SMUD™

Addendum to Final CEQA Supplemental Analysis to the FERC/USFS Final Environmental Impact Statement for Hydropower License

and

Analysis of Iowa Hill Joint Advisory Committee Comments, Appendix H2

1.0 BACKGROUND AND PURPOSE

The Sacramento Municipal Utility District (SMUD) released the draft CEQA Supplement to the FEIS for the FERC relicensing of the Upper American River Project (UARP) (Supplemental Analysis) in May 2008 and completed the final Supplemental Analysis in September 2008. SMUD then certified that the FERC/USFS Final Environmental Impact Statement (FEIS)—together with the Supplemental Analysis—complies with the provisions of the California Environmental Quality Act (CEQA). At that time, SMUD did not make the commensurate approval of the project—i.e., authorization to re-operate the UARP pursuant to a new FERC license along with the option to build and operate the Iowa Hill Pumped-storage Development—because the license, which governs the operation of the UARP, had not yet been prepared. However, SMUD is now going to approve the project in order to facilitate issuance of the 401 Certification for the project by the State Water Resources Control Board, a prerequisite to the issuance of the FERC license.

When SMUD certified the FEIS and Supplemental Analysis in 2008, CEQA was in its infancy regarding how to assess whether greenhouse gas (GHG) emissions from a project constitute a significant impact. Accordingly, the draft Supplemental Analysis did not analyze GHG emissions, and the final Supplemental Analysis provided a qualitative response to comments on that topic without a quantitative analysis, which has since become the norm for CEQA analysis of GHG emissions. To ensure that the FEIS and Supplemental Analysis satisfy the current requirements of CEQA prior to project approval, SMUD decided to conduct a quantitative analysis of GHG emissions and accordingly revise and update comment response 29.

This addendum to Appendix H-2 of the Supplemental Analysis sets forth the results of SMUD's qualitative analysis of GHG emissions.

2.0 REVISION TO RESPONSE TO COMMENT 29: GREENHOUSE GASES

Response to Comment 29 is amended as follows (deletions are shown as strikeouts; additions are underlined):

Global climate change is an alteration of the average weather of Earth, measured by wind patterns, storms, precipitation, and temperature. Global temperatures are affected by naturally occurring and human-generated atmospheric gases. These gases allow sunlight into the atmosphere, but prevent radiative heat from leaving. Called the greenhouse effect, this phenomenon is thought to cause global climate change.

In connection with increases in the release of human-generated gases, the greenhouse effect is believed to have led to an increase in the average temperature of Earth's atmosphere and oceans. In the 20th century, Earth's average surface temperature rose 1.1 ± 0.4º Fahrenheit (0.6 ± 0.2º Celsius).[1] The prevailing scientific opinion is that most warming occurring during the past 50 years is the result of human activities.[2] The weight of scientific authority indicates that increased release of carbon dioxide (CO_2) and other greenhouse gases (GHGs) is the primary human-caused activity causing global warming. GHGs are released by burning fossil fuels, clearing land, and agricultural activities.

The primary GHGs are carbon dioxide (CO_2), methane, and nitrous oxide. Carbon dioxide is released through respiration of both plants and animals, decomposition of dead organic matter, and evaporation from the oceans. These natural sources release about 150 billion tonnes of CO_2 each year. By comparison, human-caused emissions from burning fossil fuels, waste incineration, deforestation, and industrial activities generate about seven billion tonnes of CO_2 annually. In 2002, California's CO_2 emissions totaled 360 million tons, with 98 percent coming from fossil fuel combustion.[3] Methane is produced naturally when organic matter decomposes in environments lacking sufficient oxygen; anthropogenic sources include mining and burning of fossil fuels, digestive processes in cattle and other ruminants, rice cultivation, and waste management. Human activities cause approximately 60 percent of methane emissions, and methane accounts for approximately nine percent of total climate change emissions.[4] Nitrous oxide is produced naturally by microbial processes in soil and water, and is produced by humans during agricultural activities, industrial processes such as fossil fuel-fired power plants, and vehicle emissions. Nitrous oxide accounts for approximately five percent of total GHG emissions.[5]

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1 Intergovernmental Panel on Climate Change (IPCC), 2007. *Climate Change 2001: The Scientific Basis,* www.grida.no/climate/ipcc_tar/wg1/index.htm [as of August 11, 2008].

2 *Id.*

3 California Environmental Protection Agency, Governor Schwarzenegger and the Legislature, March 2006 at 11, www.climatechange.ca.gov/climate_action_team/reports/2006report/2006-04-03_FINAL_CAT_REPORT.PDF [as of August 11, 2008].

4 IPCC 2007, *supra;* Energy Information Administration, 2003. *Greenhouse Gases, Climate Change, and Energy,* http://www.eia.doe.gov/bookshelf/brochures/greenhouse/Chapter1.htm [as of August 11, 2008].

5 Energy Information Administration, 2003. *Greenhouse Gases, Climate Change, and Energy, supra.*

NOTE: *These footnotes were numbered 2-6 in the original Final CEQA Supplemental Analysis to the FERC/USFS Final Environmental Impact Statement for Hydropower License and Analysis of Iowa Hill Joint Advisory Committee Comments, Appendix H-2.*

~~Neither CEQA nor the guidelines mention or provide any methodology for analyzing a project's effects on GHGs. Pursuant to Senate Bill 97 (Chapter 185, 2007) the Governor's Office of Planning and Research is in the process of developing CEQA guidelines for the mitigation of GHG emissions. However, the guidelines are not required to be drafted until July 1, 2009, and need not be adopted by the Resources Agency until January 1, 2010. In the absence of such guidance, a review of the scientific literature shows that it is still too early to reliably determine the effect of local land use changes on global climate change.[7] Before concrete guidance can be developed on evaluating the climate change impacts of a particular project, researchers likely will need to advance the field of study by combining state-of-the-art modeling, field observations, and satellite imagery.[8] Nonetheless, as discussed below, relicensing of the UARP and the proposed Iowa Hill Development will have a long-term, significant positive effect on regional emissions of GHGs~~.

Impacts on Global Climate Change

The following is added as Section 3.3.3.5.8 of the Supplemental Analysis:

As analyzed in the FEIS, the reoperation of the UARP pursuant to the terms of the Settlement Agreement—and hence the expected terms of the FERC license—will reduce the electrical generation of the UARP from its current level of an estimated 1,835,000 MWh to an estimated 1,699,000 MWh. (*See* FEIS Table 3-77). SMUD's forecasted energy demand into the future is 2,696,000 MWh, leaving SMUD to supplement the re-operated UARP with the difference from other energy sources. SMUD will almost certainly supplement the UARP's hydroelectric energy with a mix of available SMUD-produced and purchased energy including both renewable and nonrenewable sources. SMUD's current generating resources as of 2011 included 43% renewable and 57% nonrenewable. (Sierra Research, *Estimation of Greenhouse Gas (GHG) Emissions for the Upper American River Hydroelectric Project, Final Environmental Impact Statement for Hydropower License, FERC Project No.: 2101-084, California,* Table 5.) Using this mix of resources, the GHG emissions were calculated for the annual operation of the No Project, UARP only, and Iowa Hill alternatives. The results are as follows:

2.0-1 Estimated Greenhouse Gas Emissions from Project Operation

Scenario	Project Generation	Other Generation	Emissions (metric tons per year)			
			CO_2	CH_4	N_2O	CO_2e
No-Action	Hydroelectric + On-Peak Simple Cycle Combustion Turbine	--	411,249	8	0	**411,639**
UARP-only	Hydroelectric + On-Peak Simple Cycle Combustion Turbine	SMUD Mix	460,201	9	0	**460,641**

2.0-1 Estimated Greenhouse Gas Emissions from Project Operation						
			Emissions (metric tons per year)			
Scenario	Project Generation	Other Generation	CO_2	CH_4	N_2O	CO_2e
Iowa Hill	Hydroelectric Pumped-Storage	SMUD Mix	294,598	6	0	**294,922**

Under this analysis, the Iowa Hill alternative will result in an estimated annual release of 294,922 CO_2e (a measure of CO_2 equivalency) while the UARP only alternative will result in a release of 460,641. In other words, the Iowa Hill option will result in an estimated annual release of GHG that is 165,720 CO_2e less than the UARP without Iowa Hill. The Iowa Hill alternative's net reduction in GHG as compared with the UARP-only alternative is due to the fact that the Iowa Hill power plant will produce GHG-free energy (and therefore replace other energy sources) during peak hours, whereas the energy used to pump water up to Iowa Hill will be produced and used during off-peak hours. This timing takes advantage of the fact that gas-fired power plants—which make up at least 43% of SMUD's current overall energy portfolio—rely more on simple cycle turbines during peak hours and more on combined cycle turbines during off-peak hours. (Simple cycle turbines emit a greater quantity of GHGs than do combined cycle turbines.)

The analysis also considered the GHG emissions associated with the construction of Iowa Hill. Construction GHG emissions were estimated based on the maximum rolling 12-month equipment usage rate based on 133 round trips per day, 264 construction days per year, with an average commute distance of 100 miles. Delivery vehicle emissions were based on 3,168 deliveries per year, with an average round trip haul distance of 100 miles. The amount of CO_2e estimated for release during a single year of construction of Iowa Hill is 14,134.

In conclusion, considering the mix of energy sources actually used by SMUD, GHG emissions are 28% lower than the No Action scenario and are the lowest of any project scenario. The construction emissions are relatively small (<5%) when compared to operational emissions. After one year of operation with Iowa Hill, the construction emissions will have been more than offset by the lower GHG emissions than would occur under the UARP-only alternative. Taken together, no significant GHG impact will occur as a result of the construction and operation of Iowa Hill.

~~The UARP currently provides energy to the Sacramento region without the use of fossil fuels and produces no GHGs. During the original construction of the UARP, existing vegetation was removed, thereby minimizing GHG emissions over the life of the reservoirs. The Iowa Hill Development will have a positive impact on GHG emissions, primarily by providing substantial quantities of on-peak, low-emission hydroelectric~~

~~energy as a substitute for production from GHG-emitting, gas-fired plants. Wind and solar are inconsistent energy sources, with availability being subject to day-to-day weather conditions.~~ The Iowa Hill Development will use energy from ~~these~~ renewable and nonrenewable sources during off-peak hours~~, and excess energy provided by existing fossil fueled power plants,~~ to pump water to the upper reservoir for later generation during on-peak and super-peak hours. ~~The Iowa Hill Development will, therefore, allow SMUD to overcome the intermittency issues of renewable resources such as wind and solar. By "managing" the energy produced from the resources, the Iowa Hill Development will increase their reliability, and in the long-term, promote the construction of more wind and solar facilities.~~ This new source of peak energy production eliminates the need for 400 MW of less efficient fossil-fuel-driven peaking power plants in the Sacramento region. Consequently, no new base-loaded, fossil-fuel power plants will be required for the operation of the proposed Iowa Hill Development. The Iowa Hill Development's design minimizes GHG emissions as well. As proposed, the Iowa Hill Development consists not only of a new upper reservoir, new underground powerhouse, and a new 2.5-mile transmission tie-in, but also uses the existing Slab Creek Reservoir and the existing 230 kV transmission lines. This efficient use of existing resources significantly reduces emissions from construction. To further reduce construction emissions, the first major step of the construction process will be to build the transmission line tie-in to the existing 230 kV lines. This tie-in line will convey power to the construction site throughout the remaining construction period, obviating the need to use construction-site power generators. The new reservoir should also cause minimal GHG emissions as it will be small (approximately 100 acres) and will not flood standing vegetation that would decay in water. The Iowa Hill Development also minimizes traffic-related GHG emissions. During the long-term, the Iowa Hill Development will result in little GHG emission as it will be operated remotely and visited for maintenance purposes by only a few vehicles per day. During construction, the Iowa Hill Transportation Management Plan will reduce GHG emissions by including the use of vanpools from staging areas to the construction sites.

Impacts of Global Climate Change on Existing Resources

The Iowa Hill Development will also help offset the impacts that climate change may have on the UARP. Because the intake/outlet structure will be deep in the lower reservoir, the Iowa Hill Development can reuse the stored water many times simply by pumping it back to the upper reservoir. By comparison, conventional hydroelectric projects can only use water one time before passing it downstream. The ability to reuse water will become critically important as climate change in the Sierra Nevada range reduces snowpack volumes and alters runoff patterns. Operation of the proposed Iowa Hill Development is described fully in SMUD's Application for New License, Exhibit B, and a financial evaluation is detailed in Exhibits D and H.