

Section 9

Recommendations and Next Steps

Of the approximately 100 hydro options studied, seven are economically viable for immediate implementation. All seven projects qualify for “must take” Feed-In Tariff (FIT) power purchase contracts (up to 20-year terms) with PG&E, except possibly Kaiser Siphon that requires additional investigation to confirm that it qualifies under the FIT contract conditions (see Section 7.3, Summary Results of Analyses of “Top 10” Hydro Options and Appendix C, Environmental Regulatory, Permitting and Feed-In Tariff RPS Certification and Contract Requirements).

Regulatory and electric utility programs currently promote renewable energy development with energy rate incentives, permitting exemptions, and standard contracts for energy purchases and interconnection. Exceptional economic opportunities exist for El Dorado County water purveyors to install qualifying small hydroelectric projects up to 1.5 MW in capacity at existing water and wastewater infrastructure.

California and national legislation and regulations likely will continue to promote renewable energy until the United States reduces its dependence on foreign oil, the economy recovers from the ongoing severe economic recession, air basins achieve attainment with air quality standards, and California reaches legislated goals to reduce greenhouse gas emissions. Details on these programs, legislative mandates, incentives, and exemptions that support renewable energy, including small hydroelectric development at existing facilities, are presented in Section 2 (Energy Policies Supporting Hydroelectric Generation).

Four of the projects recommended for immediate implementation are within EID’s service area and would have 1,720 kW of capacity and generate 8,550,000 kWh annually. The Kaiser Siphon and Sandtrap Siphon hydro options in GDPUD’s service area would have a capacity of 580 kW and 230 kW, respectively, and would generate 3,640,000 kWh and 1,130,000 kWh annually, respectively. The seventh project is a technology demonstration project on EID’s El Dorado Canal immediately downstream of the El Dorado Diversion Dam where Verdant Power proposes to design and install a hydrokinetic unit that would have between 30 and 40 kW of capacity and generate roughly 50,000 to 70,000 kWh annually. All of these projects except the Technology Demonstration Project are discussed in detail in Section 7 (Detailed Project Analyses of “Top 10” Hydro Options). The six projects alone would produce about half of the total annual amount of electricity that EID reportedly used in the 2007-2008 timeframe.

In addition to the seven economically viable projects, at least seven more hydro options warrant additional study beyond the scope of this plan. Recommendations on additional detailed studies for these projects are discussed in the Executive Summary and Section 8 (Projects Warranting Additional Detailed Feasibility Analyses). Sections 5.1 (Options for Existing Water and Wastewater Facilities and Operations), 7.6.1 (Existing Water System Reoperation), and 9.4 (Perform Detailed Reoperation and Energy Storage

Study of Selected Water Systems) discuss issues related to reoperation of the existing water systems.

The hydro options recommended for additional detailed study include the following:

- Small and Medium Alder Reservoir Options,
- Caples Dam Options,
- El Dorado Powerhouse Low-High Flow Optimization,
- Heavenly Ski Resort CA Base Pump Station,
- STPUD “C-Line” Treated Wastewater Outfall,
- GDPUD Stumpy Meadows Dam, and
- GDPUD and EID Water System-Specific Reoperation Options.

Additionally, this study identified and evaluated a large number of other hydro options that have significant generation and capacity potential (See Section 5, Inventory of County Hydroelectric Potential). As California and national energy policies continue to evolve, other hydro options may become viable depending on: 1) the price of energy, 2) the desire or need to further reduce our nation’s dependence on foreign oil, 3) the need for new sources of dependable energy (e.g., hydropower) to back-up increasing percentages of non-dependable renewable resources (e.g., wind), and/or 4) the extent to which our policymakers are concerned with energy independence and greenhouse gas emission effects on global climate change. If future climate changes adversely affect water supply availability, then the value of water would increase and new water storage hydro options would become more viable.

Based on the above summary findings, the remainder of this section focuses on the specific recommendations and next steps for purveyors and others to proceed with the identified hydroelectric development options in El Dorado County.

9.1 Implement the Six Economically Superior Options that Qualify for FIT Program

This plan recommends that EID and GDPUD implement the six economically viable hydro options without delay to take advantage of this year’s unprecedented rate incentives under the FIT program. By November 2009, EID and GDPUD should execute and submit to PG&E a FIT agreement for each of the six projects. Between now and November 2009, the projects can be designed and regulatory/permitting can be initiated to validate the findings of this study prior to submitting the FIT agreement to PG&E. This includes the pre-certification filing of the hydro options with the CEC for pre-qualifying the projects as RPS eligible (and therefore eligible for the FIT “must take” contracts). During this period, financing options can be further explored, including submitting applications for CREBs, recognizing that the projects are economically viable assuming purveyor 30-year bonds at 6 percent interest. Because the CPUC is seeking ways to minimize rate impacts to utility customers from the renewable energy programs, and because the FIT program rates likely will be adjusted again in December 2009, these projects cannot be delayed without risking changes to the economic viability of the hydro options.

The six economically viable projects that would be developed by EID and GDPUD:

- are financially superior and show positive net present values (Table 7-1) for the 20-year analysis period, even with conservative financing and other economic assumptions;
- qualify for “must take” 20-year guaranteed energy payment and interconnection contracts with PG&E;
- represent a very limited risk to the purveyors and their customers under the current FIT program requirements and based on the proven technology and reliability of hydroelectric generation;
- would also have indirect economic and non-economic benefits to existing water system operations and customers as described in Section 7.5 (Other Economic Considerations), Section 7.6.1 (Existing Water System Reoperation) and Section 9.8 below; and,
- would help purveyors meet expected future renewable energy and energy efficiency targets as California works to achieve its goal to reduce greenhouse gas emissions to 1990 levels by 2020 (Section 2, Energy Policies Supporting Hydroelectric Generation).

To implement the projects, assigned staff workgroups are recommended from both EID and GDPUD that will be responsible for overseeing the implementation of the hydro options. The workgroups would review and advise on the design, operations, permitting, financing, contracting and construction documents to be developed by those retained to support EID and GDPUD. The purveyors may determine that joint financing or other common objectives are desired for these and/or other hydro options identified for further study. A dedicated staff is necessary to succeed on these types of time-critical, large initiatives that require specialized expertise and knowledge.

9.2 Initiate Discussions with Verdant Power on Hydrokinetic Demonstration Project

During the 2007 EID Energy Recovery Study (Black & Veatch 2007), Verdant Power and EID discussed the potential installation of a hydrokinetic demonstration project along EID’s El Dorado Canal below the El Dorado Diversion Dam. The project was put on hold pending execution of a confidentiality agreement, which was not pursued due to operational concerns and the limited findings of the study. The FIT program has since been approved by the CPUC and average energy values increased from an average of \$0.09/kWh assumed by the Black & Veatch study to \$0.1173/kWh under the FIT program for projects coming online in 2011. Anticipated energy prices for the FIT hydro options have therefore increased by about 23 percent. In addition, new policy mandates and regulations have been issued that require utilities such as PG&E to accelerate development and acquisition of renewable energy resources (see Section 2, Energy Policies Supporting Hydroelectric Generation).

With the FIT program, and based on the findings of this study, discussions with Verdant Power should be reinitiated and also extend to other areas in El Dorado County that could possibly benefit from the type and size of hydrokinetic units proposed by Verdant

Power. More specifically, the Georgetown Ditch is an open canal similar in design to EID's El Dorado Canal. In addition, if neither Mountain Utilities nor Kirkwood Meadows PUD elect to investigate a joint project with EID at Caples Dam, then EID could consider a smaller capacity, hydrokinetic unit at Caples Dam that could meet the power supply needs of the dam outlet works, new boat launch facilities, and possibly the Caltrans maintenance station and Caples Resort.

9.3 Adopt Policy of Energy Independence

The Hydro Advisory Panel and water purveyors have recommended that, consistent with State and Federal policies, El Dorado County consider adopting a policy to encourage independence from foreign oil. The following language has been developed through HAP and purveyor meetings on this study to help meet this policy goal:

"It is the policy of the (stated agency) that resources planning and infrastructure, including water and wastewater systems, emphasize renewable energy and energy efficiency toward a goal of Energy Independence for El Dorado County and its citizens."

To facilitate purveyor, local government, and citizen attention to renewable energy and associated economic and social benefits, the El Dorado County Water Agency and each of the water purveyors are encouraged to consider and adopt, as appropriate, the above or similar language to promote development of hydroelectric energy in El Dorado County. Further discussion and issues important to the recommended policy is presented in Section 2.9 (Energy Independence for El Dorado County).

9.4 Consider Clean Renewable Energy Bond Financing of Viable Projects

One near-term option for financing some or all of the "top 10" hydro projects is the ARRA of 2009, which authorizes \$1.6 billion of New CREBs and \$2.4 billion of new QECBs. Under the ARRA, New CREBs and QECBs are being made available for financing renewable energy and greenhouse gas emission reduction initiatives. New CREBS most directly apply to the hydro options.

With New CREBs (those authorized via the 2009 ARRA), the bond holder receives a tax credit that is equal to 70 percent of the IRS-approved bond market rate for New CREBs. The effective interest rate of the New CREBs for the bond issuer (e.g., EID or GDPUD) should be close to the difference between the current tax-exempt bond rate in the market and the tax credit to the bond holder, but may be somewhat more or less than this. The application deadline for CREBs is August 4, 2009, whereas the QECBs have no projected closing date, other than award of total available bonds.

Table ES-5 displays the sensitivity of the "top 10" hydro options to CREBs. Overall, the effect of 15-year CREBs (1.8 percent) financing can be compared to 30-year bond (6 percent) financing used in the detailed economic analyses of Section 7 (Detailed Project Analyses of "Top 10" Options) as follows:

Table 9-1: Comparison of 30-Year Bonds to Example New CREBs Financing for the “Top 10” Hydro Options

<u>Financing</u>	<u>Capital Cost</u> <u>(Top 10 Options)</u>	<u>Net Present Value</u> <u>(20-Year Analysis</u> <u>Period)</u>	<u>Capacity (kW)/</u> <u>Annual kWh</u>
30-Year Bonds	\$ 20,418,000	\$ 2,962,136	3,315/16,632,000
CREBs/QECBs	\$ 20,418,000	\$ 5,194,196	3,315/16,632,000

Combining or ‘batching’ hydro projects by water system (e.g., Pleasant Oak Main and Georgetown Ditch) is a possible approach for financing and it also offers opportunities for multiple project economies of scale where proximity and system similarities can reduce design, permitting, financing, construction, and other development and operation costs. Estimating such cost savings would require that specific combinations of projects be identified. Table 7-1 displays how hydro options could be grouped by water system.

9.5 Perform Detailed Reoperation and Energy Storage Study of Water Systems

Section 8 describes how EID was recently awarded a grant from the CEC to evaluate reoperation of selected water systems. The reoperation evaluation will seek to moderate flow variation, maximize water system (e.g., El Dorado Main and Georgetown Ditch) hydro generation during peak energy value periods, improve system energy efficiencies, and shift water system energy loads to off-peak periods. A key aspect of this grant would be to assess the feasibility of reoperation by incorporating intermittent energy storage systems, primarily water storage tanks, which would allow turbine-generator efficiency optimization and peaking re-regulation of flows to maximize hydroelectric revenues. Basically, the water systems would be re-operated to uncouple customer demand from daily operations.

The four projects shown in Table ES-4 (Diamond Springs Main PRS 1, El Dorado Main 2 PRS 3, Oak Ridge Tanks to Bass Lake Tanks Pumped Storage, and Buffalo Hill Siphon) do not appear economically viable based solely on analyses of existing water system operations. The reoperation evaluation grant may demonstrate that these and other system options would be economically viable with system flow re-regulation (made possible with increased storage at key locations), energy efficiency cost savings, and load management to take advantage of energy prices at different times of the day.

A cursory evaluation of two water systems, the GDPUD Georgetown Ditch and the EID Pleasant Oak Main Pipeline, was performed as part of this study to initially assess the potential benefits of reoperation with intermittent storage. The results of the cursory evaluation are described in Section 7.6.1 (Existing Water System Reoperation), which show that significant increases in energy revenues would be expected with reoperation.

Reoperation with the intermittent storage systems would also boost overall water system reliability. Indeed, EID and GDPUD may have other facility improvement and operation considerations that could make water system hydro options attractive for reasons other than economics.

9.6 Consult with PG&E on Projects Requiring Power Line Extensions or Upgrades

Certain hydro options for EID, GDPUD, and others are either less or not cost-effective due to the estimated costs and processes required to either extend or upgrade an existing power line to the hydro option site. A prime example is GDPUD's Stumpy Meadows Dam that represents an otherwise viable FIT hydro option that meets key criteria except for utility interconnection. Other examples where interconnection issues substantially affect hydro option viability include South Tahoe PUD's treated wastewater "C-Line", which is in NV Energy's service territory, and Pleasant Oak Main at Reservoir B, which is in PG&E's service area.

This study recommends that EID and GDPUD actively solicit PG&E assistance with investigating alternative approaches to plan, permit, finance, and construct power line interconnections for geographically isolated hydro options that are otherwise considered viable. Concurrently, EID and GDPUD are encouraged to participate and submit comments through ongoing CEC proceedings regarding roadblocks to achieving the ambitious 20 percent by 2010 and 33 percent by 2020 mandated targets for renewable energy. In some cases such as the Pleasant Oak Main at Reservoir B hydro option, even the requirement to add 10,000 feet of a third wire to existing power poles adds a considerable expense to an otherwise attractive project.

9.7 Develop Framework for Joint Investigations of Alder Reservoir Options

Section 3 (Water and Wastewater Energy Management Goals and Objectives for El Dorado County) discusses the interrelated water management goals and objectives of El Dorado County purveyors and other stakeholders. Of the hydro options recommended for additional detailed feasibility study, the Alder Small Reservoir and Alder Medium Reservoir hydro options represent the greatest opportunity for hydroelectric generation to financially support new water supply storage.

The costs and benefits of a Small Alder Reservoir hydro option or a Medium Alder Reservoir hydro option include major water supply components that extend far beyond hydroelectric generation. Hydropower from an Alder Powerhouse and the El Dorado Powerhouse would help to finance the water supply, drought protection, and other potential benefits of the reservoir for El Dorado County. With renewable energy becoming increasingly important to California's AB 32 goals, and given both the increasing value of dependable energy and El Dorado County's future water supply needs, this project is highly recommended for separate, detailed feasibility studies along with the Small Alder Reservoir options. Further discussions on the Alder Reservoir options are presented in Table ES-6 and Section 8.

As a first step, this study recommends that specific design and operation concepts be outlined and evaluated by EID to identify the project alternatives that would best achieve EID's long-term hydroelectric and water supply objectives. Those concepts should include alternatives that incorporate the potential goals and objectives of other County and non-County purveyors that could help fund future studies and share the costs of project development. Potential participants and their water-related goals and objectives

are described in Section 3. Of particular importance to County purveyors is the potential for an Alder Reservoir to support water right deliveries through interties and associated operating agreements with EID.

9.8 Consider Non-Economic and Indirect Economic Benefits of Hydro Options

As described in Section 5 (Inventory of County Hydroelectric Potential), hydro power options are numerous in El Dorado County at both existing water and wastewater facilities, and at new sites. Section 8 (Projects Warranting Additional Detailed Feasibility Evaluation) describes several promising hydro options that display characteristics warranting further study. These include existing water system reoperation (Section 9.5) and the Alder Reservoir (Section 9.7) options discussed above.

As EID, GDPUD, and other purveyors consider the hydro options, and as water system capital improvements are being planned, this study recommends that the purveyors also consider the potential indirect and non-economic benefits associated with hydro generation and energy efficiency improvements. These can be important considerations to project decisions and can include some or all of the following benefits:

- Long-term economic value (40 to 50-year project life) of energy sales beyond the 20-year economic analysis period;
- Progress toward a Hydro Advisory Panel-proposed policy of energy independence for the customers served by the water systems;
- Renewable energy credits (for non-FIT and post-FIT projects) that could be either applied toward future purveyor requirements, sold in a developing cap and trade greenhouse gas emissions reductions market, or used to meet future purveyor greenhouse gas emission reduction requirements;
- National defense and regional air quality public policy benefits of developing renewable energy to help displace fossil fuel-fired electricity consumed by water system operations;
- Jobs creation and multiplier benefits to the local, water sector, and renewable energy economies from project development; and,
- Enhanced monitoring and control systems at the hydro project sites that would improve water service reliability and system equipment longevity.