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Figure 4

Example Battery Storage Container Illustration

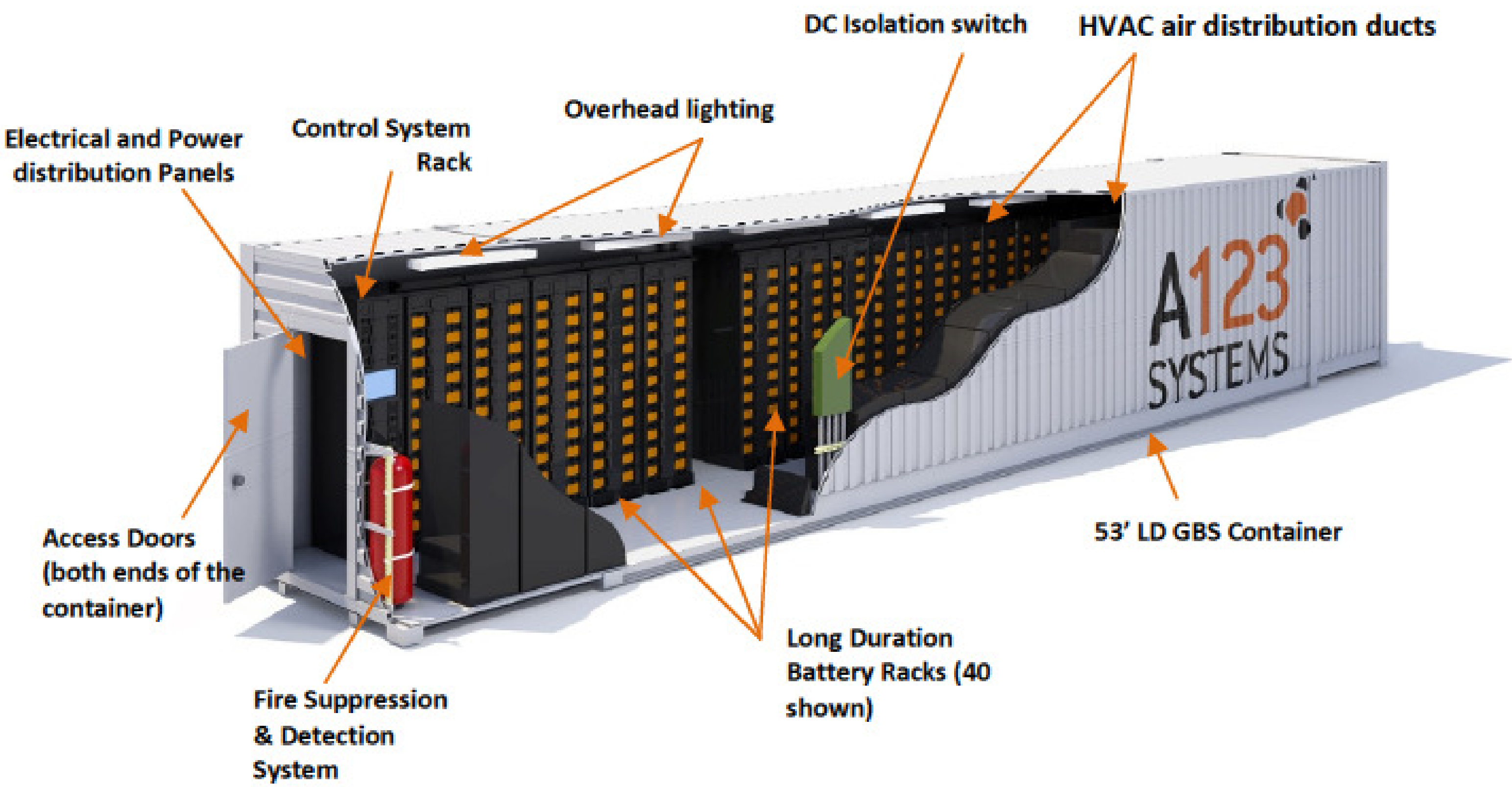

Figure 3 GBS-LD 53' Container Cutaway view (40 racks shown)

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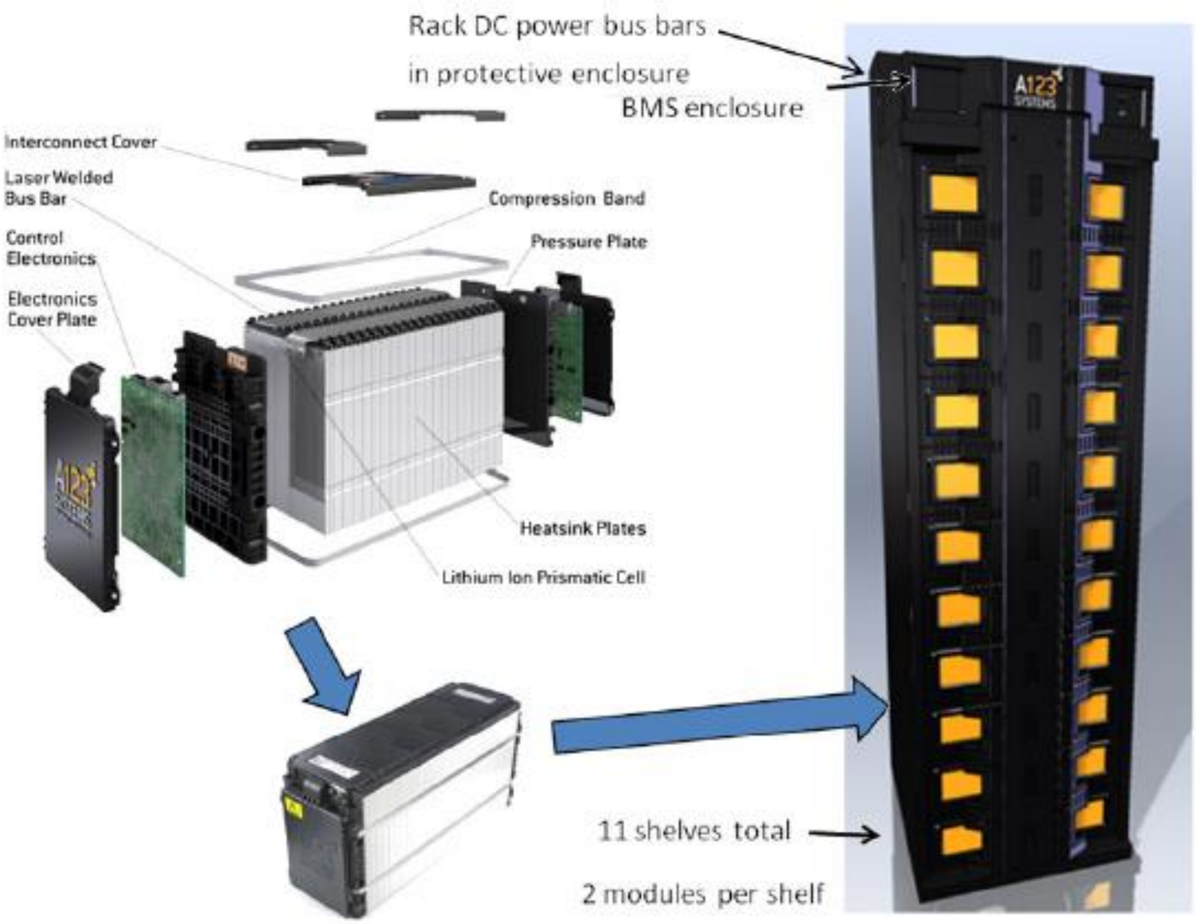
Figure 5

Lithium Ion Battery Pack (Typical)



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The proposed batteries and containers also include the following important monitoring and safety components:

- Modular battery racks designed for ease of maintenance
- Integrated fire detection and suppression system
- Integrated air conditioning system

There are various types of Li-ion batteries available for use in this application. The specific battery type proposed for the Rugged solar farm energy storage system is a Li-ion nanophosphate cell. Available data indicates that this particular type of Li-ion battery has proven to be less vulnerable to fire occurrences than typical Li-ion batteries, which as a category, include a very low occurrence of fires, but have experienced some especially high profile fires in recent years. Li-ion nanophosphate batteries include a stable cathode chemistry that substantially reduces the possibility of thermal runaway and provides for reduced reaction from abuse (Sandia National Laboratories 2012) and A123 Systems (no date).

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3.0 LITHIUM ION BATTERY TECHNOLOGY

3.1 Lithium Ion Batteries

The term Li-ion battery refers to a battery where the negative electrode (anode) and positive electrode (cathode) materials serve as a host for the Li-ion (Li+) (Mikolacjzak et al. 2011). Li-ions move from the anode to the cathode during discharge and are inserted into voids in the crystallographic structure of the cathode. The ions reverse direction during charging. An important fact about Li-ion batteries is that based on their materials content and how they operate, there is no free lithium metal within a Li-ion cell. Therefore, if a cell ignition occurs, metal fire suppression techniques are not appropriate for controlling the fire.

The four primary functional components of a practical Li-ion cell are:

- Anode
- Cathode
- Separator
- Electrolyte

Additional components of Li-ion cells, such as the current collectors, case or pouch, internal insulators, headers, and vent ports also affect cell reliability, safety, and behavior in a fire. The chemistry and design of these components varies across multiple parameters, so it is difficult to make blanket statements about fire behavior, prevention and suppression strategies, and other fire safety measures. For example, cell components, chemistry, electrode materials, particle sizes, particle size distributions, coatings on individual particles, binder materials, cell construction styles, amongst others, generally will be selected by a cell designer to optimize a family of cell properties and performance criteria. However, there are fundamental commonalities with regard to fire that are applicable to most of the Li-ion battery types. In addition, since Li-ion cell chemistry is an area of active research, it is anticipated that cell manufacturers will continue to advance cell designs including more fire safety driven updates.

Mikolacjzak, et. al. (2011) indicate that:

> “An individual Li-ion cell has a safe voltage range over which it can be cycled that will be determined by the specific cell chemistry. A safe voltage range will be a range in which the cell electrodes will not rapidly degrade due to lithium plating, copper dissolution, or other undesirable reactions. For most cells, charging significantly above 100% state of charge (SOC) can lead to rapid, exothermic degradation of the electrodes. Charging above the manufacturer’s high

> voltage specification is referred to as overcharge. Since overcharging can lead to violent thermal runaway reactions, a number of overcharge protection devices are either designed into the cells or included in the electronics protection packages for Li-ion battery packs".

There are two methods to measure Li-ion battery life: (1) calendar life and (2) cycle life. Calendar life indicates how many years a battery is expected to last. The calendar life does not depend on amount times the battery has been charge or discharged, but rather how much charge is stored and its operating temperature (Saft 2014). Cycle life is based upon the number of charge and discharge cycles as well as to what level the battery is discharged to, or, its "depth of discharge" (Saft 2014). Li-ion batteries do not suddenly stop functioning in the same way a lead-acid battery would, rather a Li-ion battery exhibits a gradual decrease in performance (Saft 2014).

3.2 Fire Hazards

The primary hazard associated with Li-ion batteries is fire. Li-ion batteries may burn according to two primary factors. The first is being exposed to an adjacent fire or heat source that is hot enough to raise the internal temperature to combustion levels or provides actual flame impingement on the battery and leads to combustion or uncontrolled increased internal temperature. This leads to the second ignition factor, which is known as thermal runaway, where the battery's internal temperature rises and can lead to increased internal pressure, combustion of chemicals, venting or rupture and release of hydrogen or other flammable gasses. Thermal runaway may be caused by a number of issues, but manufacturing defects or physical damage during transport or set up may lead to malfunctions. In most cases, mechanical damage would probably rank as the highest risk factor for initiating a thermal runaway (fire/explosion) event (Butler 2013). Improper handling can result in crush or puncture damage, possibly leading to the release of flammable electrolyte material through venting or leakage, or short-circuiting. These actions could result in thermal runaway and a resulting fire and/or explosion.

When a Li-ion battery has a thermal runaway, the battery physically expands and electrical shorts within the battery can start, or continue if that was the initial cause of the thermal runaway. The stored energy is released and may include an explosion. This process can cause adjacent battery cells to increase internal temperature, catch fire or thermally runaway (VAN 2014), leading to a chain reaction where successive batteries fail. In other words, once one battery cell goes into thermal runaway, it produces enough heat to potentially cause adjacent battery cells to also go into thermal runaway. This produces a fire that repeatedly flares up as each battery cell in turn ruptures and releases its contents. Li-ion batteries do not contain lithium metal, but do contain lithium ions in electrolyte (Butler 2013). Fires occurring in Li-ion batteries are not like a typical fire and therefore, they require a holistic pre-planning approach to reduce the potential for battery failure including battery design, shipping techniques, storage rack design and configuration, monitoring protocols, pre-planning, suppression systems, firefighter training, and extinguishing approaches.

Research (Butler 2013, Ditch & De Vries 2013, Mikolajczak et al. 2011, and others) indicates that the severity of a cell thermal runaway event will depend upon a number of factors, with the level of charge (how much electrical energy is stored in the form of chemical potential energy), the ambient environmental temperature, the electrochemical design of the cell (cell chemistry), and the mechanical design of the cell (cell size, electrolyte volume, etc.) having the greatest influence. For any given cell, the most severe thermal runaway reaction will be achieved when that cell is at 100% (or greater, if overcharged) of its charge capability, because the cell will contain maximum electrical energy. If a typical fully charged (or overcharged) Li-ion cell undergoes a thermal runaway reaction, a number of things occur, including:

- Cell internal temperature increases;
- Cell internal pressure increases;
- Cell undergoes venting;
- Cell vent gases may ignite;
- Cell contents may be ejected; and
- Cell thermal runaway may propagate to adjacent cells.

There is a lack of available data regarding large storage format Li-ion nanophosphate batteries. Testing by one Li-ion nanophosphate battery manufacturer indicates that the thermal runaway potential is reduced due to the reduced oxygen release during a failure (A123 System 2012)) However, it is anticipated that all Li-ion batteries may follow a somewhat predictable path when thermal ruaway occurs, and that some variation is likely for nanophosphate batteries. Butler (2013) predicts that when a single Li-ion battery goes into thermal runaway, the propagation creates identifiable markers, i.e., the battery behaves in a certain way. He concludes that the fire may be a progressive burn-off or one that is explosive in nature.

Li-ion batteries are non-aqueous and therefore lack the capability of dissipating overcharge energy. As such, positive metal-oxide cells will continue to absorb and store overcharge energy to the point where the material becomes unstable causing release of substantial heat and ignition. While overcharge can lead to the most serious of Li-ion failures, it is considered the least probable for stationary batteries due to well controlled charging systems, alarms, and battery isolation switches (McDowall 2014).

3.3 Fire Behavior

Research conducted by Mikolajczak et al. (2011) indicates that the severity of a Li-ion cell failure is strongly affected by the total energy stored in that cell. Stored energy is a combination of chemical energy and electrical energy. Thus, the severity of a potential thermal runaway event can be mitigated by reducing stored chemical energy (i.e., by reducing the volume of electrolyte within a cell), or by changing the electrolyte to a noncombustible material (i.e., the cell chemistry). These are active research areas within the Li-ion field, but there are not currently commercial-ready products available. It is possible that future versions of Li-ion batteries will include lower potential for fire due to the ongoing research in this direction.

It is commonly thought that the most flammable component of a Li-ion cell is the hydrocarbon-based electrolyte. The hydrocarbon-based electrolyte in Li-ion cells results in a drastically different fire behavior than the typical household lead acid, NiMH or NiCad cell batteries, which contain water-based electrolytes.

The importance of understanding the fire behavior of typical Li-Ion cells is that if they are punctured or otherwise damaged to the point that leakage or venting occurs, it will release flammable vapors. Newer cell technology and lithium ion nanophosphate cells have been tested and shown to include reduced venting and less flammable vapors, resulting in reduced intensity of thermal events (A123 2012). Similarly, fire impingement on Li-ion cells will cause release of flammable electrolyte, increasing the total heat release of the fire, assuming there are well-ventilated conditions. Other combustible components in a Li-ion cell include a polymeric separator, various binders used in the electrodes, and the graphite of the anode (Mikolajczak et al. 2011).

When a cell vents, the released gases mix with the surrounding atmosphere. Depending upon a number of factors, including fuel concentration, oxygen concentration, and temperature, the resulting mixture may or may not be flammable (Ditch & De Vries 2013). Ventilation and cooling capabilities of the storage container will have a strong influence on the ability of these gases to reach flammable levels. The combination of the Li-ion nanophosphate batteries and the well-ventilated, cooled, customized storage containers should result in a lower likelihood that flammable gas levels would be experienced.

On fire scenes where large quantities of Li-ion cells would be in close proximity, decisions regarding overhaul procedures must be made with an understanding that as cells are uncovered, moved, or damaged, they may undergo thermal runaway reactions and vent, they may ignite, and they may generate (or may themselves become) hot projectiles. Similarly, the potential for rekindles will be high at such fire scenes, and these scenes will require extended monitoring by trained firefighters.

3.4 Fire Suppression

The observations from various testing previously described in this analysis would appear to have meaningful implications on fire protection/prevention as well as firefighting procedures. As indicated in these tests, battery heating and thermal runaway controls are important to preventing fires. Specifically, if a fire occurs within a energy storage container, the battery cells and battery packs must be protected from overheating, or they may begin to vent and ignite, spreading the fire more rapidly than would be expected for normal combustibles. Therefore, the design of the energy storage racks, spacing, internal container fire walls/separators, HVAC system, venting, fire suppression system and fire fighter capabilities must all be pre-planned for best prevention, protection, and suppression success.

Butler (2013) indicates that at minimum, an effective strategy for storing lithium batteries is to develop fire containment and suppression systems that would deal with the battery fire event. Systems like this would contain the fire event and encourage Suppression through Cooling, Isolation, and Containment (SCIC). Research indicates that suppressing a Li-ion battery fire is best accomplished by extinguishing the flame with a gas-based suppression system and cooling the burning material with water. However, since the risk of fire spread beyond a container is minimal, and water and plumbing systems are cost-prohibitive and logistically challenging, it is anticipated that cooling of the batteries and container, if necessary, can be provided from firefighters. Therefore, a fire sprinkler system for these containers is not supported.

In most instances, Li-ion battery fires would not be treated like common structure fires by responding firefighters. The burn characteristics and potentially toxic by-product release components do not align with a structure fire where wood and household flammables are burning. Among the precautions that would be considered by responding firefighters are:

- The energy storage containers include electric hazard
- The energy storage containers are adjacent to energized solar panels
- There is extra energy that may be released from polymeric materials burning (binder, separator, etc.)
- Burning batteries would present smoke toxicity and environmental issues
- There is no known way to eliminate "ignition sources"; e.g.: fire initiated from an internal short, subsequent to a manufacturing defect

- There may be re-ignitions and post-fire monitoring will be required

Training regarding fire hazards, behavior, and suppression can be provided to all contractors installing the energy storage facilities, operating and maintaining them, and local firefighters who may respond to an emergency in order to preserve both life and property. Training materials should address issues including battery awareness and care, cautions, warning signs, battery fire behavior, emergency response procedures, and fire extinguisher use (Li-ion battery focus).

Firefighter Response

- Every fire emergency is unique and requires a customized approach, but a typical battery incident may include the following response:
- A firefighter would arrive on scene and size up the situation.
- Calls for additional units would be made as necessary.
- Assuming that the fire in the container was not chain reacting (the type of cell being proposed is not likely to chain react), they would confirm that the suppression gas system is performing as intended.
- If so, the fire would likely be out by the time firefighters arrived. If the system malfunctioned, then there could be a situation where fire is burning flammable materials within the container.
- The container would need to be cooled so firefighters would begin blanketing the container and nearby containers with water streams and as possible and if necessary, streaming a water fog into the container.
- The fire would continue to burn inside until the flammables were consumed. There would be no need to enter the building unless someone was maintaining the batteries and was incapacitated inside. In that case, a rescue operation would be attempted if conditions allowed.

With the energy storage technology that is being proposed, the possibility of explosion is considered extremely rare. However, unforeseen malfunctions can occur that could result in an explosion. It is not anticipated that a battery explosion would contain enough energy to breach the steel containers. However, should that occur, the containers are separated by 20 feet from the adjacent containers and are situated in an areas free of “targets” and set back from native fuels to provide a buffer for minimizing the likelihood of materials beyond the site boundaries. Furthermore, as stated in Section 5.0, Design Considerations, selection of the optional energy storage system would include regularly scheduled, on-site training with local firefighters that would be provided a Battery Storage Fire Fighting Manual shall also be prepared and distributed to local fire agencies for review and integration in their operation pre-planning efforts.

3.5 Fire Safety

McDowall 2014 states that Li-ion battery safety requires four (4) elements: (1) materials and process control, (2) choice of chemistry, (3) cell design, and (4) system design. In general, materials and process control is the responsibility of the cell manufacturer as opposed to the battery system operator. The first decision to be made by the battery operator to ensure system safety is appropriate cell chemistry for the intended use (e.g. solar power storage and delivery). Cells are designed to vent as a form of safety; therefore a safe Li-ion battery system must accommodate for large quantities of released gas including hydrogen gas vented during regular operations and inert gases vented after gas-based fire suppression systems are utilized.

As discussed above, thermal runaway has potential to cause a chain reaction of heat causing extreme failure in adjacent cells. Measures, such as electronic monitoring systems, alarms, circuit breakers and other layered safety features, should be incorporated to lower the possibility of a thermal runaway chain reaction. These electronic safety systems would monitor the individual cell voltages during charge and discharge, internal batter temperature, and cell balance; these systems would also provide communication with a form of management unit or dashboard (Saft 2014). For example, Saft's manufactured battery systems contain a Battery Management Module with two components: (1) battery management unit (manages battery functions) and (2) electrical disconnect unit (enables a safe disconnect of a portion of the system). (Saft 2014). This Battery Management Module is responsible for many of the previously listed system safety functions including: operations supervision, charge and discharge management, thermal management, warnings and alarms, State of Charge, State of Health, first level safety, watchdog, blackbox, and maintenance and diagnostics (Saft 2014). Each of these Battery Management Modules can be connected to a Master Battery Management Module for an additional layer of redundancy and safety (Saft 2014).

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4.0 POTENTIAL FIRE IMPACTS

Applicable results from related tests of Li-ion technology as well as results of chemistry, packaging, and container tests that influence the assessment conducted herein. There are extremely large quantities of Li-ion batteries in use for a variety of applications world-wide from cell phones to vehicles to large-scale energy storage. They are also utilized as back-up power for large data storage facilities. Although statistics were not available at the time of this analysis, the number of fire incidents to date, in relation to the number of batteries in use, has been very low. Li-ion nanophosphate batteries include a stable cathode chemistry that substantially reduces the possibility of thermal runaway and provides for reduced reaction from abuse (Sandia National Laboratories 2012) and A123 Systems (no date).

The potential fire impacts and how the project addresses them are summarized below.

4.1 Wildfire Hazards

Guidelines for the Determination of Significance

For purposes of this assessment, both Appendix G of the CEQA Guidelines and the County's *Guidelines for Determining Significance: Wildland Fire and Fire Protection* were utilized to determine whether the inclusion of the energy storage system to the Proposed Project identified in the DPEIR would result in a significant environmental impact related to wildfire hazards. As such, the relevant wildfire hazard guidelines are identified below.

1. Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

2. An affirmative response to, or confirmation of any one of the following guidelines from the County's *Guidelines for Determining Significance: Wildland Fire and Fire Protection*, will generally be considered a significant impact related to Wildland Fire and Fire Protection as a result of the project, in the absence of evidence to the contrary:

   - The project cannot demonstrate compliance with all applicable fire codes.
   - A comprehensive Fire Protection Plan has been accepted, and the project is inconsistent with its recommendations.

Analysis

The wildland fire risk in the vicinity of the Proposed Project has been analyzed in the DPEIR and it has been determined that wildfires are likely occurrences, but would not be significantly increased in frequency, duration, or size with the construction of the Proposed Project (Dudek and Hunt 2013). Adding the energy storage system would not change the DPEIR's conclusion that neither the Rugged solar farm individually, nor the Proposed Project as a whole, would cause a significant impact by exposing people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

The energy storage component would be located on the Rugged solar farm in an area set back from wildland fuels and the battery storage is within non-combustible, steel containers with sophisticated monitoring and fire suppression systems. It is anticipated that any thermal event involving the energy storage system's Li-ion nanophosphate batteries, as well as their negative by-products (burning electrolytes, and other matter), can be effectively managed and contained within the appropriate storage and transport environments. The temperatures and burning duration of the batteries when triggering an appropriate suppression system within a customized steel container are not anticipated to exceed the integrity of the steel containers proposed for the energy storage system. The site would be largely converted from readily ignited wildland chaparral fuels to ignition resistant facilities and equipment. The Rugged solar farm would not include full-time inhabitants, but would include increased human activity during construction and for ongoing Project operation and maintenance.

The Rugged solar farm, including the energy storage system, would comply with applicable fire codes and would include a layered fire protection system designed to current codes and inclusive of site-specific measures that will result in a Project that is less susceptible to wildfire than surrounding landscapes. The Rugged solar farm energy storage system proposes one of the most stable types of Li-ion battery technologies available (Li-ion nanophosphate) from a reputable manufacturer that includes several manufacturing processes that minimize defects, careful packaging and shipping methods, a steel container that will include a minimum 2 hour and up to 4 hour fire rating, a variety of fuses that help protect down to the cell level, an automated system that continually monitors the batteries for out of range calibrations, a heat and fire detecting system, automatic inert gas fire suppression system, and a site that is designed to allow firefighter access and facilitate suppression activities. All of these features will suppress fire risk.

Further, the facility would provide specific measures to reduce the likelihood of fire igniting on the site from necessary maintenance operations as well as measures to aid responding firefighters to the facility through direct site safety designs, apparatus and training methods. A site-specific Fire Protection Plan (FPP) for Rugged solar farm (Appendix 3.1.4-6) has been prepared, will be approved, and will be implemented. The FPP clarifies requirements of the San Diego County Consolidated Fire Code and includes multiple design considerations that would be incorporated into the design and operation of the Rugged solar farm (see Section 5.0 of Appendix 3.1.4-6). In addition, the inclusion of funding to the SDCFA (see DPEIR PDF-PS-1) and other measures in the Project's Fire Services Agreement would enhance emergency services response capabilities in the local area. Lastly, there will be no permanent, habitable structures where people would remain overnight and with incorporation of a layered fire protection system at the Rugged solar farm, on-site personnel would be able to temporarily remain on site during a wildfire. Therefore, adding the energy storage system to the Rugged solar farm would not expose people or structures to a significant risk of loss, injury or death involving wildland fires.

4.2 Hazards Associated with Interference of Emergency Responses

Guidelines for the Determination of Significance

For purposes of this assessment, both Appendix G of the CEQA Guidelines and the County's *Guidelines for Determining Significance: Wildland Fire and Fire Protection* are utilized to determine whether the inclusion of the energy storage system to the Proposed Project identified in the DPEIR would result in a significant environmental impact related to emergency response and access. As such, the relevant emergency response/access guidelines are identified below.

1. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection?
2. The project does not meet the emergency response objectives identified in the Safety Element of the County General Plan or offer feasible alternatives that achieve comparable emergency response objectives.
3. Would the project result in inadequate emergency access?

Analysis

The Rugged solar farm is projected to add an estimated fewer than 1.6 calls per year to the Boulevard and CAL FIRE White Star Fire Stations. (DPEIR, Appendix 3.1.4-6, p. 23.) Because the Rugged solar farm, including the energy storage system, would comply with applicable fire codes, would include a layered fire protection system designed to current codes, and would include specific design measures to reduce the potential for fire evens during operations, the addition of an energy storage system is not anticipated to result in an increased number of emergency calls from the project. The addition of 1.6 calls/year to a rural fire station that currently responds to approximately 7–10 calls per week is considered insignificant and will not require the construction of additional Fire Station facilities based on that increase alone. However, the project will be part of a cumulative impact from several renewable energy projects in the area that combined could cause service level decline. As such, the Rugged solar farm will enter into a Fire Services Agreement and will contribute funding to the SDCFA to improve emergency response capabilities in the area (see DPEIR PDF-PS-1). The Fire Services Agreement and PDF-PS-1 will provide fair-share funding to be used to augment existing fire emergency response capabilities of the local Fire Response Resources and off-set cumulative impacts of the Rugged solar farm and other renewable energy projects that are expected to be built in the area. The funding will provide for apparatus and equipment as well as staffing enhancements, as selected by the area's fire authorities and as recommended by the area's Fire Resource Capability Report (Dudek & Hunt 2013). The result is maintained or enhanced fire service ratios and response times to the existing condition.

Regarding emergency access, the Rugged solar farm includes fire access throughout the facility and is consistent with the Consolidated County Fire Code. The addition of an energy storage system would not affect emergency access. Fire apparatus access to the energy storage containers will include a combination of 20 feet wide and 12 feet wide road ways. Fire access on the Rugged solar farm site will be improved from its current condition which provides only limited access on dirt/gravel roads. The on-site roadways are designed as looped access throughout the project and conformance with road surface, width, turning radius, and vertical clearance Code requirements for emergency access. On-site roadways also include 20-foot-wide perimeter access roads. Therefore, emergency access is considered adequate for this type of facility.

5.0 DESIGN CONSIDERATIONS

As presented in the project's FPP, the proposed Project provides customized measures that address the identified potential fire hazards on the site. The measures are independently established, but will work together to result in reduced fire threat and heightened fire protection. These include Fuel Modification, Special Fuel Management Areas, improved access throughout the site, participation in a fire service agreement, fuel modification inspections, illuminated signage, stow mode for CPV trackers, training for firefighters, construction fire prevention plan, fire extinguishers, water tanks, and others.

This analysis assumes the implementation of the following additional design features and training/operational protocols below, which would ensure the fire impact associated with the energy storage units remain at a level below significance, including compliance with the County's Determination of Significance standards.

The energy storage system shall include the following components, or their equivalent:

- Available Battery Management Modules (BMMs) continuously monitor the state of charge, battery health, temperature, and other important information. Also available are Mastery Battery Management Modules (MBMMs) to ensure charge uniformity throughout each string of Li-ion batteries.
- Custom grate or fiberglass t-bar flooring available to cover corrosion resistant secondary containment.
- EPA Compliant Spill Containment and Access
- IEEE 1547 compliance (to preclude unplanned power backfeed or islanding)
- Electrical fault protection compatible with downstream protection coordination
- Fault current/voltage limited inverters with full electrical protection and isolation switches
- AEROS energy control system monitors and ensures operation within safe limits and can disconnect power if needed
- Ground fault detection, integrated onboard fire suppression system with smoke and heat detection
- Every rack's battery management system continually monitors for unsafe voltage, current, and temperature and has control of an automated switch to disconnect the rack from the system if necessary
- High voltage fusing for the entire rack supplements the battery management control system

- Module electronics will monitor every cell voltage and select cell temperatures, and has its own dedicated overvoltage monitoring chip
- Two additional levels of fuse safety – individual cell fuses and integral module-level fuse
- Integrated pressure vent on all cylindrical cells
- Cells certified to stringent UL1642 Lithium cell safety standards
- Effective battery standard operating procedures (SOP's) shall be developed and shall include processes that guide every aspect of battery safety, from shipping and receiving, handling, daily use, storage, and other functions involving the batteries.
- An interior inert gas fire suppression system such as the FM-200 or similar shall be installed. The suppression system shall comply with NFPA 72 safety provisions regarding fire detection, signaling and emergency communications and NFPA 2001 standards regarding inspection and testing requirements.
- Firefighters shall have access to the containers to provide water for cooling any battery fire, as possible with a back-up plan to avoid entering a container to cool the exterior of the container through water application (multiple water streams encompassing the involved container) which would positively impact interior temperatures as the batteries burned within.
- Regularly scheduled, on-site training and familiarity with local firefighters shall be conducted and battery system and container specifics provided to the fire agencies for integration in their operation pre-planning efforts. A Battery Storage Fire Fighting Manual shall also be prepared and distributed to local fire agencies.
- The HVAC and venting system shall be engineered to remove the expected toxic, thick smoke from burning plastics and the toxic fumes from electrolyte should a fire occur. The HVAC system shall be designed so that burning embers and smoke from nearby fires, such as a wildland fire, do not penetrate into the containers and ignite combustibles inside. The HVAC system shall also be on emergency standby power and monitored.
- Seismic engineering and restraint shall be incorporated in the containers and the battery racks. The proposed system comes with a seismic rating.
- Containers shall be separated an acceptable distance from one another to prevent fire/heat spread which will help control the rare occurrence of thermal runaway domino effect.
- Spill control and secondary containment shall be provided for transformers containing any appreciable amount of oil.

- An emergency shutdown device shall be provided to stop electrical flow for battery isolation and Firefighter safety.
- The required Heat/Smoke Detection system, per Fire Code, shall comply with NFPA 72 and shall be remotely supervised. The proposed energy storage component for the Soitec Rugged solar farm includes a heat and fire detection system linked to an automatic fire suppression system.
- Safety signs and warning signs shall be installed on all building for firefighter and worker safety.
- Suitable portable fire extinguishers shall be provided.
- Approved Fire Truck access shall be provided to ensure access within 150 feet of all containers.

5.1 Residual Impact Level

Fire hazard associated with the mechanical equipment of the Rugged solar farm, including addition of an energy storage system, would remain at a level less than significant with implementation of the design features listed in Section 5.0 of this addendum, which would be implemented under PDF-HZ-3 from the DPEIR, as well as with incorporation of project design feature PDF-PS-1 from the DPEIR.

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7.0 CERTIFICATION

This addendum has been prepared by Mr. Michael Huff. Mr. Huff is a County of San Diego approved CEQA Consultant for Fire Protection Planning.

Michael Huff
Principal Fire Protection Planner

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