

Memorandum

TO: Dr. Sadiq B. Ikharo, Vice Chancellor, Peralta CCD

FROM: Clyde S. Murley, Solar Program Manager, Community College League of California

CC: Kimi de los Reyes, Director of Services, Community College League of California
Nicholas González Yuen, Trustee, Peralta Community College Board
Atheria Smith, Facilities Planning & Development Manager, Peralta CCD
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RE: Community College League of California Evaluation of Chevron Energy Solutions' Preliminary Solar PV Proposal for Merritt College

DATE: September 20, 2009

A. Introduction

This memorandum responds to your request, as well as a request from Peralta CCD Trustee Nicholas González Yuen, for the Community College League of California ("CCLC" or "League") to provide an evaluation of a preliminary proposal, dated July 10, 2009, prepared by Chevron Energy Solutions Company ["Chevron ES"] entitled "Merritt College Campus Solar PV System."¹ This proposal concerns a possible solar PV system, 1.2 megawatts direct current ("MWdc") in size, which corresponds to 1.0 MW alternating current (ac). In the context of providing this evaluation you asked for responses to several specific questions:

- 1) Is the analysis realistic and is the scope of work realistic?
- 2) Are there any hidden costs?
- 3) Will the PV system generate the most electrical energy for the District's investment?
- 4) Are the overall costs competitive?
- 5) Is the payback period analysis data realistic?

As you requested, in responding to these questions below (Questions 3 and 4 have been combined) the League is providing its recommendation as to whether it would be reasonable for the Board to approve the Chevron proposal for the purpose of entering into contract negotiations with Chevron. The League's evaluation below addresses this threshold issue, the specific questions above, and the fundamental question of whether there is *enough* information in the Chevron ES proposal to warrant moving ahead with Chevron ES at this point. It is important to understand that the evaluation contained in this memo does not attempt to evaluate every single aspect of the Chevron ES proposal, but

¹ The League refers to the proposal as "preliminary" based on Chevron ES's characterization throughout the document of its "preliminary analysis" of the proposed solar PV projects.



rather to provide enough evaluation for the district to answer the threshold question facing the board.

In March of this year the League launched its Solar Electric Consulting Services Program, which provides its member districts with support and analysis as they pursue possible procurement of on-campus solar PV systems. Since that time the League has been working with many districts that are in various stages of their solar PV procurement process. Among other things, the League provides assistance with districts' solar PV competitive procurement processes, including recommending RFQ and RFP content, evaluating vendors' proposals (including pricing, cost effectiveness, system performance characteristics, vendor qualifications and track records), and working with district staff and boards. Based on its preexisting Electricity Consortium (of which Peralta CCD is a member), which has assisted districts with their electricity procurement since 1998, the League has gained extensive experience conducting competitive energy procurements on behalf of its member districts. This experience provides a strong foundation for the League's Solar Program.

Attached to this memo is (1) a brief description of the League's Solar Program and (2) the RFQ/RFP template that the League recently prepared and sent to all the districts' chief business officers. The RFQ/RFP template is provided to give a more detailed sense of the kinds of information that the League generally believes is important to obtain about solar PV vendors and their proposals.

B. Summary of Recommendations

For the reasons described in the following sections of this memo, the League offers these summary conclusions and recommendations to Peralta CCD regarding the Chevron ES proposal:

- 1) Because of the preliminary and relatively cursory nature of the Chevron ES proposal, the League does not believe that it serves as an adequate basis for the board to authorize moving forward with contract negotiations with Chevron ES on this project.
- 2) At a minimum, the League recommends that the district issue an extensive data request to Chevron ES so that the district has adequate information on the system's cost and cost effectiveness, its technical specifications, its performance characteristics, warranties and performance assurances, performance monitoring, and information on Chevron ES's solar PV track record, among other areas.
- 3) The League believes strongly that districts' solar PV interests are better served if it has full-fledged proposals from at least two qualified solar PV vendors before it decides to enter into contract negotiations with any single vendor. In its electricity and solar PV procurement experience the League has consistently found that having multiple qualified proposals can produce significant cost savings over sole source



proposals. A solicitation to one or two additional solar vendors could be done concurrently with the recommended data request to Chevron ES, putting both processes on similar timelines.

- 4) With respect to Chevron ES's recent price offer for its proposed system—approximately \$8.4 million—the League believes that there is strong possibility that one or more reputable competitors, using the same two proposed sites, could produce equivalent electricity output at a significantly lower price, perhaps as much as \$1.0 to \$1.5 million less. This preliminary estimate is based on actual binding price quotes for similar-sized systems and on general solar PV market data. Furthermore, it may well be possible to achieve a significantly higher electrical output—on the order of 15% higher—than Chevron ES is proposing, at a price that is still significantly less than Chevron ES's latest price offer. This would have the double benefit of providing a corresponding increase in the amount of electricity purchases that are offset and a corresponding increase in the size of the state California Solar Initiative rebate. A 15% boost in output would provide, in present-value terms, about \$30,000 per year in additional cost savings from offset electricity purchases and about \$300,000 in additional CSI rebates.

C. Evaluation of Chevron Energy Solutions July 10, 2009 Merritt College Solar PV Proposal

1. Information Completeness

A threshold question regarding the Chevron ES proposal is whether it contains enough information to warrant a Board decision to move forward with Chevron ES to the exclusion of other possible solar vendors. That is, even apart from the matter of answering your questions above, the district should be confident that Chevron ES has provided enough information to make its preliminary proposal ripe for a Board decision. On this basic question, relying on the July 10 proposal alone, which the League has been told is all the relevant information that has been provided by Chevron ES, the League would not be comfortable recommending that the Board enter into contract negotiations with Chevron ES. To put this recommendation into perspective, we have attached a solar PV RFQ/RFP template that the League has prepared for possible use by districts considering a solar PV competitive procurement process. This template contains the kinds of information that the League believes ought to be in hand—preferably from multiple vendors, not just one vendor—before a district's board declares its intent to award a solar PV contract to a particular company. Chevron's proposal falls short in meeting these information requirements in numerous respects. This is not surprising, since Chevron itself states explicitly that the July 10 proposal is only preliminary in nature, and the League would generally counsel against moving forward on the basis of any vendor's preliminary proposal.



A partial list of the kinds of information that we believe a district should have in hand to be able to properly evaluate a solar PV proposal, and that Chevron's proposal does not appear to provide, is as follows:

- a) Identifying information (e.g., manufacturer, model) for the PV system components (e.g., inverters, PV panels);
- b) Performance-related information (e.g., for PV modules, their efficiencies, PTC ratings, industry track record, independent verification of performance claims) on all significant system components;
- c) Size of area covered by each PV system and greater detail regarding system placement;
- d) Description of utility interconnection issues posed by the proposed placement of the PV systems;
- e) Analytical and empirical support for all electricity output performance claims, including working versions of the models used to calculate these claims;
- f) Analytical and empirical support for cost-effectiveness claims;
- g) Explicit assumptions regarding net energy metered quantities of electricity produced by the solar PV system;
- h) Detailed description and demonstration of proven track record of ongoing performance-monitoring system and services;
- i) Empirical verification of performance claims for systems previously installed by Chevron ES;
- j) Copies of all documents Chevron would be requiring the district to sign;
- k) List of customer references with similar solar PV installations.
- l) Complete descriptions of the education and green jobs components mentioned in the proposal.

The many information gaps would not necessarily be a serious issue if the preliminary proposal submitted by Chevron ES were to be followed up by a suitably comprehensive district data request and Chevron ES response that resulted in a more proper, full-fledged proposal. However, given that Chevron ES's preliminary proposal appears to be the sole basis for the Board to make its decision, the League has serious doubts about the advisability of moving forward with Chevron ES based on the information provided in its preliminary proposal, even apart from price and other considerations addressed below.

2. Is the analysis realistic and is the scope of work realistic?

a) Economic Analysis

Chevron ES provided some cost-effectiveness analysis in its proposal, based in part on simulations of the electricity production of the PV system. A key aspect of cost effectiveness is system output. As already noted, the proposal lacks manufacturer or model type information and no underlying performance characteristics of the system are provided. So while it is quite possible for a 1.2 MWdc PV system to produce on the order of 1.5 million kWh per year, as represented in the proposal, without these system specifics



and production simulation data, it is not possible to verify Chevron ES's claim in this instance.

Chevron ES used a model called PVWatts to simulate the solar productivity of its proposed system. PVWatts is not as sophisticated as other solar production models in that it does not consider certain real-world effects (e.g., shading, temperature and irradiance interactions) that can affect system productivity. Evaluating the extent to which this could be an underlying problem in Chevron's analysis goes beyond the scope of this analysis, especially since the actual system components have not been identified. We generally recommend that Chevron ES or another party confirm the production predictions in the preliminary proposal through use of another model, such as PVSYST, which is known to do a better job of accounting for real-world conditions than does PVWatts.

Perhaps a bigger concern with Chevron ES's economic analysis is that it makes a number of unsupported, questionable, and apparently conflicting assumptions about the costs that would actually be avoided by the PV system. Having reliable avoided cost data is critical to understanding the economic value of the proposed PV system.

Among other things, the explanation of the savings calculation methodology on p. 3-5 in Section 2 does not explicitly address whether and how *demand* as opposed to *energy* savings are handled by the Chevron ES model. The League has seen many instances in which savings claims assume that a solar PV system will achieve the same degree of demand savings as energy savings and this is not generally the case. This assumption leads to overestimation of PV cost savings. There is no way to verify whether Chevron ES's model separately and properly models avoided demand charges.

In one place in the proposal the current avoided cost is stated as \$0.14/kWh (on p. 3-7 in Section 2 in the list of assumptions. In contrast, Chevron ES's proforma analysis (Table 2-3 in Section 2) on the following page implies an avoided cost of \$.175 per kWh, and elsewhere (Table 3-1 in Section 3) the avoided cost is stated as \$0.178/kWh. These discrepancies are not explained and require resolution. The very brief (1/3 page) description of the calculation methodology (p. 3-5 in Section 3) is not only insufficient, it also refers unaccountably to a completely different tariff (the more expensive A-6 instead of the College's apparent existing E-19 tariff²) than would appear to apply in this case. Use of the A-6 tariff would significantly overstate the cost savings of the proposed PV system. If Chevron ES in fact is assuming that Merritt College would be eligible for this other tariff, this assumption is not made explicit nor is any justification provided. Moreover, the League has recently learned from PG&E that PG&E expects to eliminate the tariff in question (A-6) over the next several years, making its use highly questionable in a solar PV cost effectiveness calculation.

² The proposal fails to state whether the Merritt College utility account receives service at the primary or secondary voltage level from PG&E. This makes a significant difference in the costs that would be avoided by the PV system.



b) Is the Scope of Work Realistic?

The scope of work is written at a very general level. While it seems generally reasonable for the purpose of a preliminary proposal, it contains none of the typically provided specifics about such things as site preparation requirements, construction process, location of utility connection points, and any voltage step-down requirements. This is a significant concern for a document that would be relied upon by the board to declare its intent to award the solar PV contract to Chevron ES. The proposal also alludes to certain concerns and constraints imposed by the district (e.g., "Based on the requirements for parking lot "C" expressed by the district..." p. 3-13) to which the proposal apparently responds. These concerns are not explained well enough for the League to evaluate how the proposal took them into account and whether there might be better ways to take them into account.

3. Are there any hidden costs?

It was beyond the scope of the League's evaluation to conduct an in-depth investigation of what would be required to install an optimally designed 1.2 MW solar PV system at the proposed sites. In order to conduct such an evaluation the League would effectively need to complete most if not all of the steps listed on page 1-3 of the Chevron ES proposal under "Work Performed." Given this limitation and given the fairly cursory and generic description of its proposed PV project, it is therefore impossible to know for sure whether Chevron ES has omitted any costs in developing its price proposal. This is one of the chief reasons for obtaining additional information from Chevron ES as previously recommended. However, as written the League has at least the following concerns about possibly omitted costs from the Chevron ES proposal.

Quoted price is only called an "estimate": On page 3-5 the proposal states that "*Chevron ES has developed an estimated budget to build a 1.2 MW solar system at the Merritt College location.*" The table on the following page (Table 2-2) repeats the word "estimated" in its title. It is therefore unclear that Chevron ES has in fact made a binding price quote in this preliminary proposal.

O&M: It appears that O&M-related costs might not be included in the estimated price quote, but this should be confirmed. This cost is stated on p. 3-7 in Section 2 as \$0.01/kWh, escalating at 1.5% per year. At the same time, this same list includes the "Total Estimated Cost" figure, possibly implying that O&M costs *are* included. O&M costs also do not appear explicitly in the project cost breakdown in Table 2-2 in Section 2. The district should confirm whether these costs are included in the project total or not. If they are not, the district should obtain Chevron ES's O&M cost proposal as well as detailed descriptions of all O&M services.

Site preparation: The League would expect that both the ground mounted system and the parking lot system would entail some amount of site preparation. No costs are



identified for such preparation. The district should confirm whether there would be such costs and whether they are included in the cost estimate.

REC Value: "REC" stands for "Renewable Energy Credit." A REC in effect represents the value of the environmental attribute of the output of a solar PV system and is equal to 1 MWh of electrical output. Under certain circumstances the owner of a solar PV system can sell its RECs on the open market. The REC market is not yet well developed, however, and it is difficult to know how to estimate their value over such a long period as 25 years, let alone even the next few years.

The proposal assumes a REC value of \$0.025 per kWh. The League's concern in this instance is not specifically about potentially hidden costs but about assuming such a relatively high value for RECs as \$0.025 without any discussion of the considerable uncertainty associated with this valuation estimate. At this point in California, RECs can only be sold in the "voluntary" RECs market, which limits the value generally placed on them. Until and unless RECs can be used by utilities and other load-serving entities in California to meet their renewable energy procurement obligations, the League does not expect that RECs will be worth nearly as much as is assumed in the proposal. It is not necessarily unreasonable to assume a REC value of \$0.025/kWh, but it is potentially misleading to assume this value without describing these uncertainties, and the district should gain a very clear understanding of RECs and the REC market before ascribing any significant value to them.

4. Will the PV system generate the most electrical energy for the District's investment and are the overall costs competitive?

There are two components to this question: (1) amount of electrical energy generated and (2) system cost. Dividing (2) by (1) gives an important measure of the economics of a solar PV project: its cost per unit output (\$/kWh) over the lifetime of the project. Neither component can be addressed definitively without a level of site investigation and analysis that goes beyond the scope of this evaluation, and without having the Chevron ES proposal fleshed out in the areas described elsewhere in this memo. However, the League has a number of concerns in these areas, as follows.

With respect to component (1), the absence of manufacturer and model information on the PV system components and the unavailability of any performance simulation analysis leaves the district in the position of not being able to verify Chevron ES's performance claims, which is a significant concern. While it is entirely plausible that a 1.2 MWdc system of the kind generally described in the preliminary proposal could be expected to produce on the order of 1.5 million kWh per year, as claimed by Chevron ES, there is no supporting information for this claim.

We would even venture to speculate that there are probably PV systems that could achieve significantly higher productivity than that described in the Chevron ES proposal but we would not be able to confirm this without some site investigation and research and



analysis that are beyond the scope of this evaluation. We believe that such additional investigation is warranted.

Regarding component (2)—the cost of the system—the Chevron ES proposal does not provide enough specificity about the systems it is proposing to be able to compare its pricing to what a competitor might charge for the same system. Fortunately, however, the League is privy to a fair amount of recent solar PV cost data based on work it is doing with other districts and general monitoring of the solar PV marketplace. This permits the League to make some preliminary observations about the Chevron ES cost estimate provided in its July 10 proposal, which was just updated per our discussion on September 18.

The current Chevron ES cost estimate is approximately \$8.4 million (a reduction of \$500,000 compared to the July 10 proposal), for a 1.2 MWdc/1.0 MWac system that is expected to produce 1.535 million kWh in its first full year of operation, declining by 0.7% per year over its expected 25-year lifetime. Based on solar PV system cost data the League has obtained regarding solar vendors' binding price quotes for similar systems with similar output characteristics, and its general awareness of current solar PV system cost data, we believe that Chevron ES's cost estimate is relatively high by market standards, by anywhere from 1.0 to 1.5 million dollars, possibly even more. In the League's view, this is one more compelling reason—perhaps the most compelling reason—for the district to question the appropriateness of moving forward with the Chevron ES proposal as it stands.

The relatively high Chevron ES price may be due in large part to the ESCO model used in developing its proposal. While the ESCO model may have certain advantages, at least in the case of solar PV, cost competitiveness does not appear to be one of them. The League is aware of a recent competitive procurement in which an ESCO vying for a particular solar PV opportunity of similar size to the Merritt College system was over 25% higher in price than a non-ESCO vendor, with each bidding very similar systems. The ESCO in this case was not offering anything additional of value—it was simply charging a lot more for the same basic system. In the case of the Merritt College PV system, the League would not necessarily expect such a large cost difference as 25%, but we do believe that use of the ESCO model is likely to result in paying significantly more than contracting directly with a turn-key solar vendor.

As noted at the beginning of this section, a key measure of the value of a solar PV system is its cost per unit output, or cost per kWh, over the lifetime of the system. Based on this measure, a useful question to ask about the Chevron ES proposal is whether the system being proposed is as productive a system as is possible within the 1 MWac constraint that is imposed by the CSI rebate program.

The League's preliminary comparison above between the Chevron ES proposal and other PV market data assumes equivalent output, i.e., approximately 1.5 million kWh per year. However, the district should also be interested in whether a 1 MWac system that



produces significantly more than this could be built at Merritt College. An obvious consideration in this respect would be to consider the use of a tracking PV system rather than a fixed tilt system as Chevron ES is proposing. The proposal contains no mention of whether a tracking system was considered for any portion of the hillside application or the carport system. Based on available solar PV technology and market data the League estimates that if a tracking system could in fact be sited on the hillside portion, while still using a fixed tilt for the carport portion, overall output from such a combined system could be on the order of 15% higher than using all fixed-tilt systems, i.e., ~1.8 million kWh/year instead of ~1.5 million kWh per year. While tracking systems cost more than fixed tilt systems, the added productivity would be expected in many cases to be much more valuable in terms of increased CSI rebates and reduced utility electricity purchases than the incremental cost. An additional 15% output would translate to an increase in CSI rebate payments of approximately \$300,000 plus an additional \$30,000 per year (in present-value terms) in the form of reduced electricity payments. If the district and/or Chevron ES have not already considered the tracking option for at least some portions of its PV system the League suggests that an analysis of this option be conducted.

5. Is the payback period analysis data realistic?

The Chevron ES proposal contains neither a working spreadsheet version of its financial *proforma* analysis nor the actual models used to derive the underlying PV production estimates and avoided cost calculations, so it was not possible to properly evaluate the Chevron ES payback period analysis. We have already noted above several discrepancies in the avoided cost data and the somewhat questionable treatment of REC valuations, which raise concerns about the payback analysis. Without greater access to these models and resolution of the avoided cost data discrepancies the League cannot say whether or not it supports Chevron ES's payback analysis. Clearly, however, other things being equal, Chevron's apparently above-market price significantly increases the payback period relative to the more cost-competitive prices that the League believes are available in the solar PV marketplace from turn-key vendors.

D. Conclusion

The League hopes that this evaluation proves to be useful in Peralta CCD's consideration of the Chevron ES proposal and of solar PV in general. Please feel free to contact the League with any questions or requests.

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