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Exhibit Number	:	
Commissioner	:	Dian Grueneich
Admin. Law Judge	:	Steven Weissman
DRA Witness	:	Palmerton

DIVISION OF RATEPAYER ADVOCATES
CALIFORNIA PUBLIC UTILITIES COMMISSION

A.06-08-010

REPORT ON THE SUNRISE POWERLINK

San Diego Gas & Electric Company (SDG&E)

Phase 1 Direct Testimony
Volume 4 of 5

San Francisco, California
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1. INTRODUCTION

I am W. Kent Palmerton, Principal of WK Palmerton Associates, LLC. My qualifications are attached as Appendix A of this Volume. I have reviewed the methods SDG&E has used to support claims that the Sunrise Powerlink Transmission Project (Sunrise) will provide value to ratepayers and comment upon them below.

2 SUMMARY OF SDG&E ANALYTIC APPROACH

SDG&E approached the question of estimating the energy benefits associated with the operation of Sunrise by utilizing the California Independent System Operator's (CAISO's) Transmission Economic Assessment Methodology (TEAM). In its most general form, TEAM is a "global" ratepayer test of economic value relying on the summation of the difference in Nodal Locational Marginal Prices with and without the insertion of Sunrise into the transmission topology of the Western Electricity Coordinating Council (WECC). TEAM also takes into account changes in both producer surplus and congestion costs to CAISO Ratepayers.

This chapter does not specifically disagree with the theoretical application of the TEAM to estimating economic value of a large transmission project such as Sunrise. However, this chapter does challenge the short-cuts SDG&E employed, both in number of years of system simulation it performed and the number of possible future conditions it analyzed of important variables that influence future energy benefits associated with Sunrise. These limitations, among other considerations, ignore the option value of the Sunrise project, and focus the accumulation of economic evidence on a fraction of the possible futures likely to be experienced by the California electric system over the life of Sunrise. SDG&E simulated but three years – 2010, 2015 and 2020 out of an economic life of 40 years for Sunrise.

SDG&E presented economic evidence on the value of Sunrise to CAISO ratepayers derived from three years of simulation results utilizing Gridview – an hourly DC OPF simulation program.[1]

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[1] DC OPF stands for "Direct Current Optimal Power Flow" program which models the operation of WECC generation systems reflecting some – but not all – dynamic constraints on the transmission system.

In addition to the Gridview output, SDG&E added additional economic considerations not otherwise captured by Grid View, such as estimates of lower RMR costs. DRA believes that the study plan SDG&E followed was woefully inadequate to describe the range of economic impacts likely to be experienced over the 40 year life of Sunrise. The rest of this chapter will address a number of the limitations inherent with SDG&E's approach.[2]

[2] The testimonies of Messrs. Woodruff and Suurkask, found in Volumes 1 and 3 of DRA's Phase 1 Direct Testimony, respectively, review and criticize SDG&E's modeling approach in more detail.

3 SHORTCOMINGS OF SDG&E ANALYTIC APPROACH

SDG&E's simulation of only two or three years of a 40-year life project is an inadequate analysis for purposes of a CPCN. As further described below, simulating a complex system's performance every five years for two or three observations is inadequate to capture the dynamic interactions impacting the power markets and transmission system. This limitation, coupled with the deterministic selection of input variables, guarantees a narrowly focused evaluation. Imagine a multi-million dollar national study investigating western power markets that selected the years 1998 and 2003 to evaluate national electric policy. These two years would show depressed power prices, nearly all supply arrangements subject to forward contracting, low inter-zonal congestion, and a generally negative outlook for the value of next investments. In the case of the interties to the Pacific Northwest, such a study would show little justification for the investment in the third AC Intertie project the state's Investor-Owned Utilities proposed ten years earlier, which the Commission denied. But no conclusions would be further from the truth about WECC markets or about the value of the third AC Intertie.

Limiting the number of study years does not allow for changes in underlying infrastructure. The next 20 years should see large investments in new transmission infrastructure, as evidenced by the CAISO transmission interconnection queue.3 Even if only a fraction of the new resource development actually occurs, California and other states will be required to greatly increase and enhance the existing infrastructure to accommodate power plant development. The CAISO interconnection queue also indicates a growing interest in renewable resource development. Not all projects will succeed. Those that will succeed can call upon the Large Generator Interconnection Process (LGIP) to "force" transmission owners to accommodate their interconnection

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[3] Available at: http://www.caiso.com/14e9/14e9ddda1ebf0.pdf?ht=transmission%20queue%20transmission%20queue%20transmission%20queue%20transmission%20queue.

requests. Coal technology and coal plant development are clearly a competing priority in the other western states, global warming and CO2 issues not withstanding. Nuclear power development is also competing for attention. A limited view of two or three years can not factor in such competing technologies and does not allow for a more robust study plan employing a stochastic approach or the more classical decision tree approach of estimating a distribution of economic value.

The study approach taken by SDG&E was deterministic. It is clear from reading SDG&E's testimony and listening to their presentations at workshops that considerable effort was directed toward selecting the "right" input values for each of the input variables that influence, or were thought to influence the economic benefits of Sunrise. DRA supports this type of discussion and debate. However, the end result of this discussion is the selection of one value for each variable for each simulation period.

A deterministic model assumes there is only one possible result (which is known) for each alternative course or action. A deterministic process is defined as a process where each variable in a simulation (economic estimator) is assigned one value that most represents a given simulation criteria. By combining all such values according to formula or algorithm results in an outcome that is said to represent a deterministic case under study.

Unfortunately, a deterministic approach to estimating economic value is extremely limited if each significant variable in the simulation or formula is subject to uncertainty, or otherwise influenced by other variables. In other words – for almost all economic variables that influence the value of a complex system, we would expect a range of values for each variable, which may or may not be correlated to each other. Such is the case with the Sunrise Powerlink economic valuation effort.

Selecting just one value in a relevant range or selecting that value without consideration for the selection of values of other variables can not represent all possible futures, and may systematically bias results. Additional issues arise when variables are correlated with each other or otherwise dependent upon each other.

A deterministic study approach is inappropriate given the uncertainty associated with WECC markets, and is unworkable when coupled with limiting the study period to two or three years.

More than many systems, the performance of the WECC is influenced by a large number of significant and uncertain variables. The deterministic study approach selected by the parties did not address this dynamic comprehensively. Furthermore, the use of Gridview as the simulation engine was insufficient to capture the dynamics associated with the WECC system by its very design.

SDG&E elected to employ a powerful simulation tool, Gridview that by its own nature is unable to respond to changes in economic and system environment over its simulation period. Gridview's focus is on estimating Locational Marginal Prices (LMPs) over a given time period, for a given set of input assumptions and transmission topology. As discussed above, the western electric markets are not static. The resulting array of price information available from Gridview is impressive, but limited in scope and application because of the necessary limitations in data and simulation algorithms4. Gridview's simulation algorithms and resulting LMP estimation is computationally cumbersome. This fact and others likely influenced the parties to simulate a limited number of deterministic cases. San Diego's initial Gridview study plan only included the years 2010 and 2015, though they later added an additional year – 2020 – to their plan. Energy benefits and other benefits attributable to Sunrise were then estimated for the balance of the Project's life. Notwithstanding the deterministic nature of these Grid View cases, 38 other years of the one deterministic case were estimated (not simulated). The estimation technique used assumed escalation factors that could not be empirically estimated and

[4] It is beyond the scope of this discussion to address the technical issues associated wth the use of DC OPF algorithms that rely on static shift factors (deterministic).

that could not contain any information about how the electric system would respond to any number of economic events.

Table 3-1 presents a number of significant variables that influence electric market prices in WECC and California over a study horizon and within a month, season and year. Each variable listed in the table is capable of influencing market prices of power within WECC and each of its sub-regions, in addition to San Diego. Yet each variable or assumption above was selected deterministically.

TABLE 3-1
Variables Affecting WECC and California Electric Market Prices

Variable	Will change within a season or year?	Will change within 40-year study horizon?	Changes Captured in Gridview? 5
Hydro Supply in NW	Yes	Yes – multi-year cycles	No
Hydro Supply in California	Yes	Yes – multi-year cycles	No
CA Temperature (driving Load)	Yes	No	No
NW Temperature	Yes	No	No
Nuclear Plant Outages	Yes	Maybe	No
San Diego Basin Generation Plant Outages	Yes	Yes	No
Transmission topology changes	Yes – limited to forced outage	Yes – major changes	No
Natural Gas Prices - WECC	Yes	Yes	No
Natural Gas Prices – San Diego	Yes	Yes	No
Load Growth – NW	Limited to extreme events	Yes	No
Load Growth – SW	Limited to extreme events	Yes	No
Load Growth - CA	Limited to extreme events	Yes	No
Coal politics	No	Yes	No
Reserve Margin – CA	No	Yes	No
Reserve Margin - WECC	Limited to extreme events	Yes	No
San Diego In Basin Generation Development	No	Yes	No
Renewable development	No	Yes	No
Distributed Generation development	No	Yes	No
Demand Response / conservation	Yes / No	Yes/ Yes	No

[5] Other than through limited sensitivity cases and requests for Model runs from intervenor parties.

4 MORE SYSTEMATIC STUDY APPROACH NEEDED

A systematic study approach is needed to address the economic value of Sunrise. The use of Gridview to systematically study the conditions of the western electric system that would generate either positive or negative economic value for Sunrise is not appropriate. Gridview is computationally burdensome, and multi-year simulations require new input data sets. DRA notes, however, that both SDG&E and the CAISO have had to run a large amount of Grid view case studies in response to discovery and data requests for model runs. Each of these runs requested by intervener parties to this proceeding point to the need for a comprehensive study approach that would have organized these many Grid view model runs into a systematic study program. While the exercise of Grid view in such a manner would have been preferred over the somewhat random and unpredictable discovery process, the Commission is still denied a look at the conditions over a number of years and "futures" to make its determination regarding Sunrise.

DRA recommends the Commission adopt a hybrid approach to evaluating the economic value of large additions and modifications to the regional transmission topology of the WECC or California:

1. Use classic decision tree models to organize the economic problem, typically structuring major infrastructure uncertainties across the study period.
2. Use classic deterministic zonal production cost simulation models to simulate the primary uncertainties identified in the decision tree models.
3. Employ stochastic simulation methods, shocking the deterministic variables that have the greatest economic influence on the economic problem.
4. Populate the decision tree models with the simulation results to gain insight to the distribution of costs and benefits produced by the introduction of the new element in the system (Sunrise in this example).
5. To the extent the Commission employs the TEAM approach to judge the economic value of a project like Sunrise:

a. Estimate LMPs for selected candidate years (using Gridview for example) from all the simulations (often dominant cases identified in the Decision Tree models) that best represent the economic problem,

b. Investigate and create relationships between the sample year LMPs and the zonal production costs simulated in the stochastic models for each year, and

c. Make the TEAM calculations from the resulting estimated LMPs for each significant case, and

6. Present the results of the energy benefits analysis, either as zonal values or TEAM values as a distribution of costs or benefits as more closely represents the uncertainty we expect from the WECC system.

The resulting distribution of economic value may span both a positive and a negative benefit range. In such a case, the underlying assumptions / reasons for specific values can be traced in the simulations providing the Commission a powerful tool to judge the overall economic problem. For example, as applied to Sunrise, such an approach may demonstrate that Sunrise benefits are always positive when XYZ occur, positive and negative when ABC occur and always negative when EFGHIJ occur. The Commission is then able to proclaim as policy or expectation that EFGHIJ or ABC,XYZ will occur and make a determination accordingly. With the present TEAM approach to estimating the economic impacts associated with Sunrise, the Commission has limited, and at best, unstructured information from Grid view runs to make such a decision.

5 OPTION VALUE OF INVESTMENTS SHOULD BE ESTIMATED

The Commission should insist on understanding the option value of all infrastructure investments. Option value is easiest to define as that value that can be achieved when a decision can be made, or is facilitated with respect to an asset, that changes economic value.

A simple example may help to explain: consider two power plants that cost the same to construct and maintain but have different operating costs and functionality. Power plant #1 is 100 MW, costs $60 per hour/ MW and must be on all the time (can not turn off). Power plant #2 is 100 MW, costs $65 / hour / MW and can turn on and off at the direction of an operator without limitation. Plant #2 has option value, because of its ability to turn off and on.

The amount of that option value, however, depends on the system in which it is employed. In a situation where the market price of power is always above $65 and system load or market sales can always absorb the output, Plant #2 option value in that system is zero. Plant #1 is always less expensive. However, consider a situation where the market price of power routinely drops to $30 or $40 dollars/ hour / MW. Plant #1 must run, costing the rate payer $20 or $30/ hour in higher costs to serve load, where plant #2 just shuts down, allowing market purchases of power at a lower cost – saving $20 - $30 an hour/ MW. In this situation, plant #2 has considerable Option value – the ability to shut down to increase economic value.

Power plants and transmission elements have option value. The key in determining the economic value of these assets is to correctly simulate the underlying system to capture that option value if it exists. Such is the case with Sunrise. From an economic perspective, Sunrise has option value when it allows a system operator to shut down in-basin generation for cheaper out of basin generation, when it allows an operator to bring in more power from out-of basin- when load grows, when in-basin generation is forced out and when it allows resource planners to invest in out-of-basin technologies that lower the cost of power or diversify power sources.

6 CONCLUSION

SDG&E failed to simulate the underlying WECC system in such a manner to present to the Commission a true distribution of the possible economic value of Sunrise, as compared to any competing elements in this case.

SDG&E failed to simulate the underlying WECC system in such a manner to present to the Commission the option value, if any, of the competing elements in this case.

The costs of employing a more sophisticated economic evaluation approach are trivial compared to the size of the economic decision to invest $1.25 billion, or more, in infrastructure.

APPENDIX A

Kent Palmerton Qualifications

W. Kent Palmerton, Principal

WK Palmerton Associates, LLC
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Carmichael, CA 95608
916 483-5368 kent@wkpalmerton.com

Years of Experience: 29

Overview of Qualifications

- Principal – WK Palmerton Associates, LLC – Expert Consultant to the Energy Industry
- CEO / Senior Executive with P&L responsibility
- Expert in RTO / ISO Market Development and Reliability Matters
- Expert in Power Marketing, Power System Planning and Analysis
- Expert in Government Affairs / Corporate Communications / Energy Policy

SUMMARY

Mr. Palmerton has over 29 years of experience in the electric industry, in both the private and public sectors, directing activities related to generation and transmission development, planning and interconnections; corporate communications, government and regulatory affairs; competitive markets, planning and operations; reliability organizations; and other member-driven advocacy programs. Mr. Palmerton is expert in the areas of energy policy, business solutions for the power industry, structured power market analysis, strategic risk analysis and energy portfolio structure, performance and optimization.

EMPLOYMENT HISTORY

2003 – Present Principal, WK Palmerton Associates, - Expert Consultant to the Electric Industry
Engagements include: Project Lead, Transmission - 400 Mw and 500 Mw Mohave Desert Solar Projects; Expert witness addressing 1) PG&E / CAISO Tariff impacts to Reclamation facilities in Northern California, 2) Power Market Impacts associated with a premature termination of a PG&E Interconnection Agreement with the City and County of San Francisco, 3) Transmission and reliability impacts of major wind energy project in the Northwest; Policy and technical consultant to a Sacramento Lobbying firm's Fortune 500 business clients; Policy analysis and strategic planning associated with CAISO market reforms and CPUC resource adequacy initiatives; Represent a client on owners board for 200 mw Wind project construction effort in the Northwest; California market lead in preparing bids to acquire Duke Assets in North America and other RFO's.

Engagement 2005 – Present - General Manager, Power and Water Resources Pooling Authority –

Start-up responsibility for a new California Joint Action Agency of Large California Irrigation and Water Districts serving 120 Mws of load in CAISO – full P&L responsibility for all enterprise activities including metering services, power trading, power operations and planning, treasurer and controller functions.

Engagement 2003 – 2004 Vice President, Government Affairs / Origination, Constellation Power Source, Inc.
Develop and implement commercial, regulatory and legislative strategies to facilitate CPS objectives throughout the Western United States. Originate structured power sales and purchases, generation development and risk management opportunities for CPS and its sister companies in the western interconnection. Represent CPS and its holding company, CEG, its executive management, and employees before commercial, State and Federal legislative and regulatory entities.

Engagement 2003 Director, Strategic Consulting Services, Henwood Energy Services, Inc.

Develop and implement solutions for Henwood Strategic Consulting clients in North America related to power market analysis, power business solutions, strategic risk analysis and energy portfolio structure, performance and optimization.

2000 – 2003 Director, Government Affairs / Origination, Williams Energy Services
Develop and implement commercial, regulatory and legislative strategies to facilitate Williams Energy Marketing and Trading objectives throughout the United States. Originate structured power sales and purchases, generation development and risk management solutions for Williams in the western interconnection. Represent Williams and its executive management before commercial, State and Federal legislative and regulatory entities.

1995 – 2000 Manager, Industry Restructuring Programs, Northern California Power Agency (AGM level)
Developed and implemented NCPA's response to the state and national agenda to restructure the electric utility industry. Directed NCPA's State Government Advocacy efforts, California Public Utilities Commission Advocacy Program, U.S. Congress Advocacy efforts, FERC activities, California ISO activities, WSCC activities and other member forums.

Western Systems Coordinating Council, (WSCC): Initial Member of the Reliability Compliance Committee – 2001-02; Initial Member of Operating Transfer Capability Policy Committee – 1999-00; Chairman of the Planning Coordinating Committee – 1997- 98; PCC Vice Chair and PCC / OC Joint Guidance Committee Chair 1995-96; and Chair of the Regional Planning Task Force, 1994.

1988 – 1995 Manager, Planning and Contracts – NCPA (AGM level)
Directed all areas of NCPA's planning and contract activities. Functional Areas: Strategic Planning; Short-term Operational Planning; Transmission and Distribution Planning and Design, including transmission and substation Project Management; NCPA's centrally dispatched Power Pool and associated billing systems; Wholesale Power Marketing; Long-term Supply-side and Demand-side Planning; Member Contracts; Bulk Transmission and Power Supply Contracts including NCPA's Interconnection Agreement with Pacific Gas & Electric, and Federal PMA contracts; and NCPA's Natural Gas Supply and Transportation Program; Geothermal steam supply analysis.

1985 – 1988 Supervising Planning Engineer - NCPA
Similar duties and responsibilities as above including Project Manager for a 60 mile, double circuit, 230 kv generation tie transmission line from the Geysers Geothermal area to PG&E's 500 kv transmission system in Northern California.

1984 – 1985 Power Resource Engineer, The Washington Water Power Company
Areas of concentration included the Northwest Coordination Agreement, the Regional Planning Council, and power supply planning and contract activities.

1978 – 1984 Associate Power Resource Engineer, TWWPCo.
On loan 1980-83 to the Inter-Company Pool - Developed the Financial Analysis Model utilized by the Northwest Regional Planning Council and BPA to evaluate Northwest Regional Plans.

EDUCATION

Masters of Business Administration - June 1987
Eastern Washington University, Cheney, Washington
Concentration: Finance & Management

Bachelor of Science - Electrical Engineering - June, 1978
Washington State University, Pullman, Washington