Docket No.:	R.12-03-014
Exhibit No.:	
Witness:	Douglas E. Davie
Commissioner:	Michel Peter Florio
ALJ:	David M. Gamson

OPENING TESTIMONY OF DOUGLAS E. DAVIE ON BEHALF OF WELLHEAD ELECTRIC COMPANY, INC.

September 30, 2013

I. INTRODUCTION

Q. Please state your name, position, and address.

A. My name is Douglas E. Davie, and I am the Vice President of Wellhead Electric Company, Inc. My address is 650 Bercut Drive, Suite C, Sacramento, California 95811.

Q. Please describe your professional background.

A. I am a licensed Civil Engineer in California. I have been the Vice President of Wellhead Electric Company, Inc. ("Wellhead") for the last 7 ½ years. During this time, I have been involved in the development, permitting, and/or acquisition of over 200 megawatts at five different locations and have been involved in the market participation/operation of over 400 megawatts in California. Prior to my work with Wellhead, I was a consultant to energy market participants, and prior to that was a director in several different departments at PG&E.

Q. On whose behalf are you testifying?

A. I am testifying on behalf of Wellhead. Wellhead provides management services to special purpose entities that build, own and operate generating facilities in California. Wellhead leads and manages development efforts to identify potential projects, and develops these projects to the point where they are viable and ongoing.

Q. Please describe Wellhead's interest in this phase of the proceeding.

A. Track 4 of the Long-Term Procurement Plans (LTPP) is intended to determine at least the minimum level of need to replace the generating capacity lost from the retirement of the San Onofre Nuclear Generating Station (SONGS), and authorize the procurement of resources to meet that need. As a developer of energy projects in California, Wellhead would like to ensure that any procurement authorization include the full range of eligible resources with attributes able to meet local area needs, and to ensure that certain classes of resources are not excluded from participation in the procurement process and as result, from consideration by the utility customer.

II. SUMMARY

Q. Please summarize your testimony.

A: At the Prehearing Conference held on September 4, 2013, Administrative Law Judge ("ALJ") Gamson set forth seven specific issues for parties to address in their Track 4 testimony. I will be responding to questions number two, four, and seven.

My testimony states that the key driver for procurement in this proceeding should focus on the resource characteristics that are needed to ensure local area reliability, and allow participation by all resource types that can provide such attributes in the procurement authorization(s) in this proceeding. Additionally, for efficiency reasons, the Track 1 procurement currently underway by Southern California Edison ("SCE") should be appropriately modified to address/include a potential interim decision in this Track 4 proceeding around the end of this year.

III. TESTIMONY

Q: Question number two posed by ALJ Gamson states: "should anything in the energy storage proceeding Rulemaking 10-12-007 be considered with regard to Track 4 procurement"?[1] What, if anything, from Rulemaking 10-12-007 should be considered in this proceeding?

A: Consistent with Commission policy, as recognized in Commissioner Peterman's Proposed Decision in Rulemaking 10-12-007 ("PD"),[2] Track 4 procurement should recognize that energy storage should be "treated akin to a 'preferred resource.'"[3] Moreover, the PD reasonably concludes that solicitations for storage projects should be held in 2014. Finally, the schedule for energy storage solicitations set forth in the PD, if approved, should be incorporated into procurement(s) resulting from this proceeding.

[1] Order Instituting Rulemaking to Integrate and Refine Procurement Policies and Consider Long-Term Procurement Plans, Rulemaking 12-03-013, Sept. 4, 2013 Prehearing Conference Reporter's Transcript (" 9/4 RT"), p. 318: 11-13.

[2] Proposed Decision of Commissioner Peterman Adopting Energy Storage Procurement Framework and Design Program, R. 10-12-007 (Sept. 3, 2013).

[3] Proposed Decision of Commissioner Peterman Adopting Energy Storage Procurement Framework and Design Program, R. 10-12-007 (Sept. 3, 2013), p. 23.

Q: Question number four posed by ALJ Gamson asks: "what is the appropriate timeline for new resource procurement which may be authorized in Track 4?"[4]

A: Given the need for new resources in Southern California, authorization of new procurement in an expeditious and timely manner is important to safeguard reliability in local areas. Wellhead supports the modified schedule issued by ALJ Gamson on September 16, 2013 (on the expectation that evidentiary hearings are not necessary), and strongly encourages the issuance of a Proposed Decision by the end of 2013 so that the results can be efficiently incorporated into SCE's Track 1 RFO.

Q: Question number seven posed by ALJ Gamson asks, "if you're recommending preferred resources or energy storage to fill any need, it would be helpful to indicate how the attributes of such resources will meet LCR needs."[5] What attributes are most beneficial in terms of meeting Local Capacity Requirement ("LCR") needs?"

A: The California Independent System Operator's ("CAISO's") September 4, 2013 paper, *Consideration of Alternatives to Transmission or Conventional Generation to Address Local Needs in the Transmission Planning Process*, identifies the significance and importance of three generic performance characteristics required to meet local area needs: response time; duration; and availability. More specifically, response time is characterized by how quickly the resource can respond to a CAISO dispatch and achieve full capacity; duration, is the length of time the resource can sustain its response once called; and availability, is the number of times that a resource can be called during a time period. These characteristics are also described as attributes that might be provided by non-conventional and perhaps unexpected resource opportunities, including energy storage.[6]

Q: How do energy storage projects perform in terms of the performance characteristics identified in the CAISO's September 4, 2013 paper?

[4] 9/4 RT 318: 23-27.
[5] 9/4 RT 319: 17-21.
[6] CAISO, Consideration of Alternatives to Transmission or Conventional Generation to Address Local Needs in the Transmission Planning Process, p. 8 (Sept. 4, 2013).

A: As explained above, the CAISO has identified three characteristics that are needed to meet local area needs: response times, duration, and availability. Studies and operational projects show that compared to traditional gas-fired generation, energy storage projects are technically capable of providing faster and more accurate response, and have sufficient duration to meet typical standard capacity product definitions (4-8 hours).[7] Storage can also have higher availability as many technologies can start-up quickly and have little or no minimum operating load limitations or operating costs.[8] The question is not whether storage can perform these functions, but whether it can do so economically, a determination that can be made by the market in a competitive solicitation.[9]

For example, energy storage projects have demonstrated their ability to provide frequency regulation, spinning reserves and load-following services, to name just a few of the potential requirements for LCRs. As compared to traditional gas-fired generation, many storage technologies also have the advantages of: (1) faster quick-start capabilities, (2) little or no minimum operating load, (3) little or no minimum operating fuel costs or emissions, (4) much less efficiency loss with cycling and changes in output levels, and (5) can both charge and discharge, providing twice the flexible range per megawatt of nameplate capacity.[10]

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[7] Joseph Startar (2012) ARRA Painesville Municipal Electric Power Vanadium Redox Battery Demonstration Project. 2012 DOE Energy Storage Program Peer Review and Update Meeting. http://www.sandia.gov/ess/docs/pr_conferences/2012/papers/Wednesday/Session3/02_Startari_PainesvilleVR_PeerReview2012.pdf

[8] Rose, David M, and Summer R Ferreira. 2012. "Initial Test Results from the RedFlow 5 kW , 10 kWh Zinc-Bromide Module , Phase 1". SAND2012-1352. http://www.sandia.gov/ess/publications/SAND12-1352.pdf.

[9] Kintner-Meyer, M, P Balducci, W Colella, M Elizondo, C Jin, T Nguyen, V Viswanathan, and Y Zhang. 2012. "National Assessment of Energy Storage for Grid Balancing and Arbitrage: Phase 1, WECC". PNNL-21388. Pacific Northwest National Laboratory. http://energyenvironment.pnnl.gov/pdf/PNNL-21388_National_Assessment_Storage_Phase_1_final.pdf.

[10] Agrawal, Poonum, Ali Nourai, Larry Markel, Richard Fioravanti, Paul Gordon, Nellie Tong, and Georgianne Huff. 2011. "Characterization and Assessment of Novel Bulk Storage Technologies A Study for the DOE Energy Storage Systems Program". SAND2011-3700. http://prod.sandia.gov/techlib/access-control.cgi/2011/113700.pdf; Wang, Guishi, M Ciobotaru, and V G Agelidis. 2012. "Integration of Vanadium Redox Battery with PV Systems: Modeling and Operational Characteristics." Industrial Electronics (ISIE), 2012 IEEE International Symposium On. doi:10.1109/ISIE.2012.6237161; Li, L, S Kim, G Zai, W Wang, and Z Yang. 2012. "Advanced Redox Flow Batteries for Stationary Electrical Energy Storage". PNNL-21174; Kintner-Meyer MCW, C Jin, PJ Balducci, MA Elizondo, X Guo, TB Nguyen, FK Tuffner, and VV Viswanathan. 2011. "Energy Storage for Variable Renewable Energy Resource Integration - A Regional Assessment for the

The most demanding service is frequency regulation, which is required to maintain grid frequency in compliance with North American Electric Reliability Corporation ("NERC") standards, typically 60 hertz.[11] Resources must be able to respond to the area control error ("ACE") or automatic generation control ("AGC") signals that come from the balancing authority. Large thermal base-load generation can often incur significant costs to provide variable power whereas many types of fast (dis)charging batteries can provide the power with much less efficiency losses and wear and tear. Modern storage such as batteries and flywheels are often much better at following AGC signals than traditional generation. Storage can also provide faster response times for spinning and non-spinning reserves. Compared to traditional gas-fired generation, storage can charge/discharge at various levels without incurring efficiency losses.[12]

Storage systems (from 10-100 megawatts), can have discharge durations from 15 minutes to several hours.[13] Several large energy storage projects currently provide frequency

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Northwest Power Pool (NWPP)." In *2011 IEEE PES Power Systems Conference & Exhibition (PSCE), March 20-23, 2011, Phoenix, Arizona*. IEEE, Piscataway, NJ. doi:10.1109/PSCE.2011.5772548; Ferreira, Summber et.al. (2012), Life Cycle Testing and Evaluation of Energy Storage Devices. 2012 DOE Energy Storage Program Peer Review and Update Meeting. http://www.sandia.gov/ess/docs/pr_conferences/2012/papers/Friday/Session1/03_Ferreira_PeerReview_Print.pdf

[11] *Ancillary Services: Technical and Commercial Insights*, by Brendan Kirby, July 2007. For WÄRTSILÄ. http://www.science.smith.edu/~jcardell/Courses/EGR325/Readings/Ancillary_Services_Kirby.pdf

[12] Ellison, James, Dhruv Bhatnagar, and Benjamin Karlson. 2012. "Maui Energy Storage Study". SAND2012-10314. http://www.sandia.gov/ess/publications/SAND2012-10314.pdf; Chen, Yonghong, M Keyser, M H Tackett, and Xingwang Ma. 2011. "Incorporating Short-Term Stored Energy Resource Into Midwest ISO Energy and Ancillary Service Market." Power Systems, IEEE Transactions On. doi:10.1109/TPWRS.2010.2061875; John Wood (2012) ARRA Grid-Scale Energy Storage Demonstration for Ancillary Services Using Ultrabattery, 2012 DOE Energy Storage Program Peer Review and Update Meeting. http://www.sandia.gov/ess/docs/pr_conferences/2012/papers/Wednesday/Session2/02_Wood_Ecoult_PeerReview2012_Final.pdf; Dhruv Bhatnagar (2012) NYSERDA Energy Storage Projects. 2012 DOE Energy Storage Program Peer Review and Update Meeting. http://www.sandia.gov/ess/docs/pr_conferences/2012/papers/Wednesday/PosterSession1/General/13_Bhatnagar_NYSERDA_Poster.pdf.

[13] DOE/EPRI 2013 Electricity Storage Handbook in Collaboration with NRECA. Akhil et al. July 2013 ; also see "The Value of Energy Storage for Grid Applications." Denholm et al. National Renewable Energy Laboratory, May 2013 http://www.nrel.gov/docs/fy13osti/58465.pdf ; See, "Storage Resource Modeling for Load Following / Ramp Management in MISO Markets." Technical Review Group. Sept. 2011. https://www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/Workshop%20Mate

regulation, ramp control and smoothing.[14] The third-party verified Department of Energy ("DOE") Energy Storage Database lists six operational transmission level interconnected energy storage projects (excluding pumped hydro) providing frequency regulation, five providing voltage support and four projects with durations greater than four hours.[15]

Q: What other LCR needs can be met by energy storage?

A: Studies have shown that resources such as storage can provide voltage support. Strategically placed energy storage within the grid at central locations or taking the distributed approach and placing multiple VAR-support storage systems near large loads can offset reactance in the grid.[16] Furthermore, voltage support is not a discrete, isolated service. Voltage support and frequency response has traditionally been provided by a mix of inertial frequency response, primary frequency response and secondary frequency response. The PJM has found that a mix of fast responding and slower, traditional resources provides better performance (as measured by NERC Control Performance Standard 1) in frequency response than fast or slow resources alone.[17] It may well be that a portfolio of technologies provides better, lower cost grid support than traditional gas-fired generation alone. Storage may also be combined with other generation technologies so as to create even more value to the purchasing utility. This innovation/creativity should be encouraged by this Commission.

Q: In summary, how does energy storage compare to traditional gas-fired generation in terms of providing ancillary services?

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rials/Energy%20Storage%20Workshop/20110922/20110922%20Energy%20Storage%20Item%2004%20Storage%20Device%20Modeling%20for%20Load%20Following.pdf.

[14] Presentation by Dr. Imre Gyuk DOE Energy Storage Research Program Manager: http://www.cleanenergystates.org/assets/Protected-Files/CESA-2013-Spring-Meeting-DC/13-06CESA-DC-imre-gyuk.pdf

[15] DOE International Energy Storage Database: http://www.energystorageexchange.org, accessed Sept. 26, 2013.

[16] See, Akhil et al, DOE/EPRI 2013 Electricity Storage Handbook in Collaboration with NRECA, p. 9. (July 2013); see also Yang, Kai, and Anwar Walid, "Outage-Storage Tradeoff in Frequency Regulation for Smart Grid with Renewables." *IEEE Transactions on Smart Grid* 4 (1) (March): 245–252 (2013).

[17] "KERMIT Study Report to Determine the Effectiveness of the AGC in Controlling Fast and Conventional Resources in the PJM Frequency Regulation Market." KEMA. Dec. 2011. For PJM Interconnection.

A: Generally, traditional gas-fired generation provides ancillary services that are slower acting than energy storage. In comparison, the fast acting attribute of energy storage is valuable to the grid. Traditional gas-fired generation also incurs much more efficiency losses with a fluctuating output than energy/battery storage. Energy storage is also more accurate at tracking fast changing regulation signals which is valuable to the grid.[18] This is not to say that gas-fired generation is not necessarily needed but rather that storage can play a very important role in grid reliability and supporting the development of increasing amounts of renewable generation.

V. CONCLUSION

Q. Does that conclude your opening testimony?

A. Yes. Wellhead simply recommends that any procurement authorization include all resources with attributes able to meet local area needs, and to ensure that certain classes of resources are not inappropriately excluded from participation and as a result, from consideration by the electric utility customer.

[18] State of the Market Report for PJM, Monitoring Analytics, LLC., May 2013.

ATTACHMENT A

QUALIFICATIONS

DOUGLAS E. DAVIE

Employment History

2004 – present **Wellhead Electric, Inc.**

Vice President responsible for development, regulatory and agency relations, contracting, and market participation. Supervised the development of a 24-hour desk that manages/operates multiple power plants and participates in the California Independent System Operator ("California ISO") market; lead the contracting of new generation projects; and participate in California Public Utilities Commission and California ISO proceedings.

2004 – 2006 **Davie Consulting, LLC**

Founder/owner/manager of an energy business management consulting firm that advises clients on energy industry issues and opportunities to create value.

1993 – 2004 **Henwood Energy Services, Inc.**

Executive team member in charge of the North America Professional Services Division with responsibility for on-time, on-budget, and meets expectations deployment of industry-leading business management software solutions. Division was also responsible for customer support services to ensure software is able to fulfill the business needs of licensees.

1979 – 1993 **Pacific Gas & Electric Company**

Director in the Electric Fuels Policy Department (1992-1993) with major responsibility in the startup of a new department responsible for procuring natural gas supplies for 6,000 MW of gas-fired power generation facilities. Prepared the Company's first stand-alone testimony for the forecast and reasonableness review of the Company's fuel procurement policies and practices for generating power.

Director in the Qualifying Facilities Contracts Department (1988-1992) responsible for managing various aspects of Pacific Gas and Electric Company's ("PG&E") $1.5 billion annual power purchases from over 4,000 MW of non-utility electric power facilities. Led major contract negotiations, developed and administered contract management policies, and testified in regulatory/legal proceedings regarding power purchase contracts and business management activities.

Director in the Hydroelectric Development and the Electric Resource Planning Departments (1985-1988) responsible for directing efforts to evaluate and manage major generation projects including providing feasibility analysis, regulatory representation, and capital budgeting recommendations. In addition to managing the capital budget for all of PG&E's hydroelectric projects, had major responsibility for proactive efforts to relicense several major hydroelectric projects, including the pursuit of settlements pursuant to the Electric Consumers Protection Act. .

1975 – 1979	**Bi-State Metropolitan Planning Commission.** Built and managed the Environmental Unit with responsibility for initiating and managing cooperative local government/industry programs to ensure compliance with state and federal environmental regulations in a two-state area. Consensus building and the ability to present complex technical issues to elected officials were critical success factors.
Expert Witness/ Regulatory Experience	**California Public Utilities Commission; California Energy Commission; California State Water Resources Control Board; Georgia Public Service Commission; Federal Energy Regulatory Commission** Have directly participated and testified in numerous regulatory proceeding related to electric utility matters. Issues have included hydroelectric licensing proceedings, hydroelectric divestiture, inter-utility power sales contracts, gas reasonableness, energy planning/forecasting, implementation of electric restructuring, water rights proceedings, water policies and practices, and avoided costs for power purchases pursuant to PURPA.
Education	M.S. Civil Engineering, Stanford University, Stanford, California. B.S. Civil Engineering, University of California, Davis, California. Various business, management, and leadership development courses.
Registration	Registered Civil Engineer in California.