City of Brisbane
Agenda Report

TO: Honorable Mayor and City Council

FROM: Caroline Cheung via Clay Holstine, City Manager

DATE: Meeting of June 17, 2013

SUBJECT: U.S. Environmental Protection Agency (EPA)/National Renewable Energy Laboratory (NREL) Renewable Energy Feasibility Study

PURPOSE:

Receive presentation by Katie Brown, AAAS Science & Technology Policy fellow hosted by EPA on the study's findings and recommendations for next steps.

BACKGROUND:

The U.S. EPA, in accordance with the RE-Powering America's Land Initiative, selected the Brisbane Baylands site for a feasibility study of renewable energy production in November of 2011. The Brisbane Baylands was one of 26 sites nationally selected to receive technical assistance in the form of a renewable energy study. It should be noted that the City worked with members of Prescience International, highly regarded for their global adoption of life science and cleantech, in developing the study's grant application. In addition, many letters of support were included with the grant application, including that of one from the Committee for Renewable Energy on the Baylands (CREBL).

The EPA invested approximately $1,000,000 for the project, which paired EPA's expertise on contaminated sites with the renewable energy expertise of NREL. Since Brisbane's wintertime climate was much more amenable for conducting a site visit than that of the other entities which have been selected, Brisbane was one of the first sites to be visited by EPA/NREL. That site visit took place on Tuesday, January 31, 2012.

DISCUSSION:

The report was published in April of this year, focusing on "best in class" solar design (under the Repowering program, the EPA/NREL was only able to fund a single power type at each of the 26 sites) as well as financing models to give an idea of payback. The report took into consideration Universal Paragon Corporation's "Developer Option" and the Committee for Renewable Energy on the Baylands' "Renewable Energy Alternative". Note: these options are considered the broadest range of photovoltaic (PV)

implementation for the site under the two development scenarios and do not represent all of the intermediate options available.

FISCAL IMPACT/FINANCING ISSUES:

None.

MEASURE OF SUCCESS:

To have an unbiased report by a third party for inclusion as part of the Appendices in the Draft Environmental Impact Report (DEIR).

Caroline Cheung,
Administrative Management Analyst

Clay Holstine,
City Manager

ATTACHMENTS:

1 – Executive Summary of the EPA/NREL Renewable Energy Feasibility Study. The full 63-page report can be viewed here: http://www.nrel.gov/docs/fy13osti/57357.pdf

ATTACHMENT 1

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Feasibility Study of Economics and Performance of Solar Photovoltaics at the Brisbane Baylands Brownfield Site in Brisbane, California

A Study Prepared in Partnership with the Environmental Protection Agency for the RE-Powering America's Land Initiative: Siting Renewable Energy on Potentially Contaminated Land and Mine Sites

James Salasovich, Jesse Geiger, Victoria Healey, and Gail Mosey

Prepared under Task No. WFD3.1001

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Golden, CO 80401
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Technical Report
NREL/TP-7A40-57357
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NOTICE

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Acknowledgments

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Special thanks go to Cara Peck, Jessica Trice, Shea Jones, and Lura Matthews from EPA; Katie Brown, AAAS Science & Technology Policy fellow hosted by EPA; and Clay Holstine, Randy Breault, John Swiecki, and Caroline Cheung from the City of Brisbane for hosting the site visit. The authors would also like to thank Joe Peters and Jonathan Scharfman from Universal Paragon Corporation and Anja Miller, Anthony Attard, Michele Salmon, Jennifer Martin, and Cris Hart from the Committee for Renewable Energy on the Baylands (CREBL).

Executive Summary

The U.S. Environmental Protection Agency (EPA), in accordance with the RE-Powering America's Land initiative, selected the Brisbane Baylands site in Brisbane, California, for a feasibility study of renewable energy production. The U.S. Department of Energy's National Renewable Energy Laboratory (NREL) provided technical assistance for this project. The purpose of this report is to assess the site for a possible photovoltaic (PV) system installation and estimate the cost, performance, and site impacts of different PV options. In addition, the report recommends financing options that could assist in the implementation of a PV system at the site. This study did not assess the current environmental conditions at the site but assumes that conditions are not constraining.

The Brisbane Baylands site is located in the western part of San Francisco Bay and the site is divided into two areas. The west side of the site was used by the Southern Pacific Railroad for freight rail operations from 1914 to 1960, and the east side of the site was used as a municipal landfill for household waste from the 1930s until its closure in 1967. Since the landfill closure, the site has been used as a clean fill operation for construction sites in the area.[1] The City of Brisbane and the owner of the property understand that on-site renewable energy generation will be integral to the development of the land.[2]

The feasibility of a PV system installed is highly impacted by the available area for an array, solar resource, distance to transmission lines, and distance to major roads. In addition, the operating status, ground conditions, and restrictions associated with redevelopment of the brownfield site impact the feasibility of a PV system. Based on the current assessment of these factors, the Brisbane Baylands is suitable for deployment of a large-scale PV system.

The Brisbane Baylands site is approximately 684 acres, and there are two options for developing the site that include the Universal Paragon Corporation's (UPC) "Developer Option" and the Committee for Renewable Energy on the Baylands' (CREBL) "Renewable Energy Alternative." The Developer Option has more area allotted for rooftop PV and the Renewable Energy Alternative has more area allotted for ground-mounted PV. The Developer Option has approximately 24.7 acres appropriate for installation of a ground-mounted PV system and 257.4 acres appropriate for constructing buildings, which is derived from the pre-design drawings provided by the UPC. Of the 257.4 acres available for buildings, 50% is assumed to be useable for the installation of roof-mounted PV, and the remaining 50% is assumed to be used for roads, green space, and rooftop mechanical equipment.

The Renewable Energy Alternative has approximately 134.2 acres appropriate for installation of a ground-mounted PV system and 60.7 acres appropriate for constructing buildings, which is derived from pre-design drawings provided by CREBL. Of the 60.7 acres available for buildings, 38% (1 million square feet) is assumed to be useable for the installation of roof-mounted PV, and the remaining 62% is assumed to be used for roads, green space, and rooftop mechanical equipment.

[1] http://www.brisbanebaylands.com/environmentalcleanup/. Accessed July 2012.
[2] http://www.epa.gov/oswercpa/docs/r09-11-004_brisbane.pdf. Accessed July 2012.

While this entire area does not need to be developed at one time due to the feasibility of staging installation as land or funding becomes available, calculations for this analysis reflect the solar potential if the total feasible area is used for both the Developer Option and the Renewable Energy Alternative. These options are considered the broadest range of PV implementation for the site under the two development scenarios and do not represent all of the intermediate options available. It should also be noted that the purpose of this report is not to determine how to develop the site but to investigate both options and present the results in an unbiased manner.

The economic feasibility of a potential PV system on the Brisbane Baylands site depends greatly on the purchase price of the electricity produced and incentives available to the PV project. The economics of the potential system were analyzed using the average Pacific Gas and Electric Company (PG&E) June 2012 electric rate schedule of $0.1179/kWh for commercial entities. There are currently three incentives available to the project from the state and federal levels. Table ES-1 shows the current incentives considered with the incentive amount and the indicated ending criteria for each incentive.

Table ES-1. Summary of Incentives Evaluated[3]

Incentive Title	Modeled Value	Expected End
California Property Tax Incentive	100% of Property Value	12/31/2016
California Solar Initiative	$0.025/kWh	Re-funded in 12/2011
Business Energy Investment Tax Credit (ITC)	30% of installed cost	12/31/2016

The community net-metering incentive was not included in the feasibility study but will certainly improve economics if developed further. The California Energy Commission's (CEC) New Solar Home Partnership was excluded from the analysis because its applicability is uncertain. If this option were pursued and attained, the economics for each scenario would greatly improve. The combined quantitative amounts for these incentives are applied to each scenario in Table ES-2.

All scenarios considered for the site were economically attractive; the Renewable Energy Alternative scenario with a single-axis tracking PV system for the ground-mounted portion has the highest net present value (NPV). Table ES-2 summarizes the system performance and economics of a potential system that would use all available areas that were surveyed at the Brisbane Baylands site. Each scenario in the table includes the maximum utilized roof area associated with the specified development option and the specified ground-mounted system. The table shows the annual energy output from the system along with the number of average American households that could be powered by such a system and estimated job creation.

As indicated in Table ES-2, the different systems are expected to have a payback of 12.68–13.72 years and an NPV of $1.5 million to $4.1 million for a 23–28 MW PV system producing

[3] DSIRE: Database of State Incentives for Renewables and Efficiency. http://www.dsireusa.org/. Accessed July 2012.

approximately 42.4–45 GWh annually. This includes the current cost of energy, expected installation cost, site solar resource, and existing incentives for the proposed PV system. This savings and payback is deemed reasonable and as such, a solar PV system represents a viable reuse for the site.

Table ES-2. Brisbane Baylands PV System Summary

Tie-In Location	System Type	PV System Size[a] (kW)	Array Tilt (deg)	Annual Output (kWh/year)	Number of Houses Powered[b]	Jobs Created[c] (job-year)	Jobs Sustained[d] (job-year)
	Renewable Energy Alternative Rooftop PV System	4,000	20	6,018,006	1,056	101	1
	Renewable Energy Alternative Fixed Axis Ground Mounted System	23,380	20	35,175,244	6,171	590	7
	Crystalline Silicon (Fixed-Axis Ground System) - Renewable Energy Alternative, Developer Owned	27,380	20	43,129,543	7,567	691	8
	Renewable Energy Alternative Rooftop PV System	4,000	20	6,018,006	1,056	101	1
	Renewable Energy Alternative 1-Axis Ground Mounted System	19,281	20	37,007,662	6,493	649	6
	Crystalline Silicon (1-Axis Ground System) - Renewable Energy Alternative, Developer Owned	23,281	20	44,961,961	7,888	750	7
	Developer Rooftop PV System	23,876	20	35,921,477	6,302	603	7
	Developer Fixed Axis Ground Mounted System	4,303	20	6,473,870	1,136	109	1
	Crystalline Silicon (Fixed-Axis Ground System) - Developer Option, Developer Owned	28,179	20	42,395,347	7,438	711	9
	Developer Rooftop PV System	23,876	20	35,921,477	6,302	603	7
	Developer 1-Axis Ground Mounted System	3,548	20	6,809,978	1,195	119	1
	Crystalline Silicon (1-Axis Ground System) - Developer Option, Developer Owned	27,424	20	42,731,455	7,497	722	8

Tie-In Location	System Type	System Cost	Maximum Incentive Amount	PPA Price ¢/kWh	Net Present Value 2012$	Annual O&M ($/year)	Payback Period with Incentives (years)
	Renewable Energy Alternative Rooftop PV System	$ 13,690,000	$ 4,840,444	13.25	$ 169,556	$ 108,889	13.89
	Renewable Energy Alternative Fixed Axis Ground Mounted System	$ 75,066,000	$ 26,806,783	13.06	$ 1,375,151	$ 636,453	13.69
	Crystalline Silicon (Fixed-Axis Ground System) - Renewable Energy Alternative, Developer Owned	$ 88,756,000	$ 31,883,213	13.09	$ 1,544,707	$ 745,342	13.72
	Renewable Energy Alternative Rooftop PV System	$ 13,690,000	$ 4,840,444	13.25	$ 169,556	$ 109,749	13.89
	Renewable Energy Alternative 1-Axis Ground Mounted System	$ 77,990,992	$ 27,907,606	11.92	$ 3,942,864	$ 529,019	12.43
	Crystalline Silicon (1-Axis Ground System) - Renewable Energy Alternative, Developer Owned	$ 91,680,992	$ 32,984,037	12.11	$ 4,112,420	$ 638,768	12.68
	Developer Rooftop PV System	$ 80,473,360	$ 28,519,938	13.05	$ 1,406,007	$ 620,776	13.69
	Developer Fixed Axis Ground Mounted System	$ 14,708,080	$ 5,201,427	13.23	$ 188,405	$ 111,878	13.87
	Crystalline Silicon (Fixed-Axis Ground System) - Developer Option, Developer Owned	$ 95,181,440	$ 33,721,365	13.08	$ 1,594,412	$ 732,654	13.72
	Developer Rooftop PV System	$ 80,473,360	$ 28,519,938	13.05	$ 1,406,007	$ 620,776	13.69
	Developer 1-Axis Ground Mounted System	$ 14,555,536	$ 5,196,627	12.09	$ 660,859	$ 92,248	12.60
	Crystalline Silicon (1-Axis Ground System) - Developer Option, Developer Owned	$ 95,028,896	$ 33,716,565	12.90	$ 2,066,866	$ 713,024	13.55

a Data assume a maximum usable area of 684 acres

b Number of average American households that could hypothetically be powered by the PV system assuming 5,700 kWh/year/household.

c Job-years created as a result of project capital investment including direct, indirect, and induced jobs.

d Jobs (direct, indirect, and induced) sustained as a result of operations and maintenance (O&M) of the system.