FILED
05-22-13
04:59 PM

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Petition of The Division of Ratepayer Advocates to Adopt, Amend, or Repeal a Regulation Pursuant to Pub. Util. Code § 1708.5	Petition _____ (Filed May 22, 2013)

P1305008

PETITION OF THE DIVISION OF RATEPAYER ADVOCATES TO ADOPT, AMEND, OR REPEAL A REGULATION PURSUANT TO PUB. UTIL. CODE § 1708.5 TO DEVELOP A PARTNERSHIP FRAMEWORK BETWEEN ENERGY INVESTOR OWNED UTILITIES AND THE WATER SECTOR TO CO-FUND WATER-ENERGY NEXUS PROGRAMS

JONATHAN KNAPP
Staff Counsel
Division of Ratepayer Advocates
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102
Phone: (415) 703-5377
Email: jp8@cpuc.ca.gov

MATTHEW MARCUS
Deputy Director
Division of Ratepayer Advocates
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102
Phone: 916-327-3455
Email: mnm@cpuc.ca.gov

May 22, 2013

65607373

TABLE OF CONTENTS

Page

I. INTRODUCTION 1

II. BACKGROUND 5

A. CALIFORNIA'S WATER-ENERGY NEXUS 5

B. NOTABLE COMMISSION HISTORY WITH WATER-ENERGY NEXUS POLICIES AND PROGRAMS. 9

1. Commission Commits to Work Toward 10 Percent Reduction in Energy Consumption by Regulated Water Utilities in 2005 Water Action Plan. 9

2. Subsequent Commission Water Policy Rulemakings. 10

3. Commission Explores Water-Energy Nexus in 2006 Energy Efficiency Rulemaking. 10

4. Commission Approves Pilot Programs Between Energy IOUs and Public Water Agencies. 11

5. Commission Modifies D.07-12-050 to Include Pilot Programs Between Energy IOUs and Commission Regulated Water Utilities. 14

6. Commission Evaluates Water-Energy Nexus Pilot Programs. 17

7. Commission Orders Energy IOUs to Include Limited Water-Energy Nexus Programs in 2013-2014 Energy Efficiency Portfolios and Orders Staff to Develop Record to Overcome Barriers to Adoption and Deployment. 17

8. Commission Authorizes Inclusion of Local Government Regional Efficiency Pilots during 2013-2014 Period. 20

9. Commission Efforts to Develop a Statewide Methodology for Computing the Energy Embedded in Water. 23

C. BETTER THAN THE SUM OF THEIR PARTS: TAKING ADVANTAGE OF THE WATER-ENERGY NEXUS TO CREATE DUAL-FUNDED PARTNERSHIP PROGRAMS. 25

III. REQUESTED RELIEF 30

A. RECOMMENDED SCOPE OF PROCEEDING 30

B. JUSTIFICATION FOR REQUESTED RELIEF 32

1. Need for Methodology for Determining the Energy Embedded in Water Use. 32

2. Need for Methodology for Determining Water System Benefits. 32

3. Need for Methodology for Allocating Program Costs Among Partners. 33

4. Need to Address Barriers to Joint Funding of Water-Energy Nexus Programs for Different Categories of Partners. 33

5. Need to Determine Appropriate Ratemaking Treatment and/or Other Funding Mechanisms Available to Commission Regulated Water Utilities Participating in Water-Energy Nexus Programs Partnerships. 34

6. Need to Address the Availability of Additional State and/or Federal Funding. 34

7. Need for Coordination of Proposed Rulemaking with Current and Future Energy Efficiency Rulemaking Proceedings. 35

IV. PRIOR LITIGATION BEFORE THE COMMISSION OF THE ISSUES RAISED IN THIS PETITION 35

V. VERIFICATION OF FACTUAL ASSERTIONS 36

VI. COMPLIANCE WITH SERVICE AND FILING REQUIREMENTS 36

VII. CONCLUSION 37

I. INTRODUCTION

Pursuant to California Public Utilities Code section 1708.5, and Rule 6.3 of the California Public Utilities Commission's (Commission) Rules of Practice and Procedure (Rules), the Division of Ratepayer Advocates (DRA) submits this petition requesting that the Commission commence a rulemaking proceeding to develop a partnership framework between investor owned energy utilities (IOUs) and the water sector – both privately owned water utilities regulated by the Commission and public water and wastewater agencies – to co-fund programs that reduce energy consumption by the water sector in supplying, conveying, treating, and distributing water,[1] and by agricultural and industrial water customers.

Water and energy are inextricably linked. California has designated conservation and energy efficiency as first in the "loading order" of preferred resources for meeting the state's demand for electricity (before demand response and renewable energy).[2] Energy efficiency is also critical to meeting the greenhouse gas (GHG) emissions reduction goals required by the Global Warming Solutions Act of 2006 (Assembly Bill 32 or AB 32).[3] Because water-related energy use accounts for nearly 20 percent of the state's total energy requirements,

---

[1] *California's Water-Energy Nexus: Pathways to Implementation*, A White Paper by GEI Consultants, September 12, 2012 (referred to below as "GEI 2012"), at p. 16, *available at* http://www.geiconsultants.com/stuff/contentmgr/files/0/41a3b5d6d0c1d24e21a3a40c32c049c8/miscdocs/energy_nexus_white_paper_9_17_12_1.pdf (describing the three primary segments of the movement of water through managed infrastructure and end uses, or the water use cycle, as follows: (1) "Supply and Conveyance – the collection and transportation of water to treatment systems and/or distribution centers;" (2) "Treatment – of both water and wastewater; and, (3) "Distribution – of potable and recycled water to end uses.").

[2] See *Energy Action Plan,* adopted jointly by the California Public Utilities Commission, the California Energy Commission, and the California Consumer Power and Conservation Financing Authority in 2003 (EAP I), at p. 4, *available at* http://www.energy.ca.gov/energy_action_plan/2003-05-08_ACTION_PLAN.PDF; *Energy Action Plan II,* adopted in 2005 by the California Public Utilities Commission and the California Energy Commission (EAP II), at p. 2, *available at* http://www.energy.ca.gov/energy_action_plan/2005-09-21_EAP2_FINAL.PDF.

[3] Cal. Health & Safety Code §§ 38,500-38,599 (West 2008).

substantial energy savings are attainable in the water sector. Similarly, conservation and efficient use of water are essential to meeting the future demand for water in California and the state's water savings goals. The Water Conservation Act of 2009 (Senate Bill X7-7 or SB X7-7) requires a 20 percent reduction in per capita urban water use by the year 2020. Water-energy energy efficiency (EE) programs, or water-energy nexus programs, save water and energy, yet the existing policy structure only focuses on benefits to the energy sector and presents barriers to implementation of these worthwhile programs. To expeditiously implement water-energy nexus programs, DRA recommends the Commission investigate approaches that: (1) provide for joint funding of water-energy nexus programs by the benefiting entities; and, (2) consider cost effectiveness from a broader perspective by recognizing water, energy and GHG benefits..

In Decision (D.) 12-05-015, the Commission directed Commission Staff (Staff) "to develop a robust record in the 2013-2014 application proceedings or in [Rulemaking (R.) 09-11-014] or a subsequent energy efficiency rulemaking to address strategies to overcome barriers to adoption and deployment of water-energy nexus efficiency programs. . . . [including] appropriate methods for calculating energy savings and cost-effectiveness in the water-energy context, [and] issues associated with the *joint funding and implementation of water-energy programs by the IOUs and water entities* . . . ."[4] The most significant barrier to the expansion of water-energy nexus programs is the legal restrictions on the use of public funds that "hinder investments in cross-cutting programs,"[5] such as limitations on ratepayer funding of energy efficiency programs. As the Commission has previously explained, "[w]e are dedicated to incorporating water

[4] D.12-05-015, *Decision Providing Guidance on 2013-2014 Energy Efficiency Portfolios and 2012 Marketing, Education, and Outreach*, dated May 10, 2012, at p. 289 (italics added).

[5] GEI 2012, *supra* note 1, at p. 9.

conservation strategies in the utilities' energy efficiency programs *to the extent that* such strategies benefit the utilities' customers and are consistent with the overall cost-effectiveness of the energy efficiency programs."[6] The cost-effectiveness of water-energy nexus programs for energy ratepayers could be increased by fairly allocating and sharing costs between energy and water ratepayers instead of limiting funding to one sector.[7] Thus, if other sources of funding in addition to the energy IOU program could be identified to pay for water-energy nexus programs, then broader adoption and deployment could be achieved. To this end, staff of the California Energy Commission (CEC), the Policy and Planning Division of the California Public Utilities Commission, DRA, and other commentators recognize that the development and adoption of a framework for co-funding water-energy nexus programs that would allocate costs in proportion to the benefits realized by energy IOUs and their partners in the water sector is essential.[8]

---

[6] D.07-12-050, *Order Approving Pilot Water Conservation Programs Within the Energy Utilities' Energy Efficiency Programs*, dated December 20, 2007, at pp. 32-33 (italics in quote added).

[7] See *Embedded Energy in Water Studies Pilot Impact Evaluation*, ECO Northwest, March 9, 2011 (referred to below as "ECO Northwest 2011") (italics added in quote), at p. v, *available at*: http://www.cpuc.ca.gov/NR/rdonlyres/47665F26-AC6D-4DE6-8D32-ADA261B1C101/0/ECODRAFTWater_Pilots_EMV_Report_.pdf (noting that for pilot programs implemented by Pacific Gas and Electric Company (PG&E), San Diego Gas and Electric Company (SDG&E), and Southern California Edison Company (SCE) in partnership with public water agencies pursuant to D.07-12-050, where "the program costs are likely to exceed the energy benefits . . . . *Cost-effectiveness could be increased by reducing energy IOU program funding* levels and/or targeting programs to the most energy intensive water systems (e.g., Lake Arrowhead).").

[8] *California's Water-Energy Relationship*, Final Staff Report, California Energy Commission, November 2005 (referred to below as "CEC 2005"), at pp. 82-83 (recommending that interested state agencies should, among other things, "[s]eek opportunities for joint investment [in water-energy nexus programs] that could produce incremental energy benefits but are not deemed cost-effective on a single-utility resource cost test. . . . [and] [d]evelop analytical models and tools for policymakers, regulators, utilities, and other key stakeholders to use in developing cost-effective joint water and energy programs. . . . [and emphasizing that more must be done to] forge partnerships between the water and energy sectors [to] leverage the natural synergies of their joint resources and assets for the benefit of all Californians."); *Rethinking the Water Energy Nexus: Moving Toward Portfolio Management of the Nexus, Policy and Planning Division, California Public Utilities Commission*, January 16, 2013, *available at*

(continued on next page)

In order to allocate costs in proportion to the benefits realized by energy IOUs and their partners in the water sector from water-energy nexus programs, it is necessary to develop statewide methods or metrics for "calculating energy savings and cost-effectiveness in the water-energy context," as the Commission directed in D.12-05-015.[9] Further, in D.12-05-015, the Commission stated that the water-energy nexus programs to be proposed by the energy IOUs as part of their 2013-2014 energy efficiency portfolio applications should be designed to quantify embedded energy savings from all IOUs.[10] At present, however, there are no adopted statewide methods or metrics for how the energy savings embedded in water use should be measured and the lack of such a methodology prevents program costs from being proportionally allocated between partnering entities.[11]

(continued from previous page)
http://www.cpuc.ca.gov/PUC/aboutus/Divisions/ppd/ (click link for "Water Energy Nexus"), at p. 10 ("One of the underlying, though unstated, assumptions of the Nexus is that there should be some financial accounting mechanism that could account for the benefit to one sector due to savings in the other sector. For example, a water utility saves some additional water and an energy utility receives a benefit of lower energy demand from the utility. . . . For the Nexus, a new avoided cost calculation would have to account for not only energy but also water savings. Additionally this new method would also have to somehow separate the value of water savings from the value of energy savings in order to fairly attribute the cost and benefits to each sector. This accounting system currently does not exist. Developing this kind of framework and bridge of the regulatory as well as historical institutional divide is another and perhaps the largest challenge in the Nexus."); *DRA Comments in Response to Administrative Law Judge's Ruling Seeking Post-Workshop Comments on Demand-Side Cost-Effectiveness Issues*, R.09-11-014, October 1, 2012 (*citing* Haramati 2008) (stating, "[i]t seems . . . that the water-energy nexus programs are more likely to be cost-effective when they are jointly pursued and funded by several agencies that would individually benefit from water savings. This issue and the potential for agency partnerships merit further consideration, but it is not being addressed in any pending proceeding."); *Better than the Sum of their Parts: Taking Advantage of the Water-Energy Nexus to Create Dual-Funded Partnership Programs*, Mikhail Haramati, for 2008 ACEEE Summer Study on Energy Efficiency in Buildings (referred to below as "Haramati 2008"), attached hereto as Exhibit 1, at p. 11-128 (proposing that partnerships be created to fund water-energy programs "in which the costs can be allocated in the same proportion as the benefits are received.").

[9] D.12-05-015, at p. 289.

[10] *Id*.

[11] GEI 2012, *supra* note 1, at pp. 15-16; D.07-12-050, at p.30 (cautioning the before the Commission can accept that water-energy programs will yield cost-effective energy savings, "[w]e must . . . have a methodology that tells us the cost and benefits of cold water savings so that

(continued on next page)

Significantly, as detailed below in Section II(B)(9), the Commission and its staff have made considerable progress toward the development of a statewide methodology for computing the energy embedded in water use by engaging consultants to conduct a series of studies and through the ongoing efforts of the Energy Division. More specifically, the Energy Division conducted workshops in March of 2013 that addressed, among other issues, cost-effectiveness in the water-energy context, including a staff proposal for a comprehensive framework to determine costs and benefits to both water and energy ratepayers. Energy Division Staff have also publicly announced the formation of a Project Coordination Group to solicit stakeholder input on the development of avoided cost valuations for water and the overall cost-effectiveness framework proposed during the workshops. Energy Division's work to date on the water-energy nexus will be incorporated into the new proceeding.

Accordingly, in response to the Commission's directive in D.12-05-015 to develop a robust record that addresses "joint funding and implementation of water-energy programs by the IOUs and water entities," which, as explained, necessarily entails the development of a statewide methodology "for calculating energy savings and cost-effectiveness in the water-energy context," DRA respectfully submits this petition so that such an inquiry can be conducted in a new proceeding narrowly focused on this critical, threshold issue, with the active participation of potential partners from both the energy and water sectors.

II. BACKGROUND

A. California's Water-Energy Nexus

The "water-energy nexus" simply refers to the interdependent relationship between water and energy resources.[12] As the Commission explained in

---

(continued from previous page)
we and the utilities can determine the role of such savings in the overall energy efficiency portfolio.").

[12] *Id*. at p. 14 (noting that the relationship between the nation's energy and water resources is not

(continued on next page)

D.07-12-050, "[n]ot only does it take a great deal of energy to use water, it takes a tremendous amount of water to produce and deliver energy services. It is like a mirror within a mirror: to use less water means using less energy, which in turn further reduces the demand for water."[13] The concept of saving water while saving energy is all the more exciting given the magnitude of the potential savings that may be attained. In 2005, the CEC produced a report entitled "*California's Water-Energy Relationship*," that found water-related energy uses consumes 19 percent of the state's electricity, 32 percent of the state's natural gas, and more than 80 billion gallons of diesel fuel annually.[14]

Significantly, the CEC's 2005 white paper concluded that California could potentially save energy more cost-effectively than traditional energy efficiency measures by saving *cold water* and "allowing energy utilities to realize the value of energy saved for each unit of water saved,"[15] that is, the energy used by the water sector to supply, convey, treat, and distribute water that could be avoided by reduced water consumption, known as the "energy embedded in water."[16] By

---

(continued from previous page)
new: "it has been recognized for decades, primarily in [the] context of water's essential role in securing the nation's long-term energy future."). A recent example of federal interest in the water-energy nexus is evinced by "The Expanding Industrial Energy and Water Efficiency Incentives Act of 2012," a bipartisan bill currently pending before Congress that was introduced by U.S. Senators Jeff Bingaman, Olympia Snowe and Dianne Feinstein, which would, among other things, create federal tax credits of up to 30 percent for projects that increase water efficiency in manufacturing plants. *See* press release entitled "Bipartisan Bill Invests in Energy and Water Efficiency," on Senator Bingaman's website, *available at* http://www.bingaman.senate.gov/news/20120629-03.cfm.

[13] D.07-12-050, at p. 30.

[14] CEC 2005, *supra* note 8, at pp. 8, 77.

[15] *Id*. at pp. 79-80.

[16] *Embedded Energy in Water Studies Study 3: End-use Water Demand Profiles*, Prepared by Aquacraft, Inc. for the California Public Utilities Commission, Energy Division, April 29, 2011, at p.15, *available at* ftp://ftp.cpuc.ca.gov/gopher-data/energy%20efficiency/Water%20Studies%203/End%20Use%20Water%20Demand%20Profiles%20Study%203%20FINAL.PDF (defining "Energy Embedded in Water" as "[t]he amount of energy that is used to collect, convey, treat, and distribute a unit of water to end-users, and the amount of energy that is used to collect and transport used water for treatment prior to safe

(continued on next page)

contrast, hot water reduction measures that reduce energy used to heat water for end-use purposes, such as faucet aerators and hot water heaters, have been found to be cost-effective, and therefore, included in energy efficiency programs for some time.[17] As noted, in D.12-05-015, the Commission stated that the water-energy nexus programs to be proposed by the energy IOUs as part of their 2013-2014 energy efficiency portfolio applications should be designed to quantify embedded energy savings from all IOUs,[18] which would entail computing the energy inputs along all segments of the water use cycle, potentially transecting the service territories of multiple energy IOUs and water agencies. Unfortunately, as explained above, there are no statewide methods or metrics yet for how the energy savings embedded in water use should be measured and the lack of such a methodology is a major barrier to the broader adoption and deployment of water-energy nexus programs.[19]

The reduction of energy used by the water sector itself in supplying, conveying, treating and distributing water – in contrast to energy used by water customers during the consumption of water – has been the focus of past Commission efforts[20] and "is at the heart of California's regulatory water-energy

---

(continued from previous page)
discharge of the effluent in accordance with regulatory rules. Note that 'embedded energy' refers to cold, that is, unheated water. The energy it takes to heat water for purposes such as cooking or to generate steam is considered a separate category of activity. That is, energy used to heat water is not considered 'embedded.'").

[17] Haramati 2008, *supra* note 8, at p. 11-133.

[18] D.12-05-15, at p. 289.

[19] GEI 2012, *supra* note 1, at pp. 15-16; D.07-12-050, at p.30 (cautioning the before the Commission can accept that water-energy programs will yield cost-effective energy savings, "[w]e must . . . have a methodology that tells us the cost and benefits of cold water savings so that we and the utilities can determine the role of such savings in the overall energy efficiency portfolio.").

[20] See *e.g.*, D.07-12-050, at p. 8 (describing proposed pilot water conservation programs within the energy efficiency programs of PG&E, SDG&E, SCE, and Southern California Gas Company (SoCalGas) as focusing upon "cold water savings (related to the production, transportation, and treatment of water), [in contrast to] hot water savings (those related to reducing the use of energy
(continued on next page)

nexus debate."[21] This focus is appropriate given that substantial statewide energy benefits may be attained by reducing energy usage in the water sector.[22] About 40 percent of water-related electricity, or 8 percent of statewide annual electric consumption, is used by the water sector itself.[23] In fact, "[n]o other sector has as much potential to reduce summer peak demand, especially within energy challenged southern California."[24] In addition, the Commission recently directed the energy IOUs to develop proposals to increase their targeting of agricultural and industrial customers for the implementation of water-energy nexus programs "since they are the largest end users of water in the state."[25] Thus, the instant petition is focused upon the development of a partnership framework to co-fund water-energy nexus programs that reduce energy usage by the water sector itself, and by agricultural and industrial water customers of the energy IOUs.

In addition, on a policy level the scope of California's water-energy nexus includes climate-related impacts, such as GHG emissions.[26] The Assembly Bill 32 Scoping Plan (AB 32 Scoping Plan) identifies a savings potential of 2 million metric tons of carbon dioxide ($MMTCO_2E$) from water system energy efficiency

---

(continued from previous page)
to heat water for end-use purposes).") See *id*. at p. 100, Ordering Paragraph No. 2 (approving implementation of the pilot programs).

[21] GEI 2012, *supra* note 1, at p. 16.

[22] *Id*. at 31.

[23] *Embedded Energy in Water Studies, Study 1: Statewide and Regional Water-Energy Relationship*, GEI Consultants and Navigant Consulting for the California Public Utilities Commission, August 31, 2010, Appendix N, at p. N-5, *available at* http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/EM+and+V/Embedded+Energy+in+Water+Studies1_and_2.htm.

[24] GEI 2012, *supra* note 1, at p. 31.

[25] D.12-05-015, at p. 423, Ordering Paragraph No. 113.

[26] GEI 2012, *supra* note 1, at p.7.

by 2020 and another 1.9 $MMTCO_2E$ in savings from water use efficiency, water recycling, and stormwater use.[27]

B. Notable Commission History with Water-Energy Nexus Policies and Programs.

1. Commission Commits to Work Toward 10 Percent Reduction in Energy Consumption by Regulated Water Utilities in 2005 Water Action Plan.

The Commission adopted its first Water Action Plan in 2005 (Water Action Plan or Plan). In the Water Action Plan, the Commission committed to strengthen water conservation programs to a level comparable to the energy efficiency achieved by the gas and electric IOUs, with an emphasis on considering and identifying policies and practices to reduce water and energy consumption.[28] The Water Action Plan specifically targets a 10 percent reduction in energy consumption by water utilities and emphasizes the importance of reducing the amount of energy needed by water utilities for water pumping, purification systems, and other waste processes such as desalination.[29] Moreover, the Plan supports programs to reduce energy waste by water utilities from causes such as system leaks, poorly maintained equipment, defective meters, unused machines left idling, and improperly operated systems.[30]

In furtherance of these goals, the Commission's Rate Case Plan (RCP) for Class A water utilities, as revised in 2007 by D.07-05-062, provides that General Rate Case (GRC) applications must address each utility's energy conservation and

---

[27] *Climate Change Scoping Plan: a framework for change*, December 2008, Pursuant to AB 32, the California Global Warming Solutions Act of 2006, California Air Resources Board, at p. 66, Table 22: Water Recommendation, *available at* http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf.

[28] Water Action Plan, California Public Utilities Commission, December 15, 2005, *available at* ftp://ftp.cpuc.ca.gov/PUC/hottopics/3water/water_action_plan_final_12_27_05.pdf (referred to below as "2005 Water Action Plan"), at pp. 4, 7-11.

[29] *Id*. at pp. 10-11.

[30] *Id*. at p. 11.

efficiency efforts, including the identification and assessment of "options to achieve reductions in energy use related to its water utility operations over the proposed GRC cycle . . . to achieve a ten percent reduction in energy use per [centum cubic-feet] Ccf."[31]

2. Subsequent Commission Water Policy Rulemakings.

In 2007, the Commission opened an investigation to "Consider Policies to Achieve the Commission's Conservation Objectives for Class A Water Utilities"[32] that resulted in conservation rate designs, revenue decoupling mechanisms and water savings targets for Class A water utilities.[33] In 2010, the Commission instituted R.10-11-014 to consider a comprehensive policy framework for recycled water for Class A and Class B water utilities and similarly sized sewer utilities.[34] R.10-11-014 is ongoing and includes consideration of how the Commission's recycled water policies should consider California's water use efficiency and energy efficiency goals.[35]

3. Commission Explores Water-Energy Nexus in 2006 Energy Efficiency Rulemaking.

Following the CEC's landmark finding that water-related energy uses account for 19 percent of the state's total energy requirements, D.05-09-043 directed the assigned Commissioner to "explore the issue of counting embedded energy savings associated with water efficiency in informal or formal procedural vehicles in our rulemaking proceeding . . . ."[36] In R.06-04-010, the Commission

---

[31] D.07-05-062, *Opinion Adopting Revised Rate Case Plan for Class A Water Utilities*, dated May 24, 2007, Appendix A, at pp. A-29, A-30.

[32] I.07-01-022, *Order Instituting Investigation to Consider Policies to Achieve the Commission's Conservation Objectives for Class A Water Utilities*, dated January 16, 2007.

[33] [Citation needed]

[34] R.10-11-014, *Order Instituting Rulemaking to Consider a Comprehensive Policy Framework for Recycled Water*, dated November 19, 2010.

[35] *Id*. at pp. 2, 11.

[36] D.05-09-043, at pp. 167-168.

noted "embedded (or 'upstream') energy savings associated with water efficiency" had been previously identified in D.05-09-043 as an area that merited further exploration.[37] In a scoping ruling in that proceeding, dated May 24, 2006, the assigned Commissioner determined that it would be appropriate to convene workshops and receive written comments addressing the propriety of modifying the Commission's Energy Efficiency Policy Rules to include embedded energy in water savings, and the methodology that should be used to compute such energy savings.[38] Significantly for present purposes, the scoping ruling also stated "at some point in the rulemaking or another forum, as appropriate, the Commission should begin looking at the broader context for water-related savings, including the implementation of new water conservation measures not currently undertaken by either energy or water utilities, as well as related issues *such as program co-funding by water agencies and energy utilities*."[39]

4. Commission Approves Pilot Programs Between Energy IOUs and Public Water Agencies.

Most of the parties that submitted comments in response to the May 26, 2006 scoping ruling requested the Commission approve pilot programs for the 2006-2008 energy efficiency program cycle "to explore the potential for future programs to capture water-related embedded energy savings."[40] Following the submission of comments and reply comments, workshops, and preparation and service of testimony, in D.07-12-050 the Commission ordered the four largest energy IOUs to partner with public water agencies in developing one-year pilot proposals "to conserve water and improve the efficiency of water."[41] The IOUs

---

[37] R.06-04-010, at p.7.

[38] *Assigned Commissioner's Ruling and Scoping Memo and Notice of Phase 1 Workshops on Risk/Return Incentive Mechanism*, dated May 26, 2006, R.06-04-010, at pp. 13-15.

[39] *Id*. at p. 7 (italics in quote added).

[40] D.07-12-050, at p. 9.

[41] *Id*. at pp. 100-101, Ordering Paragraph No. 2.

were also ordered to provide funds for evaluations of the pilots and studies designed to: (1) validate claims that saving water can save energy; and, (2) explore whether embedded energy savings associated with water use efficiency are measurable and verifiable. Thus, D.07-12-050 approved numerous pilot programs, evaluations and studies totaling $6.37 million for the energy IOUs.[42]

Notably, the Commission's Energy Division developed an "embedded energy in water calculator," that was patterned after the E3 calculator used to determine the cost-effectiveness of Commission-funded energy efficiency measures, to aid in the Commission's ultimate selection of particular pilot programs.[43] As explained by the Commission,

> Like the E3 energy efficiency calculator, which is used to review most proposed energy efficiency programs, the water energy calculator produces a total resource cost number to determine cost-effectiveness. This number is created by comparing costs and benefits, with benefit represented by avoided costs. The number is a ratio where a value of one (1), or above, indicates the item has more benefits than it costs, and a value below one (1) means the item costs more than it produces in benefits.[44]

Based on the cost-effectiveness calculations submitted by all four energy IOUs, the Commission determined "all utility pilot portfolios have ex-ante cost-effectiveness ratios of less than one."[45] The Commission recognized, however,

---

[42] D.08-11-057, *Decision Addressing Petitions for Modification of Decision 07-12-050*, dated November 21, 2008, at p. 2.

[43] D.07-12-050, at pp. 38-45.

[44] *Id*. at pp. 42-43; *id*. at p. 94, Finding of Fact No. 11.

[45] *Id*. at p. 45. Elsewhere in the decision, the Commission identifies one potential program that "has a preliminary Total Resource Cost of 1 or above." *Id*. at p. 58 (referencing the SoCalGas portion of the Lake Arrowhead/SCE water conservation partnership, but cautioning: "it is unclear whether the apparent benefits of the SoCalGas portion are actually a byproduct of SCE's participation. In other words, it is unclear whether SoCalGas is taking credit for savings that come as a result of SCE's contribution to the program."). In any event the referenced pilot program, the Lake Arrowhead Water Conservation Project, was cancelled on SCE's request by

(continued on next page)

that "[b]ecause this is a new area of investigation, we do not have the benefit of an established body of knowledge on the issue of energy embedded in water to use as a foundation."[46] Thus, the Commission approved the pilots despite its determination that the programs would not be cost-effective.

Significantly, the four energy IOUs approached the sharing of program costs with their partners in different ways.[47] As explained by Mikhail Haramati in her white paper titled "Better than the Sum of their Parts: Taking Advantage of the Water-Energy Nexus to Create Dual-Funded Partnership Programs,"

> Some initially allocated the costs based on the advice of their partner water agencies and the availability of pilot funding, while others examined the potential energy benefits of water saved and developed a rough estimate of how much they would be able to pay for a given amount of energy saved. PG&E chose to pay a price per kilowatt-hour (kWh) saved, and commissioned a study . . . to determine the embedded energy in the water provided by specific municipalities in their service territory. Alternately, SCE approached the pilot partnerships as exploratory and initially established a 50/50 relationship for co-funding.[48]

In addition, Haramati notes, the development of the embedded energy in water calculator "allowed the utilities to adjust levels of co-funding to more accurately reflect the preliminary calculations of benefits."[49]

(continued from previous page)
D.08-11-057. D.08-11-057, at pp. 25-29, Ordering Paragraph No. 2.

[46] *Id*. at p. 93, Finding of Fact No. 4.

[47] Haramati, *supra* note 8, at p. 11-130.

[48] *Id*. (citing *Supply and Demand Side Water-Energy Efficiency Opportunities*, Green Building Studio, Santa Rose, California, 2007, *available at*: ftp://ftp.cpuc.ca.gov/PUC/energy/electric/energy+efficiency/pgewaterenergyfinalreport21607.pdf

[49] *Id*.

5. Commission Modifies D.07-12-050 to Include Pilot Programs Between Energy IOUs and Commission Regulated Water Utilities.

The California Water Association (CWA) filed a petition for modification of D.07-12-050 requesting $1.33 million for pilot operational energy efficiency programs to be implemented by the energy IOUs in partnership with Commission regulated water utilities.[50] CWA filed the petition on behalf of six water utilities regulated by the Commission.[51] CWA proposed "operational energy efficiency programs to demonstrate potential improvements in wire-to-water operational efficiency when the appropriate combination of induction motors, pumps, variable frequency drives and Supervisory Control and Data Acquisition (SCADA) systems are operated at their optimal efficiency levels."[52] The overall goal of the proposed programs was to achieve and document "at least a 10 [percent] differential optimal energy efficiency," consistent with the goal set forth in the Water Action Plan.[53]

Although the Commission denied CWA's petition on procedural grounds, it determined that the proposed programs "have merit, are consistent with our energy efficiency objectives, and are worthwhile to help us understand embedded energy in the use of water."[54] More specifically, the Commission explained that the pilot programs "move us significantly forward in our goal of determining whether less energy intensive water measures should be funded with electric utility energy efficiency dollars" because they fill "a critical void" by targeting the efficiency of water delivery and treatment systems, a strategic category unaddressed by the pilot

---

[50] D.08-11-057, at pp. 1, 5.

[51] *Id*. at p. 5.

[52] *Id*. at pp. 5-6.

[53] *Id*. at p. 6.

[54] *Id*. at p. 20.

programs approved in D.07-12-050.[55] Therefore, the Commission, on its own motion, amended D.07-12-050 to include the pilots proposed in CWA's Petition.[56]

Significantly, CWA proposed that the energy IOUs would provide the initial capital for the pilot programs.[57] CWA justified this arrangement by asserting that if the pilots were successful in demonstrating energy savings and the program was ultimately expanded, it would benefit all of the energy IOUs' ratepayers.[58] Moreover, CWA claimed that the water utilities lack access to the funding mechanisms available to the energy IOUs for such programs.[59]

PG&E, SCE, DRA and The Utility Reform Network (TURN) opposed CWA's proposal to impose all program costs on energy ratepayers.[60] Specifically, DRA and TURN argued that CWA's proposal would be inequitable to energy ratepayers "because the water utilities have already been funded through their general rate cases to make the capital improvements they now request energy ratepayers subsidize."[61]

The Commission ultimately sided with CWA, reasoning:

> The direct benefits, in the form of lower energy costs, of the programs would accrue to the water companies and their ratepayers. Ratebase will decrease because of plant retirements – further accruing benefits to

---

[55] *Id*. at p. 20; *id*. at p. 19 (explaining that in D.07-12-050 the Commission "set forth a three-prong energy efficiency strategy that we wanted to achieve: (1) conserve water, (2) use less energy-intensive water, and (3) make delivery and treatment systems more efficient. Of the 12 programs adopted by the decision, ten fell under the first strategic goal of water conservation, two programs fell under the second strategic goal and no programs were proposed for the third strategic goal. The decision expressed its disappointment that the energy utilities did not propose any programs for the third strategy.").

[56] *Id*. at p. 25, Ordering Paragraph No. 2.

[57] *Id*. at p. 6.

[58] *Id*.

[59] *Id*.

[60] *Id*. at pp. 6-7.

[61] *Id*. at p. 6.

> ratepayers but representing a loss of revenue for the water companies. As new equipment funded by this program would not be eligible to earn a return [since the existing equipment, *e.g*., an existing pump, will not have reached the end of its useful life at the time of replacement], water companies would in fact contribute to the program through lost revenues. If the water utilities achieve the stated goal in the Petition of 10 [percent] energy savings, energy utilities would gain an indirect benefit from a decreased demand for electricity.

Further, the Commission explained that not all of the pilot programs between energy IOUs and public water agencies originally adopted in D.07-12-050 had a "joint-funding component."[62] The Commission also emphasized that "[t]here was no requirement to demonstrate benefit for energy customers [from the original pilot programs]."[63] In addition, the Commission noted that the combined cost of both sets of pilot programs – the programs between the energy IOUs and public water agencies, and the programs between the energy IOUs and Commission regulated water utilities – was $7.70 million, "well below the original statewide target budget [for water-energy nexus pilots of about $10 million]."[64]

---

[62] *Id*. at p. 17 (noting, while the pilot programs adopted in D.07-12-050, "typically have a joint-funding component, this is not so in every case. For example, in the 'Emerging Technologies to Improve Water System Efficiency,' we directed PG&E to spend $341,000 to support three water agencies to include water flow and energy monitoring for their SCADA systems.").

[63] *Id*. at p. 18 (stating, the energy IOUs "argue that existing energy efficiency programs require a benefit for energy customers, so CWA's proposal cannot be solely funded by energy customers. This is a red herring. The intent of the pilot programs [originally approved by D.07-12-050] was to determine whether water conservation and less energy intensive water measures should be funded with utility energy efficiency dollars. There was no requirement to demonstrate benefit for energy customers. If there had been, most, if not all, of the pilot programs adopted by D.07-12-050 would not have qualified. And for this very reason, we allocate Evaluation dollars to measure the results of the pilot programs.").

[64] *Id*. at p. 18.

6. Commission Evaluates Water-Energy Nexus Pilot Programs.

Initial preliminary results from the pilots conducted by the energy IOUs and Commission regulated water utilities, known as the Operational Energy Efficiency Program, or OEEP, showed promising energy efficiency gains from the operation of well pump and motor combinations at optimal efficiency levels using specialized software.[65] However, the final results showed that at a majority of the sites, the OEEP did not produce efficiency savings sufficient to offset the additional losses of 2-5 percent associated with the new variable frequency drive hardware that had been installed under the program.

By contrast, the evaluation of the pilots undertaken between energy IOUs and public water agencies pursuant to D.07-12-050 showed more promising results. More specifically, the evaluation concluded that "SCE's Leak Detection program appears to offer the greatest energy savings potential (at relatively low cost) among all the Pilot programs."[66] Accordingly, the parties to R.09-11-014, the successor proceeding to R.06-04-010, and the Commission's current energy efficiency Rulemaking,[67] recommended that leak detection and pressure management programs, another relatively low cost measure, be offered by the energy IOUs during the 2013-2014 period.[68]

7. Commission Orders Energy IOUs to Include Limited Water-Energy Nexus Programs in 2013-2014 Energy

---

[65] *Energy Use in Water*, California Public Utilities Commission website, *available at* http://www.cpuc.ca.gov/PUC/Water/oeep/. See also *California Public Utilities Commission, Operational Energy Efficiency Program (OEEP): Final EM&V Report*, September 30, 2011, *available at* http://www.cpuc.ca.gov/NR/rdonlyres/DC525F78-E78B-4F77-B682-059698390241/0/OEEP_Final_Report_9_30_11.pdf.

[66] ECO Northwest 2011, *supra* note 7, at p. 139.

[67] On November 25, 2009, the Commission initiated R.09-11-014 to address the policies, programs and evaluation, measurement and verification activities related to the post-2008 energy efficiency activities. This Rulemaking also served as the forum for initiating the next planning cycle for 2013-2015 energy efficiency program plans, funding levels, and related issues.

[68] D.12-05-015, at p. 287.

Efficiency Portfolios and Orders Staff to Develop Record to Overcome Barriers to Adoption and Deployment.

In D.12-05-015, the Commission cautioned, "[i]t is not prudent to spend significant amounts of ratepayer funds on expanded water-energy nexus programs until the cost-effectiveness of these programs, and particularly the net benefits that accrue to energy utility ratepayers, are better understood."[69] However, the Commission stated that given the potential for energy savings identified in the pilots, "we will pursue three sets of activities during the 2013-2014 period to support the potential expansion of such programs in the 2015+ timeframe."[70]

First, the Commission directed the energy IOUs to develop proposals to increase targeting of agricultural and industrial customers "since they are the largest end users of water in the state."[71] Moreover, the Commission ordered the energy IOUs to "propose to continue to offer measures and services to the water sector through their calculated energy efficiency savings programs in the 2013-2014 portfolio, as they currently do."[72]

Second, the Commission ordered the energy IOUs to propose leak-loss detection and remediation programs and pressure management services to water entities that are IOU customers during the 2013-2014 period.[73] This was to be done through limited, pilot programs focused on the water sector, or through targeted efforts within the existing calculated savings programs.[74] The decision emphasized that the current efforts should build on the results of the previous

---

[69] *Id*.

[70] *Id*.

[71] *Id*. at 288; *id* at 423, Ordering Paragraph No. 113.

[72] *Id*. at 423, Ordering Paragraph No. 114.

[73] *Id* .at p. 423, Ordering Paragraph No. 115.

[74] *Id*.

pilots.[75] The Commission stated that the proposed programs or projects "should be designed to calculate reductions in water consumption, quantify embedded energy savings, and capture water and energy avoided costs to support cost-effectiveness determinations."[76]

Third, as noted, the Commission directed Staff to,

> develop a robust record in the 2013-2014 application proceedings or in this or a subsequent energy efficiency rulemaking to address strategies to overcome barriers to adoption and deployment of water-energy nexus efficiency programs. The record should address appropriate methods for calculating energy savings and cost-effectiveness in the water-energy context, *issues associated with the joint funding and implementation of water-energy programs by the IOUs and water entities*, and the development of an updated water-energy cost-effectiveness calculator and appropriate methodologies for calculating the [greenhouse gas] emission reductions associated with water-energy nexus programs.[77]

In accordance with D.12-05-015, the energy IOUs submitted proposals for water-energy nexus programs in the 2013-2014 application proceedings. The assigned Commissioner and Administrative Law Judge ultimately determined that it was necessary for the energy IOUs to file supplemental information, including more specific descriptions of proposed water-energy nexus programs.[78] The energy IOUs submitted the requested supplemental information.[79]

---

[75] *Id*. at 289.

[76] *Id*.

[77] *Id*. (italics in quote added).

[78] *Scoping Memo and Ruling of Assigned Commissioner and Administrative Law Judge*, A.12-07-001, A.12-07-002, A.12-07-003, A.12-07-004, filed August 27, 2012, at p. 8 (Attachment A to the Scoping Memo and Ruling contains Question 49, at page 10 of the attachment, which pertains to the energy IOUs' water-energy nexus proposals).

[79] See *e.g.*, *Pacific Gas and Electric Company's (U 39 M) Response to Request for Supplemental Information in Scoping Memo and Ruling*, A.12-07-001, September 5, 2012.

Significantly, neither the proposals for water-energy nexus programs contained in the original applications filed by the energy IOUs for the 2013-2014 period, nor the supplemental information furnished in response to the request by the Assigned Commissioner and Administrative Law Judge, comprehensively address "issues associated with the joint funding and implementation of water-energy programs by the IOUs and water entities."[80] Thus, pursuant to the Commission's directive in D.12-05-015, Staff is still required to develop a robust record on this issue in R.09-11-014, or in a subsequent energy efficiency rulemaking.

8. Commission Authorizes Inclusion of Local Government Regional Efficiency Pilots during 2013-2014 Period.

In D.12-05-015, the Commission authorized the inclusion of local government regional network pilots in the 2013-2014 transition portfolio, after concluding that many local governments are currently better positioned to administer energy efficiency programs than they were seven years ago, in 2005, when the Commission decided to forego local government administration.[81] As the Commission explained, "[s]ince local governments began implementing utility energy efficiency programs in 2004, many have become experienced in the energy efficiency field either through their implementation of utility programs or independent efforts initiated at the local level."[82] D.12-05-015 cited four benefits

---

[80] *See* Proposed Decision (PD) for A.12-07-001 et al., dated October 9, 2012, at p. 4 (notably, the PD does not explicitly address the water-energy nexus programs proposed by the energy IOUs for the 2013-2014 period, but does state "[f]or issues proposed in the applications of the [energy IOUs] . . . if they are not directly addressed or deferred in this proposed decision, then those aspects of the proposals are deemed to be approved."). See also *Decision Approving 2013-2014 Energy Efficiency Programs and Budgets*, D. 12-11-015, November 8, 2012 (although the final decision does authorize particular water-energy nexus programs, it does not comprehensively address "issues associated with the joint funding and implementation of water-energy programs by the IOUs and water entities.").

[81] D.12-05-015, at pp.147-148.

[82] *Id*. at p. 147.

of local government regional networks identified by the Local Government Sustainable Energy Coalition (LGSEC):

- Provide missing technical resources that will get more projects implemented;
- Include more public agencies in project implementation;
- Leverage existing local government partnerships to implement these resources; and
- Provide centralized, regional program management and administration by local governments.[83]

Thus, the Commission encouraged local governments to submit project implementation plans (PIP) and budgets for proposed regional projects in the 2013-2014 applications proceedings that "showcase how the pilot would support the identified benefits of local government program administration as described by LGSEC in its comments."[84] Specifically, local government applicants were directed to demonstrate the extent to which the proposed regional pilots:

- Leverage additional state and federal resources so that energy efficiency programs are offered at lower costs to ratepayers;
- *Address the water/energy nexus;*
- Develop and deploy new and existing technologies;
- Address workforce training issues; and
- Address hard-to-reach customer segments such as low to moderate residential households and small to medium sized businesses.[85]

---

[83] *Id*. at 146 (citing *Comments of the Local Government Sustainable Energy Coalition on "Administrative Law Judge's Ruling Regarding Guidance for the 2013-2014 Energy Efficiency Portfolio,"* R.09-11-014, December 23, 2011). *See* WETCAT Water Energy Strategy 2012-2014, the Water Energy Team of the Climate Action Team (WETCAT) (italics added), *available at* http://www.climatechange.ca.gov/climate_action_team/reports/wetcat/WETCAT_Water_Energy_Strategy_2012-2014.pdf (The WETCAT also sees great potential in regional water-energy nexus efforts: "[t]he WETCAT believes mitigating and adapting to climate change *will occur most efficiently at the regional level* where local water and energy agencies can efficiently pool resources and know-how to address issues that will inevitably cross local boundaries.").

[84] *Id*. at p. 149.

[85] *Id*. at pp. 149-150 (italics added).

Significantly, LGSEC commented that "[t]he local government regional network approach anticipates and welcomes participation by entities such as water agencies and irrigation districts," that have not previously been eligible to participate in the local government partnership program.[86] In R.09-11-014, a number of local water agencies and irrigation districts commented that the local government partnership program should be expanded to include such public agencies, asserting that "like cities and counties, these agencies have the ability to contribute to energy market transformation through several means: (a) they are large energy consumers that have the potential to reduce their own energy consumption; (b) they can encourage their constituents to become energy efficient as well, and (c) they can adopt policies, programs, codes, and standards that may help to accelerate energy efficiency adoption within their respective jurisdictions."[87]

Notably, in their comments the Inland Empire Utilities Agency (IEUA) and Irvine Ranch Water District (IRWD) referenced water-energy nexus programs that have either been completed, or are currently in progress.[88] And in the recent white paper produced by GEI Consultants, Inc. titled "California's Water-Energy Nexus: Pathways to Implementation," several of IEUA's efforts are presented as

---

[86] *Reply Comments of the Local Government Sustainable Energy Coalition on "Administrative Judge's Ruling Regarding Guidance for the 2013-2014 Energy Efficiency Portfolio,"* R.09-11-014, January 6, 2012, at p. 3. *See* D.12-05-015, at p. 142 (explaining, "[i]n the 2010-2012 program cycle, $370 million was spent to fund partnerships with local governments, state entities, and institutions. There are 86 local government partnerships statewide . . . .").

[87] *Comments of Irvine Ranch Water District on Administrative Law Judge's Ruling Regarding Program Guidance for the 2013-2014 Energy Efficiency Portfolio*, R.09-11-014, December 27, 2011 (referred to below as "IRWD Comments"), at p. 4. See also *Comments of Inland Empire Utilities Agency on Administrative Law Judge's Ruling Regarding Program Guidance for the 2013-2014 Energy Efficiency Portfolio*, R.09-11-014, December 27, 2011 (referred to below as "IEUA Comments"), at pp. 8-9; *Comments of the West Basin Municipal Water District on Administrative Law Judge's Ruling Regarding Program Guidance for the 2013-2014 Energy Efficiency Portfolio*, R.09-11-014, December 21, 2011, at pp. 5-6.

[88] IEUA Comments, *supra* note 87, at p. 3; IRWD Comments, *supra* note 87, at p. 2.

paradigms that demonstrate significant energy savings attainable from water-energy nexus programs.[89]

9. Commission Efforts to Develop a Statewide Methodology for Computing the Energy Embedded in Water.

Although there are no adopted methods or metrics yet for how the energy savings embedded in water use should be measured, the Commission and its staff have made considerable progress toward the development of a statewide methodology for computing the energy embedded in water by engaging consultants to conduct a series of studies and through the ongoing efforts of the Commission's Energy Division (Energy Division).

More specifically, as noted above in Section II(B)(4), in D.07-12-050 the Commission authorized three studies designed to: (1) validate claims that saving water can save energy; and (2) explore whether embedded energy savings associated with water use efficiency are measurable and verifiable.[90] The first study – *Embedded Energy in Water Studies Study 1: Statewide and Regional Water-Energy Relationship* – aimed to understand and quantify the primary

---

[89] GEI 2012, *supra* note 1, at p. 23 (discussing IEAU's production and use of recycled water within its service area and the energy efficiency achieved by offsetting the use of imported State Water Project water supplies: "by accelerating its capital investments in recycled water infrastructure, IEAU increased production of low energy intensity local water supplies to (0 kWh/AF) for the parched Chino Basin, while concurrently avoiding the amount of energy embedded in higher energy intensity water supplies that were no longer needed."); *id*. at 26 (discussing changes to water systems, facilities, and operations to increase energy efficiency and citing the following example: "[IEAU] has two wastewater treatment plants that are linked by sewers, enabling shifting treatment loads from one plant to another. During the 2001 energy crisis, IEUA was able to re-route flows to reduce its electricity use during peak demand periods.").

[90] The three Energy Embedded in Water Studies authorized by the Commission in D.07-12-050 are *available at* http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/EM+and+V/Embedded+Energy+in+Water+Studies1_and_2.htm. Notably, the Commission engaged the California Institute for Energy and Environment (CIEE) to manage the three studies. The Commission selected GEI Consultants, Inc. and Navigant Consulting, Inc. to conduct the first two studies, and Aquacraft, Inc. to conduct the third study.

predictors of energy consumption related to water supply systems.[91] The second study – *Embedded Energy in Water Studies Study 2: Water Agency and Function Component Study and Embedded Energy-Water Load Profiles* – developed and refined methodologies for calculating energy intensity and embedded energy and examined energy load profiles to understand time-of-use of energy in the water sector.[92] The third study – *Embedded Energy in Water Studies Study 3: End-use Water Demand Profiles* – was conducted to provide more accurate hourly waste use profile data than had previously been available.

Further, on March 20-21, 2013, the Energy Division hosted workshops on programs and cost-effectiveness related to the water-energy nexus at the Commission. These workshops were held in response to the directive in D.12-05-015 to develop "a robust record . . . to address strategies to overcome barriers to adoption and deployment of water-energy nexus efficiency programs. . . . [including, among other issues] appropriate methods for calculating energy savings and cost-effectiveness in the water-energy context . . ."[93] The first day of the workshops was focused on information sharing between energy IOUs and water agencies to better understand what water-energy nexus programs are currently running. The purpose of this discussion was to identify best practices and specific programs and partnership models that have potential to move beyond the pilot stage and that may be appropriate for statewide implementation. On the second day of workshops, Energy Division presented a framework for analyzing the cost effectiveness of water-energy nexus programs and solicited stakeholder

---

[91] See *Navigant CPUC Embedded Energy in Water Studies*, presentation at March 20-21, 2013 workshops at the Commission on programs and cost-effectiveness related to the water-energy nexus hosted by the Energy Division, *available at* http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/Water-Energy+Nexus+Programs.htm.

[92] D.12-05-015, at 289.

[93] *Id*. (italics in quote added).

feedback on the proposal.[94] Drawing a connection between the first and second day of the workshops, Energy Division staff emphasized that a cost-effectiveness framework for water-energy nexus programs would allow energy IOUs to allocate water-energy nexus program costs in proportion to benefits realized by energy IOUs and partnering water agencies and water utilities, and thereby facilitate more precise evaluation of potential partnership opportunities.

The Energy Division has moved forward with the development of the cost-effectiveness framework proposed at the workshops by forming a Project Coordination Group to solicit stakeholder input and releasing a draft Research Roadmap that identifies numerous, recommended changes to the existing, overall cost-effectiveness framework, including the addition of avoided costs related to water.

C. Better than the Sum of their Parts: Taking Advantage of the Water-Energy Nexus to Create Dual-Funded Partnership Programs.

Mikhail Haramati's 2008 white paper titled "Better than the Sum of their Parts: Taking Advantage of the Water-Energy Nexus to Create Dual-Funded Partnership Programs," addresses a fundamental public policy dilemma: how to fund programs where the benefits accrue to more than one agency, but are not cost-effective from any one agency's perspective.[95] In her white paper, Haramati recommends a practical solution – the creation of "partnerships in which the costs can be allocated in the same proportion as the benefits are received."[96] Haramati uses the example of the water-energy nexus pilot programs originally approved in

---

[94] *Energy Division Staff Proposal for a Water/Energy Cost-Effectiveness Framework,* available at http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/Water-Energy+Nexus+Programs.htm. Notably, the Energy Division has dedicated staff on loan from the State Water Resources Control Board tasked with addressing water-energy nexus issues, including cost-effectiveness and energy IOU demand side programs for water customers.

[95] Haramati 2008, *supra* note 8, at p. 11-128.

[96] *Id*.

D.07-12-050 between the energy IOUs and public water agencies (pilot programs) to demonstrate the following four steps in the creation of such partnerships.[97]

- Identifying programs or actions likely to be cost-effective but that are not cost-effective for any one agency to implement alone.
- Creating funding partnerships between agencies likely to receive benefits.
- Identifying a method for determining the costs and benefits. If funds are required to do this, a means of sharing these initial costs must also be developed. Benefits must then by compared with the costs to determine whether the program or action is indeed likely to be cost-beneficial.
- If the program or action is likely to be cost-effective, determine the allocation of costs across benefitting entities. This is done by creating a methodology for allocating costs once the benefits become known.[98]

The white paper chronicles how each of these steps played out in the initiation and development of the pilot programs. First, Haramati observes "[b]efore a partnership can be formed . . . a program or program area needs to be identified where savings are likely to occur."[99] In the case of the pilot programs, the Commission recognized the "potential for water efficiency programs that could save both water and energy" and then ultimately directed the energy IOUs to partner with public water agencies and submit applications for one-year pilots.[100] Further, the Commission developed the embedded energy in water calculator

[97] *Id*.

[98] *Id*. at pp. 11-128, 11-129.

[99] *Id*. at p. 11-129.

[100] *Id*.

(calculator) "to aid the utilities [and itself] in selecting water efficiency programs likely to be cost-effective from an energy perspective."[101]

Next, Haramati explains that once a program has been identified that is likely to be cost-effective, the lead agency must determine appropriate partner criteria.[102] Here, the Commission identified municipal water agencies as having the most potential to save water.[103] In addition to high potential for energy savings, other criteria relied upon were: "willingness of the partner to provide co-funding; water agency interest; water agency location; ability to quickly develop and implement a water-use reduction program; availability of staff resources, etc."[104] As noted, the energy IOUs approached the allocation of program costs with their partners in different ways.[105]

Third, as noted, the Commission created the calculator "to quantify the likely energy benefits and costs of the proposed pilot programs."[106] According to Haramati, the main drawback of the calculator is that it "only calculates the energy benefits without attempting to determine water system benefits to the partner water agency."[107] As Haramati explains,

> [a]lthough it has the capability to do so, this calculator is not being used to determine the benefits to the water agency co-funding the programs. Determination of water benefits requires the development of water

---

[101] *Id*.

[102] *Id*. at 11-130.

[103] *Id*.

[104] *Id*.

[105] *Id*. See *supra* Section II(B)(4).

[106] Haramati 2008, *supra* note 8, at p. 11-130.

[107] *Id*. at pp. 11-130, 11-131 (explaining that the calculator "was developed to be used as a tool in the selection of pilot programs for specific water agencies to determine which measures could pass a measure-level cost-effectiveness test. The main drawback of this approach is that the calculator, in its current form, only calculates the energy benefits without attempting to determine water system benefits to the partner water agency.").

> agency specific avoided water costs based on the agency's extra-marginal, or likely next source of water. Although critical for translating water benefits into dollars, identifying an agency's likely next water source is not always easy.[108]

Last, Haramati states that the Commission "has not yet given direction on the appropriate allocation of program costs among partners."[109] Haramati suggests the use of a Program Administrator Cost (PAC) model[110] as a way to produce cost-effective savings for both water and energy partners.[111] Notably, the PAC model enables participating agencies to "calculate cost-effectiveness independently of any benefits received by their partner when evaluating whether to participate in a program."[112] In the example presented, the program is neither cost-effective for a single agency to implement alone, nor with two agencies sharing costs.[113] However, the program becomes cost-effective when three agencies receiving benefits share the costs.[114] Predictably, the program is most cost-effective when all five of the benefiting agencies share the costs.[115]

In the context of the pilot programs, Haramati points out "potential benefits will accrue to [the Department of Water Resources (DWR)] and [the Western Area

---

[108] *Id*. at 11-133.

[109] *Id*. at 11-136.

[110] *See* California Standard Practice Manual: Economic Analysis of Demand Side Programs and Projects, California Public Utilities Commission, October 2001 (defining PAC costs as those that are incurred by the administrator, the incentives paid to customers, and the increased supply costs for the periods in which the load is increased).

[111] Haramati, *supra* note 8, at 11-136.

[112] *Id*.

[113] *Id*., Table 2: Simplistic Example of Program Cost Allocation (using the PAC test).

[114] *Id*.

[115] *Id*.

Power Administration (WAPA)] if their pump load is decreased."[116]

Unfortunately, as Haramati explains,

> [t]hese entities are not part of the partnership and would not be contributing funds so a PAC cost-effectiveness calculation would have to exclude them. The calculation will therefore need to exclude benefits to non-partner entities in the cost-effectiveness calculation. However, such cases could result in an incorrectly low cost-effectiveness number (based on [Total Resource Cost][117]).[118]

Thus, Haramati states, if a program cannot be shown to be cost-effective under the PAC approach it is for one of three reasons:

- the program is not cost-effective to begin with due to measure and administration costs that are larger than the measure benefits;
- the program is cost-effective but large beneficiaries have been left out of the partnership [as in scenario described above where only two agencies are sharing costs]; and
- the program is cost-effective, but partners are not contributing the correct amounts of funding in relation to their accrual of benefits.[119]

This last point underscores the need for a shared, accurate methodology for calculating the benefits accruing to all participating agencies in order to fairly allocate costs.[120] Returning to the pilot programs, Haramati cautions that the embedded energy in water calculator must determine water system benefits to the partner water agency if costs are to be fairly allocated: "[i]f only the energy

---

[116] *Id*. at p. 11-137.

[117] *Id*. at p. 11-131 (stating, "[t]he [Total Resource Test or TRC] is the standard cost-effectiveness test used for energy efficiency programs, and therefore is the test that will be applied to the pilot programs at their conclusion to determine if water use-reduction measures should be implemented as mainstream energy efficiency programs. The TRC test measures the net benefits of a program as a resource option, and includes both the participants' and the [utilities'] costs.").

[118] *Id*. at p. 11-137.

[119] *Id*.

[120] *Id*. at p. 11-138.

perspective is included the resulting cost-effectiveness numbers may be artificially low due to benefits accruing to non-partner agencies, insufficient water partner contributions, or total program benefits that are smaller than the costs."[121]

III. REQUESTED RELIEF

DRA requests that the Commission commence a rulemaking to develop a partnership framework between energy IOUs and the water sector – both Commission regulated water utilities and public water and wastewater agencies – to co-fund programs that reduce energy consumption by the water sector in supplying, conveying, treating, and distributing water, and by agricultural and industrial water customers. This rulemaking should consider new policies regarding joint funding of water-energy nexus programs by the energy IOUs and the water sector, and other local, state, and federal agencies to which the benefits of such programs may accrue. Rule 6.3(b) requires that the petition concisely state the justification for the requested relief, and if adoption or amendment of a regulation is sought, the petition must include specific proposed wording for that regulation. This petition does not seek the adoption or amendment of a regulation, but instead, requests that the Commission develop innovative policies regarding the critical, threshold issue of joint funding of water-energy nexus programs. The specific justification for each requested area of inquiry is described below.

A. Recommended Scope of Proceeding

DRA recommends that the Commission issue an Order Instituting Investigation/Order Instituting Rulemaking to "Develop a Partnership Framework between the Energy Investor Owned Utilities and the Water Sector to Co-Fund Water-Energy Nexus Programs." DRA proposes that this rulemaking encompass the following major issues:

- the appropriate methodology for determining the energy embedded in water;

[121] *Id.*

- the appropriate methodology for determining water system benefits to water sector partners, and other local, state, and federal entities to which such benefits may accrue;
- the appropriate methodology for allocating program costs among partners, *e.g.*, Program Administrator Cost (PAC) model;
- strategies for overcoming barriers to joint funding of water-energy nexus programs for different categories of partners, including, but not limited to, energy IOUs, Commission regulated water utilities, public water and wastewater agencies, and local government regional networks;
- the appropriate ratemaking treatment and/or other funding mechanisms available to Commission regulated water utilities participating in water-energy nexus program partnerships;
- availability of additional state and/or federal funding to increase the feasibility and cost-effectiveness of water-energy nexus programs; and,
- coordination between the proposed rulemaking and current and future energy efficiency rulemaking proceedings to ensure consistent treatment of water-energy nexus programs in the energy efficiency programs of the energy IOUs.

Each of these issues is discussed more fully below.

In addition, DRA notes that Rule 6.3(d) provides an opportunity for parties to serve comments and reply comments in response to a petition for rulemaking, which could include recommendations regarding the scope of the new proceeding. Moreover, DRA recommends that an all-party workshop be convened to solicit stakeholder input on the appropriate scope of the new proceeding.

B. Justification for Requested Relief

1. Need for Methodology for Determining the Energy Embedded in Water Use.

As explained above, in order to allocate costs in proportion to the benefits realized by energy IOUs and their partners in the water sector from water-energy nexus programs, it is necessary to develop an appropriate methodology for calculating energy savings and cost-effectiveness in the water-energy context. More specifically, broader adoption and deployment of water-energy nexus programs depends, in part, on the development of a statewide methodology to determine the energy embedded in water use. In developing this methodology, the Commission should consider whether the computation of energy savings along all segments of the water use cycle, potentially transecting the service territories of multiple energy IOUs and water agencies, is necessary.[122]

Although as chronicled above in Section II(B)(9), the Commission has been involved in the development of a cost-effectiveness methodology for computing the energy embedded in water use, as the Commission has not yet adopted any such methodology, DRA respectfully submits that this issue should be addressed in a separate, narrowly focused proceeding with the active participation of potential partners from both the energy and water sectors. As noted, the Energy Division's ongoing efforts to develop a cost-effectiveness methodology in the water-energy context will be incorporated into the new proceeding.

2. Need for Methodology for Determining Water System Benefits.

As explained above in more detail in Section II(C), the embedded energy in water calculator should be expanded to also calculate water system benefits to the partner water agency, and other local, state, and federal entities to which such

---

[122] GEI 2012, *supra* note 1, at p. 33 (suggesting changes to the energy IOU program to accommodate the needs of the water sector, such as the development of a statewide methodology for computing the energy embedded in water that would allow for the "computation of energy savings across multiple entities and multiple energy service providers.").

benefits may accrue, if costs for water-energy nexus programs are to be fairly and cost-effectively allocated.[123]

3. Need for Methodology for Allocating Program Costs Among Partners.

As noted, the Commission has not provided direction regarding how water-energy program costs should be allocated among partners.[124] In order to encourage and facilitate joint funding of water-energy nexus programs amongst a wide array of entities with varied accounting practices and standards, the Commission should determine and adopt an equitable method for allocation of these program costs.

4. Need to Address Barriers to Joint Funding of Water-Energy Nexus Programs for Different Categories of Partners.

As reiterated throughout this petition, in D.12-05-015 the Commission directed Staff "to develop a robust record in the 2013 application proceedings or in [R.09-11-014] or a subsequent energy efficiency rulemaking to address strategies to overcome barriers to adoption and deployment of water-energy programs . . . [including] issues associated with the joint funding and implementation of water-energy programs by the IOUs and water entities . . . ."[125] As noted above in Section II(B)(7), neither the proposals for water-energy nexus programs contained in the original applications filed by the energy IOUs for the 2013-2014 period, nor the supplemental information furnished in response to the request by the assigned Commissioner and Administrative Law Judge, comprehensively address strategies to overcome barriers to adoption and deployment, like the pressing need for joint funding of these programs. Thus, pursuant to the Commission's directive in D.12-05-015, Staff is required to develop a robust record regarding this issue in

---

[123] Haramati, *supra* note 8, at p. 11-138.

[124] *Id*. at 11-136.

[125] D.12-05-015, at p. 289.

R.09-11-014, or in a subsequent energy efficiency rulemaking. DRA recommends that it would be far more productive for all interested parties from both the energy and water sectors to address this threshold issue in a separate, focused proceeding.

Moreover, all of the issues identified by DRA to be addressed during the proposed rulemaking, and specifically enumerated in this section, are equally responsive to and justified by the Commission's directive to develop a robust record regarding barriers to the joint funding of water-energy nexus programs.

5. Need to Determine Appropriate Ratemaking Treatment and/or Other Funding Mechanisms Available to Commission Regulated Water Utilities Participating in Water-Energy Nexus Programs Partnerships.

Although, as explained above in Section II(B)(5), this issue was addressed and decided in D.08-11-057, the Commission's decision was issued nearly four years ago and was made in the limited context of proposed pilot programs that were not required to demonstrate any benefit to energy ratepayers.[126] Thus, it is necessary for the Commission to revisit this issue beyond the context of pilot programs, so that energy IOUs and their potential partners in Commission regulated water utilities can know whether, and if so, how and to what extent, joint funding of water-energy nexus programs is possible.

6. Need to Address the Availability of Additional State and/or Federal Funding.

As stated above, the most significant barrier to the expansion of water-energy programs is the legal restrictions on the use of public funds that "hinder investments in cross-cutting programs,"[127] such as limitations on ratepayer funded energy efficiency programs. In order to increase the cost-effectiveness of water-energy nexus programs, and accordingly, facilitate increased implementation of

---

[126] D.08-11-057, at p. 18; see *supra* note 63 and accompanying text.

[127] GEI 2012, *supra* note 1, at p. 9.

such programs, the Commission should explore the availability of additional sources of state and federal funding.

7. Need for Coordination of Proposed Rulemaking with Current and Future Energy Efficiency Rulemaking Proceedings.

If and when the issues enumerated above are resolved in the proposed rulemaking, then the resultant methodologies and other adopted elements of a partnership framework for co-funding water-energy nexus programs should be incorporated into the Commission's concurrent and future energy efficiency rulemaking proceedings and energy efficiency portfolios. Such coordination is essential to connect energy efficiency programs and estimated energy savings to the integrated energy procurement resource planning process.

IV. PRIOR LITIGATION BEFORE THE COMMISSION OF THE ISSUES RAISED IN THIS PETITION

Rule 6.3(b) requires that a petition state whether the issues raised in the petition have, to the petitioner's knowledge, ever been litigated before the Commission, and if so, when and how the Commission resolved the issues, including the name and case number of the proceeding (if known). Rule 6.3(f) clarifies that the Commission will not entertain a petition for rulemaking on an issue that the Commission has acted on or decided not act on within the preceding 12 months.

As explained throughout this petition, DRA's request to commence this rulemaking is made pursuant to the Commission's directive in D.12-05-015 to develop a record on, among other things, the appropriate methodology for calculating energy savings and cost-effectiveness in the water-energy context and barriers to joint funding of water-energy nexus programs. Thus, DRA is acting consistent with and in response to the Commission's direction in filing the instant petition.

To DRA's knowledge, the only issue involved in this rulemaking that has been disputed before the Commission, and/or upon which the Commission has

decided, is, to some extent, the appropriate ratemaking treatment and/or other funding mechanisms available to Commission regulated water utilities participating in water-energy nexus programs partnerships. In D.08-11-057, the Commission broadly addressed this issue in the limited, arguably distinct context of proposed pilot programs. Most importantly, however, D.08-11-057 was issued nearly four years ago, and thus, the Commission is not precluded from entertaining a petition that addresses this issue under Rule 6.3(f).

As noted above, although the Commission has made considerable progress toward the development of a statewide methodology for computing the energy embedded in water use, as the Commission has not decided to adopt or reject any such methodology, the Commission is not precluded by Rule 6.3(f) from formally addressing this issue in a separate, narrowly focused proceeding.

V. VERIFICATION OF FACTUAL ASSERTIONS

Rule 6.3(b) requires that a petition that contains factual assertions be verified.

DRA provides this verification in Exhibit 2.

VI. COMPLIANCE WITH SERVICE AND FILING REQUIREMENTS

Rule 6.3(c) requires that the petitioner satisfy the following requirements regarding service and filing:

> Petitions must be served upon Executive Director, Chief Administrative Law Judge, Director of the appropriate industry division, and Public Advisor. Prior to filing, petitioners must consult with the Public Advisor to identify any additional persons upon whom to serve the petition. If a petition would result in the modification of a prior Commission order or decision, then the petition must also be served on all parties to the proceeding or proceedings in which the decision that would be modified was issued. The assigned Administrative Law Judge may direct the petitioner to serve the petition on additional persons.

DRA has complied with each of these requirements. Notably, in accordance with Rule 6.3(c), DRA conferred with the Commission's Public Advisor's office and was directed to include key personnel at the Commission's Office of Governmental Affairs on the service list.

VII. CONCLUSION

In response to the Commission's directive in D.12-05-015 to develop a robust record that addresses "joint funding and implementation of water-energy programs by the IOUs and water entities," which, as explained, necessarily entails the development of a statewide methodology "for calculating energy savings and cost-effectiveness in the water-energy context,"[128] DRA respectfully submits this petition so that such an inquiry can be conducted in a new proceeding narrowly focused on this critical, threshold issue, with the active participation of potential partners from both the energy and water sectors.

Respectfully submitted,

/s/ JONATHAN KNAPP

Jonathan Knapp
Staff Counsel

Division of Ratepayer Advocates
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102
Phone: (415) 703-5377
Email: jp8@cpuc.ca.gov

May 22, 2013

[128] D.12-05-015, at p. 289.

EXHIBIT 1

Better than the Sum of their Parts: Taking Advantage of the Water-Energy Nexus to Create Dual-Funded Partnership Programs

Mikhail Haramati, California Public Utilities Commission[1]

ABSTRACT

As part of the effort towards reduction of community-wide resource consumption, partnerships will become an increasingly valuable tool to enhance funding of resource conservation programs and ensure that the most valuable programs are being implemented. Partnerships in the water-energy field can lead to additional funding for existing, multi-beneficial programs currently funded by one water or energy utility, but which have benefits to more than one. In 2006, the California Public Utilities Commission (CPUC) ordered the four largest energy investor owned utilities (IOUs) to partner with water agencies in developing one-year pilot proposals to investigate how best to take advantage of the water energy nexus. This process of developing the pilots led to questions about program funding, avoided costs, impact measurement, and agency behavior.

This paper suggests a series of steps partner agencies can use to determine what level of program co-funding is appropriate, how benefits should be calculated for each agency, and the nature of partnerships most likely to succeed. Using the CPUC Embedded Energy in Water Pilots as a case study, this paper also makes suggestions about the cost-effectiveness calculations currently being used. Entrenched in the cost-effectiveness issues is the fundamental concept of water savings vs. water efficiency, how and where possible savings may occur, and the avoided costs associated with each of these possibilities.

Introduction

Many problems in the world remain unsolved not because the solution is unknown, but because benefits accrue to multiple entities and no single organization is willing or able to pay to solve them.

This paper takes as a given that programs exist that are likely to be cost-effective where the benefits accrue to more than one agency, but are not cost-effective from any one agency's perspective. The proposal in this paper is to create partnerships in which the costs can be allocated in the same proportion as the benefits are received. Using the example of the California Public Utilities Commission's (CPUC) Embedded Energy in Water Pilots, this paper takes the reader through four steps to create such a partnership. This is done by:

1. Identifying programs or actions likely to be cost-effective but that are not cost-effective for any one agency to implement alone.
2. Creating funding partnerships between agencies likely to receive benefits

[1] The views expressed herein are the ideas of the author independently and do not necessarily represent the CPUC or its staff.

3. Identifying a method for determining the costs and benefits. If funds are required to do this, a means of sharing these initial costs must also be developed. Benefits must then be compared with the costs to determine whether the program or action is indeed likely to be cost-beneficial.
4. If the program or action is likely to be cost-effective, determine the allocation of costs across benefitting entities. This is done by creating a methodology for allocating costs once the benefits become known.

Background

In December 2007, the CPUC approved $6.4 million in funding for a one-year pilot to study the potential for energy efficiency savings achieved through water conservation and the substitution of high-energy intensity water with less energy-intensive water[2] (CPUC 2007). Starting in July 2008, this pilot will undertake a variety of water-related energy efficiency programs administered by Pacific Gas and Electric (PG&E), Southern California Edison (SCE), San Diego Gas and Electric (SDG&E) and Southern California Gas (SCG) in partnership with one or more water agencies in their service territory. These programs range from low-income residential high-efficiency toilets to industrial sector winery process improvements to recycled water and managed landscaping in the commercial and residential sectors.[3] Funding for these programs comes from both the energy utility and the partner water agency and will be described in further detail below.

Identifying Programs Made Cost-Effective by Partnerships

If a program is cost-effective for an agency to do alone, a funding partnership is not required. This paper focuses on programs which are *not* cost-effective for an agency to fund exclusively, but that may be cost-effective if funded by other entities who would also receive benefits. Before a partnership can be formed, however, a program or program area needs to be identified where savings are likely to occur.

Recognizing the potential for water efficiency programs that could save both water and energy, the CPUC held a series of workshops that culminated in an Assigned Commission Ruling (ACR) in October of 2006 directing the four largest California investor-owned energy utilities (the utilities) to partner with at least one water agency and submit applications for a one-year pilot (CPUC 2006). In the process that followed, the CPUC developed the Embedded Energy in Water Calculator[4] to aid the utilities in selecting water efficiency programs likely to be cost-effective from an energy perspective. In developing only the energy side of the calculator

[2] High-energy intensive water is water that has to move long distances, be pumped up significant elevation changes, be treated extensively before use, or otherwise has large amounts of energy embedded in it. Less energy-intensive water is that which has less energy than the water it would be used to replace.

[3] The 12 programs are: SCE Low-Income Direct install HETs for Multi Family; SCE Express Water efficiency; SCE Lake Arrowhead Water Conservation; SCE Water Leakage; PG&E Large Commercial Customer; PG&E Low-Income Single Family HET Replacement; PG&E Emerging Technologies in Water Utility Efficiency: SDG&E Managed Landscape; SDG&E Large Industrial Customer Audits; SDG&E Recycled Water; SCG CLAWA/EMWD Gas Pump Testing; and LACSD/SCE/SCG Gas water Conservation. For a full description of the programs see Decision 07-12-050.

[4] The Embedded Energy in Water Calculator is available online in zip form at http://www.doe2.com/download/Water-Energy/WaterMeasures-AvoidedCostCalcs-v4B.zip.

the CPUC made the assumption that the partner water agency would determine a cost-effective contribution for that agency. For example, if a water agency planned to contribute $50 to the cost of a high efficiency toilet (HET), the CPUC assumed that the water use-reduction benefits to the agency must be greater than $50.

Creating Funding Partnerships Between Benefiting Agencies

Once a program likely to be cost-effective has been identified, funding partnerships should be formed among agencies expected to receive benefits. Partner criteria will be unique to each agency and program, but in general, criteria should be developed by the lead agency (or agencies) so that suitable partners can be selected. In the Embedded Energy in Water Pilots the energy utilities are the lead agencies.

When the CPUC directed the investor owned energy utilities to partner with at least one water agency in the October 2006 ACR, it identified municipal water agencies as those likely to have the most potential to save water (CPUC 2006). In addition to high potential for energy savings, other criteria used were: willingness of the partner to provide co-funding; water agency interest; water agency location; ability to quickly develop and implement a water use-reduction program; availability of staff resources; etc. Once partners were selected, the energy utilities worked with the water agencies to develop pilot programs that would save significant amounts of water (therefore using less energy for conveyance, distribution and treatment), or use less energy-intensive water.

The four energy utilities approached sharing of program costs with their partners in different ways. Some initially allocated the costs based on the advice of their partner water agencies and the availability of pilot funding, while others examined the potential energy benefits of water saved and developed a rough estimate of how much they would be able to pay for a given amount of energy saved. PG&E chose to pay a price per kilowatt-hour (kWh) saved, and commissioned a study (Green Building Studio 2007) to determine the embedded energy in the water provided by specific municipalities in their service territory. Alternately, SCE approached the pilot partnerships as exploratory and initially established a 50/50 relationship for co-funding.

Development of the Embedded Energy in Water Calculator allowed the utilities to adjust levels of co-funding to more accurately reflect the preliminary calculations of benefits. These benefits were developed using assumptions about the energy use of the partner water agencies, and estimations of measure level water savings.[5]

Creating a Method for Determining Costs and Benefits

In producing the Embedded Energy in Water Calculator the CPUC sought to develop a methodology to quantify the likely energy benefits and costs of the proposed pilot programs. Specifically, it was developed to be used as a tool in the selection of pilot programs for specific

[5] Example measure inputs were drawn from "BMP Costs & Savings Study" California Urban Water Conservation Counsel, March 2005. Default embedded energy values and load shapes were drawn from "Water Supply Related Electricity Demand in California" Demand Response Research Center, Lawrence Berkeley National Laboratory, LBNL-62041, December 2006 (Hirsch 2007).

water agencies to determine which measures could pass a measure-level cost-effectiveness test. The main drawback of this approach is that the calculator, in its current form, only calculates the energy benefits without attempting to determine water system benefits to the partner water agency.

For the purposes of the Embedded Energy in Water Calculator, a Total Resource Cost (TRC) test was used to determine the cost effectiveness of a proposed pilot program. The TRC test is the standard cost-effectiveness test used for energy efficiency programs, and therefore is the test that will be applied to the pilot programs at their conclusion to determine if water use-reduction measures should be implemented as mainstream energy efficiency programs.

The TRC test measures the net benefits of a program as a resource option, and includes both the participants' and the utilities costs. The benefits calculated in the TRC test are defined as the reduction in transmission, distribution, generation, and capacity costs valued at marginal cost for the periods when there is a load reduction. The costs for this test are all costs paid by the utility and the participants (related to measure installation and program administration) plus the increase in supply costs for the periods in which load is increased. The benefit-cost ratio is the ratio of discounted total benefits of the program to the discounted total costs over the life of the measures installed. A benefit cost-ratio above one indicates that the program is beneficial to the utility and its ratepayers from a total resource cost perspective (CPUC 2001, 18-19). This test is limited by the reliability of the inputs, and the extent to which costs and benefits can be known and quantified.

In the Embedded Energy in Water Calculator the individual measure level TRC values are calculated according to the following equations.

TRC=Benefit / Cost

*Benefit = Total Avoided Cost * NTG*

where NTG = Net-to-Gross[6]

Costs

*For a rebate program: Cost = (Measure Cost-Partner Paid Cost) * NTG + (1-NTG) * Rebate Amount + Admin Cost*

*For a direct install program: Cost = Measure Cost – Partner Paid Cost – (1-NTG) * Participant Paid Cost + Admin Cost*

- **Measure cost** = For a rebate program, the purchase price of a device or piece of equipment as seen by the participant. For a direct install program, the total price paid to a contractor to have the device or equipment installed (includes the costs paid by the energy utility and any participant costs).

[6] Net-to-Gross, although indicated in the equation above is not anticipated to be a major component of the pilot evaluation as it is already known that many of the programs are likely to have high numbers of free riders. A low NTG value does not have significance in the context of the pilots since the aim is to gather information. Additionally, the energy utilities may not claim credit for energy savings achieved through the pilot since: (1) a method for determining embedded energy savings is still being developed, and (2) savings potential from this source did not go into the development of the energy efficiency goals for 2006-2008. (CPUC D.07-12-050., FOF 12-13)

- **NTG** = The calculation of net savings to gross savings (one minus the fraction of free riders for the program).
- **Measure Rebate** = Amount paid to the participant of a rebate program in $ per unit.
- **Participant Paid Cost** = The amount of the measure cost that is paid by the participant in $ per unit.
- **Administrative Cost** = The utility's cost per unit measure that is associated with the administration of the rebate or direct install program (typical values are 0.2 - 0.5 of the measure cost).
- **Partner Paid Cost** = The amount paid by a third party (water agency) per measure unit (either to the energy utility or to the participant).

The program costs are calculated according to the formulae and definitions above.

Benefits

*Benefit = Total Avoided Cost * NTG*

*Total avoided cost = annual summation of (electricity savings * avoided electricity costs + gas savings * avoided gas costs)*

The Total Avoided Cost is the present value of annual avoided electric and gas costs over the lifetime of the measure.

Energy benefits are calculated based upon the annual water use-reduction attributed to each measure installation and converted to annual electricity and gas use-reduction. The conversion of water use-reduction to energy use-reduction is calculated based on the water savings and the supplying water agency energy-use related to water treatment and distribution. The annual energy savings are then converted to IOU annual avoided energy supply costs[7] as well as lifetime avoided costs[8].

Measure level water savings are categorized as using "fresh water," "waste water," and "total" (freshwater and waste water combined). Freshwater is water that is delivered to the customer site where it is consumed, and like outdoor water use, does not enter the waste water treatment system. Wastewater is water that is created or obtained at the customer site, was not delivered there, and only enters the wastewater system. Since "total" encompasses both freshwater and wastewater, most residential indoor water conservation measures were assigned to this category.

Annual electricity and gas saved is calculated using water agency specific marginal energy use-reduction profiles to translate water savings into hourly electric demand reductions (at the water agency). The water agency marginal energy use-reduction profiles describe the water agency hourly energy use-reduction profile per unit of daily water use-reduction over the course of the year. The avoided cost per unit of water use-reduction is highly sensitive to the assumed electricity use-reduction profile for the water agency since the calculation uses hourly avoided costs times hourly electricity use-reductions to determine savings. Three default water agency energy use-reduction profiles are provided in the calculator as well as the ability to create

[7] This is calculated via a macro using avoided cost values *f*(fuel, IOU, climate zone, years), and the hourly profile of energy savings (Hirsch for CPUC 2007).

[8] Present value of annual avoided costs over the lifetime of the measure calculated using IOU specific discount rates (PG&E = 8.79%; SCE = 8.77%; SDG&E = 8.23%; SCG = 8.84%) (Ibid).

custom profiles. The default load shapes are Off-Peak, On-Peak, and 24-Hour. The Off-peak profile assumes that the water agency is highly efficient and all marginal water volume reductions only occur to off-peak pumping. The On-Peak profile is representative of a water agency that is not as efficient as it could be, and thus responds to a decrease in water-use by decreasing peak period pumping. The 24-Hour profile indicates that a decrease in water use may lead to a decrease in pumping energy evenly throughout the day, and is in between Off-Peak and On-Peak for efficiency.

Annual avoided costs are calculated as the sum of all direct and indirect costs that can be avoided or deferred by a decision that would result in delaying or avoiding supply-side investments or energy purchases in the market. This value also includes avoided or deferred transmission or distribution related costs (CPUC 2006). Under the CPUC adopted avoided cost methodology, long-run costs are used to provide a basis for comparing different demand side management options. Long-run marginal costs (LRMC) use the all-in costs of a combined cycle gas turbine (CCGT) based on evidence that the majority of new energy resources being added are gas-fired combined cycle generators (CPUC 2006).

Total avoided cost is the present value of annual avoided cost over the lifetime of the measure being installed. In the embedded energy in water calculator this is determined by the Expected Useful Life (EUL) or Remaining Useful Life (RUL) of a water conservation measure. The RUL and EUL are functions of the measure and the type of program under which the measure is being implemented. For an early retirement program that replaces existing, higher water-use equipment, the savings lifetime of the measure is the remaining useful life. For a replace on failure program that installs water conservation equipment above that required by code, the effective savings life is the number of years after which one half of the population of devices would be expected to remain installed and operating (Hirsch for CPUC 2007).

For the purposes of the pilot cost-effectiveness calculation, "embedded" energy benefits are defined as those occurring on the water agency side of the water meter. Many hot water use-reduction measures such as washing machines, dishwashers, faucet aerators, and hot water heaters have been found to be cost-effective based on energy used at the customer site, and have therefore been included in the energy efficiency programs for some time. As extensive data exists on the majority of these measures, and as the proposed programs for this pilot focused on cold water use-reduction, the commission thought it prudent to focus this effort on measures that may offer added potential for energy efficiency in an area where insufficient data exist. In its current version, the Embedded Energy in Water Calculator does not include energy use by other entities such as the California Department of Water Resources (DWR) or the Western Area Power Administration (WAPA).[9]

Determining the Water Benefits

Although it has the capability to do so, this calculator is not being used to determine the benefits to the water agency co-funding the programs. Determination of water benefits requires the development of water agency specific avoided water costs based on the agency's extra-marginal, or likely next source of water.

Although critical for translating water benefits into dollars, identifying an agency's likely

[9] Non-IOU energy use-reductions were excluded from being counted in this pilot since such energy use is not a component of the IOU avoided costs used to value energy savings since the benefits of such savings would not accrue to IOU ratepayers.

next water source is not always easy. In D.07-12-050 the commission writes that not enough is known yet to be able to confidently say what the avoided water source is for a given agency (CPUC 2007, 93). Significant discussion leading up to the approval of the pilot programs focused on the concept of intra- vs. extra-marginal water supplies. Intra-marginal source is the last unit supplied to meet demand, while extra-marginal source is the next supply needed to meet growth in demand (CEC 2006). Avoided water costs vary greatly depending on which marginal water source conservation programs will avoid or defer using. The December 2007 Decision approving the pilots finds that it would be logical to rely on extra-marginal supply assumptions for long-term planning (more than one or two years in the future), and intra-marginal assumptions for the short term (one to two years ahead). Information in a recent study by the California Energy Alliance, however, identifies extra-marginal supplies as being more appropriate for estimating both the short-run and long-run marginal sources. This is due to growing water demand, diminishing conventional water supplies, and the fact that new water supplies are being proactively sought (CSA 2008, 14).

As identified in the recent California Sustainability Alliance (Draft) study, the long-run marginal water sources from a statewide perspective are likely to be seawater desalination and inter-basin transfers. Desalination is still expensive, and a relatively high energy intensity resource. As plants are not typically operated only to meet peak demand, desalination would likely be treated as a baseload resource that would raise the average energy intensity of the state's water supply portfolio. Inter-basin transfers have been and are currently being used to make up shortfalls in historical imported water supplies. Water transferred (often from northern to southern California) comes from the California State Water Project and the Colorado River aqueducts, so the energy used to convey this water may not "change significantly in the foreseeable future" (CSA 2008, 3).

While energy avoided costs focus on the long-run marginal sources, it may be prudent to examine short-run marginal sources like inter-basin transfer as well as long-run sources when determining avoided costs for energy. Unlike electricity, water can be stored for long periods of time, and for this reason, short-run resources can also meet long-term needs (CSA 2008, 19).

Once the intra- or extra- marginal water source is identified, the water agency can then calculate short-term and long-term avoided costs based on the values for these water supplies.

Evaluating Program Cost-Effectiveness

Once the costs and benefits are in dollars a simple comparison is possible. If the benefits are larger than the costs then the program or action is cost-effective. The table below appeared in the December 20 2007 Decision approving the pilots and shows the initial TRCs of the proposed pilot programs.

Table 1. TRCs for Proposed Embedded Energy in Water Pilot Programs

Utility	Program	TRC
PGE	**Total Program (budget including EM&V)**	**.28**[10]
	Industrial Process Improvement in the Food Processing Sector	.31& .52
	Industrial Process Improvement in the Winery Sector	.41
	Ozone Laundry Treatment in the Hospitality Sector	.33
	Low-Income Direct Install High Efficiency Toilet Replacement	.20
	Emerging technologies to Improve Water System Efficiency	--
SCE	**Total Program**	**.10**[11]
	Low-income direct install high efficiency toilet replacement	.07
	Express water efficiency (PH controllers and ET controllers)	.06
	Industrial Water Efficiency (audits)	.10
	Lake Arrowhead Water Conservation	.19
	Green Schools Water Efficiency	.07
SDG&E	**Total Program (budget including EM&V)**	**.31**[12]
	Managed landscape	.20
	Large customer audits	.50
	Recycled water retrofit	.28
	Join marketing and outreach	n/a
SCG	**Total Program (budget including EM&V)**	**.36**[13]
	Lake Arrowhead/SCE/SoCalGas Water Conservation Partnership	1.33
	Pump/engine testing/evaluation program for Crestline-Lake Arrowhead Water Agency and Eastern Municipal Water District	---
	Joint Marketing and Outreach	---

Source: CPUC Decision 07-12-050 (2007)

As presented in the table above, initial estimates of program TRC values indicated that the programs would not be cost-effective from a Total Resource Cost energy efficiency perspective. Several parties argued in favor of approving the programs on the grounds that the new information obtained by the measurement and study of such programs would provide sufficient benefit to justify the expenditure (CPUC D. 07-12-050 2007, 45). Acknowledging that the current body of knowledge on embedded energy in water is inadequate to make meaningful decisions about whether water use-reduction programs should be included in the IOU's energy efficiency portfolios, the Commission approved the pilot programs despite ex-ante cost-effectiveness ratios of less than one (CPUC D. 07-12-050 2007, 93).

[10] PG&E's July 11, 2007 Additional Supplemental Testimony, p. 4.
[11] SCE's July 11, 2007 Additional Supplemental Testimony, Attachment E.
[12] SDG&E's July 11, 2007 Additional Supplemental Testimony, p. 3.
[13] SoCalGas' July 11, 2007 Additional Supplemental Testimony, p. 3.

Determining Cost Allocations

The CPUC has not yet given direction on the appropriate allocation of program costs among partners. The table and explanation that follows is a suggestion for how the CPUC might go about doing this in a way that would produce cost-effective savings for both water and energy partners from a Program Administrator Cost (PAC) perspective. The example below uses the PAC cost test in recognition that both agencies may want to calculate cost-effectiveness independently of any benefits received by their partner when evaluating whether to participate in a program.

Table 2: Simplistic Example of Program Cost Allocation (using the PAC test)

Scenario 1--The program is not cost-effective for a single agency to implement alone

Cost $1,000,000

	Benefits	% of Total Benefits	Cost Allocation	Net Benefit
Agency 1	$720,000	100%	$1,000,000	-$280,000

Scenario 2--The program is not cost-effective with 2 agencies sharing costs

Cost $1,000,000

	Benefits	% of Benefits	Cost Allocation	Net Benefit
Agency 1	$720,000	75%	$750,000	-$30,000
Agency 2	$240,000	25%	$250,000	-$10,000
total	$960,000		$1,000,000	-$40,000

Scenario 3--The program becomes cost-effective with 3 agencies sharing costs

Cost $1,000,000

	Benefits	% of Benefits	Cost Allocation	Net Benefit
Agency 1	$720,000	67%	$666,667	$53,333
Agency 2	$240,000	22%	$222,222	$17,778
Agency 3	$120,000	11%	$111,111	$8,889
total	$1,080,000		$1,000,000	$80,000

Scenario 4--The program is most cost-effective with all benefitting agencies sharing costs

Cost $1,000,000

	Benefits	% of Total Benefits	Cost Allocation (	Net Benefit
Agency 1	$720,000	60%	$600,000	$120,000
Agency 2	$240,000	20%	$200,000	$40,000
Agency 3	$120,000	10%	$100,000	$20,000
Agency 4	$84,000	7%	$70,000	$14,000
Agency 5	$36,000	3%	$30,000	$6,000
total	$1,200,000	100%	$1,000,000	$200,000

In the table above, the Program Administrator Cost (PAC) test is used to create a simplistic model illustrating allocation of program costs. It assumes that program costs and

benefits are fixed and that adding partners does not increase costs. In reality, each successive partner would likely add additional administrative costs, as well as changes to the program. The PAC test differs from the TRC test by excluding costs incurred by the program participant[14].

Scenario 1 illustrates a program that a single agency is attempting to fund. The program is not cost-effective to the agency because the benefits to the individual agency are smaller than the program costs. Scenarios 2, 3, and 4 show the addition of beneficiary agencies. In the table above, cost-effectiveness becomes a factor of the number of contributing partners that receive benefits.

Allocating the costs according to the proportion of total benefits ensures that a cost-effective program or action will be shown to be cost-effective as long as significant benefits occur to entities within the partnership. In the embedded energy in water pilots potential benefits will accrue to DWR and WAPA if their pump load is decreased. These entities are not part of the partnership and would not be contributing funds so a PAC cost-effectiveness calculation would have to exclude them. The calculation will therefore need to exclude benefits to non-partner entities in the cost-effectiveness calculation. However, such cases could result in an incorrectly low cost-effectiveness number (based on TRC).

If a program cannot be shown to be cost-effective under this approach it is for one of three reasons: (1) the program is not cost-effective to begin with due to measure and administration costs that are larger than the measure benefits; (2) the program is cost-effective but large beneficiaries have been left out of the partnership as in Scenario 2; and (3) the program is cost-effective, but partners are not contributing the correct amounts of funding in relation to their accrual of benefits.

It should be noted, however, that scenario 3 is the one most likely to succeed as it includes the minimum number of agencies needed to make the program cost-effective. If Agencies 1, 2, and 3 decide to implement the program there is a disincentive for Agencies 4 and 5 to contribute funds since they will receive benefits regardless of participation. If agencies with smaller benefits do not join a partnership, the cost-benefit values for the participating agencies will always be lower than what they could be if all costs and benefits were part of the calculation. This brings into question the competitiveness of the programs requiring partnerships to be cost-effective as compared with programs that can be cost-effective for a single sponsoring agency. For the embedded energy in water pilots to become mainstream, the associated energy efficiency programs must be competitive (on an energy savings basis) with energy efficiency programs in the CPUC's current portfolio because funds are limited.

Conclusion

If the goal of a partnership is to fund a lasting, cost-effective program, allocations of program costs should be determined when (and as) benefits are known. For programs with unknown benefits, the allocation of program costs should be determined by best estimates at the time and modified when benefits are better known. Furthermore, assumptions should not be made about the cost-effectiveness of a program to a partner based on the amount of a partner's

[14] While benefits are similar to the TRC benefits it is the PAC costs that are defined more narrowly. As defined in the Standard Practice Manual, PAC costs are those that are incurred by the administrator; the incentives paid to customers; and the increased supply costs for the periods in which the load is increased (CPUC 2001, 23).

funding contribution. It is important to accurately calculate the benefits of a program to all partner agencies so costs can be shared correctly and using the same methodology.

A successful partnership is probably one that includes the major beneficiaries of a program. The partner contributions of agencies with smaller benefits are less likely to make a program costs-effective since, by definition, their contributions would be small. Additionally, it may be in the best interest of smaller beneficiaries not to contribute funds if larger beneficiaries are already planning to implement a program. Doing so would increase the overall cost-benefit of the program to other partners, but would decrease the cost-benefits for the smaller agencies that would have received benefits regardless of their decision to contribute funds. While these agencies may not make a significant difference to the program cost-effectiveness they may be worthwhile partners for other reasons.

If partnerships are created to take advantage of the dual energy and water benefits of water use-reduction programs, the CPUC Embedded Energy in Water Calculator should calculate the total benefits of such programs. If only the energy perspective is included the resulting cost-effectiveness numbers may be artificially low due to benefits accruing to non-partner agencies, insufficient water partner contributions, or total program benefits that are smaller than the costs.

References

(CEC) California Energy Commission. 2006. *Refining Estimates of Water-Related Energy Use in California*. CEC-500-2006-118, December.

(CPUC) California Public Utilities Commission. 2006. *Assigned Commissioner's Ruling on Process Related to the Consideration of Embedded Energy Savings Related to Water Efficiency*. Docket R.06-04-010, October 16.

(CPUC) California Public Utilities Commission. 2004. *Decision 06-06-063: Interim Opinion: 2006 Update of Avoided Costs and Related Issues Pertaining to Energy Efficiency Resources*. Docket R.04-04-025, April 22.

(CPUC) California Public Utilities Commission. 2001. *California Standard Practice Manual: Economic Analysis of Demand Side Programs and Projects*. October.

(CPUC) California Public Utilities Commission. 2007. *Decision 07-12-050: Order Approving Pilot Water Conservation Programs within the Energy Utilities' Energy Efficiency Programs.* Docket A.07-01-024, December 20.

CSA) California Sustainability Alliance. 2008. *The Role of Recycled Water in Energy Efficiency and Greenhouse Gas Reduction* (Draft).

Green Buildings Studio. 2007. Supply and Demand Side Water-Energy Efficiency Opportunities. http://www.ciee.info/RFP/waterEnergy/pgewaterenergyfinalreport 21607.pdf. Santa Rosa, Calif.

James J.Hirsch & Associates for the California Public Utilities Commission. 2007. Water-Energy Measure Calculator (WEMC) Documentation. http://www.doe2.com/download/Water-Energy/]WaterSavingMeasures-Calculator-v3.pdf. June.

EXHIBIT 2

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Petition of The Division of Ratepayer Advocates to Adopt, Amend, or Repeal a Regulation Pursuant to Pub. Util. Code § 1708.5	(Filed May 22, 2013)

VERIFICATION OF JONATHAN KNAPP

I, Jonathan Knapp, declare:

1. I am employed by the California Public Utilities Commission ("Commission") as a Staff Counsel and am authorized to make this verification on behalf of the Division of Ratepayer Advocates (DRA) in satisfaction of Rule 6.3(c) of the California Public Utilities Commission's Rules of Practice and Procedure.

2. All of the factual assertions contained in *DRA's Petition to Adopt, Amend, or Repeal a Regulation Pursuant to Pub. Util. Code § 1708.5 to Develop a Partnership Framework Between Energy Investor Owned Utilities and the Water Sector to Co-Fund Water-Energy Nexus Programs* (DRA's Petition) are true and correct to the best of my knowledge.

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.

Executed this 22nd day of May, 2013, at San Francisco, California.

Jonathan Knapp