Response to Request for Statements of Qualifications (RFSQ) for 100% Renewable Energy
RFSQ Number: 10088487-18-A

Statement of Qualifications for 100% Renewable Energy

PREPARED EXCLUSIVELY FOR THE CITY OF SAN DIEGO

Delivered Wednesday, July 19, 2017

The City of SAN DIEGO

Submitted By:

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Wednesday, July 19, 2017

City of San Diego
Attn: Veronica Ford
Associate Procurement Contracting Officer
1200 Third Avenue, Suite 200
San Diego, CA 92101
VMFord@sandiego.gov
Phone: (619) 236-6032

Subject: Statement of Qualifications for 100% Renewable Energy

Dear Ms. Ford,

ZGlobal Inc. (ZGlobal) is pleased to provide the attached Statement of Qualifications in response to the City of San Diego's (City) Request for Statement of Qualifications (RFSQ) for 100% Renewable Energy. We believe that our team is an excellent fit to work with your organization as it strives to meet its ambitious but achievable goal of supplying the City with 100% renewable energy as one of the five legs designed to reduce greenhouse gas emissions to 2020 and 2035 targets. Our team is highly qualified, innovative, and has the necessary experience to work hand-in-hand with the City to design, implement, monitor, and manage a portfolio of clean, cost-effective energy resource that not only meets the City's 100% renewable objective, but sets the standard for other municipalities to follow. Our company currently provides similar services to multiple clients including public power agencies, community choice aggregators, and renewable resource owners. ZGlobal has been a certified California ISO Scheduling Coordinator since 2011 and its team members have an extensive history with California ISO markets and operations, financing, power and resource planning, power portfolio optimization and risk management.

Our approach to working with our clients is to develop a long-term relationship as a trusted advisor who is ready and willing to provide ideas, a sounding board, background and information needed to facilitate informed decisions.

We appreciate your consideration of ZGlobal, and we look forward to discussing this engagement with you in more detail. Please contact me at (916) 985-9461 or via e-mail at kcoffee@zglobal.biz, if you have any questions or need any additional information.

Sincerely,

Kevin Coffee, P.E.
Vice President, Operations
ZGlobal Inc.

TABLE OF CONTENTS

1 INTRODUCTION TO ZGLOBAL

ZGlobal was founded in 2005 with a commitment to providing our energy sector clients with practical solutions based on an essential balance between sound engineering principles and financial realities. Our suite of business services (Error! Reference source not found.) support our mission of providing a start to finish energy solution to our clients. Our clients cover a broad spectrum of business models. They range from vertically integrated utilities, irrigation districts, public power agencies, de-regulated utilities, and independent system operators, to renewable energy providers, state regulators, energy financing institutions and independent power producers.

Power Engineering	Strategic Planning	Market Analytics	Infrastructure Development	Electric Operations
Planning & Analysis	**Reliability & Compliance**	**Asset Valuation**	**Planning & Implementation**	**Energy Scheduling**
Transmission & Distribution Systems	FERC/NERC Compliance	Production Cost & Revenue Modeling Forecast	Site Assessments	24x7 Operations
Power Flow Studies	Balancing Authority/Grid Integration	Cost Benefit Analysis	Project Feasibility Studies	CRR Allocations
Feasibility Studies	Enterprise Energy Management	Acquisition Valuation & Analytics	Project Finance Analysis	e-Tagging
System Impact Studies	ISO Market Assessments	Energy, Ancillary Services & Capacity Valuation	Interconnection/Utility Interface	Outage Coordination
Facility Studies	**Regulatory & Rates**	**Energy Market & Analytics**	Renewable Resource Assessments	Forecast Solar Generation (DA/HA)
Renewable Generation Integration	Resource Planning	LMP Forecasts & Market Assessments	Detailed Design & Engineering	Bilateral Transactions
Site Assessments	Expert Witness Services	Congestion Market Assessment & Optimization	Environmental Studies & Permitting	OATT Schedules
Regulatory Assessments	Tariff Consistency	Infrastructure Utilization and Constraints	**Asset Management**	Settlements & Billing
Generation Interconnection Support	FERC Transmission Rates Analysis	**Energy Settlements**	EPC Contract Management	**Portfolio & Risk Management**
Engineering & Design	Transmission Risk Assessment	Front, Middle & Back Office Integration	Operations & Maintenance Services	Portfolio Modeling & Optimization
Preliminary & Detail Design	State & Federal Regulatory Services	Shadow Settlements	Energy Production Monitoring	Financial Settlements
Single-Line Diagrams	Market Advisory Services	Settlement Verification & Education	Power Purchase Agreements & Contracts Review	Risk Assessment & Policy Review
Equipment Specifications	Risk Performance Management	Power Purchase Agreement Verification	Owner's Representative	Operating Procedure Development
Interconnection Facility Designs	Contract Negotiations			Risk Policy Development & Implementation
Site Plans & Elevation Layouts				Power Purchase Agreement Verification & Optimization
Independent Engineering Review				

Table 1 - ZGlobal's Business Services

ZGlobal headquarters is located in Folsom, California in the Folsom Electric Building at Scott and Sutter Streets in the Folsom Historic District overlooking the historic Folsom Powerhouse – the first hydroelectric power generating facility in California. ZGlobal also has offices in El Centro, California from which we run our 24x7 operations center.

2 INTEGRATION WITH EXISTING ELECTRICAL TRANSMISSION AND DISTRIBUTION INFRASTRUCTURE

As a provider of the energy and capacity commodity, the City does not necessarily have to integrate the commodity with the delivery infrastructure. The City could allow San Diego Gas and Electric (SDGE) and the California Independent System Operator (CAISO) to wheel the electricity over the transmission and distribution system and simply procure energy without regard to where it is located or potential impacts to the grid. However, that approach would be short-sighted and provincial.

Partnership with the local utility, SDGE, is critical to integrating the City's supply plan with the delivery infrastructure for those sources that are located on SDGE's distribution system or on a customer's site behind-the-meter. The goals and benefits of integration are summarized in the diagram below.

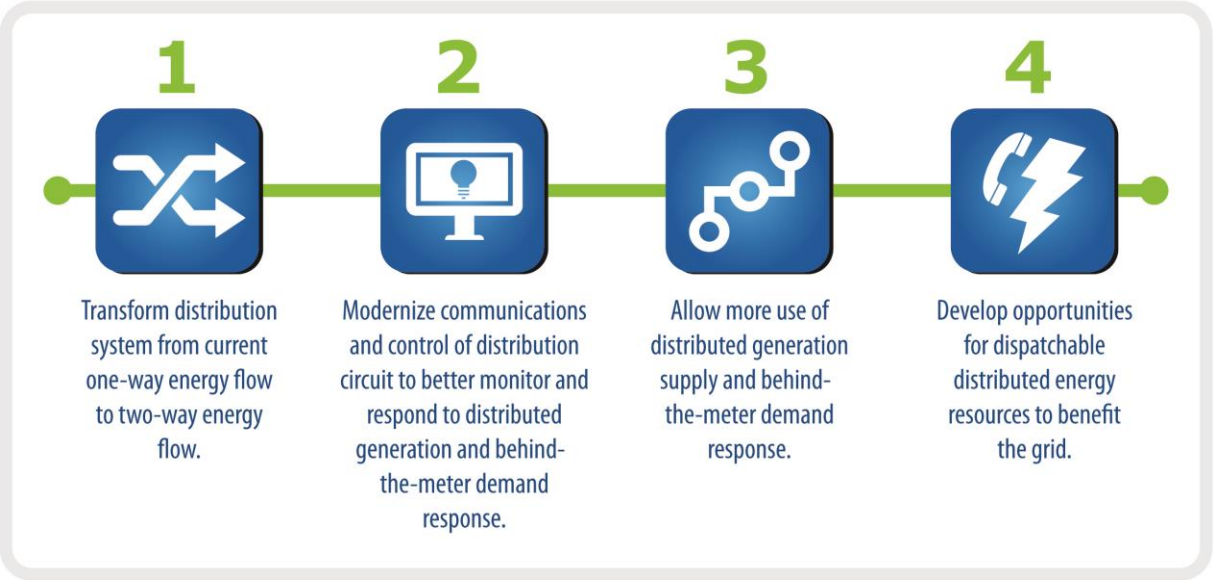

Figure 1 - Goals and Benefits of Supply and Distribution Integration

The nature of the distribution system is changing rapidly, driven by generation resources on the grid and behind-the-meter. A system that is designed for one-way power flow from the bulk transmission system onto the distribution system is evolving by necessity to accommodate supply that emanates from the distribution system. The distribution provider and a supplier that is aggregating supply from the distribution system need to work together to modernize the distribution system into an efficient two-way avenue for energy that provides benefits to the grid, and end-use customers, and promotes technological innovations.

The diagram below is an example of how supply that is connected to the distribution system and can be automatically controlled to respond to operator or automated instructions provides benefits to the grid.

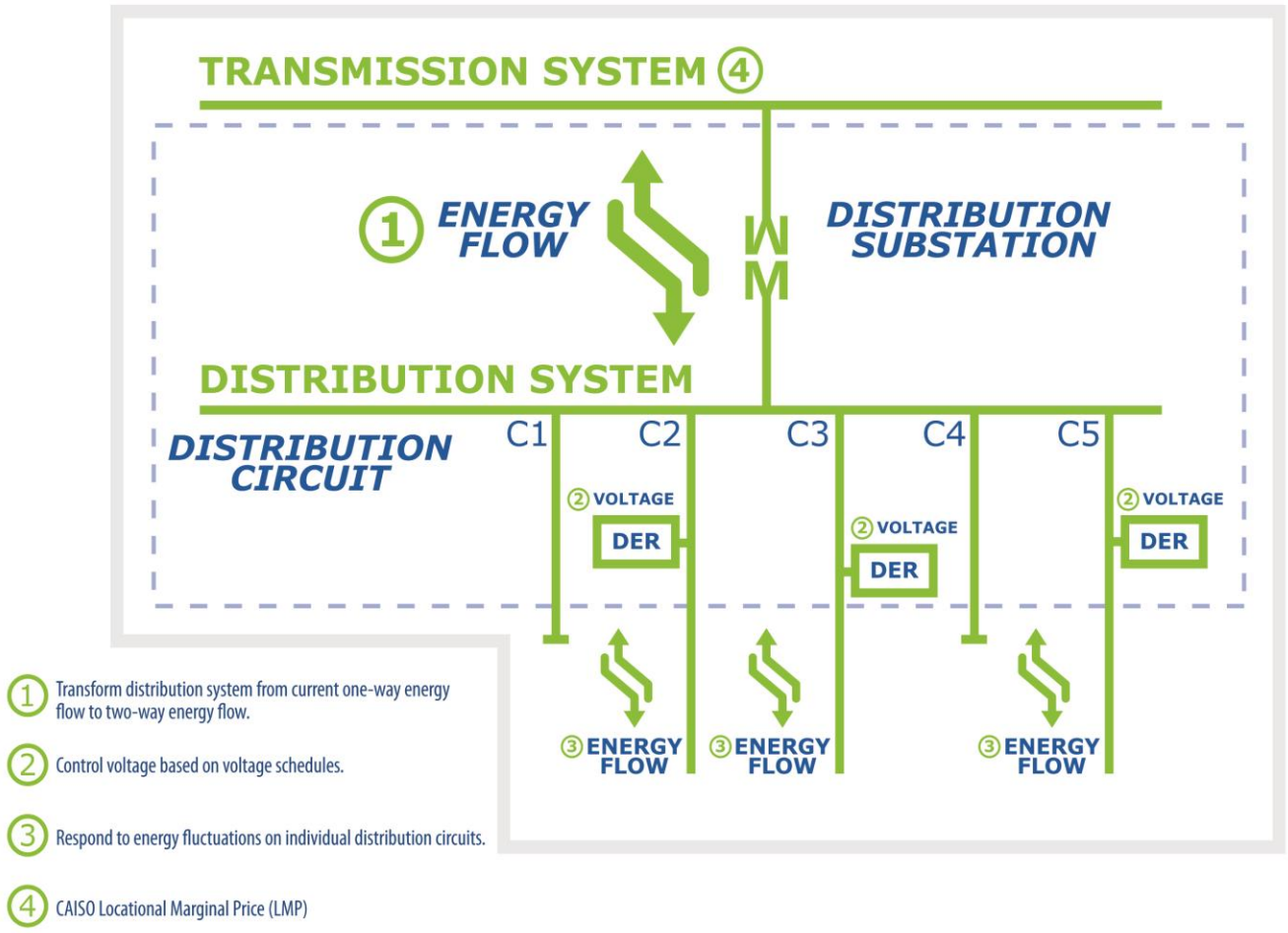

Figure 2 - Goals and Benefits of Supply and Distribution Integration

Distributed Energy Resources (DERs) can be programmed to monitor flow on the substation transformer (1). When there is too much energy flowing from the transmission system to the distribution system, the DER can generate electricity so that the energy demand from the grid is reduced. Similarly, if there is too much energy emanating from the distribution system back-feeding the transmission system, energy storage DERs can absorb that energy to charge their energy reservoirs and reduce the energy flow from the distribution system to the transmission system.

DERs can also be programmed to provide voltage support dynamically. When voltage is too high, the DER can absorb reactive power to reduce voltage. When the voltage is too low, the DER can supply reactive power to raise the voltage.

Depending upon the need, DERs can indirectly monitor net energy production and consumption by sensing flow on individual circuits and automatically respond to changes in the energy flow on the circuit by generating electricity or with energy storage DERs, absorbing energy.

And finally, the DER can also be offered to the California Independent System Operator's (CAISO) electricity market to supply energy to the transmission system when the Locational Marginal Price (LMP) at the 115 kV side of the substation exceeds a pre-determined offer price. And an energy storage DER can absorb power from the transmission system when the LMP is lower than a pre-determined bid price.

3 STRATEGIES TO EXPAND RENEWABLE ENERGY CONTENT

A comprehensive approach to providing 100% renewable energy that is consistent with the City's Climate Action Plan would incorporate energy, capacity along with the distribution and local transmission system in the San Diego area. That approach consists of the following components.

1. Acquire bulk supply from renewable energy and carbon-free resources
2. Develop local distributed energy resources (both renewable and energy storage) strategically located to support electric grid reliability and improve grid use efficiency
3. Establish behind-the-meter demand-side resources initially targeting large commercial and industrial customers, while migrating toward smaller customers as the program evolves
4. Work with campuses and local communities to design, implement and integrate microgrids
5. Continue implementation of current energy efficiency programs and technologies, and develop new incentives and programs to expand energy efficiency without compromising lifestyle

The first step toward implementing the City's energy objectives is to formally take on the role and responsibility of providing an electricity supply of the City's choice to its citizens. The City could effectively move forward with actions 2-5 above, but that alone will not completely achieve the goal of 100% renewable energy. Action 1 is needed and with that, either the formation of City's role as a Community Choice Aggregator (CCA) or establish and agreement with SDGE to allow an option for 100% renewable procurement for the City's load. As a CCA, the City has complete control over its electricity supply. As an agreement with the SDGE, the City and SDGE will need to identify roles and responsibility in acquiring 100% renewable energy for the City.

3.1 Bulk Supply

With 1.4 million people, the City of San Diego is the eighth largest city in the United States and second largest city in California. To achieve the goal of 100 percent renewable energy, the City will need a bulk supply of renewable electricity to supplement the other four supply tenets listed above. The City would first need to determine the supply objectives. Based on the City's Climate Action Plan's objectives of generating clean energy locally and spurring economic development, acquisition of bulk supply will not be based solely on price. By issuing Requests for Offers (RFOs) that state a preference for local supply, the City will incent developers to design, and construct local facilities. The City will need to determine how much of a cost premium it is willing to incur for those facilities that are presumably more expensive than those that reside in more remote locations. It likely that the results of an RFO for bulk supply will include both local and remote resources.

The bulk supply can be contracted in two forms. The first is through standardized agreements such as the Edison Electric Institute (EEI) agreement that have been vetted through years of transacting. The terms are generally accepted by suppliers and off-takers with little need for modification except for specifying the what resource is providing the product, price and delivery terms. These contracts are geared toward resources that are existing or have a high likelihood of implementation. The second is resource-specific describing milestones for development of a resource. These contracts are usually used for resources that have more development risk and have a lower likelihood of implementation.

3.2 Local Distributed Energy Resources (DERs)

Distributed Energy Resources[1] (DERs) have the potential to transform the electricity sector by disrupting the current approach of building utility-scale power plants at remote locations and transmitting the energy to load centers hundreds of miles away via high-voltage transmission lines. DERs won't replace utility-scale power plants entirely, but by generating smaller amounts of electricity in areas where the energy is consumed yields a more reliable and diverse electrical grid, and provides an avenue for communities to take advantage of new, clean, less-invasive technologies to construct energy centers locally which in turn provides jobs in the community and property tax base.

The market for DERs is maturing as described in four bullets below from the South Bay Business Plan[2].

1. Wholesale electricity markets have now begun to allow DER to be aggregated and bid in competition against large-scale power plants;
2. Southern California Edison is increasingly contracting with DER project developers to meet grid reliability procurement goals;
3. The California Public Utilities Commission is now in the early stages of overseeing a systemic transition in how the distribution grid is planned and operated so that DER may both displace utility investments in grid infrastructure and enhance the overall efficiency of the system;
4. Utilities are transitioning all customers to time-varying rates by 2019, to allow retail electricity prices to more closely match wholesale generation price dynamics. For example, electricity usage could be incentivized during daytime hours (when significant volumes of solar are produced) and discouraged in the early morning and evening hours with appropriate price signals.

In addition, Pacific Gas and Electric Company (PG&E) has recently released a Request for Offers for distributed energy resources to reduce overloading of the substation transformer at its Huron Substation near Fresno, California.

As described in Section 2, the key is to work with SDGE to identify prime locations on the lower voltage distribution system to allow integrated operation of the DER in conjunction with the distribution circuit and transmission/distribution substation interface. The DER/distribution system integration provides the distribution operator better control as it works to address issues of rooftop solar and other small-scale electricity supply, and the City with local energy supply.

3.3 Behind-the-Meter Demand-Side Management

Commercial and industrial customers are becoming more sophisticated at managing their load consumption to reduce costs and improve efficiency. Most of this effort is designed to reduce energy consumption during peak price periods and reduce overall or period-specific demand charges. With the rapid development and deployment of energy storage systems, the expectation is that commercial and industrial customers will have opportunities to expand and improve upon that effort. As the entity responsible for its customers, the City can develop and implement programs designed to incent those customers to implement behind-the-meter demand-side

[1] Distributed Energy Resources (DERs) have typically included behind-the-meter resources such as rooftop solar, electric vehicles, and demand response. For purposes of this discussion, we are defining DERs as in-front-of-the-meter resources interconnected to distribution circuits. Examples of these are small-scale solar and other type of generation facilities, energy storage, and hybrid generation and energy storage.

[2] South Bay Business Plan, Section "Overview of Distributed Energy Resources", page 20.

management. Ideally, the program would include the ability to respond to real-time price signals that should represent the value of energy on the grid at any time. When the price is high, the customers will be incented to reduce energy consumption from the grid (that is, generate its own electricity so that it can operate at full capacity). When the price is low or negative, the customer will be incented to draw electricity from the grid to serve its load or charge its energy storage system.

3.4 Microgrids

Micro grids work in conjunction with DERs, behind-the-meter demand-side management and in-front-of-the-meter distribution or transmission system. San Diego is home to a cluster of biotechnology companies, national defense contractors, military bases, tourism parks and manufacturing. These campuses are ideal for integrating DERs and behind-the-meter demand-side management resources into a localized micro grid. The micro grid design monitors the customer load, DER capability, demand-side management capability and real-time prices to determine how best to dispatch the resources to meet the customer's load to reduce costs. The application would be forward looking and forecast expected customer load, prices, and resource availability over the next few hours.

As describe in Section 3.3, the City, as the entity responsible for its customers can develop and implement programs designed to incent micro grids, with the overall objective for the City's aggregation of customers to be energy independent.

3.5 Energy Efficiency

The City implemented an energy efficiency program through its Energy Efficiency and Conservation Block Grant (EECBG). Our understanding it that program was effective. The City can again embark on implementing energy efficiency programs. However, two areas need to be improved. The first is data management. Correlations between customer usage, weather, seasons, and time-of-day can be useful in determining the effectiveness of energy efficiency. Second, energy efficiency needs to be an integrated component of the supply brand. Supply brands are important to energy providers that offer an alternative to the default provider. One advantage that the City has, it that it can compare and contrast its supply with that of SDGE's. At 100% renewable, it will have a visible brand that can be effective in promoting its goals, not just locally, but nationally as well. That brand should highlight the energy efficiency component as well as the energy from clean generation resources that the City acquires.

3.6 Proposed Methods for Accomplishing Work

To achieve the City's goal of 100% renewable energy from the categories of resources described above, we need to develop an overarching plan. The plan consists of tasks that are related functionally, one task emanating from another as shown in the diagram below.

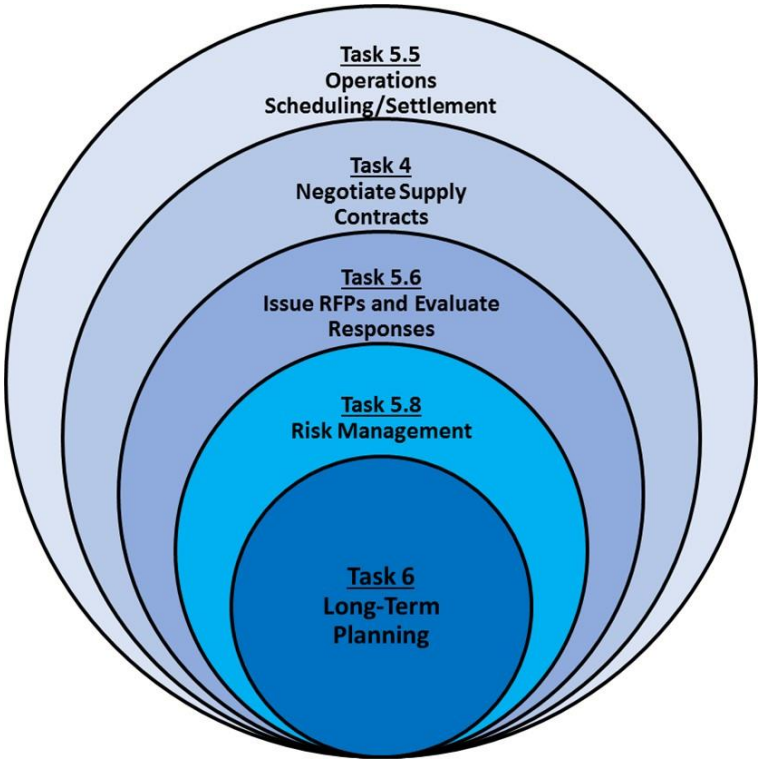

Figure 3 - Energy Assessment, Procurement, and Operations Tasks

The following subsections describe how ZGlobal will go about providing services in support of the five tasks shown above.

3.6.1 Long-Term Planning through 2035

Long-term planning is the foundation on which all other downstream tasks rely. The long-term plan establishes the customer load to be served, identifies the risks to the City, determines the supply needed to meet the City's 100% renewable goal and the resultant revenues and costs. The approach that ZGlobal will take is to first identify the load to be supplied by the City. From there, hourly load profiles will be developed by customer class based on customer count, opt-out assumptions and the timing of phasing-in of customers for inclusion in the production cost model. In addition, ZGlobal will identify the ability to reduce customer load either through existing demand response and energy efficiency programs or ideas for implementing new programs. Then ZGlobal will layer on a few different scenarios of supply options designed to meet customer load, meet the City's portfolio goals and Resource Adequacy (RA) requirements. The scenarios will provide the City with options to consider when developing, issuing, and evaluating RFPs for supply and demand response. Examples of scenarios include the following:

1. Baseline with a percentage of customer load
    a. High customer energy efficiency and demand response
    b. Low customer energy efficiency and demand response
    c. Stable customer base
    d. Variable customer base depending upon market price or utility rate reductions or technology changes
2. Baseline with current market conditions and expected price
    a. High market prices relative to today
    b. Low market prices relative to today
3. Baseline with a percentage of supply costs incurred outside the control of the City

   a. Power Charge Indifference Adjustment (PCIA)
   b. Shares of resource obligations, for example SB 859 requiring purchase of biomass energy
4. Baseline with a percentage of costs fixed
   a. High percentage is fixed
   b. Low percentage is fixed

The result of the scenarios is an assessment of cost impacts to the City, probability of occurrence and risk priority (high, medium or low).

The deliverable is a comprehensive integrated resource plan looking out five years. Because the City is not yet implemented at this stage, the integrated resource plan will describe the scenarios, potential outcomes, and benefits and risks to each approach.

3.6.2 Risk Management

The objective of risk management can be summarized with the following three activities:

1. Measure
2. Monitor
3. Manage

Examples of risks to providing customers with 100% renewable energy at a reasonable cost include:

1. Regulatory changes
2. Technology changes
3. Commodity price volatility
4. Wholesale suppliers' reliability
5. Customer attrition
6. Credit risk
7. Utility rate changes

The scenarios described in Section 3.6.1 provide information that will be used to structure a risk program that identifies and prioritizes risk so that supply can be procured to address those risks deemed most significant to the City.

Going forward, ZGlobal will develop risk management policies and procedures consistent with the City's risk appetite and objectives. The policy will be an over-arching document that describes "what", while the policies will be more prescriptive in describing "how". The policy and procedures make up the City's Risk Program.
Examples of items and activities that will be monitored in a Risk Program include:

1. Net Open Position
2. Counterparty credit
3. Transaction types and personnel authorized to transact
4. Authorized products to transact:

All activities will be coordinated with the City to ensure that reports and measures are meaningful, sustainable and are consistent with Risk Policy and Procedures documentation. The need to update Risk Policy and Procedures will be assessed and implemented as needed. This work will be done in two stages.

1. Stage 1 development will be prototype for review
2. Stage 2 development will be operational

The Risk Program roles and responsibilities will be structured into three offices.

1. Front Office – Responsible for executing and recording transactions
2. Middle Office – Responsible for monitoring risk and ensuring that activities are conducted consistent with Risk Management Policy and Procedures

3. Back Office – Responsible for settlements and accounting for all revenue and costs

The Middle Office administers the Risk Management Program. ZGlobal provides Middle Office services for clients such as Silicon Valley Clean Energy.

3.6.3 Development of RFPs and Assessment of Reponses

The logistics of developing and issuing a standard supply or demand-side RFP is straight-forward. The product definition is established by the results of long-Term Planning. Because the products are mature and well-defined, responses can be objectively assessed by reviewing a handful of standard characteristics of the offers as shown below.

1. Counterparty
2. Volume
3. Price
4. Resource type (capacity, energy, RPS, carbon-free)
5. Delivery Point
6. Term
7. Scheduling obligation (if any)

Successful offers would be determined by how much the City values each of the characteristics and how they mitigate prioritized risks. Those suppliers then move forward to Task 4, Negotiating Supply Contracts.

3.6.4 Negotiating Supply Contracts

The products described in Section 3.6.3 would be governed by standard industry-accepted enabling agreements, either WSPP (Western Systems Power Pool) or EEI (Edison Electric Institute). These contracts simplify transacting as they have been well vetted. There is little to negotiate. If there are issues that need to be addressed, they can be singled out as exceptions to the standard agreement and noted.

3.6.5 Wholesale Power Procurement Operations

The objective of ZGlobal's Short-Term Portfolio Management will be to optimize the City's energy procurement and plan short term dispatch to minimize overall costs for meeting the City's hourly load. This is referred to as least-cost dispatch, which, under the CAISO centralized market, is the result of scheduling or bidding the City's power contracts and generation resources into the CAISO's markets.

3.6.6 Load Forecast

ZGlobal's planning process begins with inputs from the City's energy procurement staff and its various energy suppliers to determine the program's residual open positions coming into the relevant month, week, or day ahead. ZGlobal will run updated load forecasts for the month and through day-ahead and schedule accordingly with the CAISO. ZGlobal uses a combination of models developed in-house and third-party load profiling algorithms to calculate hourly load requirements for month ahead, week ahead, and day ahead forecasts. The primary inputs for the forecasts include actual historical hourly load profiles, peak demand, and weather forecast. Additional factors include an understanding of and determining correlations of customer base and actual usage given season and temperature. Previous hour, day or prior week's forecast errors are also analyzed to evaluate bias adjustments for next day or next hour forecast.

ZGlobal utilizes Power Settlements as well as other applications to perform functions required for daily and same day scheduling, dispatch and settlements including:

- Maintain operator logs,

- Manage and record outages from CAISO Outage Management System ("OMS"),
- Validate forecasted energy schedules against contracts and create schedules,
- Create and submit to the CAISO schedules and/or price-sensitive offers,
- Monitor prices,
- Monitor generating unit parameters and availability,
- Create and submit DA and RT Inter-SC Trades into CAISO
- Execute and record transactions via Deal Capture

3.6.7 Outage Management

If the RFP process results in incorporating generators into the City's resource portfolio, ZGlobal utilizes the CAISO's Outage Management System ("OMS") to submit both planned and forced outages according to the CAISO Tariff and good utility practices. Outage information is submitted to the CAISO as soon as practical but within 10 minutes after notification from the power plant. In addition, ZGlobal's scheduling team interacts closely with plant operators to ensure that schedules and bids are in synch as near as possible given the uncertainties associated with power plant returns to service. During periods of OMS outages, ZGlobal provides outage status to the CAISO and other entities as necessary via phone with an email update to document the communication. It is the nature of power plant operations that information most likely will not be complete with an initial communication as power plant personnel work to identify the issue, ensure safe conditions, and determine a course of action. As such, initial communications are usually limited and require more information as it becomes available. Full written detail of the outage is provided within 48 hours (with information as it is available at the time).

Typical information included in an outage log item include:

- MW availability
- Time stamp of the event limiting MW availability
- Reason for limiting MW availability
- Effect on RA scheduling obligations (if any)
- Estimated return time
- Power plant operator
- ZGlobal scheduler

ZGlobal ensures that there is consistency between schedules and outages. If a generator is out-of-service or is capacity-limited, ZGlobal will ensure that bids and schedules do not exceed the available MW capacity.

ZGlobal also works with clients to provide annual and seasonal planned maintenance schedules and provides the information to appropriate entities such as the CAISO and transmission operators usually no later than September for the upcoming year and within 3-6 months of the planned outage with updates as necessary.

3.6.8 Dispatch Management

Again. if needed by the City, ZGlobal's staff is proficient in utilizing the various application interfaces with the CAISO to schedule, dispatch, and monitor its clients' resources including its Automated Dispatch System ("ADS"). Typically, the CAISO dispatches resources via the ADS. ZGlobal's business practices incorporate regular communication with plant operators even when automation is in place. This practice ensures that plant operators and schedulers have a common understanding of current system conditions and plans for forward dispatch hours.

3.6.9 Settlement Services

ZGlobal implements front-to-back office processes and systems which integrate scheduling and settlement functions effectively. Power Settlements provides our schedulers the ability to capture and keep an audit trail for all bilateral, CAISO, transmission and other financial transactions so that our settlement analysts can perform

settlement verification and checkouts with the CAISO efficiently. ZGlobal implements procedures to ensure our scheduling transactions flow through to our settlements processes seamlessly so that shadow estimation and final settlements with counterparties and the CAISO are based on accurate schedules, verified prices and consistent volumes. ZGlobal has senior level settlement analysts to verify all financial transactions, be proactive in identifying discrepancies for potential disputes and following it through to conclusion. We will prepare appropriate reports for the City's staff to confirm the accuracy of all settlement information by providing them timely shadow calculations with reports as well as the relevant accounting information to process weekly or monthly invoices. ZGlobal will work with the City's staff to customize any needed reports for their analysis and validation.

3.6.10 Regulatory Services

Routine filings would entail Resource Adequacy Supply Plans (annual and monthly) for the CAISO and CPUC. ZGlobal does not expect a need to interact with other regulatory bodies for these resources, however we will confirm with the City.

3.6.11 Summary of Services

In summary, ZGlobal will perform the following services related to Day Ahead and Real Time Scheduling & Optimization:

1. Provide real-time desk services 24 hours per day, 7 days a week,
2. Forecast load on a daily, weekly and monthly basis,
3. Implement and apply on a daily and real-time basis the approved bidding and self-scheduling strategies into appropriate CAISO markets or other WECC bilateral processes to meet hourly demand forecasts,
4. Submit to the CAISO and/or other Balancing Authorities as applicable, the City's schedules consistent with the timelines prescribed by relevant tariffs and protocols,
5. Provide all e-tagging and checkout of schedules consistent with applicable timelines,
6. Submit data to appropriate Balancing Authorities to satisfy planning requirements,
7. Monitoring actual usage and schedules for the City's load and resources (as data availability exists) in support of meeting load requirements through real-time,
8. Provide regular communications to the City's staff and management regarding status and performance of daily operations, and
9. Perform all settlements on behalf of the City and provide collateral to the CAISO as needed to interact with the CAISO

Perform all services in a professional manner

3.6.12 Working with SDGE and Third-Party Entities

ZGlobal's engineering team proposes to work in collaboration with the City and SDGE to identify distribution circuits best suited for siting DERs. That entails a comprehensive review of the distribution system and customers that would benefit from behind-the-meter supply and demand response. In addition, campuses and business parks that could benefit and provide benefit by implementing micro grids will be identified. A summary of tasks required is shown below.

1. Team with SDGE to perform reconnaissance of distribution and sub-transmission circuits
2. Review third party suppliers' capabilities for designing and implementing DERs and aggregation of DERs
3. Team with SDGE to identify customers that could benefit and provide benefits from DER, aggregation, and behind-the-meter demand-side management
4. Develop comprehensive list of priority grid locations for DER and customer behind-the-meter demand response
5. Prioritize the opportunities into high, medium, and low

6. Initially target high priority opportunities by offering to work with customers to implement behind-the-meter demand response and potential aggregation
7. Initially target high priority opportunities on the grid for dispatchable DERs
8. Initially target high priority opportunities by offering to work with campuses and business parks to integrate DERs and behind-the-meter resources as a micro-grid or virtual grid
9. Develop comprehensive plan incorporating tasks 6, 7 and 8 above and share that with the regulatory and legislative bodies
10. Incorporate successful and probable implementations into overall Long-Term Plan and adjust bulk supply targets as necessary

4 Ability and Expertise to Procure Renewable Sources of Electricity

ZGlobal currently transacts over 5,800 GWh of energy annually with total value exceeding $74.8 million. That amount increased by 3,800 GWh and approximately $115 million when Silicon Valley Clean Energy began operation on April 1, 2017. Our clients include community choice aggregators, variable energy resources, base-loaded renewable energy generators, a reserve sharing group and municipal load serving entities. ZGlobal has the experienced staff, processes, systems, and tools necessary for resource planning, identifying and mitigating risk, working with clients to develop and manage its portfolio of resources, forecasting load, and scheduling and settling clients' energy transactions.

ZGlobal is a certified CAISO Scheduling Coordinator (SC), including certifications for Congestion Revenue Rights (CRR). ZGlobal's operations center has been in operations since 2011. Our El Centro location is staffed around-the-clock, 7 days a week. Our operations center in Folsom is staffed 12 hours per day based on the WECC approved prescheduling calendar. Both centers are secure and staffed by a team headed by NERC-certified personnel. As a certified SC, ZGlobal establishes the financial relationship including maintaining the required credit requirements with the CAISO to schedule and settle our clients' transactions. In addition to scheduling as the responsible SC, we also perform similar services as a scheduling agent utilizing our clients' SC ID. Furthermore, ZGlobal provides resource and interchange scheduling services for our clients across multiple WECC Balancing Authorities. The table below provides a list of current and previous clients.

Client	Client Contact and Description of Services
ANAHEIM PUBLIC UTILITIES	**Contact** Contact: Tim Hammond Address: 201 S. Anaheim Blvd., Suite 802 Anaheim, CA 92805 Phone: (714) 765-4257 Email: THammond@anaheim.net **Date:** February 2014 to Present
	Description of Services and Benefits Realized • Provide real-time electricity scheduling services for Anaheim Public Utilities' electricity generation assets, customer load and energy contracts during non-business hours. Peak Load is approximately 600 MW. • Gas nominations for 5 peaker power plants. • Augment Anaheim's energy scheduling operations by utilizing ZGlobal on nights, weekends and holidays.
SILICON VALLEY CLEAN ENERGY	**Silicon Valley Clean Energy** Contact: Tom Habashi Phone: (408) 721-5301 X1001 Email: TomH@svcleanenergy.org **Date:** April 1, 2017

Client	Client Contact and Description of Services

	Description of Services and Benefits Realized
	• Provide Scheduling Coordinator services for contracts and load, including:
	  ○ Load forecasting
	  ○ Submittal of Day Ahead, 15-minute and Real-Time schedules and bids per forecasts and coordination with generator operators,
	  ○ Weekly invoice, shadow settlements and settlement statement reconciliation and reporting to Client, and
	  ○ CRR Allocation processing and optimization analysis.
	• Provide Risk Management reporting to SVCE Risk Committee

	**Marin Clean Energy** Contact: Greg Brehm Phone: (415) 464-6037 Email: gbrehm@mcecleanenergy.org **Date:** October 1, 2016 to Present

	Description of Services and Benefits Realized
	• Provide Scheduling Coordinator services for resources, contracts, and load, including:
	  ○ Load forecasting
	  ○ Submittal of Day Ahead, 15-minute and Real-Time schedules and bids per forecasts and coordination with generator operators,
	  ○ Weekly invoice, shadow settlements and settlement statement reconciliation and reporting to Client, and
	  ○ CRR Allocation processing and optimization analysis.

	**Peninsula Clean Energy** Contact: George Wiltsee, Director of Power Resources Address: 555 Marshall Street, Redwood City, CA 94063 Phone: 626-890-8346 Email: gwiltsee@peninsulacleanenergy.com **Date:** March 2017 to Present
	Description of Services and Benefits Realized • Provide Scheduling Coordinator services for small hydroelectric resources
	**Municipal Energy Agency of Nebraska** Contact: Robin Spady, Risk, Compliance and Regulatory Counsel Address: 8377 Glynoaks Drive, Lincoln, NE 68516 Phone: 402-474-4759 Email: rspady@nmppenergy.org **Date:** September 2013 to Present

Client	Client Contact and Description of Services
	Description of Services and Benefits Realized • Review of scheduling processes and procedures • Develop operational procedures for formalizing approach to operations • Provide energy market training to staff • Develop Risk Management policies and procedures and review with executive management
HALLORAN ENERGY GROUP	**Energy Unlimited, Inc.** Contact: David Lamm Address: 638 Lindero Canyon Rd., Suite 273, Oak Park, CA 91377 Phone: (818) 292-4806 Email: dlamm@sbcglobal.net **Date:** March 2016 to Present

	Description of Services and Benefits Realized
	• Provide Scheduling Coordinator services for wind generation including:
	  ○ Submittal of Day Ahead Inter SC trades per contract and coordination with counterparty,
	  ○ Daily real-time energy accounting, reporting of real time LMPs and shadow revenue amounts, and
	  ○ Weekly invoice, shadow settlements and settlement statement reconciliation and reporting to Client.
	• Provide personnel with one-on-one training and knowledge transfer regarding CAISO processes and rules as it pertains to its scheduling, settlement and market activities.

ENERGY 2001, INC. A Renewable Resource Company	**Energy 2001** Contact: Laura Rasmussen Address: P.O. Box 50724, Palo Alto, CA 94303 Phone: (650) 269-2698 Email: laura@energy2001.com **Date:** October 2012 to Present

	Description of Services and Benefits Realized
	• Provide Scheduling Coordinator services for E2001 in all transactions with the CAISO, including:
	  ○ Submit Day Ahead generation schedules and Inter SC Trades; and confirm with counterparty,
	  ○ Manage outage information and data submittals to CAISO; coordinate with generator owner/operators,
	  ○ Weekly invoice, shadow settlements and settlement statement reconciliation and reporting to client, and
	  ○ Prepare and submit Resource Adequacy Supply Plans consistent with CAISO Tariff.

Client	Client Contact and Description of Services
	• Provide personnel with one-on-one training and knowledge transfer regarding CAISO processes and rules as it pertains to E2001's scheduling, settlement and market activities.
	**Southern Company** Contact: John Spratley Scott Wheeler Address: 600 18th St N PO Box 2641, Birmingham, AL 35203-2206 Phone: (205) 257-7230 (205) 257-7631 Email: jtspratl@southernco.com sawheele@southernco.com **Date:** August 2013 to Present
	Description of Services and Benefits Realized • Provide Scheduling Coordinator services to the CAISO scheduling Coordinator for Southern Company's station load at one (1) of its solar facilities and for generation at three (3) of its solar facilities, including: ○ Load Meter data submittals to CAISO within Tariff timelines, ○ Weekly invoice, shadow settlements and settlement statement reconciliation and reporting to Client, ○ Prepare and submit e-tag; coordinate with relevant Balancing Authority, ○ Submittal of Day Ahead, 15-minute and Real-Time schedules and bids per forecasts and coordination with generator operators, ○ Daily monitoring and reporting of OASIS LMPs for their relevant locations, ○ Coordinate transaction interchange and schedule management between Balancing Areas, and ○ Operationalize provisions of Southern's Power Purchase Agreement consistent with CAISO markets and Tariff and WECC scheduling requirements. • Provide personnel with one-on-one training and knowledge transfer regarding CAISO processes and rules relative to scheduling, settlement and market activities.

Client	Client Contact and Description of Services
Silver Ridge POWER formerly known as AES Solar	**Silver Ridge Power Corporation** Contact: Rick Mitchell Address: 251 Ferrell Road, Calexico, CA 92231 Phone: (760) 618-7051 Email: rmitchell@sunedison.com **Date:** February 2014 to Present

	Description of Services and Benefits Realized
	• Provide Scheduling Coordinator services for Silver Ridge Power's station load at one of its solar facilities, including:
	  ○ Load Meter data submittals to CAISO within Tariff timelines,
	  ○ Weekly invoice, shadow settlements and settlement statement reconciliation and reporting to Client,
	  ○ Daily monitoring and reporting of OASIS LMPs for their relevant locations, and
	  ○ Provide information designed to facilitate scheduling decisions.
	• Provide personnel with one-on-one training and knowledge transfer regarding CAISO processes and rules as it pertains to its scheduling, settlement and market activities.

Wind Stream PROPERTIES LLC	**Wind Stream** Contact: Al Davies Address: 785 Tucker Road #106, Tehachapi, CA 93561 Phone: (707) 322-1101 Email: adavies@windstreamproperties.com **Date:** October 2015 to Present

	Description of Services and Benefits Realized
	• Provide Scheduling Coordinator services for Wind Stream's wind generation, including:
	  ○ Submittal of Day Ahead Inter SC trades per contract and coordination with counterparty,
	  ○ Daily real-time energy accounting, reporting of real time LMPs and shadow revenue amounts, and
	  ○ Weekly invoice, shadow settlements and settlement statement reconciliation and reporting to Client.
	• Provide personnel with one-on-one training and knowledge transfer regarding CAISO processes and rules as it pertains to its scheduling, settlement and market activities.

Table 2 - Sample of ZGlobal's Operations and Portfolio Management Clients

One of the attributes that sets ZGlobal apart is that ZGlobal's team is not limited to personnel that has expertise in managing risk, performing resource planning, optimizing and scheduling assets, and transacting. ZGlobal's engineering team has a vast array of knowledge and understanding of the underlying power grid through our

interaction with the CAISO and utilities in California and throughout the Western United States. That combination positions us to assist the City in effectively integrating local supply with distribution and sub-transmission systems consistent with the City's stated goals. The only requirement that ZGlobal insists upon is that our client relationship be team-based, working together to achieve our mutual goals, in the City's case, establishing a 100% renewable energy portfolio. Otherwise, ZGlobal has no limitations or exceptions to performing services and our qualifications are not subject to conditions, consents, or provisos from any other party.

A few of the key individuals and their areas of expertise are listed below.

Kevin Coffee heads up ZGlobal's market operations functions. Kevin's 25-years plus of broad experience in the energy sector allows him to effectively lead ZGlobal's team of portfolio managers, planners, schedulers, engineers, analysts, risk managers and other subject matter experts. Kevin has worked at ZGlobal since 2010 after spending his previous ten years leading the team responsible for scheduling all of Pacific Gas and Electric Company's (PG&E) load and managing and optimizing its portfolio of hydroelectric, renewable, thermal-fired resources. In addition, Kevin was responsible for implementation of risk management operating procedures for both portfolio management and counterparty credit risk management. Kevin oversees ZGlobal's market operations functions, which provide portfolio management, energy procurement, energy scheduling and settlements, risk management and market analytics services for our various clients. Most recently, Kevin has been instrumental in operationalizing the functions needed for the Silicon Valley Clean Energy CCA that begin operation April 1, 2017. Kevin has a solid foundation and intimate understanding of the risk, issues, and benefits associated with commercial power procurement arrangements.

Kevin is supported by a strong team of individuals that have comprehensive knowledge and experience to develop and manage portfolios, and provide operational services to the City.

Christine Vangelatos is ZGlobal's Executive Director of Market Analytics. Christine has over twenty years' experience in the energy sector with PG&E and the CAISO. She is highly knowledgeable in the day-to-day operations of transactions with the CAISO market and settlements. While at the CAISO, Christine successfully managed CAISO settlement system implementation which administered several hundred million dollars annually. Christine is an expert in the CAISO nodal market, asset valuation, and economic analysis for a variety of generating and transmission assets.

At ZGlobal, she leads a highly skilled team of engineers and market analysts that develop and use various deterministic and stochastic models to perform energy market and operations analyses, forecasting and resource planning in support of ZGlobal's energy scheduling, portfolio optimization, risk management, and asset valuation assessments for clients. Their expertise includes developing and maintaining ZGlobal's production cost models to forecast LMPs and dispatch resources under varying scenarios for the CAISO energy markets. Christine also manages ZGlobal's settlement processes. ZGlobal's settlement staff has over 10 years' experience managing energy market settlement processes, check-outs and reporting. Also, Christine provides leadership and coordinates many of ZGlobal's information technology implementation efforts having many years' experience leading market and settlement application implementation projects at CAISO.

Eric Vaa is the Manager of Energy Scheduling at ZGlobal and oversees our Real-Time and Day-Ahead operations. Eric is primarily responsible for the day-to-day activities required for scheduling our clients' resources into Independent System Operator (ISOs) organizations or the WECC bi-lateral market, executing interchange transactions between and among Balancing Authority Areas and ISOs. Eric provides training to ZGlobal's portfolio

management and scheduling team for all asset optimization services including; portfolio management, CRR's/FTR's, system monitoring, resource scheduling, and the execution of real-time energy transactions on behalf of clients. Eric also works closely with clients to help integrate new resources into their respective markets, including the CAISO New Resource Implementation process. Eric most recently worked to transition Marin Clean Energy CCA from its previous scheduling coordinator to ZGlobal October 1, 2016 and launching Silicon Valley Clean Energy CCA on April 1, 2017. In addition, Eric works with Peninsula Clean Energy CCA to schedule small hydro renewable resources in its portfolio. Eric is a NERC certified System Operator in Reliability.

Kyle Hoffman is a Principal Advisor to ZGlobal's Electric Operations team. Kyle Hoffman previously served as the Manager of Scheduling at the CAISO. He has extensive experience in Balancing Authority areas, natural gas pipeline and electric utility operations. At the CAISO, Kyle was one of three operations managers responsible for Balancing Authority interchange scheduling, Balancing Authority area operations (inclusive of the energy management system), outage coordination, NERC reliability standards compliance and the annual self-certification process. Kyle was the lead CAISO negotiator for transmission contracts and served as an expert witness for both grid and market operations before FERC. Kyle brings the experience of dealing with WECC and NERC scheduling rules and procedures, including tagging, unaccounted for energy and transmission accounting.

Appendix 1 provides resumes the ZGlobal members listed above. All four team members listed above are headquartered in ZGlobal's Northern California office in Folsom, California but also spend much time at ZGlobal's 7x24 Operational Center in El Centro, California.

ZGlobal is deeply committed to our clients' desires to provide their customers with the supply portfolio that they want. For the City, that means 100% renewable energy. We pride ourselves on being involved with clients that are on the leading edge of change and innovation. The City's vision is leading the way and we want to be part of that vision.

5 IMPLEMENTATION SCHEDULE FOR INCREASING RENEWABLE ENERGY

If the City moves forward with implementing a CCA, the schedule for increasing renewable energy is contingent upon establishing the CCA. CCA implementation would take approximately 24 months, assuming that the starting point is a CCA feasibility study. Once a CCA is established, the City could rapidly deploy an integration plan described in Section 3 and meet its 100% renewable energy goal well before 2035. A very high-level schedule for implementing a supply plan post-CCA formulation is shown in the table below.

Task	Description	Duration
1	**Long-Term Planning**	**Month 1 to Month 8**
2	**Risk Management**	**Month 3 to Month 60**
3	**Development of RFPs and Assessment of Reponses**	**Month 6 to Month 10**
4	**Negotiating Supply Contracts**	**Month 8 to Month 12**
5	**Wholesale Power Procurement Operations**	**Month 12 to Month 60**

Table 3 - High Level Timetable for Implementing Bulk Supply Plan

The table above assumes that the City's 100% renewable energy goal is satisfied via bulk electrical purchases. However, the City's goal is to incorporate more than bulk electric supply. The City can reduce the bulk electric supply as it successfully implements local DER, behind-the-meter demand-response and energy efficiency gains. A sample schedule for feathering in the local resources with the bulk electric supply is illustrated in the figure and table below.

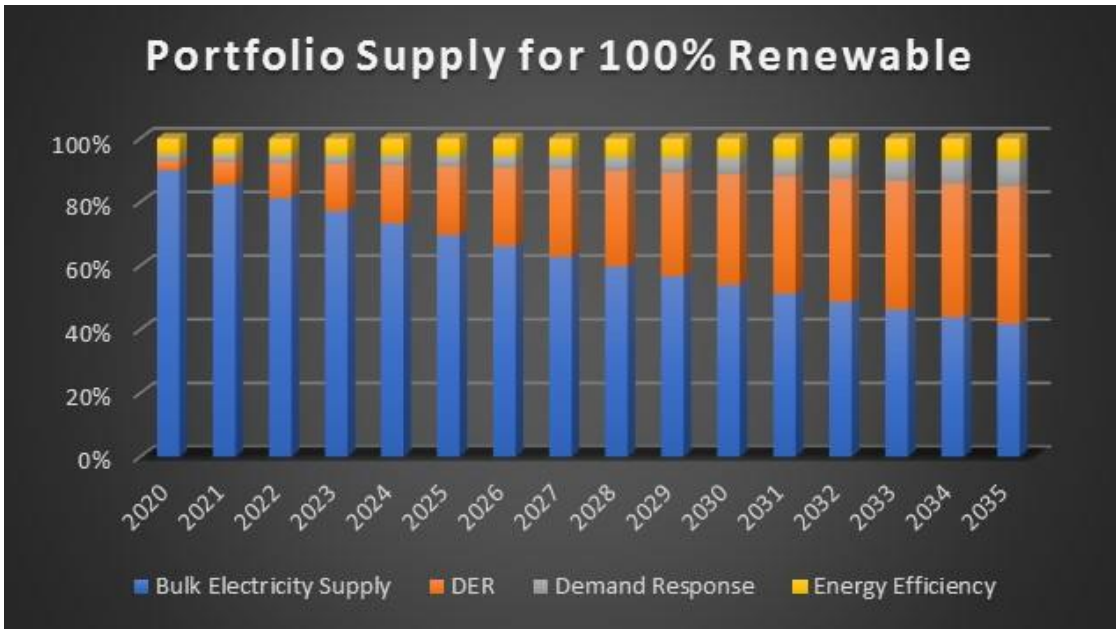

Figure 4 - Sample Breakdown of 100% Renewable Energy Portfolio

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Bulk Electricity Supply	90%	86%	81%	77%	73%	70%	66%	63%	60%	57%	54%	51%	49%	46%	44%	42%
DER	3%	7%	11%	15%	18%	22%	25%	28%	30%	33%	35%	37%	39%	40%	42%	43%
Demand Response	2%	2%	2%	3%	3%	3%	4%	4%	4%	5%	5%	6%	6%	7%	8%	8%
Energy Efficiency	5%	5%	5%	5%	5%	6%	6%	6%	6%	6%	6%	6%	6%	6%	7%	7%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 4 - Sample Breakdown of 100% Renewable Energy Portfolio

In the illustration and table above, the City has achieved its 100% renewable energy goal by 2020 with 90% bulk electric supply, 3% DER, 2% Demand Response and 5% Energy Efficiency. By 2035, when the longer-term efforts to design and implement DER, Demand Response and Energy Efficiency resources, the City's bulk electric supply has dwindled to nearly 40% while the other resources have increased their ratios.

6 ESTIMATED COSTS OF PROPOSED PROGRAM

The estimated cost of the program is shown in the table below.

	Year															
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Bulk Electricity Supply	$36.8	$33.9	$32.1	$30.4	$28.8	$27.2	$25.7	$24.3	$23.0	$21.7	$20.5	$19.3	$18.2	$17.1	$16.1	$15.1
DER	$1.2	$2.9	$4.4	$5.9	$7.2	$8.4	$9.6	$10.6	$11.6	$12.5	$13.2	$13.9	$14.5	$15.0	$15.4	$15.7
Demand Response	$0.8	$0.9	$1.0	$1.0	$1.1	$1.3	$1.4	$1.5	$1.7	$1.8	$2.0	$2.2	$2.3	$2.6	$2.8	$3.0
Energy Efficiency	$2.0	$2.0	$2.1	$2.1	$2.1	$2.2	$2.2	$2.2	$2.3	$2.3	$2.3	$2.3	$2.4	$2.4	$2.4	$2.4
Total	$40.9	$39.7	$39.5	$39.4	$39.2	$39.1	$38.9	$38.7	$38.5	$38.3	$38.0	$37.7	$37.4	$37.0	$36.6	$36.2

Table 5 - Estimate of Financing Cost for 100% Renewable Energy Portfolio

The table above assumes that bulk electric supply cost is $45/MWh and the need to finance that amount would be 2 months. The assumption of costs for DER is $45/MWh, Demand Response is $50/MWh and Energy Efficiency is $60/MWh. Costs are assumed to fall over the period by a rate of 3% due to efficiencies and new technologies. These costs do not include the cost of financing or staffing a CCA. Those costs are most appropriately addressed and identified in a CCA feasibility study.

7 ANALYSIS OF GREENHOUSE GAS EMISSIONS REDUCTIONS

SDGE's Power Content Label for 2015[3] is shown in the table below.

SDGE Power Content 2015	
Energy Resources	**Percent**
Biomass and Waste	2%
Geothermal	0%
Small Hydro	0%
Solar	18%
Wind	15%
Coal	0%
Large Hydro	0%
Natural Gas	54%
Nuclear	0%
Other	0%
Unspecified	11%
Total	100%

Table 6 - 2015 SDGE Power Content Label

It is assumed that CO2 emissions for all-natural gas and unspecified sources are from natural gas, which has an uncontrolled emissions factor of 53.97 kg/mmBtu[4] are applied to the City's load at an 8,000 Btu/kWh heat rate. That amount of generation produces 1.69 million metric tons of CO2 per year. By going to 100% renewable the City will offset 1.69 million metric tons of CO2 in the first year of operation, 2020. By 2030, when SDGE hits its target of 50% renewable, the CO2 emissions that will be offset will be reduced to 1.3 million metric tons[5]. The table below is an estimate of CO2 reduction based on offsetting SDGE's remaining carbon resources after procuring 50% RPS by 2030.

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
CO2 Reduction	1,692,211	1,666,197	1,640,183	1,614,169	1,588,155	1,562,141	1,536,127	1,510,113	1,484,099	1,458,084	1,432,070	1,406,056	1,380,042	1,354,028	1,328,014	1,302,000

Table 7 – Estimated CO2 Reduction in Metric Tons by Year for 100% Renewable Generation

[3] California Energy Commission "Utility Annual Power Content Labels for 2015" at http://www.energy.ca.gov/pcl/labels/

[4] Federal Energy Information Administration (EIA) "Table A.3 Carbon Dioxide Uncontrolled Emission Factors" at https://www.eia.gov/electricity/annual/html/epa_a_03.html

[5] This assumes a linear increase in SDGE's RPS procurement by 1% each year between 2015 and 2030 to achieve 50% RPS.

8 ANALYSIS OF POTENTIAL RISKS AND ROADBLOCKS AND POTENTIAL SOLUTIONS

The main risks and roadblocks to implementing the City's plan are summarized below.

1. Planning
    a. Commitment from governing body to move forward with CCA feasibility study
    b. If feasible to form a CCA, commitment from governing body to move forward with CCA implementation
    c. Partnering with SDGE
2. Implementation
    a. Development of cohesive and comprehensive roll out plan
    b. Financing
    c. Cash flow
3. Operation
    a. Costs of renewable energy are not hedged against revenue from customers
    b. Actual results don't match budgeted amounts
    c. Costs that are not under control of the City, for example Power Charge Indifference Adjustment (PCIA)

8.1 Planning

8.1.1 CCA Feasibility Study

For the City to have responsibility and control over its commitment to implement 100% renewable energy, it must move forward with exploring all options available, including becoming a CCA. As described earlier, the City needs to incorporate bulk electric purchases to its portfolio to achieve its 100% goal. Before implementation, the City needs to undertake a study describing the risks and benefits to incorporating a CCA that are both generic to CCAs and unique to the City. In addition, the City can review existing CCAs for lessons learned and best practices and apply those as appropriate to the City's study.

8.1.2 CCA Commitment

Should the CCA feasibility study indicate that the benefits outweigh the costs and risks, the City will need commitment from its governing body to move forward. There are hurdles to overcome during a transition such as incorporating a CCA, but none that cannot be overcome with commitment from those in leadership roles.

8.1.3 Partnering with SDGE

The plan described in this paper is best implemented with the teamwork between the City and SDGE. Early on, the investor-owned utilities have made it difficult for third parties such as CCAs to form. This plan goes beyond that and looks to SDGE opening up to provide the City with information, data and access to its distribution and sub-transmission system and as well as operation. Today, SDGE, like other utilities, allows interconnection of third party resources to its system through its interconnection process. In this plan, the City would seek to find the best places to interconnect DERs with the help of SDGE. That is far different than requesting an interconnection of a DER. Second, the City would look to SDGE's customer service team to reach out to customers and work with them to develop behind-the-meter resources.

The major hurdle to these efforts is the impact to SDGE and how SDGE can benefit from the impacts and mitigate the effects that are viewed as detrimental to SDGE.

8.2 Implementation

8.2.1 Rollout Plan

The rollout plan is critical to success. Although it can't anticipate all the obstacles to implementation, there is enough information available to establish a firm plan for forming a CCA. DER, behind-the-meter, micro grid and energy efficiency rollout is less defined but can also be defined well enough to establish a plan. The plan needs to be measurable, and adaptable.

8.2.2 Financing

Financing the implementation of the City's goal needs to be incorporated in the roll out plan. A solid understanding of how much is needed to effectively finance the goals needs to be developed and implemented with experienced entities.

8.2.3 Cash Flow

Revenue from customers has to match costs of implementation. Timing of cash flow is critical to ensuring that the City has working capital to implement its goals and minimize the amount that needs to be financed. There are a lot of moving parts between suppliers, customers, the CAISO, third party developers and finance folks. The ability to balance those moving parts is key to the plan's success.

8.3 Operation

8.3.1 Costs

Cost to acquire supply is the main factor in maintaining cost effectiveness. Costs of renewable resources continue to decline. Costs of energy storage are declining. New technologies are on the horizon. Even with the costs declining, it is important to manage the costs so that customers and cost the City remain stable. That can be managed largely by hedging those costs on a forward basis.

8.3.2 Difference from Budget

Forecasts are not 100% accurate. There are costs that are not expected or higher than expected that require adjustments to the plan. The important factor is recognizing some amount of inaccuracy in the plan and incorporating a contingency dollar amount in the plan so that there are few surprises to implantation.

8.3.3 Costs Not Under Control of the City

The major cost component that is not under control of the City is the PCIA applied by the utilities for customers exiting their portfolio. That cost cannot be hedged but the City, along with other CCAs can be and are involved in reviewing and lobbying to reduce as best we possibly can.

9 ADDITIONAL BENEFITS

The major additional benefit to the City is being on the forefront of clean energy and technology to make that happen. The City taking on a leadership role is of inordinate value to both the City and California as the energy sector transitions to the 21st century.

APPENDIX 1

KEVIN COFFEE, P.E.

VICE PRESIDENT, OPERATIONS

Kevin Coffee is ZGlobal's Vice President of Operations. Kevin has over twenty-five years of hands on experience in the energy industry. He has extensive experience in system analysis applications and electrical design, and several years directing operations associated with procuring and delivering wholesale power to retail direct access customers. Kevin has many years' experience managing direct energy procurement, transmission assessment, and asset management designed to minimize costs to electricity customers. Kevin is well positioned to lead our Operations team in providing custom designed services to our clients that include energy scheduling, reliability services, portfolio management and enterprise energy management.

PROFESSIONAL EXPERIENCE

ZGLOBAL ENGINEERING & ENERGY SOLUTIONS (2010-Present)
Vice President, Operations

- Bridge gaps between innovative generation and transmission technologies and existing infrastructure.
- Work with developers of generation and transmission facilities to allow for grid interconnection and integration.
- Assist developers with responding to utilities' RFOs with viable projects.
- Represent clients' interests in regulatory policy proceedings.
- Assessing markets to find opportunities that result in increased efficiencies.
- Promoting ideas and designs that are in concert with public policy directives.
- Heading up effort to provide compliance services for NERC registered entities.

PACIFIC GAS & ELECTRIC COMPANY (2002-2010)
Manager, Electric Procurement

- Directed energy procurement activities, transmission assessment and asset management designed to minimize costs to PG&E's ratepayers.
- Led the team that developed and executed electric hedging and resource bidding strategies.
- Assessed transmission suitability, determined energy deliverability risks, developed and implemented strategies for delivering energy from new facilities, primarily renewable energy sites.
- Member of PG&E's renewable energy team that acquired and delivered renewable energy and implemented renewable energy initiatives.
- Analyzed proposed changes to CAISO's energy, ancillary services, convergence bidding, and capacity markets, then determined and implemented strategies.
- Designed deal structures, negotiated terms and conditions and drafted contract language for customized structured energy transactions.
- Actively participated in Federal Energy Regulatory Commission (FERC) and California Public Utilities Commission (CPUC) regulatory proceedings that affected electric procurement and energy delivery policies.
- Led NERC compliance effort for PG&E's electric procurement function, including audit readiness preparation and participation in NERC/Western Electricity Coordinating Council (WECC) on-site audit.
- Collaborated with PG&E's state governmental relations team to develop statutory language designed to align renewable energy policies.
- Participated in WECC and efforts to assess power system capabilities for integrating intermittent resources.

ELECTRADE (2001-2002)

Director of Operations

- Directed operational aspects associated with launch of the electronic platform for negotiating non-standard energy transactions.
- Developed product specifications, tested software applications and ensured operational readiness.
- Marketed the product via web-based interactions, on-site visits and telephone calls with prospective clients.
- Interacted with clients to facilitate product use and transaction execution.

PACIFIC GAS & ELECTRIC COMPANY (1984-2001)
Director of Operations, Energy Services

- Led the team responsible for delivery of wholesale power to retail direct access customers.

Various Positions (Power Control, Diablo Canyon Power Plant, Power Contracts)

- Installed PG&E's first generation of real-time transmission system analysis applications (state estimator, power flow and security analysis).
- Performed electrical design in support of PG&E's Diablo Canyon Nuclear Power Plant.
- Managed relationships with PG&E's wholesale transmission customers such as California Department of Water Resources, Sacramento Municipal Utility District, Northern California Power Agency and Western Area Power Administration.
- Interacted with the CPUC in support of regulatory filings associated with annual review of electric operations.

EDUCATION & CERTIFICATIONS

M.S., Electrical Engineering, New Mexico State University
B.S., Electrical Engineering, New Mexico State University
Registered Professional Electrical Engineer, State of California

CHRISTINE VANGELATOS

EXECUTIVE DIRECTOR, MARKET ANALYTICS

Christine Vangelatos is ZGlobal's Executive Director of Market Analytics. Christine has over twenty years' experience in the day-to-day operations of and transactions with the market and settlements. She has extensive experience with implementing large market systems, providing market settlements design, business analysis, financial impact assessments, overseeing infrastructure development, and thorough knowledge of ISO Tariff. She is an expert in the ISO Nodal Market, asset valuation, and economic analysis for a variety of generating and transmission assets. For several years Christine successfully managed ISO settlements, totaling several hundred million dollars annually. Christine brings valuable skills in project and program management to ZGlobal, while exhibiting leadership in process reengineering and implementation, technology, and organizational change. Her years of experience mean she is well positioned to provide our clients with solid information that is an essential component in their investment decisions.

PROFESSIONAL EXPERIENCE

ZGLOBAL ENGINEERING & ENERGY SOLUTIONS (2006-Present)
Executive Director, Market Analytics

- Leads ZGlobal's team of engineers and analysts that develop deterministic and stochastic models to perform various market analytics, including asset valuation, transmission project benefit analysis, portfolio optimization and risk management.
- Expert in California markets, transmission pricing, transmission modeling, LMP price calculation and energy settlement.
- Manages ZGlobal's settlement processes and provides expertise to clients on CAISO charge codes and settlement rules.
- Provided analytics justifying the Trans Bay Cable project benefits to the ratepayers. Production cost analysis provided technical background for testimony filed with the Federal Energy Regulatory Commission (FERC), which led to the approval of the project.
- Performed production cost modeling and analysis to determine potential energy cost savings to a California utility by entering into a 25-year tolling agreement with a 550 MW gas-fired plant. Conducted production cost analyses to evaluate potential savings to the utility's fuel cost and import purchases by studying multiple scenarios under varying assumptions. The analysis determined potential net benefits to the utility of up to $29.2 million per year.
- Provides leadership and coordinates many of ZGlobal's information technology implementation efforts.

CALIFORNIA INDEPENDENT SYSTEM OPERATOR (1997-2006)
Manager, Settlement Projects

- Managed and settled over $4 billion a year of energy transactions.
- Managed the day-to-day operations, staff and have overall responsibility for design, implementation or analysis of business processes and charge equation configuration for the 's settlement and billing systems.
- Provided settlements' technical analysis and consulting for the Market Redesign and Technology Upgrade (MRTU) project including providing management with recommendations regarding new technologies and implementation methods supporting CAISO market design and operations objectives.
- Served as the Settlement and Market Clearing System (SaMC) project lead. Recommended solutions, defined business requirements and managed implementation efforts for market designs related to Settlements' process and charge calculations.

Manager, Market Quality and Market Integration

- Managed the day-to-day operations and staff responsible for the quality of "bid to book" market transaction data prior to the settlements process.
- Oversaw technical analysis and resolution of settlement disputes by market quality engineering analysts.
- Provided coaching and guidance for employees' work assignments, training needs and activities.
- Managed market operations testing and support engineers to collaboratively test, implement and support functionality for CAISO business systems and automated processes including SI/SA, SLIC, BITS, and data transfer processes to settlements.

Lead Market Design Engineer for Market Operations and Start-up Team Member

- Led market operations testing and support engineers to collaboratively test, implement and support functionality for CAISO's initial zonal market systems, Scheduling Infrastructure and Scheduling Applications (SI/SA).
- Coordinated successful market operations' acceptance testing and implementation of the SI/SA 1999 Ancillary Service Redesign projects.
- Provided 24x7 on-call SI/SA system support for grid resource coordinators, scheduling coordinators and other SI/SA system users.
- Prepared and reviewed functional requirements documents for various SI/SA system projects ensuring its consistency with ISO Tariff and policy grid operations engineering experience.

PACIFIC GAS & ELECTRIC (1992-1997)
Lead Power System Engineer

- Wrote RFPs and evaluated vendor bids for the systems to be used at the Independent System Operator.
- Five years grid operations engineering experience which included performing post-transient power flow analysis to determine simultaneous California-Oregon intertie and Pacific DC intertie transfer limits for various operating scenarios.
- Designed a methodology and an "on-line" computation application for calculating transmission path transfer capabilities for the South-of-Tesla (Path 15) corridor, and authored operating procedures for its implementation by grid operators.
- Evaluated San Francisco Bay Area grid constraints and recommended reliability "must-run" generation instructions to system grid operators.
- Analyzed potential system grid problems and developed contingency solutions to support transmission grid maintenance coordination and while on-call during system emergencies.

EDUCATION & CERTIFICATIONS

M.S., Computer Information Systems, University of Phoenix, Sacramento

B.S., Electrical Engineering, California Polytechnic State University, San Luis Obispo

ERIC R. VAA

ENERGY SCHEDULING MANAGER

Eric Vaa is the Manager of Energy Scheduling at ZGlobal and oversees ZGlobal's Day Ahead and Real-Time operations. Eric is primarily responsible for the day-to-day activities required for scheduling our clients' resources into Independent System Operator (ISOs) organizations or the WECC Bi-lateral market, executing interchange transactions between and among Balancing Authority Areas and ISOs. Eric provides training to ZGlobal's scheduling team for all asset optimization services including; portfolio management, CRR's/FTR's, system monitoring, resource scheduling, and the execution of real-time energy transactions on behalf of clients. Eric also works closely with clients to help integrate new resources and ensure success into their respective market, including the CAISO New Resource Implementation process. Eric most recently helped ensure the success of three 50 MW Photovoltaic resources implementation into the CAISO markets as pseudo tie generATORS. Eric is a NERC certified System Operator in Reliability.

PROFESSIONAL EXPERIENCE

ZGLOBAL POWER ENGINEERING & ENERGY SOLUTIONS (2012-PRESENT)
Energy Scheduling Manager

- Develop Real Time Load forecast for our clients to meet demand by economic dispatch of power resources which includes internal generation.
- Monitor transmission system for scheduling requirements.
- Create and submit NERC tags for energy schedules.
- Purchase transmission using OASIS from transmission suppliers.
- Maintain logs and create deals using MCG IAM for settlement of energy transactions.
- Interface with marketers and energy companies for sale and purchase of energy.
- Principles of power generation, particularly renewable power operations.
- CAISO markets and procedures, particularly scheduling, charges and settlements.
- Practices and procedures related to energy sales and trading.
- Energy price discovery and related tools and systems.
- Wholesale energy pricing techniques and principles.
- Regulatory requirements pertaining to the sale of bulk power.

Compliance Monitoring and Reporting

- Monitored NERC/WECC for new and modified reliability compliance standards.
- Coordinated dissemination of NERC/WECC compliance procedures to power generation and transmission owner scheduling customers.
- Implemented desk top compliance procedures for real-time scheduling desk.
- Supported Implementation of Southwest Reserve Sharing Group in support of BAL-OO2.
- Provided training and guidance on compliance related issues for scheduling clients.

RESTAURANT MANAGEMENT (2003-2012)

- Balanced service with costs in order to ensure profitability.
- Promoted guest satisfaction for steady repeat business.
- Purchase/control inventory with attention to budget guidelines.
- Coordinated the bi-weekly working schedule for 65 employees.
- Successfully cut food and labor costs 6% all while increasing sales.

- Managed the monthly budget and tracked all profits and losses.
- Independently elevated restaurant gross sales by more than 15% in first year with an increase every year thereafter.
- Trained new all recruits and gave them skills to achieve teamwork and success.
- Tracked sales and labor hours nightly.

EDUCATION & CERTIFICATIONS

B.S. in Kinesiology, California State University, Hayward
A.A. in Psychology, Cabot Community College
NERC Reliability Certification – 2014

KYLE HOFFMAN

PRINCIPAL ADVISOR

Kyle Hoffman is ZGlobal's Principal Advisor and serves as subject matter expert on Interchange Scheduling, NERC e-Tagging 1.8.1, Dynamic Interchange and Pseudo Ties. Previously, he was Manager of Scheduling at the and has extensive experience in electric Balancing Authority, natural gas pipeline and electric utility operations. While with the, Kyle was responsible for Balancing Authority Operations, Interchange Scheduling, related NERC Reliability Standards compliance, transmission operating agreements and Interchange related training. He also served as an expert witness in arbitration and FERC Settlement cases.

PROFESSIONAL EXPERIENCE

ZGLOBAL POWER ENGINEERING & ENERGY SOLUTIONS (2011-PRESENT)
Principal Advisor

Serves as subject matter expert on Interchange Scheduling, NERC e-Tagging 1.8.1, Dynamic Interchange and Pseudo Ties. Performs transmission path and delivery cost analysis. Serves as Project Manager for Generator Interconnection Request applications, as OATT LGIP expert. Supports power flow studies for local Utility Distribution Companies (UDCs).

CALIFORNIA INDEPENDENT SYSTEM OPERATOR
Manager of Scheduling, Grid Operations

Responsibilities included Balancing Authority Area Pre-Scheduling and After the Fact (ATF) scheduling operations. Supported Real-Time Scheduling function on the floor. Served as Lead Contracts Negotiator, Joint Transmission Business Project Manager, NERC Reliability Standards Compliance, Operations Trainer and FERC Settlements Conference Expert Witness for Grid Operations.

Client Account Manager, Client Services

Responsibilities included managing the 's Account Management group, consisting of 8 Account Managers serving over 90 Scheduling Coordinators, 15 Transmission Owners and over 150 Participating Generators. Provided market scheduling and settlements training. Served as an expert witness and Project Manager. Assigned accounts included CDWR, WAPA, SMUD, MID, MeID, TID, IID, City of Shasta Lake and Redding.

Account Manager & Lead Policy Issues Representative, External Affairs

Responsibilities included interfacing with Business Associates, Transmission Owners and Scheduling Coordinators, as well as the clients. Facilitated resolution of issues involving the scheduling, dispatch, metering and settlement of power flow on the electric transmission grid within the Balancing Authority Area.

PACIFIC GAS & ELECTRIC
Division Manager

Managed geographical operations, including construction, maintenance and operation, engineering, marketing / sales, customer service and project & facilities management, with primary responsibility for local government and community relations in the greater Sacramento metropolitan area. Led a successful team effort to persuade Sacramento Transit Board to adopt Compressed Natural Gas (CNG) as the alternative fuel for a 200-heavy transit bus fleet. Demonstrated CNG advantages to Regional Transit staff. Developed business plan and conducted sales and marketing campaign in

direct competition with an electric municipality for new residential construction market share in the greater Sacramento metropolitan area. Positioned natural gas homes as premium homes preferred for comfort, efficiency and economy. Led project management team to redesign PG&E Division distribution and transmission operations. Reorganized geographical divisions as local distribution companies (LDCs) increasing efficiency of construction, maintenance and operations. Extensive use of total quality management (TQM) principles.

Division Manager, Vaca Valley

Managed the geographic service area operations. As a member of the corporate reorganization management team, helped design and implement PG&E's business unit and division operations structure to position for gas and electric industry restructuring.

Executive Assistant to Senior Vice President, Operations

Prepared monthly operations reports for the Board of Directors. Prepared and presented capital project proposals for PG&E Management Committee authorization. Responsible for engineer training program, professional recruiting and budget administration.

Senior Gas Transmission Engineer

Planned PG&E's backbone gas transmission system including Canadian and El Paso interstate pipelines and McDonald Island underground gas storage facilities. Utilized computer modeling for gas steady state and transient flow simulations. Responsible for economic analysis and planning of supply oriented gas facilities within PG&E system, including major gas transmission pipelines and underground storage in response to corporate planning investment cases. Testified before California Public Utilities Commission (CPUC) at public hearings as PG&E's 1984 General Rate Case Gas Maintenance and Operations (M&O) expert witness. Written and oral presentations to commission staff.

Division Gas Superintendent, Humboldt Division

Managed activities of the division's gas department including engineering, transmission and distribution construction, gas measurement and regulation, gas customer service and regulatory code compliance. Supervised all automotive, facility and real estate activities.

Gas Engineering Positions

Extensive gas transmission and distribution pipeline, engineering, regulation, cathodic protection and metering experience. Project Manager for reconstruction of Eureka propane-air plant and Tompkins Hill gas field primary metering and regulations station.

EDUCATION & CERTIFICATIONS

B.S. in Mechanical Engineering, University of California, Davis