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C Note Response to California Solar Storage Association Comments to Docket No 22-BSTD-04 Re Benjamin Project

Additional submitted attachment is included below.

C Note Limited Partnership

California Energy Commission
Docket Unit, MS-4
Docket No. 22-BSTD-04
715 P Street
Sacramento, CA 95814

July 26, 2023

Re: Response to California Solar Storage Association Comments to Docket No. 22-BSTD-04 on Application for Photovoltaic System Determination for the Benjamin Project in Accordance with Section 10-109(k) of the Building Standards

Dear California Energy Commission and Staff:

Thank you for the opportunity to provide comments regarding the California Solar and Storage Association's (CSSA) views on C Note Limited Partnership's request for a determination from the CEC under Section 10-109(k) of the 2019 Energy Code. We fully support the Commission's efforts to solicit comments on our filing and appreciate the opportunity to provide clarity and additional information to facilitate a determination in this matter.

Regarding the CSSA's comments on the cost of racking and mounting hardware

First, a matter of terminology to be clear and concise. The CSSA description of a proposed potentially more cost-effective racking solution is a bit confusing. They refer to it as a ground mount attachment system. There are many forms of ground mount attachment systems, most of which are inappropriate for rooftops. The specific type of system they are referring to is known in the industry as a ballast solar mounting system. 'Ballast' refers to the addition of concrete blocks to weigh down/anchor the system. A ballast-type system can be used on the ground or roof (with the proper structural review for wind, seismic, anchoring, roof material, and maintenance considerations).

We provided details on the matter of racking costs in response to a CEC staff question on 7/11/2023. Please refer to that response, inserted below, with some additional comments. In short, our structural engineering firm would not approve a ballast system on the Benjamin project rooftops due to the dead load of such a system. This would require a new building load analysis and significant, costly changes to the structure. This is not an option for the Benjamin project. Due to multiple regulatory delays the project is past the point where such an upgrade could be considered even if it were possible to save significant costs. However, that is very unlikely. The additional costs of structure improvements, anchoring requirements (once a structural seismic and wind review for such is completed), and increased roofing inspection and life cycle maintenance costs will be significant. For additional clarity in this comment here is the prior question and answer regarding racking types and costs with some updated comments in [brackets]:

Most newer and larger installations use the ballast mounting method. Why was ballast-type installation not deemed appropriate for this project?

We discussed ballast system design and considerations with Patrick Modesitt, VP of Engineering at our structural engineering firm, PFS Consulting, Inc. (1750 Howe Avenue, Sacramento, CA 95825, 916-978-2875). The takeaway from that conversation is that they would not approve a ballast system on the Benjamin project rooftops. The most optimistic scenario from the Ironridge modeling report is that the average distributed dead load is 8.31psf. For more clarity this involves installing 14,198 pounds of concrete blocks (916) on the roof. They deem this unsafe without a significant review and redesign of the building from the ground up. [Bear in mind that the City of Lodi is in seismic design category D, which requires structural design scrutiny, added ballast, as well as additional anchor points. This further underscores the necessity for a thorough design analysis for the design of a PV system on a three-story rooftop].

Complicating the design of ballast systems are the modern PV wind loading studies that have been completed, codified, and adapted to racking manufacturers modeling programs and their certification guidelines. These standards have significantly impacted PV roof design of all types. The Ironridge model [for Building C] shows the need for 37 mechanical mounting feet for wind and 23 for seismic design. The minimum required would be 37 as the wind anchors also double for the seismic requirements. This contrasts to the 56 required for an aluminum racking system. It is very likely that a more detailed [seismic and wind] structural study of the breaks in the PV array rows due to roof protrusions and drainage roof swales [on the Benjamin three-story buildings] would necessitate more weight and anchor points.

The roofing TPO manufacturer, Carlisle, will not warranty damage to the roof from the heavy concrete block as they compress the TPO material and create water pooling areas that can lead to premature failure. This then requires even more frequent [, longer and costly] roof inspections by the roofing subcontractor.

Another issue with ballast system is the low mounting angle of 10-degrees or less versus the 20-degree angle for an aluminum racking system. We can expect increased annual solar production and less module cleaning with a 20-degree mounted PV system. [There are ballast systems with higher mounting angles but this further complicates the wind and seismic study requirements on a three-story rooftop.]

Finally, no engineering design is complete without considering product lifecycle costs. You can find a commentary on ballast systems for roofing companies from 2014 attached to the email. Without further elaboration, every single concern they brought up then is still very valid today. Perhaps more so with the newer PV wind studies. Contractors of all types, not just solar, like to present competitive bids that can also maximize profits. One easiest way to do this is to ignore total product life cycle costs and build a less resilient system. From our point of view we see no advantage to ballast type systems due to increased building construction costs, the continued need for roof penetrations and associated costs, increased ongoing maintenance costs and the risk of premature roof seal failures.

Regarding the CSAA comment about installers having more space to work below the panels: most rooftop ballast systems installed today are low profile types with five-to-ten-degree module angles. The ten-degree ballast types have at best 12 to 15 inches of clearance on the module's high side. The Ironridge (and others) flat roof rail mounting system at twenty-degrees has a 33-inch clearance on the module's high side. Yes, clearance is important. Without good clearance roofing companies have a much more difficult time inspecting feet/anchor penetrations and ballast depressions. Furthermore, the

higher clearance also makes it much easier to bridge over roof protrusions. For example, the Benjamin project's fresh air protrusions are 18" above the roof deck. These protrusions, along with multiple roof swales, complicate and add expense to ballast systems as rows must be broken up necessitating additional ballast and seismic anchor points.

There is another clarification to note regarding flat roof attachments and the need for blocking. This was more of a concern in previous years when larger lag bolts needed to be driven in to underlying structure to provide anchoring against uplift forces. Today, that is no longer the case as multiple manufacturers offer modern flat roof mounting with multi-point fastening systems that can be placed anywhere on the roof irrespective of the underlying structure.

Finally, a comment regarding the CSSA's discussion on labor costs. The prevailing wage issue has become conflated with other issues in these discussions and we feel we inadvertently contributed to the use of the term in these discussions. We chose a union-based electrical subcontractor for the Benjamin project. Our use of a union-based electrical contractor is typical in the industry for a project the size and scope of the Benjamin project. A project of this type needs a subcontractor with a staff size that can maintain the required schedules and the workloads. While we have no hard requirement for prevailing wage subcontractors, we do select appropriately sized/staffed subcontractors for the size and scope of the project. Thus, the labor costs for AC building electrical follows from a typical selection of the subcontractor not a consideration of prevailing wage. Of all the bids we received only two included so-called prevailing wage considerations, one as a project option, the other embedded in their bid. No other bid included prevailing wage for the solar, electrical, or combined bids. SED's (the Benjamin project's electrical subcontractor) portion of the PV project bid in conjunction with Chase Construction's solar-only bid came in only very slightly higher than the lowest bid received implying that their labor costs are in line and not excessive.

We appreciate that a determination request such as ours is a unique, complex, multi-faceted analysis and we thank the Energy Commission and staff for their commitment to the time and due diligence required.

Sincerely,

Chris Duke
Corporate Coordinator and Portfolio Manager
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