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~~AIS 2~~

~~TECHNICAL MEMORANDUM~~

~~**To:**~~	~~Tierra del Sol Solar Farm LLC; Rugged Solar LLC~~
~~**From:**~~	~~David Deckman, Director of Air Quality Services~~
~~**Subject:**~~	~~Supplemental Air Quality and Greenhouse Gas Analysis – Energy Storage~~
~~**Date:**~~	~~October 29, 2014~~

~~1.0 INTRODUCTION~~

~~This memorandum provides information regarding a new, optional component of the Soitec Solar Development Project (Proposed Project) that was not analyzed in the Draft Program Environmental Impact Report (DPEIR) dated January 2014. Rugged Solar LLC (Rugged) proposes to include an optional energy storage system in the Rugged solar farm as part of the Proposed Project. This memorandum describes the energy storage system, analyzes its potential to have a significant environmental impact related to air quality, and concludes that the addition of the energy storage system on the Rugged solar farm would not affect the conclusions of the DPEIR prepared and circulated for the development of the Proposed Project.~~

~~2.0 PROJECT DESCRIPTION~~

~~The applicant proposes to include a component as part of the Rugged solar farm, to be located in southeastern San Diego County. This component consists of energy storage in the form of lithium ion (Li-ion) batteries (energy storage system), which would be located on the Rugged solar farm site in order to store energy produced by CPV trackers and to provide the ability to dispatch this energy upon request depending upon demand and other factors. The battery storage system would provide 160 Megawatt hours (MWh) of Li-ion battery storage in the form of 160 1 MWh containers each measuring 40 feet x 8.5 feet x 9.5 feet (LxWxH) on approximately 7 acres with appropriate fire access and approximately 20 feet of spacing on all four sides of each container.~~

~~2.1 Location~~

~~The energy storage system would be located on an approximate 7-acre portion of the Rugged solar farm site immediately south of the on-site substation (see Figures 1a and 1b, Energy~~

~~Storage System Location) in an area previously proposed to be developed with approximately 47 CPV trackers and associated inverters and step-up transformers. The proposed energy storage system would not change the developed footprint of the Rugged solar farm site.~~

~~2.2 Components~~

~~The Li-ion battery storage would be housed in standard 40' International Organization of Standardization (ISO) shipping containers. The containers are typically made from 12 to 14 gauge steel. The supplier's logo would be displayed on each container and containers can be painted to order (i.e., containers can be painted with any color stocked by the supplier). The containers would be oriented east/west in two rows of 80 containers each or in four rows of 60 containers each. An approximate 7-acre area would be required to accommodate two rows of 80 containers and an additional 0.5-acre area would be required to accommodate four rows of 60 containers. Approximately 20 feet of spacing would be provided on all four sides of each container measuring 40 feet x 8.5 feet x 9.5 feet (LxWxH); see Figure 2, Energy Storage Container Size and Spacing. It should be noted that inverters and step-up transformers would be located within the container spacing as described below and as depicted in Figure 3.~~

~~The Li-ion batteries (cells) would be arranged into modules, which in turn would be stored in battery racks. The racks would be entirely contained within the container. The container would have an access door at each end and overhead lighting on the interior roof. Each container would have an integrated heating, ventilation, and air conditioning (HVAC) unit located on the roof of the container. Each HVAC unit would measure approximately 7.5 feet in height. An inverter with a battery management system and container control system would be installed externally on a concrete pad next to each container. A step-up transformer would be associated with a set of two containers and would be installed alongside the container on a separate concrete pad. Thus, a total of 160 HVAC units, 160 inverters, and 80 step-up transformers would be associated with the energy storage system. Figure 3 provides an example illustration of the containers, step up transformers, and related infrastructure while Figure 4 provides an example of the typical container interior and battery pack configurations. Figure 5 presents the typical Li-ion battery pack components.~~

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

- ~~Modular battery racks designed for ease of maintenance. Every rack's battery monitoring system (BMS) continually monitors for unsafe voltage, current, and temperature, and has control of an automated switch (contactor) to disconnect the rack from the system if necessary.~~

- ~~Integrated fire detection and suppression system.~~
- ~~Li-ion nanophosphate chemistry which is considered to be the most stable Li-ion technology and substantially reduces the possibility of thermal runaway and provides for reduced reaction from abuse (Sandia National Laboratories 2012) and A123 Systems (no date).~~

~~3.0 ANALYSIS~~

~~Construction Impacts~~

~~Construction of the Li-ion energy storage system would consist of site preparation and grading, development of fire access roads, container arrangement, and assembly of accessory components, including transformers and inverters. Because the energy storage system would be located on an area previously proposed to be developed with CPV systems, site preparation and grading would be included with that originally anticipated in the DPEIR. No additional grading would be required. All existing vegetation would be cleared and grubbed from the area, as originally anticipated in the DPEIR. Fire access roads and pads for each container would be graded consistent with what is required for the entire project. The energy storage system would be connected to the grid by an underground direct buried connection to the project substation. Each container would be trucked to the site and arranged on a graded pad. Accessory components would be placed either adjacent to or mounted on each container. Following placement of the energy storage systems, fire access roads would be constructed to support the imposed loads of fire apparatus (not less than 50,000 pounds) as required by the County Fire Code. All other disturbed areas would be treated with a permeable nontoxic soil binding agent to reduce fugitive dust and erosion, which is consistent with fugitive dust control measures identified in the DPEIR.~~

~~Additionally, construction personnel, equipment, and hours of operation would be consistent with that discussed in the DPEIR; refer to Chapter 1.0, Project Description.~~

~~The transportation of the energy storage units to the Rugged solar farm site would require the use of heavy-duty trucks. Each of the 160 1-MWh units would be transported individually, resulting in 160 trucks or 320 one-way trips. The energy storage system would replace approximately 47 CPV tracker components previously proposed as part of the Rugged solar farm. Approximately 123 one-way trips for material deliveries associated with the 47 CPV components were analyzed in Appendix 9.0-5 of the Final PEIR. With the addition of the energy storage delivery trips, the net increase in delivery trips would result in 197 additional one-way trips. The delivery of energy storage systems would occur in the final two months of construction during the punch list, cleanup and commissioning phase. Daily deliveries and~~

~~delivery trips during construction would not exceed more than 25 energy storage deliveries (50 one-way trips) any given day; see Attachment 1, which includes a list of the assumptions. Although it is anticipated that the amount of deliveries per day would be less, the maximum amount of trips (50 one way trips) were used in the analysis to represent a worse-case scenario. At this level, criteria air pollutants would remain below the County significance thresholds as shown in Table 1 (see AIS 2 Attachment 1 for details).~~

~~Table 1 shows the maximum daily Rugged construction emissions estimates as provided in Appendix 9.0-5 of the Final PEIR. The addition of delivery trips associated with energy storage would not occur during the construction period when maximum daily emissions would occur; therefore, the emissions estimates as provided in Appendix 9.0-5 would not change.~~

~~Table 1~~
~~Revised Estimated Maximum Daily Construction Emissions (pounds/day)~~
~~Rugged Solar Farm~~

	~~VOC~~	~~NO_x~~	~~CO~~	~~SO_x~~	~~PM_{10}~~	~~$PM_{2.5}$~~
~~2014~~	~~17.54~~	~~239.82~~	~~125.20~~	~~0.44~~	~~96.76~~	~~26.14~~
~~2015~~	~~14.19~~	~~175.61~~	~~107.17~~	~~0.38~~	~~26.03~~	~~9.94~~
~~*Maximum Daily Emissions (Revised)*~~	***~~17.73~~***	***~~244.22~~***	***~~126.10~~***	***~~0.45~~***	***~~96.89~~***	***~~26.23~~***
~~*Emission Threshold*~~	~~*137*~~	~~*250*~~	~~*550*~~	~~*250*~~	~~*100*~~	~~*55*~~
~~Threshold Exceeded?~~	**~~No~~**	**~~No~~**	**~~No~~**	**~~No~~**	**~~No~~**	**~~No~~**

~~**Source:** See Appendix 9.0-5, Attachment 1 for details.~~

~~As previously discussed, additional delivery trips associated with energy storage would occur during the last two months of construction for the Rugged solar farm. Table 2 shows the maximum daily emissions during the last two months of construction as disclosed in Attachment 1 of Appendix 9.0-5 of the Final PEIR. Table 2 also shows the resulting maximum daily emissions with the addition of energy storage delivery trips.~~

~~Table 2~~
~~Revised Estimated Maximum Daily Construction Emissions (pounds/day)~~
~~Rugged Solar Farm – Energy Storage Delivery Period~~

	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
*Maximum Daily Emissions without Energy Storage Delivery Trips**	2.37	42.06	13.35	0.10	1.95	0.99
Maximum Daily Emissions with Energy Storage Delivery Trips	5.67	113.82	28.80	0.27	4.81	2.54
Emission Threshold	*137*	*250*	*550*	*250*	*100*	*55*
Threshold Exceeded?	**No**	**No**	**No**	**No**	**No**	**No**

~~**Source:** See Attachment 1 for complete results. *See Appendix 9.0-5, Attachment 1~~

~~It should be noted that Attachment 1 used the updated emissions for the Rugged solar farm that were provided in Appendix 9.0-5 Supplemental Air Quality Analysis – Project Changes. Therefore, because the additional truck trips associated with the transportation of energy storage units would not contribute to an exceedance of the County of San Diego thresholds for the purposes of analyzing air quality impacts, air quality impacts associated with the Rugged solar farm would remain less than significant as originally concluded in the DPEIR.~~

~~Table 3 shows the maximum daily emissions that would occur under the Proposed Project scenario during the last two months of the Rugged construction period as disclosed in Attachment 1 of Appendix 9.0-5 of the Final PEIR. Table 3 also shows resulting emissions with the addition of energy storage delivery trips during the energy storage delivery period under the Proposed Project scenario.~~

~~Table 3~~
~~Revised Estimated Maximum Daily Construction Emissions (pounds/day)~~
~~Proposed Project – Energy Storage Delivery Period~~

	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
TDS – Energy Storage Period	1.51	16.47	28.80	0.26	4.781	2.54
Rugged – Energy Storage Period	5.67	113.82	10.80	0.04	1.08	0.72
Proposed Project Emissions – Energy Storage Period	***7.19***	***130.29***	***39.60***	***0.30***	***5.88***	***3.26***
Emission Threshold	*137*	*250*	*550*	*250*	*100*	*55*
Threshold Exceeded?	**No**	**No**	**No**	**No**	**No**	**No**

~~**Source:** See Attachment 1 for complete results.~~

~~As shown in Table 3, because the additional truck trips associated with the transportation of energy storage units would not contribute to an exceedance of the County of San Diego~~

~~thresholds for the purposes of analyzing air quality impacts, air quality impacts associated with the Proposed Project would remain less than significant as originally concluded in the DPEIR.~~

~~**Operational Impacts**~~

~~During operation, containers would be inspected, monthly, quarterly, and annually with physical maintenance (equipment testing, continuous remote monitoring, repair, routine procedures to ensure service continuity, and standard preventative maintenance) occurring annually. All inspections would occur during daylight hours and would be performed by the employees operating the Rugged solar farm. No additional employees would be required for the operation of the energy storage system.~~

~~Electricity required to power the HVAC systems associated with each individual unit would be directly generated by the project on site and would not require an additional external source of electricity. Each individual unit would be designed as an integrated energy storage system, and the HVAC system associated with each individual unit would be directly connected to the energy storage system's output and would not require additional electrical input. As such, greenhouse gas emissions associated with electrical use would not increase.~~

~~4.0 CONCLUSIONS~~

~~Only a minor increase in daily truck trips would be required to accommodate the transportation of the energy storage units to the project site, and no additional electricity would be required to operate the energy storage units. As a result, daily criteria pollutant emissions and annual greenhouse gas emissions would remain below the thresholds and impacts would be less than significant as previously concluded in the DPEIR.~~

~~5.0 CERTIFICATION~~

~~This addendum has been prepared by Ms. Jennifer Longabaugh and Mr. David Deckman. Mr. David Deckman is a County of San Diego approved CEQA Consultant for Air Quality.~~

~~David Deckman~~

~~David Deckman~~
~~Director of Air Quality Services~~

~~ATTACHMENT 1~~

~~Revised Air Quality Emission Estimates~~