipment. Lithium-ion battery modules will only leak if they experience catastrophic failure. Most of the leakage will be in the form of gases, and the volume of liquid electrolyte will be trace amounts of volume compared to that found in the more common flooded lead-acid batteries. The liquid electrolyte is technically in the cell itself, although cells are housed within modules, within racks, within containers.

What can I expect to see during construction?

The process for constructing an energy storage facility is relatively simple. The construction process may require some heavy machinery or trucks. Typically, there are a few deliveries per day but not enough to provide a large increase in traffic. Workers arrive and leave at the beginning and end of each workday and work occurs during typical business hours.

What positive impacts will an energy storage facility have on the local community?

Energy storage facilities provide positive impacts to the local economy through increased tax revenues to local governments, the creation of new jobs (during the construction phase), and landowner royalties. At the same time, energy storage facilities DO NOT strain public infrastructure, schools, or emergency services, making energy storage facilities a true “silent revenue generator” that benefits the entire community over several decades.

Will batteries be added to a solar system at start of construction? Or Later?

Battery storage can be installed (a) at the time a solar energy facility goes into operation or (b) at a later time to an existing solar system.

What is planned to ensure there are no environmental or visual impacts of an energy storage system?

During the development phase we will look to minimize the impact on the surrounding community by:

- Evaluating adjacent land uses (current and future) to evaluating the compatibility of an energy storage project
- Minimizing environmental disturbance to the existing site through best management practices with respect to natural resources and storm water and sediment control. Environmental surveys will be conducted for all energy storage projects, and the projects will be coordinated with the appropriate environmental regulatory agencies.
- Developing a comprehensive understanding of local zoning codes to design in accordance with existing requirements and pursue variances when only necessary
- Utilizing setbacks from property lines and public rights-of-way and strategic landscaping to provide a landscape buffer that reduces and/or eliminates visual impacts of battery storage units from adjacent land uses
- Utilizing natural and native vegetation in the landscaping to preserve the rural character of the area

How are they protected from outside elements? Rain, hail, snow, tornados.

Outdoor enclosures are designed with outdoor ratings such as NEMA 3R / IP66 to prevent water ingress. These systems are also designed with appropriate anchor bolts and latching to comply with various wind ratings per the local building code, based upon ASCE 7. This is the same code other commercial and industrial facilities are designed to.

Does an energy storage system create noise?

The energy storage equipment will be designed to be consistent with local noise requirements. The noise emitted is no higher than most electrical transformers or HVAC condensers.

Once the construction phase of the energy storage system is complete and the facility is operational, the primary source of noise will be fans associated with the inverter and battery cooling systems and will be similar to the sound emitted from commercial rooftop HVAC units.