

## 4 RFP APPENDIX 3: INDEPENDENT EVALUATOR QUESTIONNAIRE

As required in the RFP, PA presents our answers to Appendix 3 – Independent Evaluator Questionnaire below.

1. Summarize your professional background directly related to utility resource planning, portfolio optimization, and project management.

PA has a long and successful track record in evaluating and implementing supply resource strategies. We offer experienced personnel with significant expertise in resource planning processes and in electricity market modeling issues, including specific experience in California. PA has established expertise in wholesale energy markets and is the leading consultancy in supporting asset financing and valuation in the electric generator space. We have helped utilities understand the state of the art in integrated resource planning, have constructed resource plans, and have critiqued them:

- PA has completed several individual resource planning projects with Hawaiian Electric (HECO) and its subsidiaries Maui Electric (MECO) and Hawaiian Electric Light Company (HELCO) between 2009 and today. In so doing, PA developed 10- to 20-year generation plans which evaluated existing petroleum- and coal-fired thermal generation as well as a wide range of new generation options, including: wind, solar, geothermal, biomass, and biodiesel-fired reciprocating engines. These efforts have included significant analysis of distributed generation and battery storage technologies, economics, and grid impacts, work that is very relevant to the ongoing developments in California.
- PA conducted a "broad sweep" of utility Integrated Resource Plans across the country to assess the variety of planning frameworks.
- In order to facilitate its oversight of the Los Angeles Department of Water and Power (LADWP), the City of Los Angeles engaged PA to complete and document a review of LADWP's December 2010 Integrated Resource Plan (IRP).
- PA assisted the power supply team of a mid-sized regulated utility in the creation of plausible scenarios for reaching ambitious renewable energy goals. The impacts of each scenario were assessed against the organization's mission, including such elements as rate payer costs, effect on the company's generation rate base, emissions reductions, and the ability to meet or exceed environmental regulations. As a result the client has been able to implement significant improvements that have had a positive impact on business performance.
- PA supported the long-term strategic planning for a rural electric cooperative regarding its options for two coal-fired facilities. The client was the target of potential New Source Review (NSR) violations and needed to analyze how to optimize the value of the assets. Using its market modeling software and market expertise, PA worked with the client to develop and analyze multiple market, regulatory and load scenarios, and how those scenarios affected

compliance decisions, market risk, rate impact, and long-term supply additions. The resource options included both renewable and non-renewable resources as well as off-system sale opportunities.

- PA provided independent expert guidance to the executive management team of a Western investor-owned utility, which was considering de-risking from coal power generation and deploying environmental capital elsewhere. PA conducted an economic assessment of retrofit versus replacement (purchase and new build) options and the associated impact on cost of service, electric rates, and shareholder returns. PA also provided a strategic assessment of the client's ability to execute the plan given the different customer, shareholder, and regulator objectives and perspectives.

PA is also experienced in planning that focuses specifically on procurement through contracts, in implementing procurement strategies and in evaluating procurements:

- PA was retained by the Illinois Power Agency as its Procurement Planning Consultant. In that role, PA helped the Agency prepare annual Procurement Plans and reports on renewable costs, as well as special Procurement Plan for distributed PV and a report on the reliability impacts of the potential requirements of "at-risk" nuclear plants.
- PA has been one of the Independent Evaluators for SDG&E since 2006. PA has served as IE for all but one of the RPS RFOs that SDG&E has conducted in that period as well as RAM RFOs, two All-Source RFOs including the recent LCR RFO, an RFO for fossil-fired capacity, two RA solicitations (one for offers and one for swaps), two RFOs for utility-owned distributed PV, and a currently ongoing RFO for Distributed Energy Storage. PA has advised SDG&E at every step of RFO construction, design of evaluation criteria and models, quantitative and qualitative evaluation, and contract negotiation. In the last four Renewables RFOs (2009, 2011, 2012, 2013), PA conducted the quantitative bid evaluation.
- PA has managed RFP processes for other utilities. For example, PA guided one client through a complex solicitation seeking over 1,500 MW. After assisting with the RFP and solicitation, PA helped to assess qualitative strengths and weaknesses of the bidders and their projects. We then utilized a commercial simulation and resource optimization program, as well as our own customized models, to determine the expected least-cost portfolio of resources given transmission constraints, fuel-price volatility, and other operating parameters.
- PA acted as an independent evaluator to evaluate offers received by a client to meet its full power requirements for the next three to 15 years. PA developed a customized model to fairly compare the different bids received. PA considered both the net present value and the relative risks of the bids.
- PA also has leading-edge experience in sourcing and procurement in areas other than energy, in both the public and private sectors, and including platforms to facilitate procurement and solicitations. For example, we developed Zanzibar, an e-procurement system used by the British government, and the underlying intellectual property formed the basis of ProcServe, an independent company spun out of PA.

2. Summarize your professional working experience directly related to the California ISO energy, ancillary services, and ex-post markets.

PA has a keen understanding of California's electricity market mechanisms. Members of our global consulting team were involved with the WEPEX process and the development of the California ISO (CAISO), while others have direct employment experience within the California energy markets. Most important in building and maintaining our knowledge of the California markets, though, has been our ongoing project work there.

PA is intimately familiar with the process and economics associated with California's Market Redesign and Technology Upgrade (MRTU) day-ahead and nodal market launched in the spring of 2009. In the past 2 years alone, in addition to our ongoing work as IE for SDG&E, PA has modeled the gross margins and operations of more than 25 power generating assets in California. Our knowledge of the market and its development has been critical in allowing us to develop comprehensive financial projections for California power generating assets that accurately incorporate the impacts of energy, resource adequacy, and ancillary services markets.

The PA team is well versed with ISO market operations and understands the nodal pricing paradigm as we regularly model such prices in other ISOs as well as in California. In addition, PA is the world leader in certifying the correctness of ISO market software. PA has certified the pricing software for two Northeastern ISOs and has assisted ERCOT in implementing its Texas Nodal market (a transition from zonal to nodal pricing analogous to that of the California ISOs).

PA understands that the role of the CAISO and the ability to interact with it is critical to SDG&E's power procurement activity and overall business operations. For example, CAISO has two ongoing stakeholder processes, "Energy storage and distributed energy resources" and "Expanding metering and telemetry options", which will significantly impact the structure of California's IOUs. In addition to our review of materials posted on the CAISO website we are in regular communication with California utilities, through which we inform ourselves on developments at CAISO and on the market's view of the most likely evolution of CAISO business processes.

Engagements involving analysis of or independent reports on the California market include:

- PA has previously been retained by a global corporation that sought a strategic assessment of select regional U.S. power markets, in order to determine the client's geographic focus areas for potential future power investment opportunities. In particular, PA analyzed the key investment drives of the California, ERCOT, ISO-NE, MISO, NYISO and PJM power markets. PA's work included both a strategic market due diligence of historical market trends, and an analysis of potential market opportunities. PA reviewed factors that may alter (1) policy; (2) market structure; and (3) market fundamentals across all six markets. This strategic assessment as helped the client inform its strategy related to several subsequent buy-side opportunities.
- PA was retained by an infrastructure fund interested in a potential equity investment in a 100

MW wind generating facility located in the California electricity market. PA reviewed and critiqued sell-side models and reports, conducted an analysis of the California electricity region, and projected asset margins. PA's analysis included detailed analytics of potential drivers that may impact long-term electricity prices in California, including the growth prospects of distributed resources within the California market.

- PA was retained by a private equity firm to review its strategic options related to a 525 MW natural gas combined cycle and peaking asset portfolio located in the California market. As part of this process, PA developed a 20 year forecast of the California electricity market and projected cash flows and operations of the portfolio.
- PA was retained by a private equity firm that was interested in acquiring a 2,700 MW portfolio of natural gas and oil fired generation in the California market. As part of this process, PA developed a 20 year forecast of the California electricity market and projected cash flows and operations of the portfolio. PA's analysis was instrumental in informing the client's bid for the portfolio.
- PA was retained by an infrastructure fund that was interested in evaluating an investment opportunity in an 800 MW natural gas-fired peaking facility located in Southern California. As part of this process, PA prepared an analysis of the California electricity market, the asset's operating environment, and merchant/contract contribution margins under base case and downside scenarios for the asset. PA also conducted an analysis of the intrinsic value of flexible and efficient natural gas generation to the region and potential investment enhancement/exit strategies, under a range of future scenarios, including high levels of distribution generation and energy efficient growth.

**3.** Address the following items directly related to your professional expertise and experience concerning the evaluation of Power Purchase Agreements (PPA's) and proposed new electrical generation facilities. Please specifically note any experience that you may have directly related to renewable energy projects and generation asset development.

- a. Experience and level of responsibility in negotiating and evaluating energy contracts.

PA has assisted clients in the drafting of power purchase agreements and reviewed agreements to ensure they include appropriate terms. We have led a number of new owners through the process of negotiating contracts and in creating relationships with energy managers – particularly new owners who acquired the plants as creditors and needed to establish contractual relationships quickly and effectively. As part of our financial restructuring practice we have engaged with a number of financial institutions that have taken over responsibility for creditor power plants.

PA has extensive experience evaluating contracts, both as part of contract selection (which includes our current Independent Evaluator work for SDG&E) and as part of the valuation of contract portfolios during acquisitions or bankruptcies. Our evaluation of contracts has included

a range of technologies including conventional projects (coal, natural gas, and nuclear), hydro facilities, co-generation projects, and renewable projects (wind, solar, and biomass). We have evaluated contracts for both existing plants and development projects.

The following representative examples demonstrate the PA's experience in contract selection:

- PA has been one of the Independent Evaluators for SDG&E since 2006. PA has served as IE for all but one of the RPS RFOs that SDG&E has conducted in that period as well as RAM RFOs, two All-Source RFOs including the recent LCR RFO, an RFO for fossil-fired capacity, two RA solicitations (one for offers and one for swaps), two RFOs for utility-owned distributed PV, and a currently ongoing RFO for Distributed Energy Storage. PA has advised SDG&E at every step of RFO construction, design of evaluation criteria and models, quantitative and qualitative evaluation, and contract negotiation. In the last four Renewables RFOs (2009, 2011, 2012, 2013), PA conducted the quantitative bid evaluation.
- PA has managed RFP processes for other utilities. For example, PA guided one client through a complex solicitation seeking over 1,500 MW. After assisting with the RFP and solicitation, PA helped to assess qualitative strengths and weaknesses of the bidders and their projects. We then utilized a commercial simulation and resource optimization program, as well as our own customized models, to determine the expected least-cost portfolio of resources given transmission constraints, fuel-price volatility, and other operating parameters.
- PA acted as an independent evaluator to evaluate offers received by a client to meet its full power requirements for the next three to 15 years. PA developed a customized model to fairly compare the different bids received. PA considered both the net present value and the relative risks of the bids.

The following representative examples demonstrate the breadth of PA's experience in evaluating individual contracts or portfolios, outside the context of selection:

- PA was directly involved in negotiating the terms and conditions and evaluating the economic terms of a tolling agreement negotiated between a new gas-fired CCGT in California and a utility. PA assessed and assisted with drafting provisions related to energy conversion, ancillary services, replacement power options, and handling of CAISO charges.
- For financial reporting and income tax purposes, PA valued a large PPA on a mark-to-market basis, including thorough analysis of the effectiveness of the PPA as a hedge, under FAS 133 standards. As part of this, PA interpreted the PPA, modeled the expected operational and financial performance of the physical asset (including energy sales and capacity value), and analyzed historical and forecasted LMP basis between the PPA pricing point and the asset's physical delivery point.
- In support of a lending group evaluating refinancing of a gas-fired CCGT, PA modeled the expected financial and operational performance of the plant on a purely merchant basis and under the provisions of a PPA. PA analyzed the PPA's economic provisions, which covered energy, ancillary services and capacity products.
- PA appraised the power purchase contracts for several nuclear power plants located in the both the Southeastern and Northeastern US. A mark-to-market analysis of the various contracts was prepared following the standards set forth in the Uniform Standards of Professional Appraisal Practice. The analysis used Monte Carlo techniques to account for

uncertainty in the valuation. The types of contracts evaluated included firm energy and capacity contracts as well as swaps, value sharing, and costless collar contracts. The analysis also included consideration of the potential relicensing of the nuclear plants.

- PA prepared a valuation of wind and coal generator power purchase contracts in Texas. Seven wind energy power purchase agreements from were evaluated. The specific terms of these contracts were evaluated including consideration of renewable energy credits (“REC”). PA developed a renewable energy credit (REC) price forecast model for Texas that takes into consideration the existing renewable resource supply and the demand for renewable resources based on the Texas Renewable Portfolio Standard (RPS). REC prices were used in cash flows developed for valuation estimations for tax purposes.

- b. Expertise directly related to the analysis and structuring of data and complex issues associated with new generation facilities and with the associated regulatory and environmental requirements.

PA regularly values generators and power purchase agreements and in doing so has to appropriately analyze and structure data that represent or relate to the fixed and variable costs, operating constraints, environmental and emissions properties, and regulatory issues associated with these assets. Our experience allows us to identify the important data and to integrate information from multiple sources. The breadth of the company’s valuation experience, and the level of detail of data that we have used in these evaluations, distinguish PA from many other candidate IEs. As PA projects market prices and asset values so frequently, we have designed a database of characteristics of existing and proposed generators. In the design of that database we have modeled the data and determined appropriate data structures for all of the resources listed including existing, new, renewable, and qualifying facility/cogeneration units.

- c. Expertise directly related to the identification and assessment of various cost components in terms of reasonableness, completeness, variability and risk in bids for PPA's, Investor-Owned Utilities (IOU) build and new turnkey generation facilities.

We have extensive experience valuing PPAs as well as IOU-build options. Our team has particular experience with some of the contracts that have been presented to California utilities in the past and we continue to monitor all three utilities’ contracts, based on CPUC filings. As SDG&E’s Independent Evaluator, PA has validated the utility’s modeling of power contract bids. As part of a large project to help SCE prepare to resume power procurement, PA developed a stopgap Contract Valuation Tool for SCE to use while it explored commercial valuation tools. The contract valuation was sufficiently generic to represent the first round of contracts presented to SCE and in fact created an expectation within SCE that the company did not have

to settle for a vendor model that could not handle a wide range of contract terms.

Of particular relevance to IOU-ownership options as well as to PPAs that may have to be sensitive to individual power plants' operating characteristics, members of our team have had to construct and validate models of plant operations. In particular when modeling cogenerators with complex steam contracts, we have had to develop efficient representations of plants. We have used various commercial operations simulations and PA has itself developed generic models of plant operations.

As noted above, PA tracks cost developments closely, in order to maintain its models and keep its market knowledge up-to-date. Several of our team members have been involved with PA's routine reviews of cost assumptions and construction costs. We leverage our renewables work with utilities as well as contacts with renewables developers to remain abreast of fixed and variable cost trends associated with biomass, wind (onshore and offshore), and solar (photovoltaic and thermal), in addition to maintaining timely data on other renewable technologies that are not as widely considered to be "RPS qualified", such as small hydro and waste-to-energy.

PA also closely tracks regulatory and market developments. Federal tax credits and grant programs have changed significantly in recent years, directly impacting development costs, and state renewable portfolio standards continue to drive demand, thus impacting regional market prices for renewable energy. PA understands the various financing structures being employed by project sponsors today, and understands the impacts associated with fluctuating credit supply and prevailing tax equity rates. PA has monitored SDG&E's negotiations for potential tax equity investments and has experience with the way certain tax incentives have to be treated in ratemaking.

- d. Expertise in evaluating PPA's, turn-key plants and IOU build plants with different characteristics and constraints on a side-by-side basis.

PA has evaluated bids in several solicitations that had different types of offers to be evaluated side-by-side. In our financial restructuring work, we have evaluated portfolios consisting of assets of different types; in this case the values are put on a common basis so they can be accumulated rather than compared. Our experience comparing PPAs to other bid types for SDG&E is illustrated in our Independent Evaluator reports.

PA was selected as the IE for both SDG&E's first RAM auction and a contemporaneous solicitation for EPC contractors for solar photovoltaic Utility-Owned Generation, in case the CPUC needed a comparison (the comparison was never delivered). PA had the opportunity to compare the differing costs of utility-owned and third-party generation, and the way those costs translate into revenue requirements. The differences include tax treatments and the different contractual requirements or degree of specification in each case.

PA is the IE for SDG&E's LCR RFO, in which SDG&E solicited both tolling and utility-ownership

offers for energy storage.

And, PA provided testimony to the Oregon PUC as part of its examination of “build vs. buy” for generating assets.

- e. Experience in assessing the valuation of non-price components in new generation facilities, such as contractual legal and credit risk, site location, development risks, reliability, transmission access, etc.

While price is always important and contracts must include CPUC standard terms and conditions, we consider those terms related to the counterparty’s ability to perform under the contract, its ability to change the contract, and the utility’s remedies to be particularly important. We are particularly concerned with power plant contracts for which the underlying asset has not yet been completed, and with contracts for unconventional assets (including demand-side resources and energy storage) that compete with or substitute (in part or in whole) for conventional generation (since supply-side concepts must be translated to a different frame of reference). The Commission and ratepayers, as well as the utility, want to be assured of the relationship between having a contract in place and fulfilling the utility’s energy, capacity and RPS needs. This includes clauses such as:

- Representations and warranties by which the counterparty substantiates its ability to fulfill the contract
- Financing and other conditions which provide the counterparty with the ability to walk away from the contract or to reopen the pricing
- Milestones related to plant completion dates, which may be impacted by assumptions associated with lease agreements, financing, interconnection agreements, equipment supply agreements, and construction timelines. Evaluating assumptions that together contribute to the overall likelihood of meeting commercial online date goals is important in California, where contribution levels by compliance period are very relevant in evaluating a project’s relative price.
- Metering, verification, validation and the meaning of “dispatch”
- Exclusivity, or the commitment by the counterparty not to market its output or plant to another party for a defined period, should the contract be terminated
- Step-in rights where the offtaker would take over development of the plant if the counterparty cannot complete it for financing or other reasons.

An additional critical issue specific to Asset Sales Agreements (ASAs) for as-yet-unbuilt power plants and contracts for new demand-side programs is the precise definition of the asset to be constructed or program to be implemented. This includes the way in which fulfillment of specifications is to be measured, the handling of shared facilities (if the plant is to be co-located with another project), and the avoidance of double-counting of benefits or costs.

- f. Expertise with various models and sophisticated quantitative methodologies used to evaluate power products, including energy, demand response, capacity and ancillary services.

PA has a robust, well-developed, and industry-tested energy market modeling process including its fundamental representation of the power markets supported with its proprietary stochastic dispatch optimization, capacity compensation, environmental, renewable, and valuation models along with the use of production cost, transmission, and natural gas models that are operated by PA experts and populated with PA data. We are able to deploy these tools to validate decision criteria as necessary. We currently use Aurora, GE-MAPS and PowerWorld (the latter two focus specifically on evaluating transmission impacts), and we have experience with most other production cost tools on the market. We also use a number of proprietary models, especially for the valuation of financial products. We have modeled capacity markets, including specialized capacity auctions in ISOs outside of California; emissions markets; reserve markets; and markets for Green Attributes.

PA uses optimization programs such as CPLEX and GAMS for some internally developed optimization models, including models for optimal commitment and dispatch, capacity expansion and emissions valuation. We have even used them to construct bench-scale versions of ISO pricing models. PA has also used other tools for complex mathematical processing, such as SAS and Matlab. PA consultants have used a number of other tools for resource planning under uncertainty, as well as assessing risk aversion and constructing nonlinear utility functions. Our consultants have developed efficient frontiers to compare risk and reward in utility capacity expansion in order to find the combination of plants that gives the best expected return for a tolerable amount of risk.

PA's library of power market models, valuation models, and model components provides us a key advantage in addressing new markets or unconventional technologies and plant configurations. For example, we are currently engaged in creating a model of the restructured Mexican electricity market, using components and expertise from our other market models.

- g. Experience in the performance of comprehensive credit and risk analysis.

Counterparty risk management has become more important to monitor for most industry participants and is a crucial part of utility risk management strategy. While counterparty risk is inevitable, it is also controllable when managed within the correct environment. There are a number of measures that allow market participants to proactively identify risk and implement comprehensive monitoring systems. Understanding these measures and how to use them can provide the means to effectively manage counterparty exposure.

PA has extensive experience in counterparty credit cost monitoring and reporting for energy companies using credit default swap quotes to derive probability of default. PA owns a full set of

tools and expertise to validate third-party models and reports of counterparty exposure. PA assists energy companies in management of collateral risk, including compliance with regulatory requirements by continuously following the development of regulations in the industry. Our experts have profound understanding of the current state and forthcoming changes of the regulatory requirements.

- h. Expertise directly related to the analysis and evaluation of Combined Heat and Power offers.

PA has routinely performed independent market analysis of CHP assets in US power markets, including the California electricity market. Selected examples include:

- Recently, PA conducted a strategic analysis for a power developer on a 50 MW natural gas cogeneration facility/qualifying facility in the California market. As part of its analysis, PA developed a 20 year forecast of the California electricity market and projected cash flows and operations of the Asset. PA's analysis evaluated the future prospects of the California electricity market, including future developments under California's Qualifying Facilities and Combined Heat and Power Program Settlement Agreement
- PA assessed the re-contracting prospects of a cogeneration portfolio under California's Qualifying Facilities and Combined Heat and Power Program Settlement Agreement. As part of this engagement, PA analyzed the supply/demand balance for qualifying facilities under the settlement agreement and analyzed the portfolio's re-contracting prospects upon expiration of its contracts. Additionally, PA conducted an analysis of natural gas combined cycle and simple cycle transactions in California, as well as the risk premiums and EBITDA multiples associated with publicly traded independent power producer.
- PA assessed the competitive landscape in several North American markets to determine the most efficient cogeneration plant to deliver steam to the refineries operated by an oil and gas supermajor, including identifying key drivers to value under several different scenarios;
- PA served as the sell-side energy markets advisor to a large bankrupt merchant generator that was in the process of liquidating its California asset fleet, which was comprised of sixteen natural gas generation units (most of which were cogenerators) having more than thirty contracts for capacity, energy, and steam. PA conducted a fulsome analysis of the California market, developed gross margin projections for the contractual and merchant physical assets, assisted the client's financial advisor in developing sales materials and the sellers financial model, and worked collaboratively with the client, the financial advisor, and the independent engineer to constructively advise potential buyers. PA's efforts were instrumental in driving forward the sell-side process which ultimately resulted in bid which far exceeded the seller's expectations and a successful financial close of the sales process.

- i. Expertise directly related to the analysis and evaluation of Energy Storage offers.

PA understands the technical, economic, and regulatory considerations that are important in the evaluation of energy storage. PA has evaluated energy storage offers in SDG&E's recent 2014 All Source RFO as well as the 2014 Energy Storage System RFO for the Distribution Reliability / Power Quality Program. During these efforts, we have facilitated and performed analysis of energy storage offers of varying types, sizes, and contract structures. PA has also worked extensively for Hawaiian Electric Co. (HECO), which has been among the first utilities worldwide to deal extensively with issues of storage, as well as PV penetration and the "duck curve." PA's selected energy storage track record includes:

- Since 2008, PA has supported HECO's and its subsidiaries' resource planning efforts. As an island system with very high renewable penetration, HECO has evaluated the deployment of battery storage to provide ancillary services and other grid support. PA provided characteristic data including capacities, round trip efficiencies, and lifetime cycles for various applications as well as capital costs which we then used as inputs into production cost modeling to support the Power Supply Improvement Plan, HECO's 2014 resource plan that called for large-scale deployment of battery storage. PA also supported Maui Electric in evaluating the economics of pumped storage hydro.
- At the request of a large Southwestern utility, PA facilitated an Advanced Energy Storage Summit. In this session, PA presented our views on industry trends, energy storage technology, and applications, as well as procurement and deployment best practices.
- PA has served as the market expert and strategic advisor for a battery storage developer. In this role, PA summarized the market rules as they relate to battery storage technology, projected energy and ancillary services prices of several markets, and used its suite of proprietary dispatch optimization models to project the margins and operations of the client's battery storage technology.
- PA was appointed by a large Japanese investment entity to conduct a market scan of current and expected activity in the microgrid, storage, energy management and smart grid/smart city sectors and to identify potential investment opportunities at the project level. Utilizing our market network, PA was also engaged to introduce the client to range of storage providers in California that are working with grid scale renewable projects as well as behind the meter commercial scale storage infrastructure. PA evaluated a number of storage providers, business models and technologies and made recommendations across multiple energy storage business areas.
- PA was approached by a leading energy law firm to develop and present an energy storage roundtable to a team of energy attorneys on the subject of energy storage, including its past, present, and future interaction with the power industry, a summary of the technologies, and an overview of the ways in which it creates value in power systems. PA's work provided the basis for further penetration into the California storage market for the firm and for PA.
- As part of its responsibility as Procurement Planning Consultant to the Illinois Power Agency, PA wrote a review of current energy storage technologies, summarizing how these technologies are used in practice, and exploring how other states are approaching the procurement of storage to support renewable energy integration. PA reviewed the current

state of energy storage technologies from a technical and commercial viability perspective and examined the way in which other states and utilities have approached the procurement of energy storage to serve electric customers' need for clean, affordable and reliable energy. This review was included in a report to the Illinois General Assembly and the Illinois Commerce Commission.

4. Describe your qualifications and experience directly related to the task of reviewing and auditing the documentation, design, and administration of a solicitation process or similar vehicle, and providing recommendations to the IOU and Procurement Review Group that were adopted

PA has performed all of these tasks as IE for SDG&E. Through this process, PA has identified changes to the documents to clarify as well as refine the evaluation methodologies that SDG&E has applied. PA has also participated in bidder conferences and forums and addressed specific questions with the RFO, as appropriate. Additionally, these interactions with bidders have helped identify areas to refine the language in future RFOs.

PA has also audited and evaluated other contract solicitations and this experience is directly applicable to SDG&E's requirements, as listed in our responses to earlier questions. We have also developed and reviewed RFPs for the sale of power and of power plants. We have also administered an RFP process specific to energy management contracts including the analysis of responses and negotiations with bidders. In doing so, we had to consult and coordinate with a group of project lenders, taking into account their diversity of interests and levels of understanding.

5. Describe your qualifications and experience directly related to the task of reviewing solicitation documentation for the purpose of ensuring clarity of definition for price and non-price factors and products sought, to ensure that all bidders effectively responded to the solicitation.

PA has reviewed solicitation documents in its role as Independent Evaluator for SDG&E. As part of our review, we have provided comments and feedback to clarify the documents for the bidders.

In other assignments, PA has reviewed many examples of contracts and solicitation documents, not only in its resource procurement work but also in acquisition due diligence and loan workout support. In addition to solicitation documents, PA has helped develop RFPs for power sales and offering memoranda for asset dispositions (which require similar clarity of terms and definition), as well as market rules for restructured power markets.

**6. Describe your professional experience in interacting with the PRG, CPUC, & Federal Energy Regulatory Commission (FERC) and the context of your interactions.**

PA personnel have interacted with regulators and interveners on a number of different types of projects. We have participated in workshops and discovery activities, have reported to regulators (including the CPUC) and PRGs on our evaluation activities, and have provided testimony to state regulators and to FERC. We have even interviewed regulators as stakeholders on behalf of other utilities as they evaluate the quality of their regulatory-facing organizations.

**7. Describe your experience testifying in the capacity of an expert witness before state and federal regulatory agencies. Please cite document references to applicable proceedings.**

Several members of PA’s project team have testified before state and federal regulatory agencies. In particular, Dr. Jacobs has provided testimony to the FERC, the California Energy Commission, the Oregon Public Utilities Commission, and the Colorado Public Utilities Commission. He and Ms. Sands have authored multiple Independent Evaluator reports that were submitted to the CPUC. Selected state and federal testimony by members of the PA team are listed below.

**Table 1: Selected testimony**

Audience (Testifier)	Description
FERC (Jonathan Jacobs)	Testimony on behalf of Xcel Energy on use of simulation modeling for a fuel clause in FERC consolidated docket EL02-25-001 et al.
California Energy Commission (Jonathan Jacobs)	1992 Electricity Report proceeding on the value of fuel diversity
Oregon Public Utilities Commission (Jonathan Jacobs)	Reply testimony in a rulemaking concerning the accuracy and value of generic "adders" to compare Power Purchase Agreement offers with rate-based new utility construction alternatives in a long-term resource solicitation context.
Colorado Public Utilities Commission (Jonathan Jacobs)	Testimony on behalf of Xcel Energy on use of a model for allocating transaction costs in Docket 04A-050E
California Public Utilities Commission (Gregg Edeson)	"Reliability Comparison" Testimony in PG&E's 2007 General Rate Case relating to the Electric Distribution Reliability Improvement Program

Minnesota Public Utilities Commission (Ron Norman)	PA submitted rebuttal testimony and appeared before the Minnesota Public Utilities Commission, on behalf of Invenenergy Thermal Development LLC, regarding Xcel Energy's petition for Approval of Competitive Resource Acquisition Proposal and Certificate of Need. His testimony provided economic arguments regarding the benefit of contracting with natural gas fired combined cycle generation.
FERC (Ron Norman)	Testimony on behalf of Trans-Elect, Inc. as part of Docket Nos. EC03-30, et al. and on behalf of Keyspan Ravenswood, LLC as part of Docket No. ER05-428
Rhode Island PUC (Ron Norman)	Docket 4052 – Commission Review into the Adequacy of Renewable Energy Supplies.
Colorado Public Utilities Commission (Ron Norman)	Testimony on behalf of Southwest Generation Operating Company LLC, regarding the 2011 Electric Resource Plan for Public Service Company of Colorado, Docket No. 11A-869E.
U.S. Bankruptcy Court for the Southern District of New York (Ron Norman)	Valuation of several terminated energy supply contracts, as part of Calpine's bankruptcy proceeding, Case No. 05-60222(BRL).
U.S District Court for the Southern District of Indiana (Ron Norman)	Testimony on behalf of Seminole Electric Cooperative in Seminole Electric Cooperative, Inc. v. Mt. Vernon Coal Transfer Co., Case No. IP-98-1732-C Y/F (S.D. Indiana)

Expert witness engagements do not always result in testimony. For example, PA was retained by Central Louisiana Electric Co., an investor owned utility in the Southeastern US, to provide litigation support services in connection with a wholesale power contract dispute. As part of its work PA audited historical electricity sales, purchases, and billings, evaluated regional transmission constraints, and drafted an expert witness report. PA worked closely with the IOU's external legal team throughout the engagement; providing insight on power market fundamentals, as well as advising on case strategy. The matter was settled out of court, without the submission of PA's report.

8. Identify each key member of the project team that may support you during the assignment period with the lead team member clearly identified, and summarize their expected role in the process.

PA proposes to accomplish the IE tasks using a small team of experienced consultants. The Assignment Manager for this project will be Jonathan Jacobs, who will be responsible both for technical direction and cost control. Dr. Jacobs has been involved with the electricity business and power procurement in California for twenty-five years, and has been involved with California

ISO issues since the original restructuring of the California market. Barbara Sands, who has been responsible for the evaluation of SDG&E's Renewable Auction Mechanism solicitations and worked extensively on the recent All Source LCR RFO, will be the Deputy Assignment Manager and will assist with supervision and project management as needed. For each solicitation for which PA is to serve as IE, either Dr. Jacobs or Ms. Sands will be identified as the solicitation lead and Independent Evaluator of record.

We appreciate that SDG&E and the CPUC will be interested in controlling the costs of evaluation, which are an overhead to the procurement process. Furthermore, over the last nine years procurement processes have become better defined in California, and the nature of evaluation tasks better understood. We intend to make use of less senior consultants, at lower billing rates, to manage detailed quantitative evaluations and monitor extended negotiations. For example, Aaron Zhang provided analytic support for the LCR RFO, and Alex Pischalnikov has worked on the 2014 Energy Storage Systems RFO. Junior consultants will be assigned on a case by case basis.

Gregg Edeson will exercise PA's corporate responsibility for the overall direction of the project. Both Mr. Edeson and Dr. Jacobs are located in California. Both Mr. Edeson and Mr. Norman, who heads our Global Energy and Utilities Practice, will be available to testify in their areas of expertise if needed.

Brief descriptions of the senior team members follow, along with their current PA ranks. As noted in a later response, PA sets fees based on the internal rank. CVs for the senior and junior personnel named below will be found in Appendix A.

- Jonathan M. Jacobs, Ph.D., (Managing Consultant) will be the Assignment Manager. Dr. Jacobs will be responsible for the day-to-day conduct of the assignment, communication with SDG&E, work planning and the development of overall approaches to comparing resources of different types. As the Independent Evaluator of record, he will be able to testify as to the results of the evaluation. He will also provide technical expertise on California power markets, contract interpretation and in the development of mathematical algorithms for pricing and bid evaluation. Dr. Jacobs has served for nine years as an Independent Evaluator for San Diego Gas & Electric Co. He has supported clients in the analysis of ongoing developments in the California energy market and in the areas of price forecasting and asset valuation, particularly when incorporating the effects of uncertainty. He assisted Southern California Edison in developing processes for power procurement, with a particular emphasis on valuing wholesale power contracts and tolling agreements, and he has evaluated energy costs for the Los Angeles Department of Water and Power as well as its Integrated Resource Plan. He has provided testimony to FERC and state regulators. His doctorate is from the University of Wisconsin – Madison, in mathematics.
- Barbara Sands (Managing Consultant) will assist with overall supervision of evaluation tasks, will lead evaluation of RAM RFOs and other solicitations, and will supervise any market price modeling, capacity price estimation, etc., used in evaluating offers. She will also provide expertise in the development of capacity and power price forecasts and contract evaluation. Ms. Sands has over twenty years of experience assisting electric utilities with strategic resource planning and competitive rate design analyses. She has extensive experience with electric market modeling tools including PROSYM and Aurora. She led the development of

several of PA's internal modeling tools for renewable resource planning. She has evaluated PPAs for a range of technologies including nuclear, hydro, gas-fired, coal fired, wind, landfill gas, and co-generation facilities. Ms. Sands conducted an extensive analysis of supply side options for a generation cooperative in the Southeast U.S., to support its Board's decision on resource acquisition. She also managed the resource portfolio optimization analysis for a utility facing significant environmental costs related to the operation of a coal facility. She has a BS in mechanical engineering from Seattle University and is a certified appraiser with the American Society of Appraisers.

- Mason Smith (Managing Consultant) engages in asset valuation and power market analysis and has actively participated in our Independent Evaluator work for SDG&E. His other assignments have included the analysis of financing structures, evaluation of RPS policies, identification of optimal generation options, and comprehensive valuation and economic impact studies. Mason has experience with all major renewable energy generation technologies, including wind, geothermal, biomass, and solar (utility-scale and distributed), and has managed a number of recent resource planning and demand response assignments at HECO. Mason joined PA in 2006 after completing an MBA/Master of Environmental Management dual degree program at Yale University.
- Salem Esber (Managing Consultant) has advised clients on the regulatory impact of U.S. and international energy and emissions regulations, and has established client positions and valuations for the purposes of facilitating trading in related markets. Salem has conducted strategic analyses for a large U.S. independent power producer, and was a key contributor to an article featured on the cover of Electric Light & Power detailing regulatory scenarios for the U.S. power industry. Salem developed, produced, and delivered major executive and Board of Directors-level business intelligence processes and reporting tools for a major U.S. energy client with over 80 power plants. Salem has evaluated risk associated with environmental products and structured energy transactions, disaggregating transactions into discrete risk components and validating their accuracy and completeness in a risk management system. He developed a procedures manual which formed the foundation for all risk management business processes for a major U.S. client. Salem holds a B.S. degree, Cum Laude, in chemical engineering from Ohio University and an MS degree in Technology and Policy from MIT, and has two years prior experience with the Ohio Environmental Protection Agency.

Junior personnel will be assigned to the project based on their availability. As an example, two of the junior personnel we would intend to use (if available) are Alex Pischalnikov and Mayanka Mudgal.

- Alex Pischalnikov (Consultant) has recently supported the IE work for SDG&E's 12MW/4MWh Energy Storage System procurement. He specializes in electric utility regulation, distributed energy resource integration and planning, energy storage, demand side management, and smart grid technology. Alex has experience leading the development of strategic initiatives and regulatory filings for integrated resource planning, smart grid deployment, demand response, and electric rate design at both investor owned and municipal utilities across the US. Alex is based in PA's Los Angeles office and has performed a variety of rate and regulatory comparative analysis on California's utilities and energy markets. Mr. Pischalnikov holds a Bachelor of Science Degree in Mechanical Engineering from the University of Illinois at Urbana-Champaign.

- Mayanka Mudgal (Principal Consultant) has conducted the analysis of PA's Power Procurement benchmarking study. Mayanka combines project management skills with experience conducting both quantitative and qualitative analyses of financial and economic data. She has worked and lived internationally and can effectively communicate complex ideas to stakeholders across cultures. She has also passed all three examinations of the Chartered Financial Analyst program, supplementing her understanding of financial markets. Mayanka holds a Master of Business Administration (MBA) and a Master of Environmental Management (MEM) with a focus on energy systems and markets, both from Yale University. The core team will be supported by senior-level subject matter experts as needed (who will also be available to testify).

**9. Describe your level of experience preparing and orally delivering significant presentations to diverse audiences.**

PA has extensive experience developing and giving key presentations to a wide array of stakeholders which include utilities, regulators, customers, policy makers, investors, and vendors. These presentations have been delivered for purposes of reporting, facilitation, education (PA's internal training classes are almost all conducted by PA consultants), and testimony. PA consultants are regular speakers on conference platforms as varied as investor seminars, professional seminars, DistribuTECH and the Global Power Markets conference. Projects for which PA was specifically asked to help with communications to broad audiences include:

- PA has developed executive presentations to help facilitate strategic planning for the Los Angeles Department of Water and Power (LADWP) and Austin Energy.
- We have also helped develop communications strategies and marketing collateral for distribution to customers.
- In 2014, PA guided HECO in developing a presentation and talking points to hear stakeholder feedback on their Integrated Demand Response Portfolio Plan in front of a diverse group of customers, regulators, special interest groups, and vendors.

**10.** Provide two references with contact information concerning work assignments you have performed that demonstrate application of the range of skills, experience, and qualifications required for the Independent Evaluator assignment.

Dan Baerman  
San Diego Gas & Electric Co.  
+1 (858) 650-6156  
DBaerman@semprautilities.com

Jeff Peltola  
Executive Director of Fiscal Performance & Planning  
Los Angeles Department of Water and Power  
+1 (213) 367-1347  
jeff.peltola@ladwp.com

**11.** What particular topics would you anticipate to be included in the terms and conditions of a) PPA and b) turn-key contract for a power plant?

While price is always important and contracts must include CPUC standard terms and conditions, we consider those terms related to the counterparty's ability to perform under the contract, its ability to change the contract, and the utility's remedies, to be particularly important. Additional critical terms are those not yet considered standard, or which refer to relatively new regulatory or ISO requirements.

We are particularly concerned with contracts for which the underlying power plant has not yet been completed, because these are the ones for which contracting is more difficult. The Commission and ratepayers, as well as the utility, want to be assured of the relationship between having a contract in place and fulfilling the utility's energy, capacity and RPS needs. This includes clauses such as

- Representations and warranties by which the counterparty substantiates its ability to fulfill the contract
- Financing and other conditions which provide the counterparty with the ability to walk away from the contract or to reopen the pricing
- Definitions of milestones related to plant completion and associated reporting
- Exclusivity, that is, the commitment by the counterparty not to market its output or plant to another party for a defined period, should the contract be terminated
- Step-in rights where the offtaker would take over development of the plant if counterparty cannot complete it for financing or other reasons

These clauses apply equally to PPAs and Asset Sales Agreements (ASAs). An additional critical issue specific to ASAs and EPCs for as-yet-unbuilt power plants is the precise definition of the asset to be constructed. This includes both the way in which fulfillment of specifications is to be measured and the handling of shared facilities (if the plant is to be co-located with another project). California regulation and CAISO rules are continually evolving. Changes in law and

regulation (especially environmental regulation) can impose new costs on entities that build power plants. Clauses that reallocate the risk of externally-driven cost increases are particularly important in EPC and ASA contracts; while they are also important in PPAs, the increases can often be amortized over a longer period of time. Finally we have observed that parties pay much more attention to new requirements than to those which have been in place for several years; we saw this in the early negotiations of contracts subject to the CAISO Standard Capacity Product regulations, as well as recent renewable contracts subject to curtailment.

**12.** In your opinion, what contract terms and conditions are toughest to evaluate, and why? Cite examples from your experience, as appropriate (use generic descriptions to avoid disclosing confidential information).

Contract evaluation in the context of an RFO or other solicitation, or most other forms of market, is based on comparison. Therefore the conditions that are most difficult to evaluate are those which are nonstandard, not easy to compare, or address the unique properties of a particular resource. If a resource has unique value, it may be difficult to estimate; more important, it is easy to overestimate.

When dealing with uncommon technology, milestones and clauses describing performance metrics and testing can prove difficult. Any contract clause that is intended to guarantee a unique or difficult-to-quantify value (such as "local content") is similarly hard to evaluate. Such guarantees are usually balanced against a deficit in some other measurable value.

Construction cost uncertainty is a particularly difficult evaluation issue related to turn-key or EPC contracts. It can also affect PPAs. PA has been involved in the evaluation of contracts involving new technologies where the developer's cost estimate included a sizable contingency and a particularly sticky point was the verification and sharing of contingency savings. Similarly, a difficult issue in PPAs for as-yet-unbuilt plants is the responsibility for costs that cannot be determined at the time of contracting, and are out of the control of both parties. The most significant examples we have seen recently have to do with the costs of network upgrades, in particular deliverability upgrades, and of environmental remediation.

**13.** In your opinion, which cost components are difficult to evaluate while making cross-comparison between PPAs and turn-key contracts for power plants, and why?

The most significant problem in comparing PPAs and offers for Utility Ownership (ASAs) is the comparison of contractual costs with ownership costs (and ownership value).

- *Contractual costs:* A PPA should include a precise definition of the commodities to be provided -- e.g., energy, ancillary services, renewable attributes – and the price to be paid for each. The utility may be able to assert control of bidding or dispatch, thus determining the volume and mix of commodities to be purchased; the prices may be indexed; and the PPA may be based on a power plant physical characteristic such as heat rate. The PPA can also allocate some costs (e.g., emissions costs) partly to the offtaker and partly to the generator. But in general all the cost determinants can be read from the contract.
- *Ownership costs:* The cost that is most clearly defined in an ASA is the initial purchase price for an asset, essentially the capital cost. In order to evaluate the cost of the ASA one must simulate or estimate an operations strategy for the plant and identify all operating cost components, including not only fuel and O&M but others such as property taxes or the income tax impact of accelerated depreciation. All costs, including emissions costs, are allocated to the utility. If the evaluation is to be made on a ratepayer impact basis, both operating and capital costs should be routed through an incremental revenue requirements model.
- *Ownership value:* An ASA also provides value not always present in a PPA. Power Purchase Agreements are generally effective for a defined term, although they may include a buyout clause. Buyouts at “fair market value” are easy to evaluate since the value added by the buyout clause itself is zero. Under an ASA, the utility acquires an asset for its entire life. The valuation should therefore include the salvage value of the asset and decommissioning costs. Finally, asset ownership includes potentially valuable options such as expansion and repowering. The value of these options is often ignored because it is difficult to address them in an RFO context (and because it is often assumed that the option value will be close to its exercise cost) but one must be alert to particularly valuable ownership options that may be connected with a particular resource.

**14.** Capital expenses associated with new power plant construction are anticipated to be a significant element in determining the cost for both PPA Offers and utility turn-key Offers. What capability and experience does your proposed project team have in determining whether such capital expenses are reasonable as presented in the Offers received by SDG&E?

To maintain its world class proprietary models and keep its market knowledge up-to-date, PA tracks cost developments closely. Several of our team members have been involved with PA's routine reviews of cost assumptions and construction costs. We leverage our work with utilities as well as our contacts with developers to remain abreast of fixed and variable cost trends associated with steam turbines, combustion turbines, combined-cycle plants, biomass, wind (onshore and offshore), solar (photovoltaic and thermal), and energy storage systems, in addition to maintaining timely data on other emerging technologies such as small hydro and waste-to-energy. If needed, we engage qualified and well respected subcontractors where we lack specific technology expertise.

PA also closely tracks regulatory and market developments. Federal tax credits and grant

programs have changed significantly in recent years and depending on potential extensions will change again soon, directly impacting development costs, and state renewable portfolio standards continue to drive demand, thus impacting regional market prices for renewable energy. Our proprietary tools incorporate consideration of these incentive programs. PA understands the various financing structures being employed by project sponsors today, and understands the impacts associated with fluctuating credit supply and prevailing tax equity rates.

- 15.** Operating characteristics of power plants are anticipated to be a significant element of each Offer. a) What capability and experience does your proposed project team have with how operating characteristics are specified in contracts of the type SDG&E may execute? b) What capability and experience does your proposed project team have with how operating characteristics specified in an Offer and/or contract may be represented in models used to assess the value of the Offer and/or contract?

PA regularly values generators and power purchase agreements for a wide range of applications including project financing, appraisals, buy/sell transaction support, etc. To do so, PA has to appropriately structure data that describes the fixed and variable costs, operating constraints, environmental and emissions properties, and regulatory issues associated with these assets. Our experience allows us to identify the important data, and to integrate information from multiple sources. As PA projects market prices and asset values so frequently, we have designed a database of characteristics of existing and proposed generators. In the design of that database we have modeled the data and determined appropriate data structures for all of the resources listed including existing, new, renewable, and QF/cogeneration units.

a) PA has experience with both drafting the operating characteristic terms in contracts and evaluating the specific terms of agreements. We have developed best in class proprietary models to evaluate terms for all types of contracts. This has included the operating characteristics of combustion turbines and combined cycles as well as the detailed power and steam characteristics for cogenerators. We have also evaluated renewable contracts.

b) PA has worked extensively in valuing all manner of power and power plant contracts, including traditional steam plants, combustion turbines, combined cycle plants, cogenerators, wind plants, solar plants, hydrogenerators, storage plants, etc. In doing so, PA has had to construct and validate models of plant operations. For example, when modeling cogenerators with complex steam contracts, we have had to develop efficient and detailed representations of heat transfer – we anticipate that SDG&E’s requirements will be much simpler. PA has used various commercial operations simulations and has developed generic models of plant operations itself.

**16. Describe the ability and experience of your proposed project team in verifying transmission characteristics that may affect the suitability of certain bids.**

The main tools in understanding the transmission costs associated with a California resource are CAISO interconnection and cluster studies, and the TRCR reports. One of the important determinants of a project's viability, according to the CPUC, is its progress in the interconnection study process. PA is experienced in reviewing TRCR reports from its work as San Diego Gas & Electric Co.'s Independent Evaluator. The most significant difficulty we have encountered in using a TRCR report is identifying the appropriate "cluster" for a given site, which requires some familiarity with California geography and sometimes the assistance of utility transmission planners.

PA has used both power flow models and transmission-based production simulation to evaluate the impacts of transmission on contract value. PA has regularly used the PowerWorld and PSLF power flow models, the GE-MAPS transmission-based production simulation model, and the Aurora nodal model, and maintains a detailed database of transmission characteristics in the WECC. If needed, PA can use one of these models to verify transmission characteristics that may affect the suitability of certain bids. We have analyzed transmission not only to assess the of price impact of schedule congestion, but also to evaluate delivery risk. Specific engagements where PA evaluated transmission characteristics include:

- PA used its transmission constrained product cost modeling capabilities and knowledge of the Northeast power markets to evaluate the economic impacts of new regional transmission projects on the state of New York. PA worked with New York Power Authority (NYPA) and its project partners to develop a range of economic scenarios and assumptions, including forecasted load, fuel prices, generating capacity, and renewable energy development. PA then used its transmission constrained production cost model to simulate the behavior of the Northeast power markets and forecast the impact of new transmission for each of the scenarios.
- For a major Northeastern US transmission operator and developer, PA conducted a comprehensive economic analysis on a proposed high voltage interstate transmission line to support the development of high quality wind resources. A thorough analysis of available renewable resources in the region and the deployment of PA's proprietary renewable levelized cost model provided the client with detailed information on the lowest cost renewable energy options.
- In our IE work for SDG&E we were specifically requested, by both SDG&E and the Energy Division, to comment upon SDG&E's methodology for assessing congestion costs and to suggest alternatives. We proposed a method to SDG&E and worked with the utility to refine it, and SDG&E incorporated it into subsequent RFOs.

**17. Describe the ability and experience of your proposed team to evaluate different types of renewable resources.**

PA has been the Independent Evaluator of SDG&E's 2006, 2008, 2009, 2011, 2013, and 2014 RPS RFOs and all of the RAM RFOs, and has written many reports evaluating bilateral contract proposals relative to those RFOs. One of those contracts even required the Independent Evaluator to review forecasted and ongoing construction costs. PA is very familiar with the evaluation of renewable technologies including wind, solar, geothermal and biogas.

We understand the cost drivers associated with renewable energy development and operations. Our team members have analyzed the levelized costs of all mainstream renewable technologies and have modeled renewable energy credit prices in many U.S. power markets.

PA has prepared economic analyses for all types of renewable resources including: wind, small hydro, land fill gas, biomass, solar, and geothermal. In addition, PA models the existing and projected resources in the energy markets. As part of these analyses, PA incorporated the detailed operations of the resources and associated economics.

PA worked closely with HECO to evaluate renewable energy options for power generation against a broad suite of performance metrics, with the ultimate goal of identifying a path to become a cost effective and 100% renewable utility. Individual resource scenarios were used to isolate the impact of adding a renewable resource to the system. Options examined included distributed solar photovoltaics, biomass substitution, landfill gas co-firing, biodiesel substitution, geothermal, wind, and wind with pumped storage hydro. PA then combined the best elements of new generation options with other beneficial actions (e.g., contract renegotiations) to create a "Renewable Energy Case" that results in rate decreases of 20%, renewable generation which will exceed 70% of the total generation, and greatly increased earnings opportunities for the company.

**18. In your experience, what evaluation criteria and methodologies have been used in assessing and selecting among Offers in long-term Requests for Offer (RFO) and Request for Proposal (RFP)?**

A common approach is to score offers by assigning points based on pre-established criteria, related to both price and non-price characteristics. In many cases, only bidders that meet threshold criteria move are pre-screened for a more detailed evaluation. It is important to establish evaluation criteria and first-round scoring rules in advance of issuing in an RFP. Especially when dealing with offers that have already been pre-screened, evaluators attempt to reduce each offer to a single measure, usually based on price. Offers of different lengths can be put on the same basis by choosing a base contract length, ignoring the back ends of longer contracts and filling out shorter offers based on projected market prices.

Alternatively, contracts can be evaluated based on the net present value of the difference between contract and projected market prices (or projected avoided costs). Additional bid attributes, such as reliability, system benefits or fuel diversity (including green attributes) are often dealt with using standardized “adders” or predetermined proxy values. Rather than using such a single-contract approach some solicitations attempt to evaluate combinations of contracts in the context of the utility’s existing portfolio.

In a multi-attribute decision analytic framework one might prefer to measure attributes separately and to compare them using a facilitated group decision-making process. This approach has been used elsewhere, but generally not in California, because of the difficulty in demonstrating objectivity and producing work papers suitable for examination by regulators. The use of both a Procurement Review Group and an Independent Evaluator could help overcome those objections.

The following list summarizes the various dimensions by which quantitative evaluation methods may be characterized.

- “Pre-screening” vs. single-stage
- Discrete Scoring vs. Continuous
- Single-contract evaluation with adders vs. portfolio evaluation
- Single-attribute vs. multi-attribute evaluation
- Algebraic combination of multiple attributes vs. more complex interactive process

The fundamental basis of asset valuation is price, but other factors also come into play. Some of these, such as transmission access, can be dealt with in an estimated-cost framework. Others, such as market risk and credit risk, can either be used as an additional dimension of valuation or can be factored into the choice of contract-specific discount rates. One example of the use of additional factors for planning and evaluation is a project PA undertook for a U.S. retail utility. PA developed a value at risk model to guide risk management decisions about the level of power transactions to target for long-term versus short-term positions. The model developed target long-term positions based upon risk preferences, earnings targets, and a combination of historical and simulated distributions of wholesale gas and electric prices.

All these are quantitative approaches and do not apply directly to non-quantitative factors. Non-quantitative factors include categorical variables and hard-to-quantify factors. A categorical variable is one that takes on discrete values with no natural preference order, such as technology type. A hard-to-quantify variable is not discrete, but also difficult to measure on an ordered scale: for example, proponent credibility or location (assuming that location is important for other reasons than, say, congestion cost). Hard-to-quantify variables are sometimes treated as categories, e.g. by classifying locations into zones.

There are three main approaches to addressing non-quantitative factors. First, the need (the amount of capacity to be procured) can be allocated among different categories (values of a categorical factor), For example, an indicative resource plan can be used to set targets by fuel type or energy source (such as wind, solar, and dispatchable gas) and separately evaluating each offer type. Second, a factor can be used as part of a pre-screening process, for example by only accepting bids from certain zones. Categorical factors are better suited for pre-

screening than non-categorical, hard-to-quantify factors since pre-screening by such factors will appear like a subjective test that is susceptible to favoritism. Third, quantitative scoring can be used to create shortlists from which winning bids will be chosen based on other qualitative factors. Transparency and equity are best served by maximizing the importance of the quantitative (objective) analysis, by making the shortlist not much larger than the need.

PA believes that there is no single “best” evaluation methodology, especially when accounting for non-quantitative factors.

**19.** SDG&E has proposed to use Least Cost Valuation and Portfolio Best Fit as two evaluation criteria in their RFO's. (Least Cost Valuation means how a bid's total costs compare to the other bid's total cost. Portfolio Fit means how well a bid's features match SDG&E's portfolio needs.) How would you independently verify the analysis performed by SDG&E?

There are two basic approaches.

- Under a monitoring and supervision approach, PA would validate SDG&E's own valuation models and concentrate on checking SDG&E's numerical and market assumptions, and the way that SDG&E constructs its inputs. As an example, in the recent All Source RFO, PA talked directly to the vendor of SDG&E's customized energy storage model to understand the algorithms, inputs, outputs and other parameters.
- Under a full independent valuation approach, PA would work with SDG&E to identify and understand its evaluation criteria, desired modeling approach, and the nature of quantitative results to be obtained from that approach, but PA would then conduct a fully independent evaluation of the bids (not necessarily parallel as it may involve different approaches to the same criteria). The quantitative evaluation would be the result of PA's implementation of SDG&E's evaluation criteria, in order to avoid any bias or unfairness in the implementation if the criteria are stable and well-defined then separate implementations should yield similar results. “Implementation” could refer to the evaluation algorithm (in other words, PA would independently construct a scoring tool) or only data entry (PA would enter data into SDG&E's tool, which PA had previously validated). PA would confer with SDG&E on the evaluation of non-quantitative factors.

Both of these approaches involve the elicitation of SDG&E's evaluation methodology rather than the implementation of a PA methodology. PA's evaluation of the appropriateness of SDG&E's methodology would still be based on clearly stated standards and based on the minimization of costs to ratepayers relative to a market benchmark. We believe that the primary role of the Independent Evaluator is to ensure that the utility's evaluation is unbiased and falls within the spectrum of reasonableness.

PA successfully used the monitoring and supervision approach in most of its Independent Evaluations of SDG&E procurement. Recently though PA has performed fully independent bid evaluations using either a modified version of SDG&E's evaluation model or a totally independent implementation of SDG&E's evaluation methodology. Therefore, PA is

comfortable with either approach.

In order to verify a Market Valuation criterion, PA would prefer to use its proprietary price forecasting processes to develop one or more scenarios of market prices, or else to form a base for opining upon the usefulness of SDG&E's forecasts. Each option could then be compared with the market forecasts to compute its net present value, based on expected performance. The values of the bids would need to be adjusted to account for ancillary service value, RA credits, congestion and other attributes, based on best available market information about the values of those attributes. Transmission expansion costs within California can be estimated based on utility Transmission Ranking Cost Reports.

The Portfolio Fit criterion could be interpreted in more than one way, and PA will have to work with SDG&E to understand exactly which meaning is to be used. On the one hand, it could mean that because SDG&E is seeking to meet specific needs in its portfolio, offers should not be evaluated solely against market price but against prices adjusted by SDG&E's position – higher when SDG&E is expecting to be short, lower when SDG&E is expecting to be long. This would account for market illiquidity and other reasons why spot purchases and sales may not be a judicious procurement plan. On the other hand, "Portfolio Fit" could refer to portfolio diversification and risk reduction, in which case PA would compute price distributions and risks consistent with its understanding of SDG&E's intention, and attempt to produce an independent ranking of bids.

**20.** How would you determine whether or not the RFO process is transparent and fair?

Transparency of an RFO process can be judged in two ways. First, one can verify the availability to all parties (e.g., on the internet) of documents clearly describing the RFO requirements and evaluation criteria. Secondly, in a fully transparent process an independent party such as the IE should be able to replicate the evaluation results. Some lack of transparency is acceptable, e.g., the utility may not make the numerical values of all evaluation parameters available to bidders, due to concerns about proprietary information or potential gaming.

Fairness adds yet another concern because an unfair process can still be transparently applied. The RFO should optimally be examined for fairness before it is conducted, by a detailed examination of the rules and procedures, and simulating their application to different types of bid. Decisions made during the evaluation should be subjected to a quasi-adversarial analysis to ensure that the rules laid out in the RFO document are not violated and also that no bidder or potential bidder is unfairly disadvantaged – in other words, that their "chance of winning" is only diminished to the extent that the bid is revealed to have less value than others.

PA has applied all these methods in RFO evaluation. Moreover, it is important to seek continuous improvement in the process and to increase fairness and transparency. PA has taken part in, and sometimes driven, that process.

**21. Conflict of Interest:** [NOTE TO RESPONDENTS: The existence of a conflict of interest in response to the questions listed under Section 21(a) and (b) and Section 22 shall not necessarily disqualify a Respondent. Furthermore, the threshold amounts contained in question (a)(iii)(1) and (2) below shall be considered triggers for additional inquiry as to conflict of interest and shall not be considered thresholds for disqualification.]

a) Do you have an existing contractual relationship with, or financial interest in, a market participant (including SDG&E and any other Sempra affiliate, but excluding Independent Evaluator work performed for any other California utilities; please identify any contracts with California utilities ) in the California energy markets? ii) Does any member of your proposed project team have an existing contractual relationship with, or financial interest in, a market participant (including SDG&E and any other Sempra affiliate, but excluding Independent Evaluator work performed for any other California utility) in the California energy markets? iii) Does the business entity that would be the contracting party for the Independent Evaluator engagement, or any of its affiliates or subsidiaries or directly related companies, have an existing contractual relationship with, or financial interest in, a market participant (including SDG&E and any other Sempra affiliate, but excluding Independent Evaluator work performed for any other California utility) (1) in an aggregate amount of more than One Million Dollars or (2) having more than 20 percent of contract revenue with any entity buying or selling energy in California, excluding work conducted as an approved Independent Evaluator (as such term is used in referenced in Decision 07-12-052)? iv) Are there any other business or personal relationships that you, a family member, your employees or your company has that could possibly influence your judgment or create an appearance of impropriety in executing the duties of the Independent Evaluator?

PA Consulting Group has existing contracts and current assignments with other California utilities. PA does not derive more than 20% of its contract revenue from any entity buying or selling energy in California. Over the last five years, PA's contractual relationships with the Los Angeles Department of Water and Power and the City of Los Angeles have yielded more than \$1 million in revenue.

PA has also consulted to, and continues to consult to, the owners and creditors of merchant power plants. Some of those plants are or were located in California. This work has included valuation, litigation support and market analysis. PA has also helped structure contract offers and has reviewed transactions on behalf of lenders but has not prepared final offers. The disclosure of additional detail is restricted by confidentiality agreements.

We know of no other business or personal relationships involving PA, its employees or the members of the families of the project team that could possibly influence PA's judgment or create an appearance of impropriety in executing the duties of the Independent Evaluator.

b) For a period of five years prior to the issuance of this RFP, did you have a contractual relationship with, or financial interest in, a market participant (including SDG&E and any other Sempra affiliate, but excluding Independent Evaluator work performed for other California utilities; please identify any contracts with California utilities) in the California energy markets? ii) For a period of five years prior to the issuance of this RFP, did any member of your proposed project team have a contractual relationship with, or financial interest in, a market participant (including SDG&E and any other Sempra affiliate, but excluding Independent Evaluator work performed for other California utilities) in the California energy markets? iii) For a period of five years prior to the issuance of this RFP, did the business entity that would be contracting party for the Independent Evaluator engagement, or any of its affiliates or subsidiaries or directly related companies, have a contractual relationship with, or financial interest in, a market participant (including SDG&E and any other Sempra affiliate, but excluding Independent Evaluator work performed for other California utilities) (1) in an aggregate amount of more than One Million Dollars or (2) having more than 20 percent of contract revenue with any entity buying or selling energy in California, excluding work conducted as an approved Independent Evaluator (as such term is used in referenced in Decision 07-12-052) in the California energy markets?

Please refer to the answer to the previous question. In the last five years, PA has generally performed work similar to the work it now performs.

**22.** Do you, any member of your proposed project team, the business entity that would be contracting party for the Independent Evaluator engagement, or any of its affiliates or subsidiaries or directly related companies, own or operate power facilities or otherwise participate in any manner in the California energy market?

No.