

STATE OF CALIFORNIA
 Budget Change Proposal - Cover Sheet
 DF-46 (REV 08/15)

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|--|-----------------------|--|--|
| Fiscal Year 2016/17 | Business Unit 3360 | Department California Energy Commission | Priority No. |
| Budget Request Name 3360-012-BCP-DP-2016-GB | | Program DEVELOPMENT | Subprogram RESEARCH AND DEVELOPMENT |

Budget Request Description
 Implementation and Administration of the Water Energy Technology (WET) Program

Budget Request Summary
 This proposal requests \$30,000,000 from the Greenhouse Gas Reduction Fund (GGRF) in Fiscal Year 2016/17 for the implementation, execution and administration of the Water and Energy Technology (WET) program as mandated by the Governor's Executive Order B-29-15, Ordering Paragraph 17. Budget Bill language allowing up to 5 percent for the administration of the program and authority for a two-year encumbrance period and an additional four years to expend the funds is also requested.

| | | |
|---|--|------|
| Requires Legislation <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Code Section(s) to be Added/Amended/Repealed | |
| Does this BCP contain information technology (IT) components? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <i>If yes, departmental Chief Information Officer must sign.</i> | Department CIO | Date |

For IT requests, specify the date a Special Project Report (SPR) or Feasibility Study Report (FSR) was approved by the Department of Technology, or previously by the Department of Finance.

FSR SPR Project No. Date:

If proposal affects another department, does other department concur with proposal? Yes No
 Attach comments of affected department, signed and dated by the department director or designee.

| | | | |
|--|---------------------|-------------------------------------|----------------------|
| Prepared By | Date | Reviewed By <i>W Wait</i> | Date <i>12/2/15</i> |
| Department Director <i>[Signature]</i> | Date <i>12-2-15</i> | Agency Secretary <i>[Signature]</i> | Date <i>12/30/15</i> |

Department of Finance Use Only

Additional Review: Capital Outlay ITCU FSCU OSAE CALSTARS Dept. of Technology

BCP Type: Policy Workload Budget per Government Code 13308.05

| | | |
|------|--------------------------------------|--|
| PPBA | Original Signed By: Ellen Moratti | Date submitted to the Legislature <i>1/7/16</i> |
|------|--------------------------------------|--|

BCP Fiscal Detail Sheet

BCP Title: Water and Energy Technology Program

DP Name: 3360-012-BCP-DP-2016-GB

Budget Request Summary

| | CY | BY | BY+1 | BY+2 | BY+3 | BY+4 |
|---|------------|-----------------|------------|------------|------------|------------|
| Operating Expenses and Equipment | | | | | | |
| 54XX - Special Items of Expense | 0 | 30,000 | 0 | 0 | 0 | 0 |
| Total Operating Expenses and Equipment | \$0 | \$30,000 | \$0 | \$0 | \$0 | \$0 |
| Total Budget Request | \$0 | \$30,000 | \$0 | \$0 | \$0 | \$0 |

Fund Summary

Fund Source - Local Assistance

 3228 - Greenhouse Gas Reduction Fund

Total Local Assistance Expenditures

Total All Funds

| | | | | | | |
|--|------------|-----------------|------------|------------|------------|------------|
| | 0 | 30,000 | 0 | 0 | 0 | 0 |
| Total Local Assistance Expenditures | \$0 | \$30,000 | \$0 | \$0 | \$0 | \$0 |
| Total All Funds | \$0 | \$30,000 | \$0 | \$0 | \$0 | \$0 |

Program Summary

Program Funding

 2390019 - Research and Development

Total All Programs

| | | | | | | |
|---------------------------|------------|-----------------|------------|------------|------------|------------|
| | 0 | 30,000 | 0 | 0 | 0 | 0 |
| Total All Programs | \$0 | \$30,000 | \$0 | \$0 | \$0 | \$0 |

Analysis of Problem

A. Budget Request Summary

This proposal requests \$30,000,000 in one-time funding from the Greenhouse Gas Reduction Fund (GGRF) for the implementation, execution and administration of the Water and Energy Technology (WET) program as mandated by the Governor's Executive Order B-29-15, Ordering Paragraph 17. Budget Bill language allowing up to 5 percent for the administration of the program and authority for a two-year encumbrance period and an additional four years to expend the funds is also requested.

In response to California's drought, Governor Brown's Executive Order outlines bold steps to save water, increase enforcement of water use standards, streamline the state's drought response, and invest in new technologies to make California more drought-resilient. In an effort to accelerate innovative water and energy saving technologies, the Energy Commission, jointly with the Department of Water Resources (DWR) and the State Water Resources Control Board (WRCB), will implement the WET program and provide funding for emerging technologies that meet the following criteria:

- Display significant potential for both water and energy savings.
- Demonstrate actual operation beyond the research and development (R&D) stage.
- Document readiness for rapid, large-scale deployment (but not yet widely deployed) in California.

Working in partnership with DWR, the WRCB and other experts, the Energy Commission developed the program eligibility and application process. Projects must have direct water savings, direct energy savings, and reduce greenhouse gas (GHG) emissions. The Energy Commission has gone as far as possible in designing this emergency drought program. Funding is now required to implement the program.

B. Background/History

Implementation of the California Global Warming Solutions Act of 2006 (AB 32) includes measures that achieve real, quantifiable, cost-effective reductions of GHG emissions and return California to 1990 emission levels by 2020. Since 2006, the State has continued to steadily implement a set of actions that are driving down GHG emissions, cleaning the air, diversifying the energy and fuels that power our society, spurring innovation in a range of advanced technologies and improving natural resource health statewide.

These efforts have put California on course to achieve the 2020 emissions limit, and have created a framework for ongoing climate action that can be built upon to maintain and continue reductions beyond 2020. In addition to the near-term GHG emission reduction goals established in AB 32, mid-term and longer-term GHG emission reduction targets have been established in Executive Orders B-30-15 and S-3-05 to reduce GHG emissions by 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050, respectively.

The Greenhouse Gas Reduction Fund (GGRF -funded by the Cap-and-Trade Program generated Auction Proceeds, authorized by AB 32) has been established for the purpose of funding measures that allow California to achieve its GHG reduction goals, furthering the purposes of AB 32. In addition, SB 535 (de León, Chapter 830, Statutes of 2012) requires that twenty-five percent of GGRF funds are spent to benefit designated disadvantaged communities, and ten percent must be spent within disadvantaged communities.

In response to California's drought and Governor Brown's Executive Order B-29-15, the Energy Commission will work jointly with the DWR and WRCB to implement the WET program and provide funding for emerging technologies. The Energy Commission will implement the program in three phases. Phase 1 will focus on agriculture. Phase 2 will focus on industry, businesses, and residents. Phase 3 will focus on desalination. Projects will focus on deploying innovative technologies that provide significant water savings, energy savings, and GHG emission reductions.

Analysis of Problem

Phase I: Advancing Energy and Water Reducing Technologies for Agriculture

Efficient irrigation systems and water management practices are critical to reducing water use in the agricultural sector. California's agricultural sector uses 80 percent of California's developed water supply, or approximately 34 million acre-feet annually. Expanding and deploying innovative energy and water efficient irrigation methods will help reduce water consumption and reduce GHG emissions. Phase 1 will fund advanced water efficient and GHG emission reducing technologies.

The following are examples of innovative water and energy saving technologies under consideration for inclusion in this program:

- Efficient irrigation systems that convert from high-pressure drip to low pressure drip systems with prescriptive requirements for high efficiency equipment, distribution uniformity and maintenance.
- Water-use monitoring software that is integrated with control and action strategies that result in on-site energy and water reduction and can include the following:
 - Moisture sensors and other sensors to assess water and energy use
 - Automated water measurements (e.g., flow meters) and recordkeeping
 - Imagery and remote sensing to estimate crop stress
 - Irrigation controllers
 - Leak detection and repair
- Advanced integrated irrigation systems that result in on-site energy and water reductions and can include:
 - Moisture sensing
 - Remote sensing
 - Regulated deficit irrigation practices
 - Control strategies
- On-farm precision technologies and other technologies that directly control on-site water and energy use.

Phase 2: Advancing Water and Energy Efficiency Technologies for Industry, Commercial, and Residential Sectors

The second phase of the WET program will include innovative water management technologies focusing on industry, businesses, and residents, including integrated on-site water reuse, and technologies that reduce or eliminate water requirements for specific residential, industrial and commercial processes while also reducing on-site energy use.

The following lists innovative water and energy saving technologies under consideration for inclusion in Phase 2.

- Integrated on-site use of recycled water with direct on-site energy savings
 - Water recycling and reuse: use of advanced membrane and other technologies to filter wastewater from food processing and other operations for re-use in non-potable purposes, combined with heat recovery or other energy saving technologies.
- No or Reduced Water Use
 - Replace and install food processing and other equipment that requires no water—such as use of infrared for removing fruit and vegetable skins instead of water and steam that saves both on-site energy and water use

Analysis of Problem

- Replace commercial laundry, food service equipment and other industrial/commercial equipment with systems that use little or no water—such as use of CO2 laundry systems and water/heat recovery systems but have both on-site energy and water savings
- Other water and energy saving systems that have broad application with documented water and energy savings.

Phase 3: Desalination

The third phase of the WET program will include innovative technologies to increase the energy efficiency of existing desalination facilities in California and that also result in increased on-site water production. Examples of potential areas under consideration include:

- Maximize energy efficiency and cost effectiveness through use of advanced technologies/systems, such as low osmotic pressure membranes
- Minimize energy associated with discharge and disposal costs of sludge – dewatering and other uses of the sludge
- Increase potable water production due to plant practices that improve energy efficiency and water production

In preparation for the WET program, the Energy Commission has implemented the following coordination efforts:

- Periodic calls with interested state agencies
- Coordinated with the California Air Resources Board (ARB) on GGRF requirements
- Coordinated with DWR, the WRCB, the California Department of Food and Agriculture, and others to ensure the WET program is complementary and not duplicative
- Provided key state agency representatives with updates at meetings of the Water-Energy Team of the Climate Action Team (WET-CAT)
- Submitted a draft Expenditure Record to the ARB
- Developed draft program requirements, such as project and applicant eligibility and selection criteria
- Developed draft technical/administration mechanism (e.g., agreements, guidelines)
- Conducted public workshops to obtain stakeholder input on program design and focus
- Developed outreach information (now available on Energy Commission website):
 - Fact Sheet (in English and Spanish)
 - WET Website
 - WaterSaver Listserv
 - Idea Exchange
 - WET Program Comments

C. State Level Considerations

Five days after Governor Edmund G. Brown Jr. signed the \$1 billion emergency drought package calling for funding relief and critical water infrastructure projects, he directed the first ever statewide mandatory water reductions in Executive Order B-29-15. These actions will save water, increase enforcement to prevent wasteful water use, streamline the state's drought response and invest in new technologies that will make California more drought resilient.

The Energy Commission, jointly with DWR and the WRCB, will implement the Water Energy Technology (WET) program. In addition, other state agencies have and will continue to provide input, including the ARB, California Department of Finance, California Department of Food and Agriculture, California Public Utilities Commission, California Natural Resources Agency, and the Office of Planning and Research. In addition, the Energy Commission will also receive input from federal agencies, such as the US Department of Agriculture and the Bureau of Reclamation, various universities, federal laboratories, industry trade associations, electric and water utilities, and other water and industry experts.

The following is the responsibility delineated in Executive Order #17:

Analysis of Problem

The Energy Commission, jointly with the Department of Water Resources and the State Water Resources Control Board, shall implement a Water Energy Technology (WET) program to deploy innovative water management technologies for business, residents, industries, and agriculture. This program will achieve water and energy savings and greenhouse gas reductions by accelerating use of cutting-edge technologies such as renewable energy-powered desalination, integrated onsite reuse systems, water-use monitoring software, irrigation system timing and precision technology, and on-farm precision technology.

D. Justification

This plan addresses the execution of the WET program to support the Governor's Executive Order B-29-15, Ordering Paragraph 17. The plan is based on the budget assumption of the Energy Commission's Research and Development Division receiving \$30,000,000 in one-time funding from the GGRF. Authority is also requested for a 2-year encumbrance period and an additional 4 years to expend the funds.

Subject to legislative approval, the Energy Commission will implement the WET program as a three-phase program. Phase 1 focuses on agriculture; Phase 2 focuses on industry, businesses, and residents; and Phase 3 focuses on desalination. Projects must have direct, on-site energy and water savings. The Energy Commission has conducted workshops throughout the state and there is strong demand for the program.

E. Outcomes and Accountability

The WET program is established with a series of oversight and coordination efforts with DWR, WRCB, and the Governor's Office that will ensure the outcomes are appropriate and the overall program has accountability. The execution and use of the GGRF funds will be reported to the public in annual program status reports and in other Cap and Trade required reporting documents. Additionally, the WET program will establish a management and supervisory chain that will review the quality of the work, supervise the personnel and report to the management structure of the Energy Commission. As a result, there will be ongoing oversight and assessment regarding the effectiveness of these program activities.

- *How will we measure outcomes and benefits of the WET program?*

Funding for the WET program will be managed by the Energy Commission through public workshops and public Energy Commission Business Meetings. The results of the WET program activities will be made available to the public. The execution and use of the WET program funds will be reported to the ARB through required Cap and Trade status documents.

- a. To be eligible for the program, technologies will be required to pass engineering analysis (by internal staff review or third party verification).
- b. Grant selection criteria will include a requirement that applicants provide operational data to document on-site energy and water savings.
- c. After installation, on-site field verification and post-project monitoring and verification will be done for a sample of projects, or as required by the GGRF program.

- *Expected Outcomes from the WET Program (rough estimates):*

- a. Estimated savings:
 - 12,000 MWh saved per year
 - 2,000 million metric tons CO2 equivalent reduced per year
 - 34 billion gallons/year reduced water used
- b. Constituents served:
 - About 200 mid-size farms in California, focusing on crops and orchards currently using high-pressure irrigation systems.
 - About 30-40 industrial facilities in California, focusing on food processing facilities.

Analysis of Problem

- About 50 commercial facilities in California, such as office buildings, retail, universities, and prisons.
 - About 4-5 large-scale builders of multi-family and single family residential communities in California.
 - Up to 2-3 desalination plants in California.
- c. Number of projects funded: ~100.
- d. Planning for a fast implementation period to generate a quick response
- *What controls will be in place to ensure the appropriate use of the requested resources or authority?*
- The Energy Commission will follow public resources statute requirements in the development, award and management of agreements funded with these one-time funds. The awarding of the funding for grants, contracts and other funding vehicles will follow a public and transparent process including Energy Commission Business Meetings, the Energy Commission Executive Office approval and other normal contract and grant award process oversight capabilities.
- *How will the requested resources be accounted for and monitored?*
- The resources used in the WET program will be planned and executed through the Energy Commission public workshop process and approved by the Energy Commission through a public process. The execution and use of the GGRF funds will be reported to the ARB and the public in annual program status reports.
- *How will improvements or changes be measured?*
- Part of the WET program annual reporting process will be on the benefits and value of the investments made through GGRF annual reports. The benefits received will be reported to the ARB as directed by GGRF documentation.

F. Analysis of All Feasible Alternatives

1. Do nothing.

Pro

No benefit to this alternative other than requiring no appropriation of GGRF funds.

Con

The Energy Commission will not be able to comply with and support the Governor's Executive Orders B-29-15 and B-30-15 to the full extent possible.

2. Authorize use of requested GGRF funds for the implementation, execution, and administration of the WET program.

Pro

The Energy Commission will be able to comply with and support the Governor's Executive Orders B-29-15 and B-30-15. The proposed funding will bring innovation in addressing the drought and its impact on California citizens and businesses.

Con

Requires an appropriation from the GGRF.

G. Implementation Plan

The Energy Commission will implement the program in three phases: Phase 1 will focus on agriculture; Phase 2 will focus on industry, businesses, and residents; and Phase 3 will focus on desalination.

Analysis of Problem

The following lists innovative water and energy saving technologies to be considered and planned for implementation in the WET program.

Phase I: Advancing Energy and Water Reducing Technologies for Agriculture

Efficient irrigation systems and water management practices are critical to reducing water use in the agricultural sector. California's agricultural sector uses 80 percent of California's developed water supply, or approximately 34 million acre-feet annually. Expanding and deploying innovative energy and water efficient irrigation methods will help reduce water consumption and reduce GHG emissions.

- Advanced irrigation system with specific requirements for conversion from high pressure drip to low pressure drip system and must include the following:
 - Designed by a certified irrigation designer
 - Completed Pump Test
 - Conversion from high (>45 psi) to low pressure (<30 psi)
 - Operate for more than 1,000 hours/yr
 - Distribution uniformity
 - Must have maintenance plan
 - Minimum specification requirements for the water flow meter, air vents/pressure relief valves, sand meter filters, high efficiency pumps and motors, and variable frequency drive motor controls
- Automation and monitoring systems with direct control of on-site energy and water use and can include the following:
 - Moisture sensors and other sensors to assess water and energy use
 - Automated water measurements (e.g., flow meters) and recordkeeping
 - Imagery and remote sensing to estimate crop stress
 - Irrigation controllers
 - Leak detection and repair
- Integrated irrigation systems linked to control strategies that result in direct on-site reductions in energy and water use and GHG emission reductions and can include the following:
 - Irrigation scheduling
 - Soil moisture sensing
 - Remote sensing
 - Regulated deficit irrigation practices
 - Minimize potential for evapo-transpiration
 - Other on-farm precision technologies that directly control water and energy use.

Phase 2: Advancing Water and Energy Efficiency Technologies for Industry, Commercial and Residential Sectors

The second phase of the WET program includes innovative water management technologies focusing on industry, businesses and residents, such as

- Integrated on-site use of recycled water with direct on-site energy savings
 - Water recycling and reuse: use of advanced membrane and other technologies to filter wastewater from food processing and other operations for re-use in non-potable purposes, combined with heat recovery or other energy saving technologies.
- No or Reduced Water Use
 - Replace and install food processing and other equipment that requires no water—such as the use of infrared for removing fruit and vegetable skins instead of water and steam that saves both on-site energy and water use.

Analysis of Problem

- Replace commercial laundry, food service equipment and other industrial/commercial equipment with systems that use little or no water—such as use of CO2 laundry systems and water/heat recovery systems that have both on-site energy and water savings.
- Other water and energy saving systems that have broad application with documented water and energy savings.
- Use of advanced cooling towers that use less or no water while also increasing energy efficiency.

Phase 3: Desalination

The third phase of the WET program includes innovative technologies to increase the energy efficiency of desalination facilities while increasing water production and can include:

- Maximize energy efficiency and cost effectiveness through use of advanced technologies/ systems, such as low osmotic pressure membranes.
- Minimize energy associated with the discharge and disposal costs of sludge – dewatering and other uses of the sludge.
- Increase potable water production due to plant practices that improve energy efficiency and water production.

H. Supplemental Information

None.

Recommendation

Recommend approval of the request for \$30,000,000 from the GGRF in FY 2016/17 for the implementation, execution and administration of the WET program as mandated by the Governor's Executive Order B-29-15, Ordering Paragraph 17. Approve Budget Bill language allowing up to 5 percent for the administration of the program and authority for a two-year encumbrance period and an additional four years to expend the funds.