

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

In the Matter of the application of San Diego Gas & Electric Company (U 902-E) for Approval of The SDG&E Solar Energy Project	Application 08-07-017 (Filed July 11, 2008)
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**PREPARED DIRECT TESTIMONY
OF DAVID R. CROYLE
ON BEHALF OF UTILITY CONSUMERS'
ACTION NETWORK (UCAN)**

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I. INTRODUCTION

My name is David R. Croyle. My resume is provided as Attachment A. I am a professional economist with almost 30 years of experience in the energy utility business as a utility analyst, manager and as a consultant. I have testified before the California Public Utilities Commission in previous proceedings as a witness for SDG&E, and had worked for SDG&E for more than a decade prior to my retirement from the Company in May 2006. I have suspended my retirement to address grave concerns raised by SDG&E's application.

The purpose of this testimony is to identify the critical deficiencies in SDG&E's SEP application and to identify the essential modifications to eliminate the deficiencies. UCAN's recommendations are intended to ensure the best use of program funds for the most cost-effective PV systems and the most cost effective means for financing the PV investments. These changes should lead a more beneficial program for the ratepayers. In these unusually challenging economic times, it is especially important to do the right things in the right way and at the right time.

This concept was graphically demonstrated in Shakespeare's Hamlet. Claudius, the play's antagonist, arranges a fencing match between Hamlet and Laertes, but plots with Laertes to poison his foil and give Hamlet a poisoned drink. The King's plan fails; Hamlet's mother -- Queen Gertrude -- drinks from the poisoned chalice instead of Hamlet and dies. Hamlet is in a position to wreak revenge by fatally stabbing Claudius with the poisoned sword, but does not. Instead, he compels the King to drink from the same chalice that poisoned his mother. He does so because such revenge is timely and most appropriate in light of Claudius' insidious plot.

In its application, SDG&E proposes to throw some \$250 million at a comparably wrong-minded plot and earn a 9.4% return on the investments installed over five years. More egregiously, the \$250 million excludes various uncapped expenses. While UCAN doesn't seek revenge, it does wish to avoid gratuitous violence to ratepayer monies by urging the Commission to consider both timing and propriety in its assessment of the

SDG&E Solar Energy Project. Thus, instead of plunging the poison sword into the heart of the SDG&E program in its entirety, UCAN has proposed that SDG&E first drink from the chalice by restricting the program initially to projects on utility-owned property. If it turns out not to be a poisonous concoction, then the program can be safely expanded to municipal-owned and other customer-owner property. Polonius, speaking to his son Laertes as he prepared for travel abroad said: “To thine own self be true.” Thus, SDG&E can show it is adhering to this advice by testing the program on utility-owned property before involving any hosts or burdening the ratepayer with a larger program. However, if a full-scale program is to proceed, UCAN has recommended several essential remedies.

Toward this end, we will show how:

1. SDG&E has conducted no program or market research to support the contention that \$7,000/kW (dc) is a cost-competitive PV price, and therefore that investing \$250 million on a PV technology basecase that costs \$7,000/kW (dc) is a financially unsound proposition.
2. SDG&E has not demonstrated that single-axis tracking PV systems are more cost effective than alternative systems since it produced no cost studies that compare tracking to non-tracking system costs or polycrystalline to thin-film panels costs.
3. SDG&E has not shown that a solar parking program provides more potential to benefit customers or contributes more to Renewable Portfolio Standards (RPS) than other programs across the U.S., including other solar parking projects.
4. SDG&E has not shown that “turnkey projects,” i.e., where the capital outlay is added to rate base, is less expensive than other methods used in solar parking projects across the U.S., e.g., Power Purchase Agreements (PPAs) and leases.
5. SDG&E has established no evaluation criteria for choosing among competitive vendors or demonstrated how it will show that the Solar Energy Program (SEP) and individual projects benefit ratepayers and guarantee cost effectiveness.
6. SDG&E has relegated much of the critical detail needed in this case to the Advice Letters. This is inappropriate, as it transfers the burden onto the Energy Division to create guidelines and develop Commission policy. It also reduces the ability of market participants and intervenors to evaluate the SDG&E funding decisions.

In Act II, Scene 2 of Shakespeare's Hamlet, Polonius overhears Hamlet speaking and, convinced he must be mad, says: "Though this be madness, there is method in it." But in this case, although the public has listened to SDG&E speak through its SEP application, UCAN is unable to find the method in it. Certainly, SDG&E must have a rationale, or an underlying strategy that explains why it has proposed the SEP program in its current form. Unfortunately, that rationale is not clear and the supporting research that would lead the Commission to the conclusion that this is the right time and the right program is simply not there.

In the Powers Engineering testimony on behalf of UCAN, Mr. Powers shows that other PV technologies may be more cost effective than single-axis tracking PV systems. But SDG&E has not investigated those alternatives or proven other options less desirable. In this testimony, UCAN shows that there may be other potentially less expensive ways to finance the PV projects besides rate base investments. SDG&E has not assessed those alternatives either. In fact, SDG&E has limited its focus to a single technology financed as turnkey projects without providing evidence to support those choices over other alternatives. Furthermore, SDG&E has not developed criteria for selecting vendors nor proposed any methodology for evaluating competing bids. UCAN believes in order to make Tier 3 Advice Letters easier for the Commission to review and approve, pre-established criteria, methodologies and performance measures must be established in this proceeding and used later to support Tier 3 Advice Letter reviews.

In addition, many costs have neither been estimated in the application nor "capped" as were overall funding levels and program development and administration costs. Therefore UCAN recommends that review criteria be provided by SDG&E to ensure that the uncapped costs are managed to prevent adverse impacts on the ratepayers. For example, site-specific construction costs and negotiated lease payments remain unknown costs to ratepayers with no pre-established criteria for managing those costs. To support the application and Advice Letter process, therefore, several issues need to be addressed in this proceeding. In this testimony we identify deficiencies and

where possible recommend remedies. And UCAN requests specific information of the company which SDG&E will have an opportunity to address in its rebuttal testimony.

UCAN concludes that SDG&E's application does not provide a sufficient justification for an expenditure of up to \$250 million to obtain up to 52 MW (dc) of renewable power in the load basin.¹ Although UCAN commends SDG&E for seeking PV opportunities within the basin, the application places far too much burden upon the Tier 3 Advice Letter process. The Scoping Memo asks all the right questions and infers that the SDG&E application should include standards for review in both the application itself and individual projects to be approved in Advice Letters.

This testimony is directed at revealing deficiencies and identifying potential remedies and alternative program specifications. SDG&E's application suffers from being too narrow in terms of acceptable technologies and alternative financing arrangements. Moreover, it leaves far too much detail to be addressed in the Advice Letters, placing an undue burden on the Energy Division that is simply unnecessary. Without sufficient evidence presented in the application on the costs included by the spending cap and those not included under the cap, the Commission is left without a sufficient basis for approval without substantial modification to the application. If SDG&E is unable to fill in the gaps in its proposal, i.e., if it has no better costs or information to provide, then UCAN recommends a more streamlined approach to the application that focuses initially on utility-owned property.

Installing systems initially on utility-owned property only has several benefits:

- Less than \$50 million must be committed initially to the program instead of \$250 million since utility property accounts for only 7 of the expected 52 MW (assuming \$7,000/kw for the 7 MW of utility opportunities SDG&E identified).
- SDG&E will gain essential cost information, missing from the application, from initial project bids that will benefit project assessments in the future when or if the program expands to include municipal-and customer-owned property.

¹ In UCAN's Second Data Request, Question 8, SDG&E stated: "The 52 MW is an estimate of the expected capacity delivered for an installed cost of \$4,000/kW." The \$250 million is a cap on the total using these estimates as approximations.

- The complexity of the early projects is simplified, eliminating the need for SDG&E to explore opportunities at host sites and negotiate with hosts over lease terms, lease payments and responsibilities for site-specific construction.
- Lessons learned from the projects on utility property can provide a knowledge and experience base, something SDG&E claims it seeks as a program benefit.

Whether this approach or some modification to the application is preferred, the Commission should require the utility to consider non-tracking as well as tracking PV systems and financial alternatives to rate base investment. The Testimony of Powers Engineering on behalf of UCAN addresses UCAN's contention that SDG&E has cast its net for PV technology too narrowly, thus resulting in a very cost-ineffective proposal. Assuming Mr. Powers' estimates of thin-film technology to be accurate, then this will benefit ratepayers by ensuring all potentially cost-effective options are considered. This testimony addresses other methodological deficiencies in the SDG&E application.

For example, it will show that criteria can and should be pre-established for use when negotiating lease agreements, assigning construction cost responsibilities and selecting vendors, technologies and funding methods.

UCAN has proposed an alternative two-phased program that could help SDG&E overcome the lack of costs and other data for assessing the SEP program. Absent that, UCAN recommends that the Commission require some or all of the changes below prior to approving the application and/or that SDG&E address in its rebuttal testimony:

1. SDG&E should demonstrate that undertaking a Solar Energy Project dedicated to deployment of tracking PV at this time is preferable to alternative PV technologies and is superior to a UCAN-recommended phased approach that incorporates the condition of the California economy, PV technology developments, conventional fuel prices and PV system costs for all technologies.
2. SDG&E should demonstrate that the Solar Energy Project should be limited to parking facilities and ignore other potential sites within the load basin, including residential and commercial rooftops as well as energy park developments of available sites outside the urban core.
3. Regarding the choice of technology and PV systems:

- a. SDG&E should allow bids from thin-film fixed panel systems as well as single- and dual-axis tracking systems to ensure the most cost effective alternatives.
 - b. SDG&E should match the site to the appropriate PV technology instead of assuming single-axis tracking systems are equally appropriate for all sites.
 - c. SDG&E should provide more specific information to the Commission on PV solar technology/industry developments, including price projections for PV panels or systems to justify the timing of the program.
 - d. SDG&E should provide a separate cap for thin-film fixed panel systems and single-axis or dual-axis tracking systems instead of an overall \$7,000/kW cap as SDG&E proposed. The individual project cap should be based on solar parking project evidence elsewhere and not strictly on the CSI experience.
 - e. Criteria for choosing between tracking and non-tracking systems should be based on comparative benefit-cost criterion and not on “maximizing annual energy output and peak capacity deliveries” as proposed in the application.²
4. SDG&E should demonstrate that utility ownership is a better choice for customers than ownership, operation and maintenance by hosts or third-party investors.
 5. The criteria for judging alternative technologies, ownership and financing methods should be based on which alternative provides the optimum benefits to SDG&E’s customers at the least cost and best fit with system needs.
 6. The \$250 million cap, based roughly on an estimate of 52 MW at \$4,000/kW for PV installations (\$241 million) plus program development (administration) costs, should be revised to reflect a more realistic assessment of the mix of technologies installed. (see footnote 1, above)
 7. Site-construction costs that are the ratepayers’ responsibility should be capped on individual projects. Prior to approval of the application, criteria for assigning cost responsibilities for site-specific construction costs should be required These cost responsibilities should guide any lease negotiations.
 8. Vendors bidding for the Solar Energy Project:
 - a. should be able to adopt one or more of SDG&E’s proposed host sites or submit their bid in partnership with a host site of their own.

² A vendor proposing a fixed panel (non-tracking) PV system must do so at a cost that is low enough to more than offset the 25-30 percent efficiency improvement expected with single-axis tracking PV. Dual-axis tracking must also meet a cost-benefit test, i.e., additional cost justified by the increase in output, etc.

- b. should be able to bid on multiple projects at the same time if they offer the package of PV projects at a lower unit cost than if they were to bid on individual projects only.
 - c. should be permitted to propose an addition to the SDG&E project that provides the host with CSI-qualifying PV projects, i.e., under 1 MW that meets the hosts own needs.
 - d. should be allowed to propose alternative methods for financing these projects besides turnkey projects, including Power Purchase Agreements.
 - e. should be permitted to propose alternatives to ongoing O & M by SDG&E, such as long-term maintenance contracts by vendors or subcontractors.
9. Screening criteria for evaluating the vendors and proposed technologies in their bids should include at least the following elements:
- a. Vendor experience (corporate qualifications)
 - b. Experience of any co-bidders or subcontractors
 - c. Performance of the solar PV systems proposed
 - d. Guarantees to install the most efficient technology
 - e. Cost of vendor's proposal compared to benefits
 - f. Offer of performance-based (instead of cost-based) pricing
 - g. Offer of multiple site "package" discounts on PV systems
 - h. Offer of CSI-qualifying additions to the project at reduced costs.
 - i. Financing alternatives available, including leased systems and PPAs.
10. SDG&E should be required to consider performance-based pricing in reviewing vendor proposals, i.e., guaranteed annual energy output and capacity deliveries for a fixed and cost-effective price with the price adjusted if performance falls below a threshold stated in the PV contract.
11. SDG&E has provided few details on the nature of lease arrangements with the host. Site leases between the utility and the host should include the following elements:
- a. Restrictions on the kinds of site-specific construction costs that will be the responsibility of hosts and utilities, i.e., who pays for the parking structure.
 - b. Lease termination provisions if the host wants to use the parking area for a non-parking use or wants to sell the parcel during the 20-year lease term.

- c. Lease termination provisions for the utility if the system fails to perform or costs more to maintain than expected, i.e., failure of the site or technology.
 - d. Contingencies for breach of contract by the utility or the host for any reason, i.e., the failure of either party to meet one or more terms of the lease.
 - e. Possible buyout provisions by the host after the first five years when the accelerated tax depreciation and tax credits have been taken by the utility or the vendor and the system can be sold to the customer at a reduced cost.
 - f. Lease provisions for “new owner” if the host chooses to sell the business. (These provisions may be required to value the lease as part of the sale).
12. In evaluating each individual project, SDG&E should demonstrate that the project satisfies pre-established guidelines and performance measures prior to approval. These should be allowed to include the following:
- a. A business case for the project that shows the stream of costs and benefits over the life of the equipment, including the anticipated impact on non-participating ratepayers as a result of undertaking this project.
 - b. An assessment of whether the project meets least-cost and best-fit criteria
 - c. Limitation on cost per kW and/or cost per square foot for the parking project consistent with the PV technology/system selected for installation at the site.
 - d. Well-defined cost responsibilities between SDG&E, the host and any third parties involved in the project, including responsibility for cost overruns.
 - e. Monetary cap on site-specific construction costs to be paid by ratepayer.
 - f. Evidence that the technology selected is appropriate for the parking site, e.g., whether tracking or non-tracking PV systems are suitable for the site.
 - g. Evidence that the timing of the project is optimal, i.e., evidence that PV system costs will not be lower if the project is delayed.
13. In evaluating the program overall:
- a. Performance of individual projects and the program overall should be assessed on an annual basis, comparing expected to actual costs and efficiency/performance, to demonstrate whether the program should be continued, terminated or refined to improve results.
 - b. Performance should be judged based on the quality of the projects and not just the number, i.e., managing the costs and performance of the systems.

II. BEST OF TIMES AND THE WORST OF TIMES

“It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair, we had everything before us, we had nothing before us, we were all going direct to Heaven, we were all going direct the other way- in short, the period was so far like the present period, that some of its noisiest authorities insisted on its being received, for good or for evil, in the superlative degree of comparison only.”

-- from *A Tale of Two Cities* by Charles Dickens.

The quoted paragraph above that opens *A Tale of Two Cities* sets the stage for a story in which situations can be seen as either good or bad, depending on point of view. Similarly, renewable energy can also be viewed as a positive or negative, depending on a variety of factors. It has the potential for reducing carbon dioxide (CO₂) emissions -- but at the same time, it is still a more expensive alternative to conventional energy sources based on fossil fuels. UCAN supports the transition towards renewable power but also recognizes that while the sun is free, the resources necessary to convert sunlight into power are not. Therefore, it is critical that the Commission approve the most cost-effective and market transformational programs.

The last line of the quote above is especially relevant and insightful: *“... in short, the period was so far like the present period, that some of its noisiest authorities insisted on its being received, for good or for evil, in the superlative degree of comparison only.”* One theme in this testimony is that the SDG&E application lacks the “comparisons” to other programs, technologies and financing alternatives necessary to make an informed decision regarding approval of the application. SDG&E has shown a single-minded focus on single-axis tracking PV systems mounted on parking structures within the load basin. But myopia is no excuse for ignoring key elements of a comprehensive business case.

Other programs identified across the U.S. include the Connecticut Solar Lease Program and the SMUD Solar Shares Program (Attachments B and C, respectively). However, in response to UCAN Data Requests, SDG&E admitted it had not examined other program alternatives. In Question 19 of UCAN’s Third Data Request regarding the SMUD and LADWP Solar Shares Program, SDG&E responded “SDG&E did not consider

these other programs.” Responding to Question 21 of the same data request, SDG&E admitted: “SDG&E does not have enough information about the CT Solar Lease Program to respond.” Through discovery, UCAN requested that SDG&E provide it with any cost-effective analyses, technology comparisons or financing options that were considered by the company in its preparation of the application. SDG&E confirmed that it has ignored potentially more cost-effective non-tracking (fixed panel) systems that use thin-film technologies instead of crystalline. It also admitted to ignoring the many alternative ways that these PV systems could be financed, e.g., through third parties that offer Purchases Power Agreements, leases and even lease-purchase options. In Questions 8 and 9 of UCAN’s Third Data Request, UCAN asked whether leases and PPAs were a viable alternative to turnkey projects. SDG&E responded: “SDG&E does not have sufficient information to admit or deny. There is no comparison to other renewable programs to confirm that the SEP offers the best use of funds or to other existing solar parking programs observed across the U.S. that may offer SDG&E valuable insights on costs and other program details to guide the program development and specifications. Finally, SDG&E made no comparison to the valid option of waiting until the economy improves and/or PV system costs either decline or PV performance improves. The SEP is narrowly defined by analytical blinders and is lacking any analytical support for its conclusions. These deficiencies should be addressed prior to approval.

Organization of This Testimony

This testimony is organized into the following sections:

- Summary of the Critical Scoping Memo Issues
- Consistency with Legislative and Regulatory Policies
- Standards for Review of the Solar Energy Program application
- Standards for Review for Individual Projects in Advice Letters
- Reasonableness of Program and Project Costs
- Benefits to Ratepayers and Performance Measures

III. SDG&E DID NOT HEED THE SCOPING MEMO DIRECTIVES

In its November 6, 2008 Scoping Memorandum, Commissioner Peevey and Administrative Law Judge Ebke request that parties address the concerns addressed in this testimony. The following roadmap identifies Scoping Memo issues we address:

A. Legislative and Regulatory Policy

- “Whether the proposed program meets the requirements of Pub Util. Code § 2775.5.” That is, PUC Code Section 2775.5 addresses concerns expressed by various parties that the Solar Energy Program should not in any way restrict competition or hinder the growth of the solar energy industry. (Scoping Memo, Page 6, Section C)
- “How the proposed program complements or conflicts with existing Commission and State policies and goals to promote renewable and distributed generation and mitigating greenhouse gas emissions.” (Scoping Memo, Page 6, Section D)

B. Standards for Review of the Application

- “Whether to approve the proposed SDG&E Solar Energy Project and funding either as proposed in the application or with modifications? (Scoping Memo, Page 3)
- “Whether elements of the proposed SDG&E Solar Energy Project are reasonable?” (Scoping Memo, Page 3)
- What should be the standard of review for evaluating the reasonableness of this proposal? (Scoping Memo, Page 3)
- “Whether the proposed SDG&E Solar Energy Project is cost effective?” (Scoping Memo, Page 3)

C. Standards for Review of Individual Projects

- “What is the appropriate standard of review for individual projects submitted under the Solar Energy Program, should it be approved, and is the Advice Letter process the appropriate vehicle for submitting these projects to the Commission?” This is necessary “Since SDG&E has not proposed criteria for evaluating the individual projects, and has not stated whether multiple projects would compete against one another for approval.” (Scoping Memo, Page 4-5, Section A)

- “With respect to parties’ request to conduct a least cost best fit (LCBF) review, the question of whether to conduct a LCBF may be more relevant on a project-specific basis when SDG&E brings individual projects for Commission review in a proposed advice letter process.” (Scoping Memo, Page 4, Section A)

D. Reasonableness of Program Costs

- “Whether the cost estimates are reasonable?” (Scoping Memo, Page 3)
- “Whether the proposed costs are reasonable in comparison to other renewable portfolio standards (RPS) projects bidding into SDG&E’s competitive solicitation for renewable energy projects.” (Scoping Memo, Page 4, Section A)
- “Whether the proposed costs are reasonable in comparisons to other potential utility-owned renewable energy projects.” (Scoping Memo, Page 4, Section A)
- “Whether the proposed costs are reasonable in comparison to customer owned distributed solar installations under the CSI.” (Scoping Memo, Page 4, Section A)

E. Ratepayer Benefits and Performance Measures

- “What are the benefits to the ratepayers?” (Scoping Memo, Page 3)
- “Whether to approve SDG&E’s proposed cost recovery mechanism, including the rate of return?” (Scoping Memo, Page 3)
- “Whether any specific measure or mechanism should be established to ensure system performance and safeguard ratepayers from cost overruns.” (Scoping Memo, Page 6, Section B)

These directives appropriately address whether the Solar Energy Project is reasonable, cost effective, beneficial to ratepayers and consistent with the enabling legislation and subsequent regulatory decisions, policies and goals regarding utility addition of renewable resources in California as well as how various elements of the application and Tier 3 Advice Letters should be reviewed. This testimony will explain how SDG&E has failed to meet specific directives outlined in the Scoping Memo.

IV. Legislative and Regulatory Precedents

California utilities are required by Public Utilities Code §§ 399.14, in Section (a)(2)(B) to evaluate renewable energy bids using the least-cost best-fit (LCBF) methodology as part of the RPS process. According to the CA Public Utilities Code, a renewable resource satisfies the least cost criterion if costs include the direct costs of renewable generation as well as the indirect costs associated with integration of the renewable resource with the necessary transmission investments. A renewable resource must also be “best fit, i.e., it must best fit system needs. This language helps guide our recommendations.

Many of the recommendations UCAN offers below are based upon procedural requirements set forth in Decision D.07-12-052 (December 20, 2007) regarding the utilities’ long-term procurement plans, and related decisions, e.g., D.08-11-008 (November 6, 2008) regarding several petitions for modification to D.07-12-052 and Decision 08-10-026 (October 16, 2008) regarding the market price referent for the RPS represent the most recent decisions. In addition, earlier decisions, D.04-07-029 (July 8, 2004), adopting least-cost best-fit criteria for bid evaluations and D.03-06-071 (June 19, 2003), initiating implementation of the Renewables Portfolio Standard (June 19, 2003), are relevant with respect to SDG&E procurement of renewable power.

Specifically, we gave great weight to the following ordering paragraphs of D.07-12-052 that are important in reviewing the application and recommending alternatives:

Ordering Paragraph No. 14: “The IOUs are not to create any false barriers to participation in RFOs or to attempt to limit the competitive process by manipulating RFO product descriptions. (D.07-12-052, OP 14, p. 302).

Ordering Paragraph No. 30: “IOUs may no longer apply a 20% DE “bid adder” as a bid evaluation tool when evaluating PPAs.” (D.07-12-052, OP 30, p. 304-5). However, this OP was modified in D.08-11-008 as a result of a Petition for Modification (see below).

Ordering Paragraph No. 32. IOUs will no longer be allowed to consider as an option in their competitive PPA RFOs the transfer of the fully depreciated resource underlying a PPA to the IOUs. (D.07-12-052, OP 32, p. 305)

We also note that D.08-11-008 addresses several Petitions for Modification to D.07-12-052 and accepts a change to the use of “debt equivalence” in bid evaluation:

Ordering Paragraph No. 1a: “We authorize the investor-owned utilities (IOUs) to recognize the effects of debt equivalence (DE) when comparing power purchase agreements (PPA) against PPAs in their bid evaluations, but not when a utility-owned generation (UOG) project is being considered...” This is particularly beneficial if the Commission agrees that turnkey projects are not the only or the most cost effective method for acquiring renewable power.

Finally, D.08-10-026 clarified the basis for a market price referent:

Ordering Paragraph No. 1: “The market price referent (MPR) required to be calculated for the renewables portfolio standard program shall be calculated for 2008 and later years in accordance with the methodology set out in Decision (D.) 04-06-015 and D.05-12-042, with the adjustments and improvements set forth in today's decision.

MPR provides a basis for comparing proposed programs to an independent benchmark.

Furthermore, SDG&E is required to add renewable resources in the load basin. Specifically, the Commission addressed this fact when it responded to the Petitions for Modification to D.07-12-052 on November 6, 2008 in D.08-11-008: “We authorize San Diego Gas & Electric Company (SDG&E) to procure a total of up to 530 megawatts (MW) of new local capacity that was conditionally authorized in D.07-12-052 and require that applications for this procurement be supported by updates of the status and projected on-line date of the Sunrise Powerlink project. By introducing a solar parking project in the load basin, SDG&E addresses local capacity potential with the Solar Energy Program consistent with Commission decisions and policies. In addition, SDG&E contributes to the RPS goals, up to 10 percent of the 530 MW goal for local area capacity. By seeking

opportunities in the load basin, SDG&E supports Commission goals to in D.07-12-052 to add renewable capacity and reduce GHG emissions.

However, in the application, SDG&E has not indicated how it will evaluate the environmental benefits or, to the extent they vary between competing technologies, how the bid evaluation process will address these and other benefits, i.e., qualitatively or quantitatively. SDG&E should be required to show how to compare technologies in terms of environmental and other benefits, as part of the overall bid evaluation process

On the other hand, the restrictions on allowed technologies (tracking only) and financing alternatives (turnkey projects) restricts competition from various technology vendors and firms able to finance solar projects more cost effectively than SDG&E. For example, we reiterate the following ordering paragraph of D.07-12-052 that addresses the concern about whether the program restricts competition:

Ordering Paragraph No. 14: “The IOUs are not to create any false barriers to participation in RFOs or to attempt to limit the competitive process by manipulating RFO product descriptions. (D.07-12-052, OP 14, p. 302).

To address the concerns about unfair competition from a regulatory perspective:

- SDG&E should be required to consider bids from vendors who offer either non-tracking or tracking PV systems and establish comparative cost criteria for making sure the most cost effective and beneficial options is selected.
- SDG&E should be required to consider bids that offer financing alternatives to turnkey projects, including leases and/or PPAs and be able to compare turnkey projects to leases or PPAs where both are permitted to bid for the same project.

V. Standards for Review of the Application

Clearly the state of California has an appetite for renewable energy projects. Furthermore, it is reasonable to satisfy that appetite when cost effective renewable energy alternatives are identified. But the State needs to watch the renewable diet served up by utilities and make sure it is a healthy diet, especially in the California economy at the present time ... and be especially careful of what it is being fed.

A. Need for a Business Case

Toward that end, the Commission should insist that the utilities provide an adequate business case for undertaking a program that would cost ratepayers as much as \$250 million under the proposed cap and an undetermined amount outside the cap.

Moving from the general to the specific, SDG&E's business case should have demonstrated that the timing, technology and program financing options are the best use of funds by conducting market analysis of other solar parking structures across the U.S., providing cost effectiveness studies of single-axis tracking PV systems compared to non-tracking systems to justify the former, and stakeholder analysis to show how customers and shareholders will benefit.

The case that needs to be made includes the following elements:

- A demonstration that this is the right time (during the 2009-2013 program period or more flexible to enable acceleration or postponement based upon future technology developments in terms of PV cost and/or performance);
- A demonstration that this is the right program (solar parking facilities compared to other programs observed throughout the State and U.S.);
- A demonstration that this is the right technology (single-axis tracking PV compared to non-tracking systems and/or thin-film panel technologies);
- A demonstration that this is the right approach to ownership (utility-ownership compared to customer or third party ownership options);

- A demonstration that this is the right approach to financing the projects (rate base investment, i.e., turnkey projects compared to other methods, such as leases, lease-purchase and Power Purchase Agreements)
- A demonstration that new co-developed PV projects can be expected and will benefit customers via CSI incentives and lower design and build costs.

In investigating each of these components, a business case should address the positive and negative factors (costs, benefits and risks) that impact various SDG&E stakeholders, including the utility shareholders, hosts and ratepayers under different program alternatives. Even if computations in the application stage are illustrative, meaningful cost drivers and evaluation criteria can be defined so that a case could be made to accept the SDG&E proposal or consider alternatives to those now proposed.

A better way to present this case for SEP would have been to demonstrate the urgency to undertake this program at the present time as compared to a more phased approach that UCAN recommends. A phased strategy has many advantages over the rush to judgment to spend \$250 million over the next five years, including the current state of the economy and the potential for PV system cost reductions over time. That said, it would have made sense to begin with a survey of technology developments to determine whether cost and performance expectations for alternative PV technologies, including thin-film as well as polycrystalline, suggested this is the right time to invest in polycrystalline technology. In defending balancing accounts, at IV-4 SDG&E recognized the possibility of cost and performance improvements over time that might suggest a delay of installations but only during the 2009-2013 program period. Yet, SDG&E did not choose to consider monitoring thin-film technology developments as an alternative to jumping into the program now with a single-minded intent on installing single-axis tracking PV systems. This despite the fact that solar parking projects have chosen both tracking and non-tracking systems. SDG&E should have asked “why?” What are the cost drivers that caused some end-use customers to choose the particular technology?

Therefore, it would also have been prudent to identify projects around the U.S. that may have preceded or even prompted the SDG&E proposal. But SDG&E did not perform a survey of any similar solar energy parking facility projects with respect to:

- the type of PV systems installed (fixed non-tracking or tracking systems),
- the initial costs, system performance, output and savings of these systems,
- the various owners of the PV systems: utilities, customers or third parties,
- any problems experienced in the system design, construction or operation,
- how PV systems under construction or in operation were being financed.

Once this information was collected and organized, it would be much easier to design and defend a solar PV parking program that made sense for SDG&E customers, leveraging comparable experiences and avoiding the problems of the past and thereby ensuring that the Solar Energy Program approach taken was the most cost effective.

Sound project evaluation methods would address project economics based upon costs that are incremental to the project (economic costs), not on revenue requirements based upon regulatory accounting measures of costs. A business case should be a cash flow analysis comparing incremental benefits and incremental costs over the life of the equipment. In this instance, we have five years of PV installations and twenty years of benefits and costs associated with each installation. A business case is not only a revenue requirement calculation but an economic calculation with cash flows assigned to the year they are incurred *and not to the years in which they are recovered from SDG&E ratepayers*. But SDG&E provided no methods or criteria for assuring the most cost-effective projects.

Furthermore, it should be demonstrated that all program costs incremental to the project have been included. Costs that do not change should not be included, e.g., overhead costs or Administrative and General (A&G) costs that do not change as the direct or indirect result of the program or project under consideration. But SDG&E's focus was the revenue requirement associated with the rate base investments and not incremental cash flows, costs and revenues, over the life of the program installations.

B. Insufficient Evidence in the application

After reading the application, UCAN provided SDG&E with three sets of data requests, provided in the Appendix to this testimony, attempting to obtain some detail

or substance behind the choices and “numbers” (e.g., comparative costs and benefits) that are an essential subject of this proceeding. Here is a sample of relevant responses:

- “SDG&E has not performed a cost effectiveness study of photovoltaic technologies, but instead, expects this to be borne out by competitive solicitation.” (UCAN DR1, Q16)
- “No documents have been produced by SDG&E which address or analyze PV cost-effectiveness.” (UCAN DR1, Q19)
- “... SDG&E has not done a cost estimate, but has identified a prospective range of expected market costs and further relies on future competitive solicitations for cost refinements.” (UCAN DR2, Q04)
- “SDG&E has not undertaken evaluation of the life expectancy of single-axis tracking mechanisms.” (UCAN DR2, Q05)
- “SDG&E has not quantified the potential transmission and distribution cost savings associated with SDG&E Solar Energy Project, and notes to do so would be nothing but a *hypothetical exercise*.” [*italics added*] (UCAN DR2, Q16)
- “Removal costs attributable to a contract breach or cancellation have not been incorporated into SDG&E’s cost estimates.” (UCAN DR2, Q20)
- “SDG&E did not assess or contemplate the degree of the economies of scale that may be garnered by the host under either of these scenarios. Economies of scale benefits to the host customer under either of these scenarios are for the host customer to assess.” (UCAN DR2, Q22c)
- “SDG&E does not know, however, it suspects that order volume with a particular panel manufacturer, regardless of panel size, does assist in leveraging discounts.” (UCAN DR2, Q22e)
- “SDG&E Solar Energy Project will seek turnkey completion of projects from existing vendors. SDG&E does not expect to procure equipment.” (UCAN DR3, Q5)
- “SDG&E does not have sufficient information to admit or deny.” (UCAN DR3, Q8, 11, 13, 22)
- “SDG&E has not contemplated leasing the PV systems proposed for the SDG&E Solar Energy Project.” (UCAN DR3, Q10)
- “SDG&E did not have such discussions [with Nellis Air Force Base].” (UCAN DR3, Q12)

- “No, SDG&E did not examine the referenced information.” (UCAN DR3, Q15)
- “SDG&E has not compared these projects.” (UCAN DR3, Q16)
- “SDG&E did not consider these other programs.” (UCAN DR3, Q19)
- “Low cost financing alternatives were not considered when developing the basis for the SDG&E Solar Energy Project.” (UCAN DR3, Q20)
- “SDG&E does not have enough information about the CT Solar Lease Program to respond.” (UCAN DR3, Q21)
- “SDG&E is open to considering these [lease] criteria; however, they will be considered on a case-by-case basis.” (UCAN DR3, Q23)
- “SDG&E has not yet developed selection criteria.” (UCAN DR3, Q30a)
- “Cost and selection criteria have not yet been developed.” (UCAN DR3, Q33a)
- “SDG&E has not stipulated the specific cost analysis and methodologies to be included in the Tier 3 Advice Letters.” (UCAN DR3, Q33b)
- “SDG&E has not conducted in-depth research nor is it aware of any market research on solar parking facilities.” (UCAN DR3, Q37)

These responses demonstrate that SDG&E has not put sufficient thought into its application regarding the costs, benefits, risks and criteria necessary to make an informed choice. The Commission should view this application as deficient.

C. Market and Technology Research Needs

As revealed in the above responses to UCAN Data Requests, SDG&E admits that it did not reviewed or produced any cost studies and did not provide any cost estimates for single-axis tracking systems nor did it provide any data on the expected life, component replacement or maintenance requirements. To determine whether the proposed program would be cost effective, then, it would be appropriate to conduct market research on other comparable projects across the country.

For example, it proved relatively easy to get information on the Nellis Air Force Base Solar Energy Project (referenced in a photograph as an example of single-tracking systems in Appendix I at II-32. The Nellis Air Force Base project utilized the technology and experience of SunPower Corporation. According to Nellis Air Force Base, the 14.2

MW system cost \$100 million (\$7,042/kW). It was completed in December 2007, covers 140 acres and took 26 weeks to build. The annual energy savings have been estimated at \$1 million and annual energy output is 30,100,000 kWh (25 percent of the Nellis Air Force Base energy requirements) for an annual savings of 3 cents per kWh. The Nellis project that utilized the SunPower T20 Tracker PV system was comprised of:

- 5,821 trackers
- 72,416 solar panels
- 5,891,328 solar cells
- 200 watts per panel
- 18 transformers
- 54 inverters
- 5,550,000 feet of power cables

We note that the 3 cents per kWh price of power at Nellis offers at least one benchmark for comparison to other projects that SDG&E may evaluate in terms of the competitive bids. We also note that this 14.2 MW project exceeded SDG&E's proposed individual project cap of \$7,000/kW despite the fact that it was many times larger than SEP projects. This fact cast doubt on the ability of 1-2 MW projects to meet the cap.

According to Nellis Air Force Base Solar Power System case brief on the project (Attachment D): "Equally innovative is the funding and ownership of the \$100 million system: MMA Renewable Ventures, LLC has financed and will own and operate the landmark solar energy system, selling power to Nellis Air Force Base at a guaranteed rate for the next 20 years, as well as selling Renewable Energy Credits (RECs) to Nevada Power." MMA Renewable Ventures offers "cost-effective financing options" for energy developers and utilities. For example, MMA offers a Power Purchase Agreement which they define as: "*...a service contract between MMA Renewable Ventures and a customer (site-host) where we finance, own and operate a solar energy system at the customer's location and sell the electricity it generates to the customer for a pre-determined*

period." (See Attachment N). In the case of Nellis Air Force Base, the facility will receive power under a PPA for a 20 year term.

It is also noteworthy that MMA Renewable Ventures recently announced creation of the Gemini Solar Development Company, a joint venture with Suntech Corporation that will develop, own and operate utility-scale photovoltaic projects in the U.S. (October 2, 2008 press release included as Attachment E). It makes sense to at least consider what firms like MMA and others have to offer even if just to establish a cost benchmark for comparison to turnkey projects.

In August 2007, Steve Dumont produced a presentation for GovEnergy on the Nellis Air Force Base solar power project. (Attachment F) In the Nellis presentation, Dumont discusses the funding sources considered as part of the overall contracting strategy, such as third party, power purchase agreements and capital investment, as has been discussed above. Dumont also provides a timeline of events that offer insights into the timeframe from conception to construction to operation, including team formation, requests for bids, and model leases. Furthermore, Dumont discusses key "selection strategy criteria," including best value, low bid and technically acceptable low bid. He describes a 2-part bid evaluation strategy that first screens bids to ensure that projects meet certain technical requirements. Only those bids surviving the initial screen are evaluated in terms of the bid/price proposal. Regarding construction-specific issues addressed, Dumont admits to an aggressive construction schedule from June 7 to December 7, 2007. Of course, this was a 14 MW facility that cost \$100 million. One of the key lessons learned, according to Dumont, was to "formalize [the] business case for leadership." We support better market and technology research to be included in a business case to support the program and compare the costs of individual projects. The Nellis AFB project is one that has been investigated by others. Yet there are more that could be researched and which could better guide cost comparison and other vendor, technology and site selection criteria and aid the choice among competing projects.

Useful details on the Nellis Air Force Base Solar Energy Project are discussed in Attachments D through I, as well as in the Powers Engineering testimony. These

attachments include meaningful and insightful details in case study briefs and presentations, draft contracting documents and a “model lease agreement.” In addition, we have briefly summarized in Attachment J several other projects worthy of investigation in California and other states. We have also identified in Attachment K, a 2008 presentation on “Solar Energy Meets Parking Structures” by Michelle Wendler of Watry, Inc. This presentation addresses projects in terms of size, cost, design and construction issues and offers both a contractor’s and owner’s perspective.

D. Measurable and Verifiable Evaluation Criteria

Prior to approval, SDG&E needs to overcome certain deficiencies in its SEP application to ensure that the Commission decision is based on sufficient evidence to support the funds to be spent and the activities upon which they will be spent.

If SDG&E fails to address these issues in its rebuttal, then it would be appropriate for the Commission to disregard the entirety of the SDG&E proposal and, instead, focus upon those advanced by intervenors. However, SDG&E has the opportunity to address these issues and ensure that the application contains sufficient and measurable criteria upon which the Commission can decide to reject or move forward with the SDG&E SEP.

UCAN also notes that Advice Letters are not an appropriate process for approving individual projects *absent measurable and verifiable criteria*. Given that these individual projects will be identified and specified over the five-year period and the sites, vendors and technologies that will be selected cannot be known at the present time. There must be a means by which these individual projects can be reviewed and either accepted or rejected. Certain conditions can be established in this application to govern these Advice Letter filings that provide measurable and verifiable criteria for the individual case-by-case reviews. For example, parties’ concerns could be addressed by:

- Criteria for assessing the appropriate timing for PV installations by considering a “wait scenario” as well as the more typical install and don’t install scenarios.
- Measurable site selection criteria to identify the best sites for different PV systems, e.g., a site may be best suited to fixed panel systems or need too much construction.

- Measurable screening criteria for assessing the cost effectiveness of PV technology alternatives, including non-tracking, single-axis tracking and dual-tracking systems. SDG&E has proposed the criterion of “maximizing annual energy output and peak capacity deliveries.” (See SDG&E testimony at II-16) But this may not be the most cost-effective option.
- A research basis for setting the cap on individual projects, established in the SDG&E application as \$7,000/kW. Since other technologies and systems may be cheaper, the single \$7,000/kW cap should be stratified to address different PV technologies.
- Measurable screening criteria for the competitive solicitation process to ensure that consideration is given to other PV vendors and technologies that meet specific cost, performance and other key criteria even if proposing non-tracking PV systems.
- Methods for comparing turnkey projects to PPAs and/or comparing different solar technologies with different expected lives or performance characteristics to ensure SDG&E has chosen the most cost effective vendor, technology and financing option.
- Measurable criteria for assigning cost responsibilities for site-specific construction costs among the utility, host and third party.
- Measurable criteria for lease negotiations, e.g., boundary parameters that limit what the lease costs may include, e.g., cost responsibilities of the host and the utility and measurable criteria upon which a lease can be judged as meeting critical guidelines.
- Measurable criteria for choosing between competing projects, especially where the projects involve different technologies and financing recommendations, e.g., PPAs.

In summary, there are too many places in the application and in responses to UCAN’s Data Requests that suggest much of the critical information the Commission requires in its Scoping Memo will be provided in Tier 3 Advice Letters but with no promise of comparative cost or cost effectiveness analysis or decision-quality criteria or measures to ensure the Commission has the essential information to make an informed choice on whether to approve the individual project or projects.

E. UCAN's Proposed Alternative Program

There are some threshold elements that should be weighed by the Commission in assessing this application. First – timing. Given the state of the California economy, it may be premature to undertake the full-scale Solar Energy Program as specified in the SDG&E application. In addition, the state of the solar technology is changing notwithstanding the fact that SDG&E presented no market or technology research to justify proceeding with the program at this time or its choice of technology and turnkey project. SDG&E does admit, in defense of balancing account treatment, that timing issues are relevant and must be addressed. At IV-4, SDG&E explained that: “The solar market is an emerging, evolving market” and, therefore, proposes “balancing account” treatment. But the nature of the evolution or expectations regarding cost or performance for different PV technologies are ignored.

Secondly, it should consider options. SDG&E did not provide sufficient cost data, technology development detail or costing methodologies to support either its choice of single-axis tracking PV over less expensive non-tracking systems and developing thin-film technologies or its choice of turnkey projects over other approaches, e.g., Power Purchase Agreements (PPAs). The ability to know what and when to install or whether to wait until PV costs decline and/or performance improves, requires insight into PV technology developments and cost/performance expectations. In addition, assuming that turnkey projects provide the most beneficial choice to ratepayers also requires some knowledge of the cost of PV parking projects around the country that have been financed under PPAs or as turnkey projects, whether by utilities, consumers or third parties. But the utility provided no PV market, technology or financing research nor any cost information or criteria to help it determine the right time, the right PV system and the right way to finance PV systems.

UCAN believes this narrow specification of the program in the application ignores potentially cost-effective technology and financing options and provides little or no real guidance for knowing when to undertake specific projects. Greater diversity in program specifications would offer more confidence to the Commission that what

SDG&E hopes to learn from competitive solicitations was based on more than a single program option. As already noted, most of the critical detail is deferred to Advice Letter filings yet with no pre-established criteria for making choices between the vendors, technologies and financing options when the Advice Letters are filed. The Commission's ability to gauge appropriate timing and program options is hamstrung by SDG&E's deficient application.

To address the lack of supporting cost information, address critical timing issues, and permit greater competition from PV vendors and third party financing firms, UCAN proposes an approach that segments PV solicitations and prioritizes projects over time.

SDG&E estimates 52 MW of potential applications of single-axis tracking in the application. Actually, at II-11, SDG&E identifies 115 MW (dc) of potential parking lot opportunities, including 60 MW (dc) from local entertainment and shopping complexes, 48 MW (dc) from municipalities and 7 MW (dc) on utility-owned property. According to SDG&E, the 52 MW (dc) estimate reflects the fact that all the sites identified may not offer suitable projects.

Specifically, for utility-owned property, there are potentially 7 MW of projects that do not require negotiations with the host regarding site-specific construction costs, lease terms or lease payments. But with other sites, e.g., shopping malls and city parking structures, i.e., projects located on either municipal or other customer property, these additional project elements are relevant and their costs, which have not been estimated, have been deferred to Tier 3 Advice Letters. Occum's Razor states the simplest answer is most often the right answer. In this case, projects on host sites not owned by the utility are likely to be more complicated, i.e., more costly and more risky because of the unknown specifics of site leases, lease payments and site-specific construction costs.

Accordingly, and consistent with Occum, UCAN suggests that if no costs or selection criteria are offered to determine whether this is an appropriate program at the appropriate time, it would seem more reasonable to conduct a smaller-scale program initially, installing the PV systems SDG&E proposes as turnkey projects if the Commission

agrees, but limited to utility-owned property that SDG&E has estimated at 7 MW of potential sites. At the \$7,000/kW maximum estimate for individual projects, 7 MW of utility-owned projects located on utility-owned property would cost no more than \$49 million. This approach is designed to allow SDG&E to learn firsthand those project costs it has neither estimated nor capped (as it did for system costs) but has deferred until Advice Letters, leaving unknown and undisclosed the ultimate cost to ratepayers.

UCAN's alternative approach is to delay more complex, costly and risky projects at the customer and municipal sites while undertaking the more modest projects at the utility sites right away. As the Powers Engineering testimony suggests, some very promising PV technologies appear to be far more promising than single-axis tracking PV. It may well be that these are very cost-effective, as suggested by the Sempra deployment discussed by Mr. Powers. An initial phase provides a means for approval of the SDG&E program without over-committing available funds, while allowing SDG&E to discover many of the costs firsthand that SDG&E has not yet provided and without necessarily committing future projects to either tracking PV systems or turnkey projects. Relying exclusively on competitive solicitations as SDG&E proposes without independent PV project benchmarks for comparison, especially where PV technology and financing alternatives were limited, does not ensure the most cost effective program or projects.

In addition to gaining an understanding of system alternatives and costs, an initial program provides essential information on most of the other costs that SDG&E considered unknown and/or uncapped. Installing PV systems initially on utility-owned property exclusively necessarily involves construction expenditures and reveals any design and/or construction-related problems that will help manage project costs on future installations at host sites. That is, even if SDG&E knew that thin-film panels were appropriate (a better balance of costs and efficiency), there are good reasons for caution, proceeding in two phases, to gain essential knowledge and experience.

In its December 20, 2007 Decision (D.07-12-052), the Commission ordered that "The IOUs are not to create any false barriers to participation in RFOs or to attempt to limit the competitive process by manipulating RFO product descriptions. (D.07-12-052,

Ordering Paragraph 14). Consequently, SDG&E should be required to consider both tracking **and non-tracking** systems in its competitive solicitations to comply with D.07-12-052 in the initial phase on utility-owned property and later on customer/municipal-owned property. Competitive solicitations may reveal whether tracking or non-tracking PV systems are more cost-effective. But there is no basis for biasing PV project offers toward any one technology. No qualified vendor or technology should be excluded.

F. PPA Bid Evaluations and Debt Equivalence

As discussed above, UCAN proposes an emphasis on turnkey projects for utility-owned property in this first phase. Customer and municipal sites developed later can be either turnkey projects or Power Purchase Agreements, the actual choice improved by what was learned in the first phase.³ We note that PPAs can now benefit from the recently reinstated “debt equivalence adder” that applies to “PPA to PPA” bid evaluations, i.e., exclusively between PPAs competing against other PPAs, noting that if the utility chooses to accept bids on both turnkey projects as well as PPAs, then the debt equivalence adder does not apply. SDG&E pushed hard for the debt equivalence adder in its brief in its Opening Brief on June 20, 2008 (R.06-02-013), involving Petitions for Modification to D.07-12-052, just a month before it filed the current SEP application. SDG&E states: “SDG&E continues to maintain that consideration of debt equivalence for PPAs in bid evaluations is reasonable given that the credit rating agencies include long-term fixed obligation, such as PPAs, in their credit risk analysis.” (OB, p. 2) “Ultimately, excluding debt equivalence from a utility’s resource planning will distort the true economics of various resource options. SDG&E therefore urges the Commission to reinstate the use of debt equivalence in bid evaluations involving PPAs.” (OB, p. 5)

Regarding resolution of the debt equivalence issue, we initially take note of D.07-12-052 (December 20, 2007) in which the Commission ordered: “IOUs may no longer apply a 20% DE “bid adder” as a bid evaluation tool when evaluating PPAs. (D.07-12-052, Ordering Paragraph 30). Petitions for Modification of D.07-12-052, filed by SCE and SDG&E on January, 23, 2008, challenged D.07-12-052 on debt equivalence, leading

the Commission to modify its earlier finding: “We authorize the investor-owned utilities (IOUs) to recognize the effects of debt equivalence (DE) when comparing power purchase agreements (PPA) against PPAs in their bid evaluations, but not when a utility-owned generation (UOG) project is being considered.” (D.08-11-008, OP 1a)

Since the Petition for Modification decision was issued on November 6, 2008 after SDG&E’s July 11, 2008 SEP application was filed, it is understandable, given SDG&E’s position on debt equivalence in its Opening Brief, why SDG&E may have focused on turnkey projects (rate base investments), ignoring PPAs as a viable alternative to utility-owned generation.

In Question 7 of its Third Data Request, UCAN asked the utility whether “...SDG&E receive[s] a “debt equivalence” adjustment to its rate of return for any Power Purchase Agreements (PPAs) it may enter into?” SDG&E responded “This question is beyond the scope of this proceeding. Please see the Cost of Capital proceeding, A.07-05-007, D.07-12-049.” SDG&E prefers that PPAs and debt equivalence remain beyond the scope of this proceeding. However, SDG&E is in error. This issue should not be excluded from this proceeding. If SDG&E can get a debt equivalence adjustment, then PPAs provide a viable alternative to rate base investments.

UCAN is not commenting on the rationale for the debt equivalence adder, only recognizing the modifications set forth in D.08-11-008 permitted recognition of debt equivalence in “PPA to PPA only” competitive bids. Should PPAs be considered in this application, therefore, and assuming that a debt equivalence (DE) adder is essential to making PPAs competitive with turnkey projects for SDG&E, then it may be advisable for SDG&E to segment the PV bidding process to comply with D.08-11-008.

To summarize, UCAN’s observations in relation to debt equivalence are:

- If bids on utility-owned sites are exclusively turnkey projects, DE adders are not relevant in the bid evaluation process;
- If bids for customer-owned or municipal-owned sites are exclusively PPAs, DE adders can be recognized in the bid evaluation process.

³ One notable exception is the backcountry deployment discussed in the Powers Engineering testimony.

- If bids for customer-owned or municipal-owned sites are both turnkey projects and PPAs, DE adders cannot be recognized in bid evaluations.

In addition, with respect to the shopping malls and municipal parking facilities, there is no reason to preclude these customers from undertaking similar solar projects themselves, something that is becoming more and more common. UCAN understands that SDG&E does not administer CSI programs but it would be instructive for the Commission to know whether SDG&E could provide PPAs or low-interest loans to these customers who “co-develop” PV system installations as a result of SDG&E’s program. If that option turns out to be more affordable than the PPAs that third parties have undertaken, then SDG&E could continue the PPA or low-interest loan program.

All these options create the information lacking in the proposal but which is necessary for informed decisions. In addition, this alternative proposal allows for cost effectiveness comparisons between tracking and non-tracking systems as well as among alternative program financing, e.g., comparing PPAs to the turnkey projects (rate base projects).

The UCAN alternative is an improvement upon the SDG&E application because it makes it capable of serving as a source of comparative cost data. At a minimum, it could potentially save the ratepayers millions of dollars on a solar program that could certainly have been better defended and better specified to ensure the “least cost best fit” program. By phasing in solar projects based on property ownership, more insight into costs including different technology and financing options, can only make future projects more cost effective. These turnkey projects on utility property, in fact, provide comparative benchmarks for determining which technologies are most cost effective, whether SDG&E can provide renewable resources more cost effectively than PPAs offered by third parties and that means SDG&E will not be a captive of competitive solicitations when it evaluates bids.

In addition, with a portfolio of technology and financing options in place, hosts may consider co-developed and CSI-qualifying projects using the PPAs (or leases, lease-purchase agreements or low-interest loans) offered either by the utility or third parties.

This potential is currently ignored with a program limited to turnkey projects. If PPAs finance utility projects, it may be easier for third parties to offer PPAs to the host too.

G. Overcoming Shortcomings of the Application

In the following sections UCAN addresses recommendations that make SDG&E's shortcomings more acceptable and beneficial to ratepayers.

1. Lease Criteria

Negotiated lease payments are mentioned in the SDG&E application but not very well explained. "At II-5, Thomas and Bialek state: "Lease payments to project hosts, if applicable, will be considered and negotiated on a case by case basis." Presumably the lease payments would be made to the host if costs are incurred by the host or imposed on the host by the utility as a direct result of participation in the SEP. Some direct costs are obvious, such as any costs imposed on the employees who must find alternative parking during construction. But these costs are short-lived and do not lend themselves to long-term lease payments.

On the other hand, access to the site by SDG&E over the life of the equipment for inspection or ongoing maintenance can also represent a cost to the host that could warrant compensation. But any costs imposed on the host could be associated with offsetting benefits. For example, the host may have shaded parking that it did not have before. Alternatively, the parking structure may have to be upgraded or modified to support the new PV systems. While some of these costs might seem to be the responsibility of SDG&E, again it is not specified, leaving it to future negotiations to make clear. In either case, utility-to-host lease payments should be associated with specific categories of costs and offset by benefits. A negotiated lease payment should not be an incentive tool for gaining participation by the host. If lease payments are not under the cap, they are difficult to monitor and control.

To address this problem, lease payments should be well-defined in principle in advance in terms of a complete list of what they will cover, what they will not cover and what, if any benefits to the host will offset the lease payments. Once a methodology for

the lease payment calculations is defined, and terms of the lease are pre-approved, it can remain outside the cap if the Commission desires, but still subject to later review.

In Question 18 (b) of UCAN's Second Data Request, SDG&E attempted to describe its considerations in negotiating lease payments:

“For the illustrative parking structure, lease payments could be negotiated in a manner to help offset parking structure costs or as an annual payment. SDG&E has not done any analysis as to what those amounts may be; however, SDG&E does not expect to fund entire cost of structures. SDG&E expects that the leased properties do not have a higher opportunity value for the host and that the host will receive an intrinsic value of the PV above and beyond monetary compensation. Host-specific circumstances will dictate the ability of SDG&E to front load lease compensation. For example, SDG&E would have little hesitation to the concept of front loading lease payments to a municipality, but would have to give careful consideration for a private land owner to guard against future defaults. While all lease payments are subject to negotiation, SDG&E will have a predetermined monetary cap that it will apply equally to all potential hosts.”

This response suggests that SDG&E expects that over the 20-year lease, host customers will never identify an alternative use of the parking area more profitable than parking. SDG&E also assumed the PV offers them an intrinsic value over and above the monetary compensation in the lease but does not indicate whether it means the direct value of shaded parking or the indirect value of “green power.” Finally, SDG&E proposes a “monetary cap” on all leases that will be predetermined and applied equally to all potential hosts, something not articulated in the application. The flaws in this approach are manifold. For example, SDG&E has not estimated site construction costs nor stated how the host customers will be required to pay their fair share of those costs. Yet SDG&E claims it can calculate a predetermined monetary cap that will apply equally to all hosts. Leaving the entire lease development for case-by-case negotiations leaves too much for the Commission to address in Advice Letters.

Fortunately, the Department of the Air Force in the development of Nellis Air Force Base Solar Energy Project *has* provided many documents for public review. One of those documents is a “model lease agreement” that we include as our Attachment I. UCAN recommends that SDG&E submit a draft lease agreement with obvious “blanks” for actual payments and other case-by-case provisions but with the cost responsibilities

assigned and other criteria identified. The advantage of a draft lease should be clear: in the Advice Letter process, the Commission must address fewer project-specific details, having already reviewed and pre-approved the criteria and conditions in the lease. The Nellis Air Force model lease agreement includes the following criteria (the list below is comprised of part of the 33 “Conditions” that comprise the Nellis Air Force Base lease):

- Leased Premises, i.e., description and location of the property
- Term and Delivery of Possession, e.g., 20 years and project start date.
- Easements and Rights-of-Way
- Condition of Leased Premises
- Use of Leased Premises
- Other Agreements, e.g., any project-specific, case-by-case agreements
- Consideration, i.e., lease payments
- Default and Termination, e.g., contingencies
- Surrender of Leased Premises, i.e., in the event of termination
- Environmental Protection and Natural Resources
- Maintenance of Leased Premises, i.e., who is responsible for maintenance
- Access and Inspection, e.g., rights and restrictions
- Compliance with Applicable Laws
- Construction and Alternations, i.e., who is responsible for what costs
- Disputes
- Restrictions on Use of Leased Premises
- Amendments

A draft lease agreement is a reasonable document for the Commission to require in this proceeding. With such a document, the Commission only needs to address case-by-case details and modifications when reviewing the Advice Letter. UCAN recommends the Nellis AFB model lease agreement in Attachment I serves as a reasonable starting place for an SDG&E draft lease.

2. Criteria for Comparing Cost and Efficiency Criteria

After describing the performance potential for single-axis tracking systems at II-15, SDG&E states: “It is for this reason that the SDG&E Solar Energy Project will focus on tracking PV, *while not precluding other applications that meet the overall objective of maximizing annual energy and on-system peak capacity deliveries.*” [italics added]

A preference for tracking systems in the application and in any competitive solicitations issued by SDG&E will bias the bids received against other lower cost alternatives. This is a real problem. SDG&E offers a caveat that other options will be not be precluded as long as they meet this narrow objective. But this is more exclusionary than inclusive, biasing against least-cost best-fit options exclusively toward technical performance considerations and not cost-effectiveness or value-received for costs incurred. Cost comparisons among competing alternatives are ignored in favor of maximizing energy output and on-peak capacity deliveries.

Instead, individual projects should be compared on a comparative cost basis. Project analysis or evaluation criteria are conspicuously absent from SDG&E's SEP application and proposed plan. In its response to UCAN Question 6 in its First Data Request and others, SDG&E claimed not to have produced any cost effectiveness studies or evaluated/compared PV system costs. The methodology SDG&E proposes that will reveal the costs of these systems and assist in choosing among vendors/bidders is to rely on competitive solicitations, i.e., without independent system cost benchmarks, market/technology research or cost effectiveness studies.

3. Tracking PV Systems versus Non-Tracking Systems

We will not restate Commission requirements herein. However, we highlight one order item in the Commission Decision that is potentially violated in the application and which suggests that SDG&E was overly restrictive in its solar technology specifications. Ordering Paragraph No. 14 states: "The IOUs are not to create any false barriers to participation in RFOs or to attempt to limit the competitive process by manipulating RFO product descriptions. (Decision (D.)07-12-052, December 20, 2007, Order No. 14, p. 303). Given this requirement, UCAN believes that by focusing on single-axis tracking PV to the exclusion of other cost effective alternatives -- unless they meet the unduly restrictive requirement of "maximizing annual energy output and peak capacity deliveries" -- the utility-manipulated product descriptions thereby limiting meaningful competition from non-tracking options that may offer cost effective alternatives for solar parking facilities. Therefore, the Commission should require

SDG&E to consider other PV alternatives, to ensure that both the appropriate technology is selected for the facility in question and to ensure that the competitive solicitation process is consistent with D.07-12-052.

In addition, there is a concept generally used in agricultural development called “appropriate technology” that is germane in this proceeding. When helping to develop the agricultural business in underdeveloped countries, some have recommended “high tech” options, such as tractors. But appropriate technology in many of these cases would be a metal blade on a wooden plow. *Appropriate technology* means matching the right technology to existing circumstances, including (as in the case of agricultural development), the skills of the labor force. SDG&E has proposed to install single-axis tracking PV systems despite the fact that it has not investigated any of the existing parking structures that may be in place at the prospective host sites. Since parking structures may not exist at the sites or range from simple carports to multi-level parking structures, it is not known to what extent the structures may need to be retrofitted to be structurally sound enough to support the tracking PV solar systems. A more appropriate approach to this project would be to allow the technology to fit the structural conditions.

4. Turnkey Projects vs. PPA, Lease, Lease Purchase

SDG&E proposed to own, operate and maintain the PV systems installed at host customer sites. This approach provides several advantages to SDG&E. First, SDG&E receives the tax benefits that were recently extended and expanded to include utilities in the October 2008 Emergency Extension , namely the 30 percent renewable energy tax credit and five-year accelerated depreciation despite the 20-year expected equipment life. Second, SDG&E shareholders receive 9.4 percent on the rate base over 20 years In Yunker at III-6: “The 9.4% RoR includes SDG&E’s currently authorized RoR of 8.4% incorporating an additional 100 basis point incentive for renewable ownership.” Third, SDG&E benefits by adding just 0.38 percent to meeting its RPS goals.

On the other hand, there are several disadvantages to SDG&E owning, operating and maintaining the installed PV systems. First, except on utility property, SDG&E must

negotiate a lease with the host over the 20-year life of the equipment to ensure access and lock-in the customer to a long-term arrangement, suggesting lease contingencies to address. Second, SDG&E may be responsible for some site-specific construction costs that the host might otherwise pay if the host was the owner-operator of the PV system. Third, SDG&E would be responsible for maintaining the system and replacing inverters and other component parts over the life of the equipment. Except for the projects on utility property, complicated projects can be more costly and risky for the ratepayers.

Alternatively, SDG&E could get most of the benefits and avoid most of the costs with a different approach to the PV project. For example, SDG&E could purchase these PV systems initially and lease to the host customers for five years, after which it could sell the PV systems to the customers at reduced prices. The lease financing option is discussed in Attachment L. By so doing, SDG&E receives the same tax benefits and earns the 9.4 percent return on its rate base for at least the five years. But the customers (lessees) become responsible for the system's operation and maintenance and the utility (lessor) avoids the need for the long-term site lease with the host and the ongoing need for site access. After receiving the tax benefits and selling the system to the customer, SDG&E avoids any future complications or contingencies and only gives up 0.38 percent towards RPS; at the same time it may contribute to CSI.

Another alternative would be for SDG&E to leverage third party financing that firms like MMA Renewable Ventures have been known to offer many times in project collaborations with PV makers like SunPower Corporation, obtaining the energy from these PV systems under a Power Purchase Agreement (PPA). PPAs are discussed in Attachment M. MMA's services to utilities and others are described in Attachment N. Under this approach, the utility and its ratepayers avoid the initial capital outlay and yet receive the renewable power that it is seeking in this application, including the small RPS benefit. In this scenario, the third party receives the tax benefits but will be responsible for operating and maintaining the system and gaining access to the site over the 20-year equipment life. Basically, the third party assumes all the risk and guarantees renewable power to the utility under these PPAs at a pre-determined price.

There is a decided ratepayer benefit in such an approach and it shouldn't be disregarded by SDG&E. For example, MMA Renewable Ventures has undertaken to finance these PPA PV projects with energy developers, customers and utilities who want to buy renewable power.⁴

SDG&E may also be authorized to assume the MMA role in co-developed PV projects in CSI and sell power to the host customer at a fixed price under a PPA. At a minimum, either the utility or other third party could offer a PPA for CSI-qualifying PV systems that SDG&E assumes could potentially be added and not otherwise installed. Whether SDG&E or a third party can provide the capital and sell renewable power to customers at the lower cost is the key question to be addressed and the reason for accepting both turnkey and PPA bids at some point. This is precisely what a business case must address and why approving turnkey projects on utility property initially provides comparative information for choosing between turnkey projects and PPAs.

SDG&E should have examined each of these possibilities and determined that the ownership and rate base investment option was the best approach for the utility, customer (host) and non-participating customer (ratepayer) in terms of who benefits, who pays and how much. Instead SDG&E only envisioned a single approach, the rate base investment, ignoring other approaches that could have yielded many or most of the benefits of adding renewable power but at a reduced cost over turnkey projects.

At I-5, Avery states: "In D.08-02-008 the Commission encouraged the utilities "...to actively assess the feasibility of utility ownership, and pursue such ownership when and where it makes sense." While SDG&E has proposed utility ownership of PV facilities in its application, it has neither "assessed the feasibility of utility ownership" nor shown that utility ownership "makes sense" in this particular case. But SDG&E should be required to rule out approaches to obtaining renewable power that do not require utility ownership, i.e., can third parties provide the power at a lower cost?

⁴ We note that the utility is precluded from purchasing the depreciated system from third parties after the tax benefits have been recovered from those third parties. Specifically, Ordering Paragraph No. 32 of D.07-12-052, states: "IOUs will no longer be allowed to consider as an option in their competitive PPA RFOs the transfer of the fully depreciated resource underlying a PPA to the IOUs. (D.07-12-052, OP 32, p. 305)

Table 1 follows with a comparison of the various options available. It is relevant to note that MMA Renewable Ventures and SunTech Corp. recently announced creation of Gemini Solar Development Corporation, a joint venture to develop, own and operate utility-scale solar projects in the U.S.. The alternatives to rate base should be considered.

TABLE 1: OWNERSHIP AND FINANCING OPTIONS

Project Type	Utility Owns	Customer Owns	Third Party Owns
Turnkey Projects <i>(SDG&E Approach)</i>	<ul style="list-style-type: none"> ▪ Adds to rate base ▪ 9.4 % rate of return ▪ Pays fixed price for installed PV system ▪ Tax benefits (tax credit & accelerated 5-year depreciation) ▪ Ongoing O&M costs ▪ Certain site-specific construction costs (depends on lease; case-by-case basis) ▪ Requires 20-year lease with host if on customer property (avoid any lease if on utility property) ▪ Replace inverter after first ten years ▪ Power supplied to customers via grid ▪ Adds to RPS goals 	<ul style="list-style-type: none"> ▪ Fixed price for the installed PV system ▪ Initial capital outlay ▪ Tax benefits (tax credit & accelerated 5-year depreciation) ▪ Ongoing O&M costs ▪ Incur site-specific construction costs ▪ No need for lease if on customer property ▪ Replace inverter after first ten years ▪ Net metering option and/or feed-in tariff ▪ Power to customer offsets requirements from SDG&E grid ▪ Potential 1 MW project under CSI (co-developed PV) ▪ CSI incentives for 1 MW of PV installed (lowers initial costs) 	<ul style="list-style-type: none"> ▪ Ownership ends when PV system is installed at a utility or customer site ▪ Collaboration with PV vendor, utility, customer, financing entities and solar energy developers ▪ No tax benefits (tax credit & accelerated 5-year depreciation) ▪ No O&M costs ▪ No site-specific construction costs ▪ No 20- or 5-year lease requirement ▪ No replacement of inverter in ten years ▪ Project profit from completion of sale

TABLE 1: OWNERSHIP AND FINANCING OPTIONS (CON'T)

Project Type	Utility Owns	Customer Owns	Third Party Owns
Leased Systems	<ul style="list-style-type: none"> ▪ Lease to customer ▪ Add to rate base (20-year straight line depreciation) ▪ 9.4 % rate of return ▪ Tax benefits (tax credit & accelerated 5-year depreciation) ▪ Requires 20-year lease with the host ▪ Avoid O&M costs ▪ Replace inverter after ten years (if required by lease) 	<ul style="list-style-type: none"> ▪ Lease from utility or from third party ▪ Avoid initial outlay ▪ No CSI incentives ▪ Ongoing O&M costs ▪ Incur site-specific construction costs ▪ Requires 20-year lease with utility or third party owner 	<ul style="list-style-type: none"> ▪ Lease to utility or to customer ▪ Tax benefits (tax credit & accelerated 5-year depreciation) ▪ 20-year lease ▪ Avoid O&M costs ▪ Replace inverter after ten years (if required by lease)
Lease-Purchase Arrangements	<ul style="list-style-type: none"> ▪ Lease to customer ▪ Add to rate base (5-year straight line depreciation) ▪ Tax benefits (tax credit & accelerated 5-year depreciation) ▪ 5-year lease ▪ Avoid O&M costs ▪ No replacement of inverter in 10 years ▪ Sell at reduced cost after the five years 	<ul style="list-style-type: none"> ▪ Lease from utility or from third party for first five years. ▪ Avoid initial outlay ▪ No CSI incentives ▪ Buy system in five years at lower price ▪ Ongoing O&M costs throughout 20 years ▪ Incur site-specific construction costs ▪ Replace inverter in 10 years (5 years after the purchase) 	<ul style="list-style-type: none"> ▪ Lease to customer ▪ Tax benefits (tax credit & accelerated 5-year depreciation) ▪ 5-year lease ▪ Avoid O&M costs ▪ No replacement of inverter in 10 years ▪ Sell at reduced cost after the five years ▪ Sell at reduced cost after the five years

TABLE 1: OWNERSHIP AND FINANCING OPTIONS (CON'T)

Project Type	Utility Owns	Customer Owns	Third Party Owns
<p>Power Purchase Agreement (PPA)</p>	<ul style="list-style-type: none"> ▪ Sell energy to the customer at a fixed price for 20 years ▪ Rate base investment for full 20-year life ▪ 9.4 % rate of return ▪ Debt equivalence if PPA projects only ▪ Utility may not buy depreciated system ▪ Tax benefits (tax credit & accelerated 5-year depreciation) ▪ Ongoing O&M costs ▪ Certain site-specific construction costs (depends on PPA; case-by-case basis) ▪ Requires 20-year lease with host if on customer property (avoid any lease if on utility property) ▪ Replace inverter after first ten years ▪ Power supplied to all customers via grid ▪ Adds to RPS goals 	<ul style="list-style-type: none"> ▪ Customer does not own but obtains the power output for a 20-year period at a fixed price (inflation-adjusted over time depending on deal) ▪ No tax benefits (tax credit & accelerated 5-year depreciation) ▪ Avoids the initial capital outlay ▪ Avoids ongoing O&M costs ▪ Avoids the 10-year inverter replacement ▪ Power supplied under PPA offsets power supplied by the grid 	<ul style="list-style-type: none"> ▪ Sell energy to utility or customer at fixed price for 20 years ▪ Tax benefits (tax credit & accelerated 5-year depreciation) ▪ Ongoing O&M costs ▪ Certain site-specific construction costs (depends on PPA; case-by-case basis) ▪ Requires 20-year lease with the host (customer or utility) ▪ Replace inverter after first ten years ▪ Power supplied to customer offsets power from grid

VI. Standards for Review of Individual Projects

A. Advice Letter Process and Performance Measures

Two issues identified in the Scoping Memo for parties to review are (1) whether the Advice Letter process is an appropriate method for approving individual projects and (2) whether performance measures might be needed to avoid cost overruns. Given that individual projects will be identified over the five-year program period (2009-2013) and actual host sites, vendors and PV technologies to be selected during that period cannot be known with certainty at the present time, Advice Letters are not appropriate for obtaining the Commission's approval unless there are pre-established, measurable criteria to facilitate and simplify the most critical elements of individual project review.

Certain rules and/or conditions can be specified in the current proceeding to guide the Advice Letter process and performance measures can be developed to ensure the Commission will be able to adequately assess individual projects. In its response to Question 33b of UCAN's Third Data Request, SDG&E responded that: "SDG&E has not stipulated the specific cost analysis and methodologies to be included in the Tier 3 Advice Letters."

UCAN believes that the Commission should require some assurances by SDG&E prior to approval of the application that cost analyses and methodologies used to justify individual projects under SEP will meet certain cost effectiveness standards and that these "review standards" can and should be clearly articulated in the application. Pre-established criteria enables a non-controversial Advice Letter review process. SDG&E's reliance upon Advice Letter proposals creates a high potential for contested filings and exposes Energy Division staff to additional analysis thus taxing limited resources.

As will be discussed below, the Commission should issue pre-established project criteria that will enable the Energy Division to measure the project-specific details.

1. Pre-Conditions for Advice Letter Process

There are various criteria or boundary conditions that can be defined now as part of the application proceeding to guide and/or assess Advice Letter proceedings. These conditions, discussed elsewhere in this testimony, are only summarized below:

- Criteria for assessing specific host sites appropriate for the Solar Energy Project.
- Criteria for assessing PV vendor qualifications, e.g., expertise and experience.
- Criteria for assessing PV technology options eligible for the Solar Energy Project.
- Criteria for assessing rate base investment versus alternative financing options.
- Criteria for assessing the cost effectiveness of competing bids (which may involve different technologies, financing arrangements, site-specific construction costs or lease arrangements). A methodology is required to compare different proposals in cases where differences make apples-to-apples comparisons more difficult. As an example, a bid may propose projects with different hosts, equipment lives, systems and financing. The methodology should permit such comparisons objectively.
- Criteria for assigning responsibilities to leases between the host and the utility.

These criteria should be approved in the application to inform Advice Letter filings.

2. Performance Measures for Individual Projects

Prior to approval of an individual project, the Commission should require the following:

- All unknowns identified in this application must be quantified prior to approval of an individual project, e.g., site-specific construction costs, lease payments, ongoing O&M costs and inverter replacement costs for the specific site and PV system.
- Each of these costs, i.e., costs SDG&E asserts are not included in the \$250 million cap, should have a specific limit above which the ratepayers will not be responsible. For example, site-specific construction costs and leases between a host and the utility should cap the cost responsibilities for utility ratepayers.
- An assessment of project costs over the 20-year life of the equipment, including program administration costs directly attributable to the individual project. Program development or administrative costs that are common to all projects

are not assigned to individual projects but considered overhead in project evaluation.

- A 20-year projection of rate increases due to the addition of an individual project compared either to rate increases otherwise experienced without the project or independent project benchmarks to ensure selection of cost effective projects.
- An ongoing assessment of the contribution to overall program performance as well as individual project performance, where the program involves five years of PV program installations, 20 years of costs and benefits for each installation in each year, covering the years from 2009-2033. Each individual project added to the total program should be assessed both individually and as part of the total.

B. Least-Cost Best Fit Criteria

Decision 08-10-026 (October 16, 2008) addresses the “Market Price Referent” (MPR) for the RPS. In addition, D.04-07-029 (July 8, 2004), adopts least-cost best-fit criteria for bid evaluations and D.03-06-071 (June 19, 2003), initiating implementation of the Renewables Portfolio Standard (June 19, 2003). These decisions address the bid evaluation process. Both suggest the need for independent cost benchmarks and cost effective assessments.

Public Utilities Code §§ 399.14, Section (a)(2)(B) requires that utilities evaluate renewable energy bids using the least-cost best-fit (LCBF) methodology as part of the RPS process. According to the Public Utilities Code, renewable resources satisfy the least-cost criterion if costs include the direct costs of renewable generation and the indirect costs associated with integration of the renewable resource with the necessary transmission investments. A renewable resource must also be “best fit, i.e., it must best fit system needs. But while these legislative and regulatory mandates guide the RPS bid evaluation process, SDG&E did not produce any screening criteria or evaluation method.

SDG&E proposes to “screen potential opportunities with the goal to construct facilities which provide the greatest benefit to all customers.” (See SDG&E testimony at II-12, line 9)) SDG&E proposes an initial project screen to ensure that potential installations meet “basic program characteristics...” (See SDG&E testimony at II-12, line 11) Importantly, SDG&E has not specified by what methods or criteria these evaluations will be performed or conducted. This should be established prior to approval of the

application rather than wait for Advice Letters to know how individual projects are being selected and evaluated.

SDG&E offers its experience in meeting Renewable Portfolio Standards (RPS) and in the Sustainable Communities Programs (SCP) as its rationale for choosing from among the various projects proposed as part of its competitive solicitations. While RPS and SCP experiences are certainly relevant, those experiences do not assure selection among the competing vendors and technologies will be unbiased and objective. A well-articulated project evaluation methodology must include initial screening processes to eliminate proposals that are “unacceptable” (e.g., failure to meet essential criteria) or “dominated” (e.g., comparable PV systems offered at a lower cost); benchmark cost estimates from independent sources; and cost-benefit comparisons of the best surviving proposals so that different projects using different technologies with different costs or performance and useful lives can be compared and so that a “winner” can be selected from among the competitive bids on a reasonable and objective basis. SDG&E’s proposal doesn’t do this.

Evaluating individual projects effectively and getting the most beneficial results to justify the expected cost presumes that competitive solicitations are based on RFPs that have allowed for a full range of vendors and technology options suitable to the kinds of sites in the market niche proposed by SDG&E, i.e., parking structures and other open spaces located in close proximity to the load and transmission lines. As currently proposed, SDG&E’s Solar Energy Plan focuses strictly on single-axis tracking systems and only considers other PV technology options that “*meet the objectives of maximizing annual energy and on-system peak capacity deliveries.*” (Thomas and Bialek at II-15)

In other words, cost effectiveness (or cost-benefit) comparisons among solar technology options that represent alternatives to single-axis tracking systems in this market niche are not comparably considered. In Question #16 of UCAN’s Data Request #1, UCAN asked SDG&E to “provide any and all analysis conducted by SDG&E of the cost effectiveness analysis of any photovoltaic technologies, including but not limited to thin-film PV and single-axis tracking.” SDG&E responded to our question about cost

effectiveness with ““SDG&E has not performed a cost effectiveness study or conducted any market research on solar parking facilities of PV technologies, but instead, expects this to be borne out by competitive solicitation.” Additionally, responding to UCAN’s Question 37 of its Third Data Request, the utility admitted: “SDG&E has not conducted in-depth research nor is it aware of any market research on solar parking facilities.”

There are several reasons why relying on the outcome of SDG&E’s competitive solicitations without any prior information or independent cost benchmarks is an inadequate approach. First, SDG&E proposes to focus attention solely on single-axis tracking systems and/or others that will “*maximiz[e] annual energy and on-system peak capacity deliveries.*” So cost effectiveness among competing PV system technologies cannot possibly get a fair hearing by looking solely at the competitive bids if the only bids requested and considered are tracking systems.

Second, if the objective is maximizing annual energy and on-peak capacity deliveries, the only consideration of cost likely to count is the cost of PV systems that meet that restrictive performance objective. Third, information on solar parking facilities across the country is available, including the Nellis Air Force Base project that SDG&E identified in its application. In addition, what remains unexamined are less expensive, non-tracking PV options that may provide more benefits per unit of cost, allowing the \$250 million cap to fund more PV installations. SDG&E’s preference for tracking systems in its application means that any competitive solicitations issued by SDG&E can only bias the bids received against other lower cost alternatives. Cost-benefit comparisons among competing alternatives are ignored in favor of maximizing energy output and on-peak capacity deliveries regardless of costs. Instead, individual projects should be compared on an economic, cost-benefit basis that complies with the LCBF requirement. Project analysis is conspicuously absent from SDG&E’s application and proposed plan. In their response to UCAN’s questions in Data Request #1, SDG&E claimed not to have examined any studies nor developed any costing methodologies for evaluating/comparing PV system costs.

Finally, individual projects must be evaluated in a comprehensive manner since the set of bids submitted all compete for a share of the \$250 million budget (spending cap). That is, in each program year, SDG&E must investigate multiple bids and compare:

- Projects located at different host sites;
- Project submitted by different vendors;
- Projects using different PV technologies;
- Projects offering different financing options.

Because all projects are competing for their share of the \$250 million spending cap, it is not sufficient to compare all projects at a given site without consideration of whether the projects at that site are more cost effective than projects at other sites. Project economics of a host site could be dominated by other projects at other sites. Choosing among the competing projects, therefore, requires a methodology that allows objective comparisons among alternative sites, vendors, technologies and financing.

C. UCAN's Recommendations

In Table 1, UCAN showed how different financing alternatives affected the utility, host and third party. As the table reveals, depending on project elements, some costs might be relevant and some might not. Turnkey projects imply that SDG&E assumes responsibility for certain costs, e.g., initial capital cost, ongoing O&M, that it may not assume under a lease or PPA project. If the Commission adopts SDG&E's approach, i.e. allowing only turnkey projects and tracking PV systems, then individual project evaluation is certainly easier. There are few factors that differ among projects. Most expected project costs have been identified in the application and discussed in this testimony, including installed PV system costs, annual O&M costs, site-specific construction costs, inverter replacement and lease payments. In SDG&E's proposal, projects would all be turnkey projects, i.e., rate base investments, employing single-axis tracking PV systems.

In cases where SDG&E is looking at two or more projects with comparable system specifications located at the same site, it will need to determine which proposal is less costly. Assuming technologies are roughly comparable, and examining all projects

at a single site, SDG&E would not need to calculate any differences in GHG emissions, interconnection costs, distribution cost savings, site-specific construction costs or lease payments. It is basically seeking the low cost proposal/bidder for the specific site.

But while easier to compare, projects at other sites and cost effective alternatives to single-axis tracking and rate base investment (turnkey) projects should be compared on an equal or objective basis. What UCAN proposes is a project evaluation method that can compare projects that differ in many respects, including different sites. For example, SDG&E might need to compare a turnkey project (single-axis tracking) at one site to a non-tracking PV system under a PPA at another site. Since SDG&E is subject to a budget constraint, i.e., the \$250 million cap in the proposal, they may have to choose among different sites. In order to consider alternatives to single-axis tracking and rate base investments, SDG&E will need a method for comparing dissimilar alternatives. Facilitating the evaluation of multiple projects with the same or different PV systems at the same or different locations, involves three stages:

- Screen all projects to make sure that they meet minimum project criteria. Based on the customer benefits identified by SDG&E at II-18 through II-20, projects can initially be screened according to threshold criteria to eliminate projects that do not meet pre-established criteria, e.g., projects that exceed the individual project cap or require excessive system interconnection costs.
- Screen the remaining projects to eliminate projects that are dominated, i.e., projects at the same site that involve comparable systems and benefits but at a higher cost than other project proposals.
- Rank the surviving projects based on any pre-established qualitative criteria.
- Evaluate those same surviving projects based on quantitative criteria, i.e., comparative cost evaluations using both least-cost and best fit criteria.

There is a simple way to compare multiple projects regardless of specifics. Essentially, the Commission should ignore those site, vendor, technology and financing factors that are comparable or even identical and concentrate on those that differ. Hypothetically, consider two projects: (1) Project A is an SDG&E turnkey project at Site A with Vendor A and PV System A (single-axis tracking) and (2) Project B at Site B with Vendor B and System B under a PPA offered by the vendor or a third party. Where the differences between the projects are small or non-existent, the factor can be ignored

when comparing the two projects. In other words, thinking incrementally, the Commission only need to measure factors that change.

TABLE 2
Individual Project Comparison: An Example

Criteria	Project A	Project B	Compare A to B
Site <i>What differs between sites? Ignore if same site.</i>	Site A: Interconnection costs Distribution benefits Site construction costs Annual lease payments Co-developed PV added	Site B: Interconnection costs Distribution benefits Site construction costs Annual lease payments Co-developed PV added	Evaluation Process: Eliminate if minimal requirements not met. Eliminate if dominated. Rank qualitative factors. Evaluate quantitative factors where different.
Vendor <i>What differs between the vendors? Ignore if same vendor</i>	Vendor A: - Corporate qualifications - Single or multiple project potential - Co-developed PV	Vendor B: - Corporate qualifications - Single or multiple project potential - Co-developed PV	Evaluation Process: Eliminate if minimal requirements not met. Eliminate if dominated. Rank qualitative factors. Evaluate quantitative factors where different.
Technology <i>What differs between the technologies? Ignore if same system specifications</i>	Technology A: Installed cost Output efficiency Cost per kWh System reliability Emission reductions Technology changes: - Costs decline - Efficiency improves	Technology B: Installed cost Output efficiency Cost per kWh System reliability Emission reductions Technology changes: - Costs decline - Efficiency improves	Evaluation Process: Eliminate if minimal requirements not met. Eliminate if dominated. Rank qualitative factors. Evaluate quantitative factors where different <i>Technology changes inform decision maker whether to wait.</i>
Financing <i>What differs between the financing alternatives? Ignore if both PPA or both turnkey.</i>	Turnkey Project: Annual power costs Installed system cost Annual O & M costs Inverter replacement Site construction cost Lease payments, if any Cost of capital Tax Benefits, e.g., ITC Project-related A&G Rate impacts	PPA: Annual power costs Inflation adjustment Rate impacts	Evaluation Process: Eliminate if minimal requirements not met. Eliminate if dominated. Rank qualitative factors. Evaluate quantitative factors where different: - compare turnkey power costs to fixed PPA price. - identify any specific cost components that differ, if any, e.g., cost of capital.

In comparing multiple projects, SDG&E needs an objective ranking of all submitted project bids. In the final analysis, some site, vendor, system and financing

option combinations might be eliminated from consideration if they contribute less to overall program performance than they other project bids. The Commission will want SDG&E to choose the best group of projects regardless of the host site rather than the best project at each site.

The important thing to note when applying this approach to competing projects is that when there is a budget constraint, SDG&E must find the best projects that contribute most to program objectives. Consequently, sites, vendors, technologies and financing options compete simultaneously for the limited program budget. A project evaluation methodology must respect the fact that multiple projects compete for a limited budget. Otherwise authorized program funds may be depleted before better projects are identified.

UCAN's recommended methodology should also consider a "wait scenario" to allow for technology developments. As discussed, SDG&E's approach to the balancing account treatment was justified based in part upon the fact that technology developments may lead SDG&E to delay installation within the 2009-2013 timeframe where technology improvements or cost reductions are expected. But SDG&E provides no means for obtaining knowledge of those developments or a methodology for determining when to wait or not to wait. UCAN supports a methodology in which three scenarios are examined with respect to the installations: (1) install, (2) don't install and (3) wait until more information is available. Once more is known about performance improvements and cost reductions, a decision to install can be revisited. By examining the wait scenario, allowing for monitoring of technology developments, the project when installed can be more cost effective than if installed prematurely.

Essentially:

- SDG&E should be required to produce an LCBF methodology that allows for competition between competing sites, vendors, systems and financing options.
- SDG&E should be required to consider a wait scenario when evaluating any solar technology where costs are expected to decline or performance to improve.

VII. Reasonableness of Proposed Program Costs

SDG&E provides few costs by which the Commission can evaluate its proposal. The \$250 million figure represents a constraint on a subset of costs incurred during the 2009-2013 program period. At II-24, SDG&E states: “Included in the costs of SDG&E Solar Energy Project are all costs required to develop and install the solar PV facilities, consisting of direct capital costs and indirect capital costs and the annual SDG&E Solar Energy Project administrative costs. Costs associated with on-going lease payments (if applicable), operations and maintenance (“O&M”) staffing and operations and maintenance activities are not included in the \$250 million SDG&E Solar Energy Project cost. In addition, post installation capital costs such as inverter replacement are not included in the \$250 million SDG&E Solar Energy Project costs.” In other words, the “cap” excludes certain initial costs incurred during the 2009-2013 period when PV systems are installed. It also excludes certain ongoing costs incurred directly as a result of those installations during the 2009-2013 period. Finally it excludes certain costs incurred over the period beyond 2013, i.e., over the life of the equipment.

It includes the capital cost of the PV systems, the cost of installation, and program development and administration costs during the 2009-2013 period. (See SDG&E testimony at II-24, lines 11-19) But the cap may include certain site-specific construction costs that may or may not be the responsibility of ratepayers but may be incurred when the systems are installed. These can be formidable if the structure needs significant modifications to support the installed panels. In addition, the cap does not cover the cost of lease payments that might be required to assure participation by the host. The cap also does not include any expenditures beyond 2013, including the costs associated with ongoing O&M expenses or inverter replacements (that SDG&E intends to add to rate base as SDG&E admitted in Question 9 of UCAN’s Third Data Request). In addition, program administration costs beyond 2013 are excluded.

There is too much *not* covered by the so-called spending cap and at a minimum SDG&E should be required to provide limitations on such expenditures that customers would be required to pay or performance measures to ensure these costs are managed.

The discussion of cost estimates or more specifically the absence of cost estimates in the application makes it impossible to respond in any meaningful way to the following:

- “Whether the proposed costs are reasonable in comparisons to other potential utility-owned renewable energy projects.” (Scoping Memo, Page 4, Section A)
- “Whether the proposed costs are reasonable in comparison to customer owned distributed solar installations under the CSI.” (Scoping Memo, Page 4, Section A)
- “Whether the proposed costs are reasonable in comparison to other renewable portfolio standards (RPS) projects bidding into SDG&E’s competitive solicitation for renewable energy projects.” (Scoping Memo, Page 4, Section A)

Such comparisons would certainly help support the SDG&E program as proposed and alleviate relevant concerns that we address in the discussion below.

A. System Costs

In its application SDG&E discusses the potential higher efficiency of single-axis tracking systems compared to non-tracking PV systems. But SDG&E does not address the cost side of the equation. In Question 16 of UCAN’s First Data Request, UCAN asked SDG&E to: “Please provide any and all analysis conducted by SDG&E of the cost-effectiveness of all photovoltaic technologies, including but not limited to thin-film PV and single-axis tracking.” SDG&E responded by stating: “SDG&E has not performed a cost effectiveness study of photovoltaic technologies, but instead, expects this to be borne out by competitive solicitation.” Following up, UCAN asked for the basis of the \$7,000/kW figure that SDG&E claims represented the high side of the cost estimate.

Responding to Question 4 of UCAN’s Second Data Request, regarding the basis for SDG&E’s estimate of \$7,000/kW as the proposed cap on individual projects, SDG&E states: “Please see Section VII, A, Direct Capital Cost, page II-24 of testimony by witness Thomas. SDG&E has not done a cost estimate, but has identified a prospective range of expected market costs and further relies on future competitive solicitations for cost refinements.” At II-24, Thomas states: “SDG&E expects the installed direct capital cost

will be in the range of \$4,000/kW_{dc} - \$7,000/kW_{dc}⁵. This estimated cost includes materials, engineering, and installation costs including construction labor, for the photovoltaic panels and all balance of plant (which includes inverters, cables, wires, conduit, mounting structures, and all required hardware). Historical installed costs of the CSI program have been approximately \$6,500 to \$7,000 kW_{dc}.⁶ Given the scale considered for the SDG&E Solar Energy Project, SDG&E expects to achieve cost savings such that installed costs will be consistent with or lower than those of the CSI program which delivers predominantly fixed, non-tracking, systems.

It is essentially impossible to determine whether cost estimates are reasonable for costs that have not been provided in the application or in response to data requests. What SDG&E did provide was an overall \$7,000/kW “cap” on individual project system unit costs. Responding to Question 20 of UCAN’s First Data Request, SDG&E stated: “SDG&E’s application seeks authority to install photovoltaic systems that will be competitively bid at a cost of less than \$7,000/kW_{dc} and then submitted for approval via a Tier 3 Advice letter.”

However, this cap was based upon CSI project experience, as per SDG&E, and not on any research on the solar parking projects in place or under construction across the country. But in our evaluation, UCAN finds that the 14 MW Nellis Air Force Base Solar Energy Project cost \$100 million or just over \$7,000/kW. Since that project was much larger than projects proposed by SDG&E, it remains to be shown that the \$7,000/kW cap is meaningful for these smaller 1-2 MW projects. (Attachment D)

In addition, a single overall cap may not be appropriate if SDG&E is required to modify the program to allow for less-expensive systems, e.g., non-tracking systems, or less expensive technologies, e.g. thin film panels. Essentially, a more effective cap on individual projects should include a unique cap that varies by systems or technology.

⁵ “The lower range value \$4,000/kW_{dc} is based upon Southern California Edison Company’s (SCE’s) Solar PV Program application (A.08-03-015) \$1.024 billion for 250 MW_{dc}, with consideration given to the differences between SCE’s program and SDG&E’s Solar Energy Project. In any event, SDG&E’s actual costs will be based on competitive bids.”

⁶ “This estimate is based on the average cost per kW for photovoltaic projects listed as part of the California Solar Initiative April 30, 2008, and the average cost per kW for photovoltaic projects listed in the Self Generation Incentive Program (SGIP) in 1st quarter 2008. These two lists were accessed through the California Center for Sustainable Energy website.”

But responding to UCAN Data Requests, SDG&E admitted:

- “SDG&E has not performed a cost effectiveness study of photovoltaic technologies, but instead, expects this to be borne out by competitive solicitation.” (UCAN DR1, Q16)
- “No documents have been produced by SDG&E which address or analyze PV cost-effectiveness.” (UCAN DR1, Q19)
- “... SDG&E has not done a cost estimate, but has identified a prospective range of expected market costs and further relies on future competitive solicitations for cost refinements.” (UCAN DR2, Q04)

With no research to back up the \$7,000/kW cap, with at least one project 7 to 14 times larger than the project size of the proposed solar parking projects (Nellis Air Force Base) that is just above the cap, and with a range of PV systems and technologies that vary in terms of cost and performance, a single \$7,000/kW cap is inadequate for this program. SDG&E should produce unique project caps by size, system type and panel technology that reflect comparable projects and/or cost estimates.

Proper defense of the SDG&E application would have shown the results of an investigation into solar parking projects around the country in terms of whether they installed tracking or non-tracking systems and the cost versus size of the installations.

B. Site-specific construction costs and lease payments

At II-24, Thomas and Bialek state: “Costs associated with on-going lease payments (if applicable), operations and maintenance (“O&M”) staffing and operations and maintenance activities are not included in the \$250 million SDG&E Solar Energy Project cost. In addition, post installation capital costs such as inverter replacement are not included in the \$250 million SDG&E Solar Energy Project costs.” There is no basis for evaluating costs that have not been estimated. But there is a rationale for establishing criteria for accepting or rejecting certain costs or setting limits on these uncapped costs.

In its response to Question 18 a and b of UCAN’s Second Data Request on the subject of lease payments and cost responsibilities, SDG&E stated: “For the illustrative parking structure, lease payments could be negotiated in a manner to help offset

parking structure costs or as an annual payment. SDG&E has not done any analysis as to what those amounts may be; however, *SDG&E does not expect to fund entire cost of structures [italics added]*...While all lease payments are subject to negotiation, SDG&E will have a predetermined monetary cap that it will apply equally to all potential hosts.” In 18c, SDG&E adds: “SDG&E will quantify any lease payment, be it lump sum, annual payments, or some combination thereof, in the form of money, upfront construction work, or O&M for host owned, co-located PV. Externality benefits, such as auto shading, augmentation of host green image, will not be quantified, but rather qualified.

The design and construction phase of a solar parking project involves many decisions and potential issues. According to a 2008 presentations by Michelle Wendler for Watry, Inc. entitled “Solar Energy Meet Parking Structures,” (Attachment I), the developer/designer must choose the lighting system, locate the electrical room for housing inverters, size parking structure columns to support PV system loads, address fire requirements for the facility, and for existing structures consider coring slabs to run electrical conduit. The site-specific construction costs can vary on a case-by-case basis. We earlier discussed why criteria should be established in this application proceeding to address design and construction costs and to whom they should be assigned (either the utility, the host or third party developer).

SDG&E should have investigated and contacted developers to identify site-specific construction cost issues that they could have listed in the application along with cost responsibilities assigned to the utility or the host. By approaching site-specific construction costs in this manner, SDG&E could have provided boundary parameters only leaving quantification of those costs to Advice Letters. Instead, SDG&E supports unknown site-specific construction costs to be addressed on a case-by-case basis in Advice Letters with no pre-established restrictions on who pays or how much. As we addressed earlier, the Commission should require SDG&E to identify categories of site-specific construction cost and pre-establish which party (host, utility or third party) who would be responsible for them. We add that the UCAN program alternative approach

allows SDG&E to discover the costs to make the necessary modifications to parking structures. That data in hand would inform project selection at other sites.

C. Program development and administration costs.

During the five-year program period, 7 FTEs are requested in SDG&E's program administration cost estimate. But only 2 FTEs continue in 2014 and beyond and these do not appear to be covered in the cap. In its work paper provided in response to Question #1 in UCAN's First Data Request, i.e., *Cost Data for Illustrative Revenue Requirement*, SDG&E calculates the "Total Annual Labor Cost Per Year" as being \$1,325,569.61. This calculation is based upon 7 FTEs at an annual salary of \$100,000 (direct labor) and labor-related indirect costs of \$89,367.09 (assuming an 89.4% loader). The 2 FTEs in 2014 through 2033 (assuming a 20-year equipment life) at the same direct labor salary (\$100,000) and the same indirect labor loader (89.4%), ignoring any change in unit costs, e.g., real or inflationary, amounting to an additional annual expense of \$378,734.18, i.e., the cost of 2 FTEs each year from 2014-2033.

In Thomas and Bialek at II-28: "The annual staffing budget for the 7 FTEs dedicated to the program is \$1,326,000 fully-loaded in 2008 dollars for years 2009-2013... In addition to the *incremental employees [italics added]* required for the SDG&E Solar Energy Project there will be on-going, periodic support provided by individuals in SDG&E's Supply Management, Commercial Legal, Accounting and Business Planning and Environmental groups." SDG&E has defined "incremental employees" for the SEP as those employees incremental to the program but has not yet determined whether they will be new hires (incremental to the company) or existing company employees that may be redeployed to SEP.

For example, in Question 13 of UCAN's Second Data Request, UCAN asked whether these 7 FTEs would be new hires or existing employees and SDG&E responded: "SDG&E has not contemplated the origination of the new FTEs." But whether or not these particular employees are new to the company, they may represent opportunity costs, i.e., other activities that must be performed, and may require replacement new hires for other positions. Furthermore, as indicated in the Staffing Requirements Table

II-3, these 7 FTEs are “Total New FTEs” as compared to other staffing requirements in the table that may be utilized from Supply Management, Commercial Legal, Accounting and Business Planning and Environmental groups but that were not quantified as to the level of support. SDG&E is requesting recovery of the cost of seven FTEs through 2013 but proposes to reduce the staffing level to 2 FTE from 2013 through 2033.

In fact, between Table II-3 and Appendix II the “full-time equivalent” labor is *equivalent* to seven full-time employees. Appendix II of the application describes four position descriptions (FTEs from Table II-3 in parentheses):

- Program and Business Manager (1 FTE)
- PV Technical Specialist (1 FTE)
- Project Developer (2 FTE)
- Construction and Project Management (2 FTE)

The only position not described in Appendix II is Administrative Support.

Therefore, assuming that new employees must be hired to fill these positions or to fill other positions vacated by the personnel filling these new positions, the company has seven more employees in 2009-2013 with the project than it would without it. That begs the question: “What is the company going to do with these employees in 2014 when the program staffing requirements are reduced to 2 FTEs?” Work papers provided in UCAN Data Request #1 (Cost Data for Illustrative Revenue Requirements) indicates that the 7 FTEs required between 2008-2013 decline to 2 FTEs after 2013.

An important concept in project analysis is called “*closing the planning loop.*” In order to properly assess the project economics of the SEP and assume that labor expenses are reduced by five employees (five FTEs) in 2014, but in fact no labor expenses are actually reduced, then the true cost of the program has been understated. This is not an uncommon problem in project analysis where claims of potential cost savings have been indicated as part of project justification. But if the potential savings used to justify the program are not realized, the program may not be justified after all. For example, DSM programs might be justified in part due to potential savings from delayed generation or T&D investments. But unless those planned investments are

actually delayed, the DSM program may not be cost effective and should not have been undertaken. If planned SEP staffing reductions requirements are not realized, then there are seven FTE and not two FTEs in 2014 and beyond. Unless SDG&E can explain how it proposes to reduce staff in 2014, the Commission can't accept SDG&E's anticipated labor costs for years 2014-2033.

Second, all seven of these employees, whether PV technical specialists, project managers or administrative support personnel are assigned a salary of \$100,000 for the purpose of this application. Add to that the 89.4 percent labor loader and you have total compensation of \$189,400. Given the specificity of the position descriptions, it would be reasonable to require the five positions to be assigned appropriate, realistic salaries based on position levels and average salaries for those positions in SDG&E compensation studies. However, assuming seven new employees are paid \$100,000 plus \$89,400 in benefits regardless of job requirements, it *is not just illustrative, it is meaningless*. SDG&E should provide more realistic salaries in its application even if actual costs will ultimately be what ratepayers are asked to recover. What is important for the Commission to know is a realistic assumption on program administration costs.

Third, SDG&E has not placed a value on the existing resources that will be called upon for support. (Table II-3 identifies FTE requirements for the 7 FTEs identified specifically but does not estimate the cost of propose an AG&E adder or other method for determining the burden on these groups). Consequently, these 7 FTE's understate the total incremental annual staffing cost associated with the SEP. While this may not matter for the purpose of the revenue requirement calculation, it is important for development of a business case to know the extent of support from these other groups necessary to implement the program. 7 FTE's represents only "Total New FTEs" and ignores burdens placed on any existing staffing resources in other areas of the utility to the SEP from other activities. If it can be assumed these are fully-employed and not idle resources, there are "opportunity costs" associated with the activities these existing resources would have otherwise performed. Therefore, to assess a program, all administration costs must be included. At a minimum, SDG&E should be required either

to estimate the equivalent FTE's associated with activities expected to be performed by Supply Management, Commercial Legal, Accounting and Business Planning and Environmental and any group tasked with supporting the SEP or to provide an A&G adder component that incorporates the resources required from other departments. The Commission should require SDG&E to provide a program evaluation that addresses all costs associated with the program when they are incurred, and not a revenue requirement calculation that only shows what and when costs are recovered.

Fourth, SDG&E did not differentiate between the activities required of labor resources during the program years and after the program period has ended and the installed PV units are only operated and maintained. There is clearly a need for a full program analysis where relevant costs are not truncated in the year 2013 and pre-program and post-program costs are more clearly delineated beyond the rudimentary illustrative revenue requirement work paper.

D. Potential Tax Benefits and Pricing Advantages of PPAs

In the musical version of "Camelot", Arthur and Guenevere sing "What Do the Simple Folk Do?" as they ponder what life must be like for the commoners residing in the kingdom. It is a song that could (and perhaps is) as easily sung by utility analysts who can be professionally isolated from the "folks" who work in competitive businesses. Certainly, SDG&E's application affirms such an impression. Since SDG&E's application lacked the details on costs and cost effectiveness necessary to make this determination and SDG&E chose not to consider approaches other than rate-based turnkey projects, at a minimum, PPAs should be investigated. Turnkey project on utility-owned property as are part of that investigation.

UCAN proposes an alternative approach to SDG&E's solar parking program that (1) focuses program spending initially to turnkey projects on utility-owned property and (2) expands spending on the program to customer-owned property as more data accumulates on the costs, benefits and risks associated with installing PV systems on parking structures. In our recommendations, UCAN suggests that PPAs may offer a

more cost effective alternative to turnkey projects. Third parties may have certain advantages in terms of costs, e.g., lower financing costs, lower labor costs and lower project-related overheads, and experience. Some of the reasons for these advantages are the treatment of investment tax credits (ITCs) and accelerated depreciation, especially with utilities governed by normalization accounting rules. Third parties may also have pricing advantages, e.g., greater pricing flexibility in a competitive market.

1. Investment Tax Credits, Accelerated Depreciation and Normalization Accounting.

At III-9 and III-10, SDG&E addresses the tax benefits that were extended in October 2008 for eight years and broadened to include the utilities as well as other businesses. (See Attachment S and T) To take both the investment tax credit (ITC) and five-year accelerated depreciation benefits using the MACRS schedule in Table 3, the utility must use normalized accounting rules. Normalized accounting rules that govern utility accounting in these cases require the following:

- ***Investment Tax Credit:*** Utilities are required to pass through ITC credits to ratepayers over the twenty-year book life of these PV system investments. SDG&E states: “ITC benefits flow to customers ratably as a reduction to tax expense in cost of service over the book life of the property that qualifies for ITC.” (SEP, III-9-10)
- ***Accelerated Depreciation:*** A 5-year MACRS schedule applies to renewable energy project. To calculate the depreciation basis, the initial investment is reduced by 50% of the ITC prior to the application of MACRS percentages. SDG&E adds that “this is a permanent book/tax difference, so there are no deferred taxes attributable to the ITC claimed.” (SEP, III-9, 10)

The *Fact Sheet on Federal Tax Incentives for Solar Energy* provided by the San Diego Regional Energy Office (Attachment R) confirms that the 5-year accelerated depreciation calculations require the depreciation cost basis to be reduced by 50%. Philip Spector of Trautman Sanders Law Firm also confirms these tax benefit calculation

requirements in *Lease Financing and Solar Power*. (Attachment L) Consequently, the depreciation basis for a \$10 million project is \$8.5 million since the \$3,000,000 ITC (30% of the \$10 million) must be reduced by 50 percent and then subtracted from the initial investment. MACRS percentages below are applied to the reduced depreciation basis.

TABLE 3
MACRS Depreciation Schedule
5-Year Depreciation Schedule
Using Half Year Method

YEAR	PERCENTAGE
1	20.00%
2	32.00%
3	19.20%
4	11.52%
5	11.52%
6	5.76%

Using the “half-year convention,” equipment placed in service during a tax year is assumed placed in service in the midpoint of the tax year. A half year’s depreciation is applied to the first year and the last year of the recovery period or the year in which a capital investment is removed from rate base. Intervening year depreciation includes a full year, according to the MACRS depreciation schedule. Therefore, we see in the table below only 20% instead of 40% in Year 1 and only 5.76% instead of 11.52% in Year 6.

Essentially, normalization accounting rules limit how tax benefits are treated for utilities and how they are passed through to customers, i.e., how, how much and when, for the Solar Energy Project if the project is a utility-owned, rate-based turnkey project.

2. Third Parties May Have Pricing Advantages Relative To Regulated Utilities

One aspect of turning to third parties not yet addressed is that these third party firms compete against one another in competitive solicitations for the utility's PV project. Consequently, whether the third party (system vendor and financing firm) has lower costs or not, and regardless of whether they must account for tax benefits in the same way that utilities must, third parties have more flexibility in terms of pricing and not necessarily limited to the same cost-based pricing restrictions that utilities endure. Labor overhead cost of capital

Market pricing is essential for competitive enterprises. Competitive bids must recover incremental costs, both direct and indirect, but not necessarily recover a pro rata share of overhead costs or "pass through" tax benefits as part of the project bid. Competitive enterprises see a difference between costs and price. Competitive price should be based on market considerations while project costs help determine project profitability. Overall and over time, a competitive business must recover its full cost, including overheads, to remain viable, but pricing individual projects is more flexible.

3. Implications for Utility Ownership

Utility ownership, therefore, is potentially higher cost and offers less flexibility for project pricing, i.e., for passing through any advantages of ownership to customers.

To the extent that IRS rules differ for utility and non-utility owners of renewable energy projects, and given the recent Commission ruling on debt equivalence, it seems obvious that if SDG&E cannot pass along the full effect of the ITC to ratepayers, then it makes sense for the utility to consider third party Power Purchase Agreements (PPAs) as a viable alternative to turnkey projects. Furthermore, third parties may not be as limited in how, how much and when they factor tax benefits from ITC and accelerated depreciation to customers. The point to understand is that the key driver for winning the bid is not utility costs but other competitive market pricing.

Both the ITC and accelerated depreciation benefits accrue to the third party and benefit customers to the extent that the third parties pass along tax benefits directly or indirectly through market pricing. That is, if third party costs are reduced, they have a lower price floor that can help them be competitive in their bidding. The market price

for power from the PPA reflects both cost savings and market considerations. These factors lead to a reasonable conclusion that a third party PPA may have more to offer SDG&E ratepayers than utility turnkey projects. In summary:

- Third party firms may have a lower cost of capital than the utility;
- Third parties may have lower labor and non-labor costs than the utility;
- Third parties may have lower project-related overheads than the utility;
- Third parties may have less restrictive rules on tax benefits than the utility;
- Third parties may have more pricing flexibility that can benefit ratepayers;

Furthermore, SDG&E can add debt equivalence in bid evaluations where PPA's compete only with other PPAs but not where competing with turnkey projects.

VIII. Ratepayer Benefits and Performance Measures

A. Customer, Utility and State Benefits

SDG&E provides a list of potential "customer benefits," including environmental benefits, although the benefits shown do not only benefit customers but potentially the utility and the State as well, are shown on II-18 through II-20 and are repeated below:

SDG&E claims that: "Customers will benefit from the SDG&E Solar Energy Project by the following:

1. Additional renewable resources and contribution to SDG&E's RPS goals.
Output from up to 52 MW_{dc} of solar installations are projected to generate up to approximately 69,100 megawatt hours on an annual basis contributing to approximately 0.37% of SDG&E's retail electric sales in 2013.
2. Contribution toward SDG&E's annual resource adequacy and grid reliability requirements as detailed in Section IIIE.
3. The distributed generation solar PV generation facilities will be connected to the SDG&E distribution system located in areas that do not require notable interconnection costs.

4. Reduction in GHG emissions that SDG&E can use in the future to meet its Assembly Bill (“AB”) 32 obligations, if applicable⁷. Output from up to 52 MW_{dc} will reduce annual GHG emissions by approximately 34,480 metric tons.
5. SDG&E Solar Energy Project will create opportunities for SDG&E’s customers hosting a solar PV facility to participate with a facility of their own at the same time SDG&E develops and installs its solar PV facility, thereby realizing lower installed costs through economies of scale and the receipt of CSI incentives up to the first megawatt (ac) of installed capacity.
6. SDG&E will gain knowledge and experience about projecting the generation and scheduling the output and energy from distributed solar generation resources. This knowledge and experience will be of increasing benefit as SDG&E increases the amount of solar generation in its resource portfolio.
7. SDG&E will gain knowledge and experience about the potential for localized impacts due to intermittent energy deliveries to its distribution system, specifically, the potential for and impacts of voltage deviations, and mitigation measures.
8. Through SDG&E’s development and ownership of solar renewable facilities, SDG&E will further the State’s objectives under the CSI as well as the development and the promotion of the solar market.
9. SDG&E’s generation and energy resource portfolio in the future will contain increasing and significant amounts of renewable energy resources. Through utility-owned development and ownership, the SDG&E Solar Energy Project will provide valuable experience and knowledge concerning the development, ownership, operations and maintenance, performance, cost, integration and utilization of solar renewable energy.”

Expanding on the environmental benefit in #4 above, at II-20, SDG&E states: “Displacement or reduction of fossil fueled generation by solar PV results in the lower production of emissions and greenhouse gases.” SDG&E adds: “For projection of the emissions benefits of the SDG&E Solar Energy Project it is assumed that the fossil fuel generation that is displaced by solar PV results in a reduction of 1,100 lbs CO₂/MWh.

⁷ “AB 32 obligations are presently being developed by the California Air Resource Board (“CARB”). While, the CPUC has yet to specify the requirements of its regulated utilities pursuant to CARB, GHG emissions are tracked by SDG&E.” (also from SDG&E testimony)

SDG&E's list of customer benefits begs several questions, e.g., how does the Commission value or more precisely how does SDG&E plan to quantify these benefits in project evaluation:

- A 0.38 percent addition to the RPS compared to other uses of \$250 million?
- The contribution to annual resource adequacy and grid reliability requirements?
- The interconnection cost savings from locating PV projects in specific areas?
- The potential boon to the CSI program due to co-developed PV installations?
- The reduction in CO2 emissions?

Even the gain in knowledge and experience is subjective with no qualitative criteria for evaluating the overall program or choosing among individual projects or making use of the knowledge and experience. The UCAN alternative does make good use of project experience by using what is learned in the first phase to better implement the second.

SDG&E also claims benefits to the CSI program from solar development under SEP (explicitly in benefit #5 and #8). In Question 4 of UCAN's First Data Request where UCAN asked "...the basis for SDG&E assuming that its PV program would have any material effect on the rate of development of PV under the CSI program in SDG&E service territory." SDG&E responded: "A review of testimony does not reveal that SDG&E stated that its PV program would have any material effect on the rate of development of PV under the CSI program. By offering the opportunity for co-development, SDG&E enhances the opportunity for PV development under the CSI program."

Clearly, SDG&E states that "by offering the opportunity for co-development, SDG&E enhances the opportunity for PV development under the CSI program." In Benefit #5, SDG&E claims that economies of scale will cause SDG&E customers to install more PV than they otherwise would have install and qualify for CSI incentives, thereby furthering the State's CSI objectives and development of the solar market as identified in Benefit #8. UCAN attempted to ask how much of the co-developed "up to 25 MW" of PV that SDG&E assumed would be "incremental" (i.e., not otherwise installed) would

be eligible under CSI. At I-7 (line 6), Jim Avery's original statement was modified as follows: "SDG&E Solar Energy Project *may* [not *will*] facilitate under the CSI program that may [not would] not have been developed. In fact, SDG&E is making no claims that the co-developed PV will be forthcoming. Consequently, it should not be considered a benefit nor considered as a basis for approving the application.

Finally, SDG&E claims the SEP will add to its "experience and knowledge" in Benefit #6 in terms of "projecting the generation and scheduling the output and energy from distributed solar generation resources" and in Benefit #9 in terms of "development, ownership, operations and maintenance, performance, cost, integration and utilization of solar renewable energy." SDG&E claims their experience and knowledge under both the Renewable Portfolio Standard and Sustainable Communities Programs make SDG&E the obvious candidate to design, implement and administer the Solar Energy Program. Yet SDG&E has not demonstrated a knowledge of PV costs and cost effectiveness of the proposed program, projects and systems or the advantages and disadvantages of turnkey projects versus PPAs. Furthermore, SDG&E suggests at II-19 that there are things about which they can gain knowledge despite the experience:

- "SDG&E will gain knowledge and experience about projecting the generation and scheduling the output and energy from distributed solar generation resources. This knowledge and experience will be of increasing benefit as SDG&E increases the amount of solar generation in its resource portfolio."
- SDG&E will gain knowledge and experience about the potential for localized impacts due to intermittent energy deliveries to its distribution system, specifically, the potential for and impacts of voltage deviations, and mitigation measures.

This is one of the reasons that UCAN has proposed an alternative program that enables SDG&E to gain needed experience and knowledge. That is, to install solar systems on utility-owned property to gain experience and knowledge of costs and performance and prior to expanding the program to its customers, including municipalities.

Furthermore, despite offering the list of benefits, SDG&E offered neither criteria nor methodologies for measuring and verifying those benefits for the program overall or the contribution to those benefits by individual projects. Yet the evaluation of projects should include such benefit measures if the benefit measures have any meaning at all. It is not enough to hope the program yields these benefits, it is necessary to prove it.

Therefore, to quantify benefits to customers in furtherance of the program or project evaluations, it would be useful to calculate benefit measures and comparative costs based on independent data. For example, it would be useful to know:

- The cost differentials between single-axis, dual-axis and non-tracking (fixed panel) PV systems. SDG&E and several tracking system manufacturers state that single-axis tracking systems increase output by 25-30 percent compared to non-tracking systems. But this comes at a price that could be obtained from the manufacturers or by reviewing the costs of existing tracking and non-tracking solar parking projects.
- The cost differential between polycrystalline and thin film technologies. Thin-film technologies are aiming toward direct panel costs in the neighborhood of \$1,000 per kW.⁸ Of course, since these thin-film technologies may be less efficient compared to silicon wafers (polycrystalline), it therefore takes more panels to produce the same output.
- The cost differential for installation costs when installing tracking vs. non-tracking systems. SDG&E only provides the \$7,000/kW cap on individual projects but makes no estimate of any additional installation costs for installing the tracking PV systems.
- The cost differential for annual maintenance costs between tracking and non-tracking systems. SDG&E assumes \$25/kW-yr for the proposed single-axis tracking systems. But if tracking and non-tracking systems are considered, it is necessary to provide information from manufacturers on any maintenance cost differences.
- The cost differential, if any, between PV system projects of different size. SDG&E discusses economics of scale as a benefit to host customers who may want to

⁸ In an August 14, 2008 article in Power Engineering by Harry Zervos, Technology Analyst, IDTech Ex on thin-film technologies, he references U.S. DOE estimates of thin-film technology costs, with cadmium telluride panels representing 34% of the thin-film market and costs observed around \$1.25/watt.

install a system of their own in co-development with SEP. But SDG&E does not provide any information on the level of purchase discounts that may be available to the utility or to the host. By examining the costs of solar parking projects around the country, SDG&E could identify the cost differences between systems of different sizes when the projects are large multi-level parking garages versus small single-level carport structures to determine whether purchase discount assumptions have validity.

- Potential transmission savings by locating within the load basin instead of remote areas would be an interesting calculation to observe, even on a per kW-mile basis and yet despite the fact that SDG&E has proposed a load basin project, estimated transmission savings as part of a cost-benefit calculation would help support SEP.
- Given the potential in remote regions for wind farms or other renewable resources, it would be instructive to provide a comparative benchmark for these alternatives. A shift toward resources in the load basin does offer transmission savings but what does it give up, e.g., where else could \$250 million be spent and what benefit do customers receive from these remote projects in terms of cost and performance compared to PV? The question of scale economies is relevant since project size is potentially greater in remote areas compared to 1-2 MW solar parking projects.

In addition, the list of benefit measures suggests that SDG&E should calculate:

- Variance between the actual and expected output from the individual project;
- Contribution of the project toward annual resource adequacy and grid reliability;
- Project interconnection costs compared to average system interconnection cost;
- Estimate of GHG emission reductions based on the actual output of the system;
- Estimate of system purchase discounts, if any, for customers who co-develop PV;
- Proof of a gain in “knowledge and experience about projecting the generation and scheduling the output and energy from distributed solar generation resources” based upon a measure of the variance between actual and expected project system output;
- Proof of the gain in “knowledge and experience about the potential for localized impacts due to intermittent energy deliveries to its distribution system,

specifically, the potential for and impacts of voltage deviations, and mitigation measures.”

- Proof that the SEP furthered the State’s objectives under the CSI based upon the additional CSI projects co-developed as a consequence of the Solar Energy Program.

B. Program Performance Measures

Having produced no binding cost estimates other than the proposed \$250 million cap on rate base investments and program development and administration costs during the 2009-2013 PV program period, SDG&E provides no guarantees or safeguards against cost overruns on specific projects. Cost overruns that could harm ratepayers are not just the costs associated with the installed system cost but also the unknown costs, e.g., site-specific construction costs and lease payments. SDG&E admitted in response to UCAN’s Third Data Request in its Question 30b that it would require a fixed price for turnkey projects that provided that safeguard against cost overruns. In addition, in response to Question 18 a-b in UCAN’s Second Data Request, SDG&E stated it would cap lease payments that applied to all hosts equally. (“While all lease payments are subject to negotiation, SDG&E will have a predetermined monetary cap that it will apply equally to all potential hosts”) By establishing criteria prior to approval of the application and therefore available for evaluating and guiding the bidding, design and implementation of specific PV projects, Commission approval of the modified application assures that Advice Letter will be less problematic.

Given the lack of comparative cost data in the application, performance of the program is essential. UCAN has identified possible “benchmarks” and benefit measures elsewhere in the testimony. Furthermore, as discussed above, measures of individual project performance is just as important as overall program performance. We discuss individual project performance in the section on the individual project methodology. Assessment of overall program performance can be based on easily collected data:

- Project cost per kW and/or per square foot of parking space;
- Comparison of unit costs under SEP to comparable CSI program results;
- Comparison of unit costs to large-scale renewable or conventional options;

- Budget variance or difference between expected and actual project costs;
- Budget variance between expected and actual program administration costs;
- Budget variance between expected and actual project O&M costs;
- Cost of work performed by SDG&E versus outsourcing alternative;
- Cost comparison between utility-owned and customer-owned projects;
- Cost vs. value comparisons between tracking and non-tracking PV systems;
- Cost vs. value comparison between single-axis and dual-axis tracking systems;
- Cost comparison between turnkey projects and Power Purchase Agreements;
- Expected versus actual savings in distribution benefits over all the projects;
- Expected versus actual savings in interconnection costs over all the projects;
- Trends over time regarding whether these measures increased or decreased.

SDG&E should be required to conduct follow-up studies to determine the actual project costs compared to expected costs as offered in the proposal. SDG&E should also be required to develop specific performance measures that can be used to assess the performance of the overall program and the performance of individual projects. Finally, SDG&E should require commitments by winning vendors regarding responsibilities for cost overruns in terms of the installed cost of the turnkey project or the price of power received under a PPA.