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June 18, 2010

DOCKET
09-AFC-8
DATE JUN 18 2010
RECD. JUN 18 2010

California Energy Commission
Attn Docket No. 09-AFC-8
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

Re: Genesis Solar Energy Project; 09-AFC-8

Dear Docket Clerk:

Enclosed are an original and one copy of **TESTIMONY OF DAVID MARCUS ON BEHALF OF THE CALIFORNIA UNIONS FOR RELIABLE ENERGY ON SOIL AND WATER RESOURCES FOR THE GENESIS SOLAR ENERGY PROJECT**. Please docket the original, conform the copy and return the copy in the envelope provided.

Thank you for your assistance.

Sincerely,

/s/

Rachael E. Koss

REK:bh
Enclosures

2364-073a

STATE OF CALIFORNIA

Energy Resources Conservation and Development Commission

In the Matter of: The Application for Certification for the GENESIS SOLAR ENERGY PROJECT	Docket No. 09-AFC-8

TESTIMONY OF DAVID MARCUS ON BEHALF OF THE CALIFORNIA UNIONS FOR RELIABLE ENERGY ON SOIL AND WATER RESOURCES FOR THE GENESIS SOLAR ENERGY PROJECT

June 18, 2010

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2364-072a

I. INTRODUCTION

I have been working for the California Unions for Reliable Energy ("CURE") as a consultant on the Application for Certification ("AFC") for the Genesis Solar Energy Project ("Genesis" or "GSEP") since the data adequacy phase. I have reviewed documents and have conducted my own analysis regarding the use of dry cooling for the Project.

My testimony is based on the activities described above and the knowledge and experience I have acquired during more than 25 years of working as an energy consultant, including a dozen years working on CEC siting cases on behalf of CURE. A summary of my education and experience is attached to this testimony as Exhibit 1.

II. WATER USE AND THE ECONOMIC VIABILITY OF DRY COOLING (SA, pp. B.2-17 to B.2-18)

The Genesis project is being developed by a subsidiary of NextEra Energy Resources, LLC, just like the Beacon Solar Energy Project which is also in licensing at the CEC.[1] Both projects are proposed to have a maximum output of 250 Mw.[2] Both propose to use wet cooling. Both have had analyses prepared for them by Worley Parsons which look at the feasibility and economics of using dry cooling instead of wet cooling.[3] The analysis below is based on the two Worley Parsons studies prepared for the Genesis and Beacon applicants, and also relies upon supplemental confidential analysis prepared by the Beacon applicant and the CEC staff, and reported in the alternatives chapter of the Beacon FSA.

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[1] For the Beacon developer, see p. 1 of http://docs.google.com/viewer?a=v&q=cache:_Gf3alezgoAJ:www.energy.ca.gov/sitingcases/beacon/DESCRIPTION.PDF+%22Beacon+Solar,+LLC%22&hl=en&gl=us&pid=bl&srcid=ADGEESjqVmGRZTE1tmB5c0vhzAGuxyrgKsk8sSPgYRwjPo3mmXigOphM5c37XJ9ijyg4M7XGeSahqUaHxm4KvUlWbEwxQ65d0vEW2fIQb31aomLCy4boyyvfgWknqpqH_ItD7Sb4ohtA&sig=AHIEtbS5Fbr4pBgPii7yttGGqXwsDLIi7A, and also http://www.nexteraenergyresources.com/news/contents/2009/010709.shtml. For Genesis see http://www.energy.ca.gov/sitingcases/genesis_solar/index.html.

[2] http://www.energy.ca.gov/sitingcases/all_projects.html

[3] For Beacon, Ex. 623, available online at http://www.energy.ca.gov/sitingcases/beacon/documents/applicant/2008-02-01_DRY_COOLING_EVALUATION_TN-49597.PDF; for Genesis, the 76 page document cited and declared non-confidential (after the publication date of the Genesis SA) in http://www.energy.ca.gov/sitingcases/genesis_solar/documents/2010-01-14_Reponse_to_Application_for_Confidentiality+Cooling_Study_TN-54955.PDF.

A. Economics of changing to dry cooling without changing the size of the solar field

1. Switching to dry cooling is economically even more attractive for Genesis than for Beacon

The Worley Parsons analysis for Beacon concludes that a shift from wet to dry cooling would reduce the Mwh output of the Beacon project by 7.50 percent,[4] increase its capital cost by $20.497 million,[5] but decrease its annual O&M cost by $1.288 million.[6] The net effect would be to reduce the net present value of the Beacon project by $71 million.[7] For Genesis, because groundwater at the site requires extensive treatment for the wet cooling process,[8] the net cost of changing to dry cooling would be smaller.[9] Specifically, the reduction in Mwh output from switching to dry cooling would be only 6.88%,[10] less than the 7.50% at Beacon. The incremental capital cost of dry cooling at Genesis would be only $516,000,[11] or only 2.5%[12] of the $20,497,000 incremental capital cost for Beacon.[13] And the benefit of decreased O&M costs would be slightly more at Genesis than at Beacon ($1.498 million per year[14] versus $1.298 million per year[15]). Thus, the total impact on NPV of switching to dry cooling would be only $43 million for Genesis,[16] versus $71 million for Beacon.[17] In percentage terms, the

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[4] Beacon Exh. 623, p. 16.
[5] Ibid., p. 17.
[6] Ibid., p. 15.
[7] Ibid., p. 17.
[8] Worley Parsons, "Cooling Study – 125 MW Solar project," 8/11/2009 (cited below as "WP"), p. 4.
[9] The WP study is for a 125 MW project. The Applicant has indicated, in response to CURE data request set 3, questions 1-2, that the Genesis project will actually consist of two independent 125 Mw projects, and the results of the WP study can be simply doubled to show impacts for the Genesis project as a whole. Comparisons below between the WP studies for Genesis and Beacon take into account the fact that the Beacon study was for 250 Mw and the Genesis study was for 125 Mw.
[10] Based on output of 294.717 gwh per year per 125 Mw with wet cooling and 274.439 Mwh per year per 125 Mw with dry cooling. WP, p. 4. See also Exhibit 2 (attached hereto), "solar field unchanged" column.
[11] WP, p. 8, bottom line, showing a difference between dry cooling and wet cooling capital costs of $258,000 per 125 Mw unit. $258,000 x 2 = $516,000 for the full 250 Mw Genesis project.
[12] See Exhibit 2, "Capital cost" line.
[13] Beacon Exh. 623, p. 17.
[14] WP, p. 20, next-to-last line, showing a difference of $746,000 per year per 125 Mw unit in O&M costs. $746,000 x 2 = $1.498 million for the full 250 Mw Genesis project.
[15] Beacon Exh. 623, p. 15, difference between O&M costs with and without dry cooling.
[16] See Exh. 2. For both Beacon and Genesis, the total NPV impact is the sum of the incremental capital cost, the NPV of the annual O&M cost impact, and the NPV of the annual generation revenue impact. For Beacon, the calculated total impact on NPV can be compared to the reported total impact on NPV from Beacon Exh. 623, p. 17, confirming that the calculations in Exhibit 2 match those done by the Applicant's Worley Parsons consultant. For Genesis, the capital cost comes directly from WP, p. 8; the net generation impact is calculated from the Mwh in WP, p. 4 and the price and NPV data in Beacon Exh. 623, p. 17; the O&M NPV cost comes from the annual data in WP, p. 20 and the NPV cost/annual cost ratio for O&M data shown in Beacon Exh. 623, pp. 15 and 17.

economic cost of switching to dry cooling at Genesis would be only 60 percent as large as the cost of doing so at Beacon.[18]

The Worley Parsons data show three reasons why converting to dry cooling at Genesis would be less expensive than at Beacon. First, because groundwater at the project site requires considerable treatment for the wet cooling process, converting to dry cooling would save energy that would otherwise have to spent on water purification. The result is that the cost of lost generation due to dry cooling would be $6.5 million less at Genesis than at Beacon.[19] Second, again because groundwater at the project site requires extensive treatment for wet cooling, use of wet cooling would require substantial capital costs for water treatment.[20] The result is that the capital cost penalty for dry cooling at Genesis would be $20 million less than at Beacon.[21] Third, the lifecycle NPV benefit from reduced O&M with dry cooling would be $2.1 million bigger at Genesis than at Beacon.[22] The sum of these three differences, $28 million,[23] explains why the NPV of the economic cost of switching to dry cooling would be more than $28 million less at Genesis than at Beacon.[24]

2. Switching to dry cooling is economically viable at Beacon

The Applicant, the CEC staff, and CURE have all analyzed the economics of switching from wet cooling to dry cooling at Beacon. CURE

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[17] Beacon Exh. 623, p. 17. The $71 million figure is also calculated from its components in Exhibit 2 to this testimony.

[18] $43 million/$71 million. See also Exh. 2 to this testimony, "Total impact on NPV" line.

[19] See Exhibit 2, "NPV of generation impact" line. The NPV of lost revenue due to decreased generation is $63.86 million for Beacon. For Genesis, assuming the same value per Mwh at Genesis as at Beacon, and the same discount rate, the NPV of lost generation revenue is $28.67 million per 125 Mw unit, or $57.34 million for the full 250 Mw plant. The difference between $63.86 million and $57.34 million is $6.52 million.

[20] WP, p. 8

[21] $20.50 million incremental capital costs for dry cooling at Beacon, per Beacon Exh. 623, p. 17. $0.26 million incremental capital costs for dry cooling at each 125 Mw unit of Genesis, per WP, p. 8, resulting in $0.52 million of incremental capital cost for the full 250 Mw plant. $20.50 million minus $0.52 million = $19.98 million.

[22] See Exh. 2, "NPV of O&M cost impact" line. Switching to dry cooling provides a lifecycle NPV benefit of $12.98 million for O&M costs at Beacon per Beacon Exh. 623, p. 17. The corresponding benefit at Genesis is $7.52 million per 125 Mw unit, based on an annual benefit of $746,000 per WP, p. 20, and the same lifecycle NPV/annual benefit ratio used for Beacon. The total O&M benefit at Genesis of switching to dry cooling is thus $7.52 million times two, or $15.04 million, which is $2.06 million more than the Beacon benefit.

[23] $6.52 million plus $19.98 million plus $2.06 million (see preceding footnotes) equals $28.56 million.

[24] See Exh. 2, "Total Impact on NPV" line. The total economic penalty at Beacon for switching from wet to dry cooling is $71.38 million (or $71.1 million per Beacon Exh. 623, p. 17). The corresponding penalty at Genesis is $21.41 million per 125 Mw unit, or $42.82 million for the full 250 Mw plant. The penalty is $71.38 – 42.82 = $28.56 million less at Genesis.

concluded that doing so would have minor impacts on the economic viability of the Beacon project.[25] The CEC staff concluded that switching to dry cooling would leave the Beacon applicant with a project that was still economically viable, based on the rates of return accepted by other solar developers.[26] The Applicant's numbers are confidential, but the Applicant never provided any testimony disputing the FSA or CURE regarding dry cooling, and the CEC staff's confidential analysis used the Applicant's own numbers.[27]

3. Conclusion

The unrebutted record in the Beacon proceeding shows that dry cooling would be economically feasible for Beacon. A comparison of the Applicant's analyses of dry cooling for Beacon and dry cooling for Genesis shows that the economic cost of switching to dry cooling is lower for Genesis than Beacon. Thus, it seems inescapable that dry cooling would also be economically feasible for Genesis. The fact that other applicants at the CEC are proposing on their own initiative to use dry cooling[28] is just further evidence for the economic viability of dry cooling.

B. Effect on the economics of dry cooling if the solar field were enlarged

1. Solar field enlarged by 12 percent

In the Beacon and Genesis analyses of dry cooling described above, switching to dry cooling reduces annual generation. It also reduces the maximum plant output to less than 250 Mw under maximum temperature conditions. One alternative, as acknowledged in the Genesis SA,[29] is to enlarge the size of the solar field at the same time that the cooling system is switched to dry cooling. In the case of Beacon, as the Beacon FSA explains, the additional solar field area needed to maintain a 250 Mw capacity for an air-cooled alternative at Beacon would not just lead to an additional annual cost. It would also result in 4.1 percent greater annual generation from an air-cooled alternative than from the Applicant's proposal.[30] The Beacon FSA indicates that to maintain a 250 Mw output under maximum temperature

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[25] CURE testimony regarding Beacon, Exh. 616, p. 5, ftn. 44.
[26] Beacon FSA, pp. 6-13-14. See also the Genesis SA, p. B.2-18, which reiterates the conclusions of the Beacon FSA regarding the economic feasibility of dry cooling.
[27] Beacon FSA, pp. 6-12-13, describing the Applicant's data and its use by the CEC staff.
[28] See 07-AFC-5, Ivanpah Solar Electric Generating System; 09-AFC-7, Solar Millennium Palen Solar Power Project; 09-AFC-6 Solar Millennium Blythe Power Project; and 09-AFC-9 Solar Millennium Ridgecrest Power Project.
[29] Genesis SA, p. B.2-18.
[30] Beacon FSA, pp. 6-9, 6-40, 6-44.

conditions would require expanding the solar field by 12 percent. That would more than offset the 7.5 percent annual average efficiency loss associated with dry cooling, leading to greater annual output with dry cooling.[31] In the case of Genesis, expanding the solar field by 12 percent would more than offset the 6.88 percent annual average efficiency loss,[32] leading to a 4.29% increase in annual output.[33] If the additional 25 gwh per year of generation[34] were sold at 15 cents per kwh (the price assumed by the Beacon Applicant in assessing dry versus wet cooling,[35] and used by the Staff as well in the Beacon case[36]), it would be worth $3.8 million per year.[37] The 30-year NPV of an additional $3.8 million per year of revenue would be over $35 million. That would be enough to offset all but $2.7 million (0.3 percent) of the 30-year NPV incremental cost of dry cooling.[38]

In other words, the economics of Genesis with dry cooling and a twelve percent larger solar field are virtually identical (within 0.3 percent) of the economics of Genesis as proposed with wet cooling, and are better than the economics of Genesis with dry cooling but no expansion of the solar field. This is consistent with the findings in the Beacon case, where the CEC staff concluded that dry cooling with a 12 percent larger solar field was economically superior to both wet cooling and to dry cooling with no increase in the size of the solar field.[39]

2. Solar field enlarged by 7.39 percent

The Genesis SA suggests that a 12 percent increase in the Genesis solar field would require 150 acres, which may not be available.[40] However, this large of an increase is not required either to maintain the annual Mwh output of Genesis or its net Mw output. The annual Mwh output decrease due to dry cooling is 6.88%, which would be offset by a 7.39% increase in the solar field size.[41] The net output of Genesis under maximally adverse

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[31] 1.12*(1-.075) > 1.00.
[32] WP, p. 4. See also the Genesis SA, p. B.2-18, which rounds the 6.88 percent reduction to 6.9%.
[33] 1.12*(1-.0688) = 1.0429.
[34] 294.7 gwh per 125 Mw unit with wet cooling, per WP, p. 4, implying 589.4 gwh for the full 250 Mw plant. 4.29% increase in output with dry cooling and a 12% larger solar field (see the previous footnote. 589.4 x .0429 = 25.3 gwh.
[35] Beacon Exh. 623, pp. 15 and 17 (45162 Mwh sell for $6,774,300; $6774300/45162 Mwh = $150/Mwh).
[36] Beacon FSA, p. 4.9-158.
[37] 25.3 gwh/year x $150/Mwh x 1000 Mwh/gwh = $3.795 million/year.
[38] See Exhibit 2, "Solar Field expanded 12%" column, and double the cost numbers there to reflect the difference between one 125 Mw Genesis unit and the full 250 Mw plant.
[39] Beacon FSA, pp. 6-12-13.
[40] Genesis SA, p. B.2-18.
[41] (1-.0688) * (1 + .0739) = 1.00.

conditions[42] with dry cooling and no increase in solar field size would be 239.8 Mw.[43] Increasing the field size by 7.39 percent would increase the plant output to over 250 Mw.[44] Thus, it is sufficient to increase the field size by just 7.39 percent, or 92 acres,[45] to maintain both annual Mwh output at the same annual level as with wet cooling and also maintain maximum output of 250 Mw under all temperature/humidity conditions.

A 7.39% increase in solar field size would (assuming a cost increase proportional to that at Beacon) result in a net cost life cycle NPV penalty of only $18.1 million,[46] or 2.2%.[47] That is barely one fourth the penalty associated with dry cooling for Beacon with no solar field increase,[48] a penalty which the CEC staff found would leave the Beacon project still economically viable.[49] It is also less than half the penalty associated with converting Genesis to dry cooling without expanding the solar field.[50] As with Beacon, expanding the solar field improves project economics.

3. Conclusion

As with Beacon, enlarging the solar field improves the economics of dry cooling. As with Beacon, enlarging the solar field by 12 percent makes the economics of dry cooling comparable to if not superior to the economics of wet cooling. If a 12 percent enlargement of the solar field is not feasible due to lack of space, a 7.39 percent enlargement would be sufficient to avoid any reduction in annual Mwh output or peak Mw output under extreme temperature conditions. Dry cooling with a 7.39% solar field expansion would have better economics than simply converting to dry cooling. Since switching to dry cooling at Genesis is cheaper than switching to dry cooling at Beacon, and switching to dry cooling with an expanded solar field is cheaper yet, and because switching to dry cooling at Beacon is economically feasible and provides an adequate return to investors,[51] switching to dry cooling at Genesis with an expanded solar field is economically feasible.

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[42] 122 degrees F and 9 percent relative humidity. WP, Appendix 4, "NextEra – Ford Dry Lake Dry Cooled CSP Plant Performance Evaluation," 4th page.
[43] Ibid., showing 119.931 Mw per unit, or 239.862 Mw for the full plant.
[44] 239.862 * 1.0739 > 250.
[45] A 12 percent field increase is equal to 150 Mw, per the Genesis SA, p. B.2-18. Thus, a 7.39% field increase would only require 150 acres x .0739/.12 = 92.375 acres.
[46] $9.057 million per 125 Mw unit, or $18.114 million for the full 250 Mw Genesis plant. See Exhibit 2, "Solar Field expanded 7.39%" column.
[47] See Exhibit 2, "Solar Field expanded 7.39%" column.
[48] See Exhibit 2, "Total Impact on NPV" row.
[49] Beacon FSA, p. 6-13.
[50] See Exh. 2, "Total Impact on NPV" line. 2.17% is less than half of 5.14%.
[51] Beacon FSA, pp. 6-12-13.

DECLARATION

I, David Marcus, declare as follows:

I have reviewed the above testimony regarding the Genesis Solar Energy Project. To the best of my knowledge, all of the facts in my testimony are true and correct. To the extent that this testimony contains opinion, such opinion is my own.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct to the best of my knowledge and belief. This declaration is signed at Berkeley, California.

Dated: 6/17/10 Signed: _David Marcus

EXHIBIT 1

RESUME

DAVID I. MARCUS **January 2010**
P.O. Box 1287
Berkeley, CA 94701-1287

Employment

Self-employed, March 1981 - Present

Consultant on energy and electricity issues. Clients have included Imperial Irrigation District, the cities of Albuquerque and Boulder, the Rural Electrification Administration (REA), BPA, EPA, the Attorney Generals of California and New Mexico, alternative energy and cogeneration developers, environmental groups, labor unions, other energy consultants, and the Navajo Nation. Projects have included economic analyses of utility resource options and power contracts, utility restructuring, utility bankruptcy, nuclear power plants, non-utility cogeneration plants, and offshore oil and hydroelectric projects. Experienced user of production cost models to evaluate utility economics. Very familiar with western U.S. grid (WSCC) electric resources and transmission systems and their operation and economics. Have also performed EIS reviews, need analyses of proposed coal, gas and hydro powerplants, transmission lines, and coal mines. Have presented expert testimony before FERC, the California Energy Commission, the Public Utility Commissions of California, New Mexico, and Colorado, the Interstate Commerce Commission, and the U.S. Congress.

Environmental Defense Fund (EDF), October 1983 - April 1985

Economic analyst, employed half time at EDF's Berkeley, CA office. Analyzed nuclear power plant economics and coal plant sulfur emissions in New York state, using ELFIN model. Wrote critique of Federal coal leasing proposals for New Mexico and analysis of southwest U.S. markets for proposed New Mexico coal-fired power plants.

California Energy Commission (CEC), January 1980 - February 1981

Advisor to Commissioner. Wrote "California Electricity Needs," Chapter 1 of Electricity Tomorrow, part of the CEC's 1980 Biennial Report. Testified before California PUC and coauthored CEC staff brief on alternatives to the proposed 2500 megawatt Allen-Warner Valley coal project.

CEC, October 1977 - December 1979

Worked for CEC's Policy and Program Evaluation Office. Analyzed supply-side alternatives to the proposed Sundesert nuclear power plant and the proposed Point Concepcion LNG terminal. Was the CEC's technical expert in PG&E et. al. vs. CEC lawsuit, in which the U.S. Supreme Court ultimately upheld the CEC's authority to regulate nuclear powerplant siting.

Energy and Resources Group, U.C. Berkeley, Summer 1976

Developed a computer program to estimate the number of fatalities in the first month after a major meltdown accident at a nuclear power plant.

Federal Energy Agency (FEA), April- May 1976

Consultant on <u>North Slope Crude. Where To? How?</u>, a study by FEA's San Francisco office on the disposition of Alaskan oil.

Angeles Chapter, Sierra Club, September 1974 - August 1975

Reviewed EIRs and EISs. Chaired EIR Subcommittee of the Conservation Committee of the Angeles Chapter, January - August 1975.

Bechtel Power Corporation (BPC), June 1973 - April 1974

Planning and Scheduling Engineer at BPC's Norwalk, California office. Worked on construction planning for the Vogtle nuclear power plant (in Georgia).

<u>Education</u>

Energy and Resources Group, U.C. Berkeley, 1975 - 1977

M.A. in Energy and Resources. Two year master's degree program, with course work ranging from economics to engineering, law to public policy. Master's thesis on the causes of the 1972-77 boom in the price of yellowcake (uranium ore). Fully supported by scholarship from National Science Foundation.

University of California, San Diego, 1969 - 1973

B.A. in Mathematics. Graduated with honors. Junior year abroad at Trinity College, Dublin, Ireland.

<u>Professional Publications</u>

"Rate Making for Sales of Power to Public Utilities," with Michael D. Yokell, in <u>Public Utilities Fortnightly</u>, August 2, 1984.

EXHIBIT 2

Exhibit 2

Dry cooling versus applicant-proposed technology

Parameter	Beacon dry cooling (250 Mw plant)				Genesis dry cooling (125 Mw unit)				Genesis as % of Beacon on a per-Mw basis		
	Solar Field Unchanged	Page # in WP study	Solar Field Expanded	Page # in WP study	Solar Field Unchanged	Page # in WP study	Solar Field Expanded 12.00%	Solar Field Expanded 7.39%	Solar Field Unchanged	Solar Field Expanded 12.00%	Solar Field Expanded 7.39%
Annual output with wet cooling	602527	p. 16	602527		294717	p. 4	294717	294717	97.8%		
Net generation impact (Mwh)	-45,162	p. 17	0		-20,278	p. 4	12655	0	89.8%		
% reduction in net gen	-7.50%	p. 16	0.00%	Note A	-6.88%		4.29%	0.00%	91.8%		
Revenue impact of net gen	-$6,774,300	p. 17	$0		-$3,041,700		$1,898,202	$0	89.8%		
Capital cost	-$20,497,000	p. 17	-$73,497,000	p. 17	-$258,000	p. 8	-$26,758,000	-$16,575,135	2.5%	72.8%	45.1%
Annual O&M cost impact	$1,288,000	p. 15	$1,288,000		$746,000	p. 20	$746,000	$746,000	115.8%	115.8%	115.8%
NPV of O&M cost impact	$12,980,000	p. 17	$12,980,000	p. 17	$7,517,919		$7,517,919	$7,517,919	115.8%	115.8%	115.8%
NPV of generation impact	-$63,860,000	p. 17	$0		-$28,673,510		$17,893,979	$0	89.8%		
Total impact on NPV	-$71,377,000		-$60,517,000		-$21,413,591		-$1,346,102	-$9,057,216	60.0%	4.4%	29.9%
Reported total impact on NPV	-$71,100,000	p. 17	-$60,100,000	p. 17							
Price at which output is sold ($/Mwh)	$150	p. 17	$150		$150		$150	$150			
NPV of 30-year output, wet cooling	$851,988,467		$851,988,467		$416,737,316		$416,737,316	$416,737,316			
Total impact on NPV	-8.38%		-7.10%		-5.14%		-0.32%	-2.17%			

	Implicit O&M inflation rate	0.7991%
Per WP pp. 15, 17 for BSP:	NPV/annual cost for O&M	10.07764
Per WP p. 17 for BSP:	NPV/annual cost for generation	9.42680
	Implicit discount rate	10.000%

NPV discount rate calculator and escalation rate calculator		NPV of revenues with wet cooling
1	1	$44,207,550
1	1.007991	$44,207,550
1	1.016046	$44,207,550
1	1.024165	$44,207,550
1	1.032349	$44,207,550
1	1.040599	$44,207,550
1	1.048914	$44,207,550
1	1.057296	$44,207,550
1	1.065745	$44,207,550
1	1.074261	$44,207,550
1	1.082846	$44,207,550
1	1.091499	$44,207,550
1	1.100221	$44,207,550
1	1.109013	$44,207,550
1	1.117875	$44,207,550
1	1.126808	$44,207,550
1	1.135812	$44,207,550
1	1.144888	$44,207,550
1	1.154037	$44,207,550
1	1.163259	$44,207,550
1	1.172555	$44,207,550
1	1.181925	$44,207,550
1	1.191369	$44,207,550
1	1.20089	$44,207,550
1	1.210486	$44,207,550
1	1.220159	$44,207,550
1	1.229909	$44,207,550
1	1.239737	$44,207,550
1	1.249644	$44,207,550
1	1.25963	$44,207,550
9.4268	10.0776	$416,737,316

Note A: Should have been 4.1%, not zero, per Beacon FSA, pp. 6-9, 6-40, 6-44

PROOF OF SERVICE

I, Bonnie Heeley, declare that on June 18, 2010 I served and filed copies of the attached **Testimony of David Marcus on behalf of the California Unions for Reliable Energy on Soil and Water Resources for the Genesis Solar Energy Project**. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at www.energy.ca.gov/sitingcases/genesis. The document has been sent to both the other parties in this proceeding as shown on the Proof of Service list and to the Commission's Docket Unit electronically to all email addresses on the Proof of Service list and by depositing in the U.S. Mail at South San Francisco, CA with first-class postage thereon fully prepaid and addressed as provided on the Proof of Service list to those addresses NOT marked "email preferred." I also sent a copy via email and an original and one copy via U.S. mail to the California Energy Commission Docket Office.

I declare under penalty of perjury that the foregoing is true and correct. Executed at South San Francisco, CA on June 18, 2010.

_______________/s/_________________
Bonnie Heeley

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