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C Note Limited Partnership

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

March 13, 2024

Re: Response to BPi, SunPower, and Powertree Services 3/5/24 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 BPi, SunPower, and Powertree Service's 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.

Section A. Overview of Comments prior to detailed responses

We'd like to thank BPi, SunPower and Powertree Services for their interest and responses regarding the Benjamin PV determination request. On-going stakeholder communication and feedback is a vital component in helping to move the CEC and California initiatives forward given the multi-faceted complexity of our energy landscape.

The posted comments fall into four categories:

1. Utility regulations, which involve two-thirds of the comments (and others indirectly)
   - VNEM not available
   - Interconnect fees
   - Utility cost escalation rate
   - Reselling electricity and microgrids not available
   - Meter socket adapter option not available
2. Construction costs
   - Scale and complexity of the project
   - Wire/material costs
   - TPO roof issues
   - ITC options
   - Small PV systems per unit
3. O&M costs
   - Correction and explanation
4. Future considerations/suggestions

Section B. C Note's responses (in RED) to BPi's 3/5/24 public comments on the Benjamin Project PV Determination request filed in CEC Docket No. 22-BSTD-04

March 05, 2024
Wynand van der Wateren, on behalf of:
Brian Peterson
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PO Box 10637
Napa, CA 94581

BRIGHT POWER, INC. DBA BPI
LICENSED CONTRACTOR
CLASSIFICATION
A C-10
LICENSE NO.
930054
STATE OF CALIFORNIA

California Energy Commission
715 P Street
Sacramento, CA 95814

Re: Benjamin Apartment Building Comments
Address: 2525 Century Boulevard, Lodi, CA 9542

BPi reviewed the provided designs for the Benjamin apartment building to evaluate a potential project cost and general financial viability of similar projects.
The main cost drivers for the projects were determined to be:

1. Complexity of the interconnection.
    a. The local utility does not permit master metering or Virtual net metering.
    b. This means that smaller solar systems needed to be connected to each of the individual tenant meters.
    c. Each connection needs an independent NGOM meter and blades disconnect for the local utility.
2. The scale of the project.
    a. A 26.4 kW DC solar array is considered a very small commercial solar system.
    b. Given the complexity of the system, residential installers would find the system difficult to execute and most commercial installers would view the system as too small to be viable.
    c. A system more than 50 kW would be more appealing for commercial installers.
3. Interconnection fees.
    a. The interconnection and permitting fees are higher than typical.

The above list is a good start for a list of the cost drivers but is incomplete as follows:

- **The resulting very small per unit PV systems (kW DC) drive per watt construction cost higher.**

- **TPO roof requires expensive sealing, maintenance &inspection of PV, electrical, and mechanical mounts by roofer.**

- **A number of significant long-term O&M costs are factored into the ROI calculations.**

The main cost advantage for the system is the fact that it is a new construction.
With a congested, commercial grade roof with TPO covering and numerous unusually small PV systems in addition to high O&M costs and a unique regulatory environment, the Benjamin project has no cost advantage over any standard new construction residential or commercial project.

1. If it is assumed that the building was designed solar ready, structurally, engineering fees are reduced drastically. **Yes, 'solar ready' is required by 2019 Title 24 code. There are no engineering or architectural fees built into our cost analysis.**

2. A C-10 contractor could permit this scope without an electrical engineer signing off since it is less than 100 kW. **An electrical engineer did sign off because, as new construction, it interfaces with the rest of the electrical system design. However, no additional fees were added to our cost analysis.**

3. If the general contractor installs conduit and pipe work required, the price can be reduced.
In a $25M+ project we would only have our electrical subcontractor do this work using their trained and experienced electricians - to do otherwise would introduce unacceptable risk and liability issues, especially in a multi-family project.

4. If the roofing company installing the new roof were contracted to incorporate solar anchors into the scope for the roofing installation, cost savings could be realized**. There is significant additional work for the roofer to seal the mounting, electrical and mechanical roof mounting feet needed for this job. The roofing company did bid the cost of doing this work and it is included in our cost analysis.**

BPi would consider a price ranging from 4.8 $/W to 5.8 $/W reasonable depending on the level of solar readiness for the project. It is our opinion that a project like this one can be made viable with appropriate planning for a solar system.

If the previous comments reflect appropriate planning then it's difficult to arrive at the above opinion given our responses as well as the recognized regulatory and project issues.

Based on these comments BPi understands some of the complexities and cost drivers of the Benjamin PV design but not all of them, nor do they discuss them in any quantifiable detail. The analysis is missing the details and references back to our plan set, extensive cost analyses & bids, Q&A's and other documents we submitted to the CEC these last 16 months. Every PV company on our project had a significant number of questions during the bidding to assess the scope of this project. Finally, it is unclear what is

meant by 'viable' as we are specifically evaluating for cost effectiveness using the specific NREL cost categories and the framework of the CEC cost effectiveness process algorithms, neither of which is referenced.

End of C Note response to BPi comments

Section C. C Note's responses (in RED) to SunPower's 3/5/24 public comments on the Benjamin Project PV Determination request filed in CEC Docket No. 22-BSTD-04

SUNPOWER®

March 5, 2024
California Energy Commission
715 P Street
Sacramento, CA 95814

RE Docket 22 BSTD-04 2022 Energy Code Photovoltaic and Battery Storage Cost Effectiveness Determinations, Staff Review and Analysis of Benjamin Apartments Project

Thank you for the opportunity to provide comments on the Staff Review and Analysis of the Benjamin Apartment Projects as a part of Docket 22-BSTD-04. SunPower is one the nation's leading providers of residential and multifamily solar, battery storage, and energy services. SunPower currently serves more than 550,000 residential customers in the U.S. We provide solar and battery storage directly to customers and work with home builders and multifamily developers to install solar and storage in new construction projects.
We appreciate the information provided by C Note Limited Partnership and the analysis completed by staff at the California Energy Commission (CEC). We understand and support the need for cost effectiveness throughout the Building Energy Efficiency Standards and work to ensure that our projects are cost-effective and beneficial to the developers of multifamily buildings and their tenants.
We want to provide comments on several aspects of the Staff Review and Analysis of the Benjamin Apartment Project that we believe should be adjusted in the analysis or could be updated in project bids to achieve a lower cost project. There are several aspects of the staff analysis inputs that impact the cost effectiveness of the project.

Potential Updates to Project Bids to Reduce Cost

The bids for the Benjamin Apartments Project were received between November 2022 and May 2023. At this time, the price of copper was at an all-time historical high. This rise in the price of copper, driven in part by supply chain constraints during the COVID 19 pandemic, would be impactful for a project like the Benjamin Apartments. Without Virtual Net Metering (VNEM) and without this authority having jurisdiction (AHJ)

accepting the common practice of single disconnects or other interconnection means via a meter collar or breaker, each unit or common area will need to have a small solar system individually wired to its meter. The Benjamin Apartments Project bids would have been particularly impacted by the high material costs in late 2022 and early 2023 because of the additional wiring required to interconnect solar to each meter on the project. With materials prices declining in 2024, the Benjamin Apartments Project may see a decrease in the cost per watt of the solar installation, which would help improve the cost-effectiveness of the project. The high price of copper would not have been the only upward price pressure on the bids provided for this project. The bids for the Benjamin Apartments Project were also developed during a period of high inflation and interest rates which would have contributed to a higher cost per watt. During the time period that these bids were developed, inflation was near its highest point in the last 20 years. Higher prices driven by high inflation would be reflected throughout the bids provided. Inflation has been closer to 3% since the end of December 2023, which could lead to lower bid prices if the bids were to be submitted today. The start of construction for the Benjamin Apartments Project is likely closer today than it was in November 2022 which would provide greater clarity on the price of materials and current inflation rates that would serve as inputs to bids.

Copper wire did hit a high in 2022 with the copper wire cabling index peaking in April of 2022 at 425.86. Today it sits with an upward trend at 390.46 (current Jan 2024 price, update due 3/14), a decline of about 8% from 2022:

https://ycharts.com/indicators/us_producer_price_index_metals_and_metal_products_copper_wire_cable

However, the index does not include transportation, overhead, and profit at electrical distributors. You'd be hard pressed to find an electrician or electrical subcontractor who would agree costs have declined even 8%. Most would say that costs have increased as continued pressure on overhead and labor costs have burdened electrical suppliers. In any case, while a few material supplies have seen cost decreases, continued material price hikes, overhead and especially labor costs contribute to high prices throughout the construction industry creating net increases in overall project costs.

As far as inflation is concerned, we have had higher inflation in the recent past and it has moderated since then. But since it has not turned into 'deflation', lowered inflation does not at all imply lower prices. Quite the contrary since inflation continues to increase albeit at slower rates. However, the inflation index is not specifically tied to the construction industry. We can say that select materials have lowered in cost but overhead, transportation and labor costs are trending higher, netting higher costs overall.

Some utilities and AHJs allow solar on multifamily buildings to use the breaker or a single disconnect switch for the entire system rather than individual bladed disconnects for each point of interconnection. If the City of Lodi and Lodi Electric Utility (LEU) were to allow an option for disconnects other than individual bladed disconnect switches, the materials and installation cost of the solar would decrease.
Understanding Lodi and LEU's openness to disconnect options other than individual bladed disconnect switches should be further explored.

These issues surprised us initially (and all companies that bid on the Benjamin PV project) and these issues (among others) were discussed with LEU extensively for many, many months prior to us contacting the CEC and applying for a PV cost effectiveness determination. Like many other public utility companies, particularly smaller ones, throughout the state they have established regulations wherein these options are not available. Hence the suggested cost savings through pursuing these sorts of approaches are not available for the Benjamin project.

Modifications to Inputs to the CEC Cost Effectiveness Analysis

There are several inputs to the CEC cost-effectiveness analysis that we believe should be updated to reflect more accurate operations and maintenance costs and utility rate escalation. First, the CEC analysis on cost effectiveness adds $0.78/W in O&M plus inverter cost based on data from NREL, which will often be duplicative to bids put forward by solar contractors and adds additional unnecessary cost to the analysis. Many solar contracts will have O&M including inverter replacement as a part of the warranty that is standard in the contract and reflected in the bid price. Many solar warranties cover nearly the entire 30-year period that the CEC cost-effectiveness analysis – solar warranties are commonly 25 years. CEC staff should ensure that any additional cost that is being added to account for O&M or inverter replacement is not duplicative to the solar developer's warranty thereby adding unnecessary double counted cost in the in the cost-effectiveness analysis. In the cost-effectiveness analysis on Building C for the Benjamin Apartments, the benefits-to-cost-ratio (BCR) was between 0.93 and 0.95 and could easily be impacted by the $0.78/W that CEC staff added to the bids. Additionally, many developers such as SunPower offer full-service warranties on installed systems, which go beyond the manufacturer's warranty and offer more protection against any potential future O&M costs.

In reviewing O&M model costs with the CEC in the summer of 2023 we agreed that the initial NREL cost estimate of $0.78/W for inverter replacement was high. On further review we discovered that NREL updated this for microinverters and allocated $2.50/kW/year for microinverter labor replacement which was not covered by warranty. At that time we discovered a number of unaccounted O&M costs (and others) which brought the total of O&M well above $0.78. The model run by the CEC for the final cost effectiveness study included an early cost analysis without these updated additional costs. Here's is part of the letter (in italic) sent to CEC staff on August 22, 2023, discussing the O&M issues:

Discussion on O&M Costs
First, before addressing Benjamin O&M, we'd like to reiterate NREL's comments on the cost models. It explicitly states that the models are average national benchmarks for the type of project they are reviewing and do not necessarily represent the specifics of any particular project or location. For the Benjamin project this is certainly the case as we've seen with cost issues due to the construction specifications and the limited options for solar design due to utility requirements. These same issues also reflect directly on calculating lifetime PV O&M for the project. The Benjamin project is a large scale multi-residential project professionally managed with maintenance, repairs, and inspections conducted by subcontractors who are qualified and insured in their areas of expertise. There are no unlicensed 'handymen' working on a project like this given legal requirements and the liability issues associated with families living in these units. Given that perspective, we do not see any

equivalent analyses in the NREL PV cost studies conducted to date especially when the unique Building C characteristics are considered.

Here's our analysis of the O&M issues in the Benjamin project (NREL categories):

PV inspection
$250 per year for one inspection on Building C.

Microinverter replacement (labor only, hardware covered by 25-year warranty)
NREL acknowledges the 25-year warranty on microinverter and allocates about $2.50/kW/year (2021$) for microinverter labor replacement.
$2.50 x 25.680kW = $64 in 2023.

Module and other component replacement
NREL estimates about $4.50/kW/year (2021$) for PV modules and miscellaneous component replacement.
$4.50 x 25.680kW = $116 in 2023.

Module cleaning
Given that Lodi is surrounded by miles of agricultural land, two cleanings per year are to be expected. (in several of the past ten years, three cleanings would have been necessary due to fire soot) Clearview Washing Service bid for Building C: $540 washing X 2 = $1080 per year.

Insurance
Impact of Building C PV on Property and liability insurance = +$396 per year.

Roof Inspection (added costs due to PV)
The roofer's re-quote for inspecting Building C with roof top PV and the associated roof penetrations increased by $2,266 per year.

Total O&M per year – Building C (in 2023 $) $4,172 in 2023.
Present Value of O&M costs (2023 = $4,172, 30 years, 3% discount rate) = $84,226
Minus 30% Federal Investment Tax Credit = $58,958 or $2.30/kW O&M costs on Building C.

The microinverter replacement cost has clearly been significantly reduced reflecting labor costs only. However, it's clear that there are other significant maintenance and inspection costs associated with normal operations as well as the TPO roof.

The CEC analysis of benefits includes an average utility escalation rate of 1.6%. While the Lodi City Council has approved only a few rates base electric rate increases in the last several years, the Energy Cost Adjustment (ECA) changes each month and contributes to increases in volumetric rates for customers. While the ECA can be applied as a credit to customer's bill, the number of months where the ECA is a credit to customers has decreased over the past decade. The ECA rate changes in response to changes in energy costs and power consumption. LEU doesn't anticipate an increase to the base electric rate until after 2030, but the ECA will

continue to fluctuate in that time. Based on data from the Energy Information, since 2004, Lodi Electric Utility has had an average rate escalator around 3%.
The CEC is in discussions with Lodi Electric Utility (LEU) regarding the escalation rate. Given capital improvements that LEU has recently made, we understand that the LEU cost escalation rate is now 0.9%.

Unique Elements of the Benjamin Apartments Project

There are several elements of the Benjamin Apartments Project that are unique and contribute to the cost of the project. This project should not be understood as representative of multifamily solar projects. C Note Limited Partnership selected a union-based electrical subcontractor for the Benjamin Project, which includes higher labor costs at local prevailing wage. The developer included information in the docket on their choice of electrical subcontractor, which was not driven by a requirement. A union-based electrical subcontractor was selected for the project because they had a large enough staff size to complete the project. This choice in subcontractor contributed to increased labor costs on the project.
We agree with several of the comments in the above paragraph but take issue the notion that the 'choice of contractor contributed to increased labor costs on the project." SED Electric was the low bidder among a number of electrical subcontractors capable of handling the Benjamin project. They were chosen as a result of being the low bidder plus had the staff and competency to get the job done. The fact that they were a union-based company was coincidental in the decision-making process.

The Benjamin Apartments uses a TPO roof which increases the costs of the solar project – this necessitates a costlier racking or ballast system, and TPO roofing penetrations are more costly to seal. Those costs would also have been driven by the roofing subcontractor, as it is typical in a new build for the roofer to require that they seal all penetrations in order to keep their roofing warranty intact.
High interconnection fees contribute to an increased project cost for the Benjamin Apartments.
The Benjamin Apartments are on three-phase electric service, which includes a higher interconnection fee of $1,207 per point of interconnection – essentially adding a significant cost to each unit. Many utilities across California have interconnection fees significantly lower than Lodi, particularly for the smaller solar systems that are being interconnected to individual tenant meters in the Benjamin Apartments Project. For example, Sacramento Municipal Utility District (SMUD) has an interconnection fee of $475, Alameda Municipal Power has an interconnection fee of $660 for multifamily, and Merced Irrigation District has an interconnection fee of $600 – essentially half of the cost of the Lodi interconnection fees or lower. Lodi also requires additional production meters to be installed for all solar projects, which is included in their interconnection fee. The requirement for a separate production meter not only drives up the cost of the interconnection fees in Lodi – it requires additional wiring and labor to be installed. In Lodi, each point of interconnection would be required to have a consumption meter, a production meter, and an individual bladed disconnect. Many utilities across California do not require additional production meters, which are a very unique, unnecessary and onerous requirement of this particular AHJ.
The Benjamin Apartments Project has a particular set of circumstances – from the timing of the bids to the additional costs incurred based on requirements from the utility and local AHJ to additional labor costs based on the use of prevailing wage for a subcontractor – that are all contributing to a higher project cost. We do not

believe that the Benjamin Apartments Project is representative of other multifamily solar projects across California, including those that require individual points of interconnection at each tenant meter.

The timing had little impact with continuing cost escalations per our previous comments here. We do agree that the Benjamin PV Project in Lodi, CA has unique issued at play and is not generally representative of other multi-family projects across CA, particularly in PGE jurisdictions with VNEM available.

CEC staff have added additional costs for O&M and inverters that could be duplicative to the warranty offered by contractors bidding on the project. The confluence of these factors is currently resulting in a BCR of less than 1. Updating the cost-effectiveness model to reflect project warranties and updating costs to reflect an easing of supply chain constraints and inflation could reduce the project bid to move the BCR to above 1. We believe that if new bids for the project were submitted in the first half of 2024, the project could benefit from cost savings. Additionally, we request that CEC staff remove duplicative costs from the cost-effectiveness analysis and review the utility escalation rate that should be included in the model.

We have addressed the cost and O&M issues and hopefully cleared up any misconceptions or confusion. Given that the CEC is reviewing new cost escalation data from LEU with the prospect that their analysis may make the CEC staff report's recommendation even more solid. Furthermore, we believe that if the CEC cost effectiveness modeling were run again with our actual O&M expenses outlined in the 8/22 email then our margin for a cost effectiveness exemption determination would improve even further.

Thank you for the opportunity to provide comment on Docket 22-BSTD-04.
Sincerely,
Bronte Payne
Manager, Policy and Strategy
SunPower
Bronte.payne@sunpower.com

End of C Note response to SunPower comments

Section D. C Note's responses (in RED) to Powertree Service's 3/5/24 public comments on the Benjamin Project PV Determination request filed in CEC Docket No. 22-BSTD-04

Powertree Comments re Analysis and Cost effectiveness of Benjamin Apartments Cost Effectiveness
March 5, 2024 CEC Docket: 22-BSTD-04

Contact: Stacey Reineccius, CEO@powertree.com

Overview:

In considering any exemptions to a mandate we think it is critical to understand that the purpose of a mandate is to spur change and that change creates the necessity for new ways of doing things to be worked out.

The 2019 Title 24 Code has mandates, processes and assumptions in place are based on years of prior work by the CEC, other agencies and stakeholder feedback. The CEC PV Exemption Determination process relies on this significant body of work. 'New way of doing things' unfold with innovations in technology & processes and changes in utility regulatory environments within a defined process through successive versions of Title 24 Code every 3 years.

The Benjamin Apartments Project while analyzed as not Cost Effective by Staff can be achieved in Cost Effective if certain assumptions to the design and approach based on modern technology and not techniques that were developed for a different market segment than the one being addressed by Benjamin Apartments.

In successive comments throughout this document we'll address standard practice within the context of the 2019 Code, local utility requirements, building design and market segments.

Powertree Services Inc., having focused on Multi-Family since 2009, has deployed multiple approaches and evolved its technology for Multifamily deployments. But Powertree is not alone with recent new entrants such as Holu Hou and Allume also providing offerings.

The design approach embodied in the Benjamin Apartments project is the same that Powertree implemented in projects in 2009, almost 15 years ago with similar outcomes of complexity and un-necessary costs.

The Benjamin Project design approach followed the 2019 Title 24 Code and standard PV industry practices (given the regulatory issues) and this is reflected by the publicly posted comments by BPi and Sunpower regarding the Benjamin Project.

Building on these 15 years of experience, Powertree wishes to make some comments and suggestions to improve the cost effectiveness of the Bejamin Apartments Project and potentially future similar projects.

Comments:

1. The property Owner/Developer has a right under Public Utilities Code Secon 218(a) to generate energy for its own use and to sell or provide to its tenants. The Owner is NOT required to utilize the Utility for 100% of its electrical supply. This option is not mentioned in the report nor apparent in the bids.

Lodi Electric Utility, as a public utility and a wholly owned entity of the City of Lodi has specific regulations in place that do not allow the resale of electricity within in utility district, among other regulations. This is not an option for the Benjamin Project.

2. Based on the bid descriptions in the Staff report it seems no other technological approach was investigated by the Developer or the bidding Contractors that would facilitate a Cost Effective system installation. While VNEM is not available, the purpose of VNEM being to facilitate the billing and value allocation, at least three other approaches are available in the market that could have been analyzed for bid all of which are UL certified with live projects installed:
    a. Powertree's Energy Allocator™ system. A fully behind the meter Zero Back Feed system with Solar, Energy Storage and support for EV charging and Backup power per apartment allowing per apartment

customization and Opt-In access to the onsite energy without needing either NEM or VNEM. All onsite generation is self-consumed.

b. Holu Hou Enhanced Hybrid: A low rise focused behind the meter solar plus battery system that switches DC generation from low use to high use apartments. Can work with NEM.
c. Allume Energy: A NEM adjacent phase matching system that facilitates a higher rate of self consumption.

The Benjamin project/building design started in 2021 and (as there was no mandate for battery requirements) has not allocated space or future-proofing aspects of design required for batteries, battery safety and interconnection. We designed with standard industry practices given the Code and utility issues in play. As property owners looking out over at 30 thirty-year horizon we would not favor niche, proprietary solutions not widely adopted within the PV industry.

3. Apartment loads can change dramatically over time as tenants turn over and new tenants move in and/or if a tenants changes jobs and moves from remote work (where they have high at home loads) to in-field work (where they have lower at home loads) or vice versa. A KEY design consideration is that today's (or last year's) load profile WILL Change when a new tenant moves in OR the current tenant changes their work style. This dynamic is not accounted for or reflected in the Lodi designs.

This is neither a requirement nor a key design consideration for the Benjamin Project based on a project designed under the 2019 Title 24 Code. Furthermore, it is not an issue included by the CEC in modeling/analyses of the Benjamin Project designed under the 2019 Title 24 Code.

4. The Solar array due to the fixed sizing and lack of controls matching generation delivery to load only achieves a fraction of its potential value and will back feed, at lower compensation rates, a significant and variable amount of its production. Powertree's study on live sites has shown that a fixed array will have a self-consumption rate of between 24% and 47% depending on the array size and tenant work style. Larger arrays and away from home workers have lower self-consumption rates. This reduces the value achievable from a system. By contrast, systems with storage and controls can achieve self-consumption rates in the high 90%+ range.

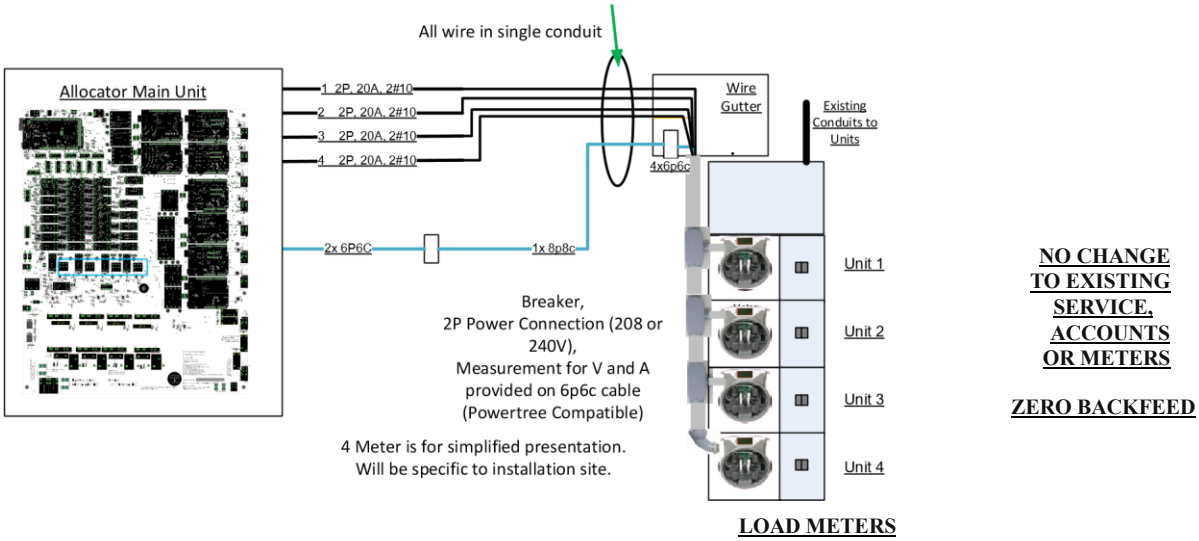
The Benjamin's PV designs/bids were based on standard, common PV practices. Lodi Utility's compensation rates are among the most generous in the state of California at this time and were factored into the CEC algorithm's modeling and analysis.

5. Wall mount disconnects and subpanels *are not the only way for solar to be connected* to a Tenant or recipient meter and should not be the assumption for cost estimations.

   As in any application the appropriate technology needs to be used. Multi-Family presents some unique needs in their design. For example, DC Coupled systems feeding the Solar PV into a battery can have a single disconnect for the Battery and flexibility for the AC connection.

   Use of Meter Socket adapters with or without Microgrid capabilities is currently approved or being approved by the IOUs and are directly transferable to non-IOU installations. [UL 414 SB approved] The meter socket adapters are safer than standard sockets as they cool the meter more and they integrate the disconnect AND V & A measurement directly into the adapter. ***Adapters take less than 30 minutes to install and require NO additional wall space and lead to MUCH lower installation costs per meter.***

Here is an example SLD of a Meter Adapter installation of a Powertree system:



Companies other than Powertree are also in the process of adapting for the use of Meter socket adapters. Legal analysis shows that the Meter Socket itself is owned by the Property and only the Utility Meter is owned or restricted by the Utility. As such, the benefits of a Meter Socket Adapter use are within the control of the Property owner and the local AHJ and can be applied in ANY Utility territory.

This 'legal analysis' appears to be incomplete. As a public utility, Lodi Electric will not allow the use of meter sockets due to a number of concerns (practical, legal, and liability related). This is true for a number of other utility districts throughout the state. Furthermore, microgrids are also not allowed with the Lodi Utility District.

6. The ITC level of the projects was bid without using the Domestic Content ITC adder of 10%. Domestic panels and equipment are available and would contribute to raising the CBR. This would be an ITC level of 40% NOT the 30% used in the analysis.

Domestic sourced products are often more than 10% higher in cost than alternative products. Beyond that - as with any prudent procurement – quality, availability and supplier reputation are important considerations.

7. No value is calculated or presented for the long-term Equity Value gain to the property from increased income for the property. Unlike Single Family properties, Multi-Family properties values are based upon their cash flows and the short hand known in the RE Industry as the Cap Rate (Cap Rates, Explained | JPMorgan Chase). This value gets increased when solar is applied and is a separate value resource that is available to the building owner. It should be ADDED to the NPV of the cash flow itself when calculating the Cost Benefit Ratio.

This is yet another issue that falls into the category of 'future considerations' as it is not currently a formal part of the CEC cost-effectiveness model/algorithm.

8. The Utility rate escalation value of 1.6% used in the analysis does NOT reflect the actual history or recent increases actually posted by Lodi Electric. Residential figures are quoted as a 2.00% increase rate and commercial at 3.00%. As tenants are paying the Residential rates it would be more accurate to reflect the 2.00% rate.

There should be continued discussions between the CEC and LEU. Given capital improvements that LEU has recently made, we understand that the LEU cost escalation rate is now 0.9%.

9. A Non-Export/Zero Export system will not be impacted by the compensation rate decline of Table 14 as all energy is self-consumed and would be valued not at the export rate but rather at the displaced retail value based upon the tier of consumption. Instead of $0.10/kwh the value would be higher by at least the 5 years of compounded escalation on the full retail value. This would be at least $0.15/kwh or more in value depending on an apartment's specific consumption level.

10. No consideration is made for the cost benefit and value impact of using a battery system. Under Title 24 this can allow for a 25% reduction in PV size, a trade of in battery cost but properly designed would entail only 1 DC disconnect per building and facilitates higher value by increasing self-consumption if the appropriate controls are available. [See comment #2 above].

Regarding 9. and 10., a battery system was not integrated into our project design as this was not mandated in the 2019 Code. Neither were future-proofing options involving space and interconnects considered.

11. No reference is made to any discount to value that may be provided to tenants. This would reduce the effective value to the Owner but assure an alignment of interest and benefit for the tenants.

This also relates to #7 above. This could be a forward-looking code revision for future consideration but is not an element of the cost effectiveness algorithms/models for the 2019 Title 24 Code.

12. Using similar system parameters but adjusted to reflect an alternate technology approach, the Powertree Allocator we see that Benjamin Apartments could achieve a positive CBR, comply with Title 24 with a 160.4KWdc plus 641 kwh battery spread across the buildings, not require NEM or VNEM and deliver savings to Tenants while achieving a positive XIRR to the Owner after savings to the Tenants. Such a system would achieve a positive Cost Benefit Ratio as follows:

30 Year XIRR	5.9%
30 Year Benefit Ratio	
NPV Value	$ 1,223,059
Cost	$ 1,147,979
BCR	**1.07**
$/W Including ESS & ITC	$ 4.29

NOTE here that the all-in cost per watt is POST ITC.
Cost is below the Staff Report final cost per Watt/

13. If the benefit of the Equity value [per Comment #7 above] is considered the CBR performance improves dramatically:

NPV + Equity	$ 2,483,391
Cost	$ 1,147,979
BCR MF	**2.16**

14. While not reflected in the Staff report we draw attention to the additional Title 24 requirement for EV Charging placement and potential revenues from that capability. There is synergy between the solar, the battery which can be used for demand reduction and resilience as well as value enhancement by using the Solar PV to displace the energy loads from electric vehicles. If 4 shared used, 50A chargers, were included priced for use at 50% of the equivalent cost per mile of gasoline and fed in part from the solar in Lodi here is the projected CBR impact:

30 Year XIRR	19.7%
30 Year Benefit Ratio	
NPV Value	$ 5,634,596
Cost	$ 1,223,655
BCR	**4.60**
$/W Including ESS & ITC	$ 4.58

NPV + Equity	$ 25,679,580
Cost	$ 1,223,655
BCR MF	**20.99**

Regarding comments 12, 13, and 14:

Given the issues we've outlined previously in this response we find it untenable to engage in a moving target analysis that assumes a different regulatory and legal environment, building design, PV standard practices, Code framework, and PV exemption process than the ones that are actually in place and that we have been dealing with these last two- and one-half years.

SUMMARY:

1. The Benjamin Apartments project CAN be done with a positive Cost Benefit Ratio.

As noted in the previous response, given the reality of the regulatory and legal environment, building design, PV standard practices, Code framework, and PV exemption process that has faced the Benjamin Project we respectfully disagree with this assertion.

2. We suggest that CBR analysis in multi-family include the Equity addition to the property when evaluating the Present Value of Cost Savings as the local Cap Rate impact is meaningful to the Owner and the local community tax base.

We view the above suggestion as a potential 'future consideration' for Title 24 Code cycles.

3. This case shows a clear need for the inclusion of multiple technological approaches in bids to meet Title24 requirements before any exemptions are granted.

Given that the CEC is moving to mandate more aggressive adoption of battery technology in future cycle reviews it's not clear yet that this is required. If one or more of the technologies incorporate proprietary, patented technology, PV stakeholders may have a variety of inputs as to whether or not this is in the public interest.

4. PRIOR TO any request for exemption a Developer should have a quote/design using at least two different technology approaches that are appropriate for the project. If only one is suitable then the reason for the others not being quoted should be noted.

In line with our previous comment, significant future CEC analysis and stakeholder feedback should be conducted.

5. Because there are synergies in avoiding grid upgrades, increasing resiliency, establishing support for EVs (also a requirement in Title 24) and significant value

benefit for all parties we encourage including the revenue and cost impacts of the concurrent installation of EV charging when evaluating Cost Effectiveness.

The above response may be a future consideration for battery and EV-based systems.

6. Powertree is happy to provide more detail to the CEC on our analysis and costing with appropriate confidentiality protection.

Moving forward in new Code cycles new, sole sourced, proprietary & patented technologies should be subject to open evaluation and transparency for all stakeholders.

We appreciate the effort that Powertree Services Inc. has made to examine efforts at reducing costs. Many of them deserve more open and widespread discussion as the CEC and within the industry as moves California toward electrification and lowering greenhouse gas emissions. Our concern with the analysis at hand is ensuring that we are evaluated to the regulations, standards and practices in play over the period of time this PV exemption determination has been on-going. Listing all potential cost reduction avenues creates a useful list for future discussions. However, on any given project there exists a framework of practical issues that limit the scope of solutions.

End of C Note response to Powertree Services comments

Section E. C Note Summary

The Benjamin Project PV design and evaluation process started over two-and-a-half years ago. We worked diligently with Lodi Electric Utility (LEU) to pursue a VNEM approach including floating the idea of paying a developer to enhance their database &

infrastructure. We explored a number of creative approaches in hardware design as well. After that first year we began to work towards filing the requisite information and data with the CEC to pursue a formal PV exemption determination. That process has lasted approximately 16 months with the give and take of answering questions, modeling and providing additional quotes and data.

As the BPi and Sunpower public comments illustrate the PV design approaches submitted for the Benjamin Project are very much relevant given the Project's regulatory requirements. Indeed, both of these companies noted the 'unique elements' of our project and the particular set of circumstances we find ourselves in given:

1. **The regulatory and legal requirements**
2. **The CEC 2019 Title 24 Code framework**
3. **Our building design, size and market segment**
4. **Standard PV design deployed by a wide variety of companies**
5. **The CEC PV exemption process and associated modeling and analyses.**

These are not moving targets, but rather the reality of what we've been dealing with these past two-and-a-half years. One of the biggest misconceptions in the public comments relates to the significant differences between large and small, public and private utility companies. They often operate with significantly different regulations as we have seen. One of the key purposes in having a PV exemption process is that one size does not fit all.

Should design and build approaches in the PV industry change? Of course! The PV industry is one of the most vibrant sectors within the entire construction industry, with new generations of products being introduced literally every two or three years. One can make the case that some of these innovations are moving faster than our normal regulatory rules and process cycles. It's important for the public that technology be widely available. Technologies that are proprietary, patented, and/or otherwise unavailable to public and stakeholder review are often not historically conducive to lower cost approaches as they have the potential to tilt towards monopolization of market segments. Open standards, interoperability, and transparency will ultimately be the drivers for lower costs and widespread adoption of next generation production, management, and monitoring technology.

Given our responses noted throughout this document, the current discussions related to the LEU utility rate escalation value, and the apparent omission of our (higher than NREL) actual O&M costs we believe that the CEC staff recommendation for a PV exemption determination for the Benjamin should stand and continue to move forward.

We appreciate that a PV cost-effectiveness 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,

David F. Chase
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