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

Fiscal Year	Business Unit	Department	Priority No.
2016/17	3360	California Energy Commission	

Budget Request Name	Program	Subprogram
3360-001-BCP-DF-2016-GB	ENERGY RESOURCES CONSERVATION	DEMAND SIDE PROGRAM EVALUATION

Budget Request Description
Continued Support of Energy Data Infrastructure to Meet 21st Century Policy and Planning Objectives

Budget Request Summary
This proposal requests the conversion of six limited-term positions to permanent to continue supporting the development of disaggregated energy demand forecasts necessary to implement statewide energy decisions such as the renewable portfolio standard, rooftop solar and zero-emission vehicles. These forecasts are used by the Energy Commission, the California Public Utilities Commission and the California Independent System Operator for energy planning and procurement. Current energy demand forecasts are inadequate for the complex energy decisions needed to meet California's energy demand to avoid shortages and blackouts. Total funding request for this proposal is $724,000 from the Energy Resources Programs Account (ERPA).

Requires Legislation	Code Section(s) to be Added/Amended/Repealed	
☐ Yes ☒ No		
Does this BCP contain information technology (IT) components? ☐ Yes ☒ No *If yes, departmental Chief Information Officer must sign.*	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	Date
			11/17/15
Department Director	Date	Agency Secretary	Date
	11-18-15		12/30/15

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		Date submitted to the Legislature
	Original Signed By: Ellen Moratti	1/7/16

BCP Fiscal Detail Sheet

BCP Title: Continued Support of Energy Data Infrastructure to Meet 21st Century Policy and Planning

DP Name: 3360-001-BCP-DP-2016-GB

Budget Request Summary

	FY16					
	CY	BY	BY+1	BY+2	BY+3	BY+4
Positions - Permanent	0.0	6.0	6.0	6.0	6.0	6.0
Total Positions	**0.0**	**6.0**	**6.0**	**6.0**	**6.0**	**6.0**
Salaries and Wages						
Earnings - Permanent	0	417	417	417	417	417
Total Salaries and Wages	**$0**	**$417**	**$417**	**$417**	**$417**	**$417**
Total Staff Benefits	0	163	163	163	163	163
Total Personal Services	**$0**	**$580**	**$580**	**$580**	**$580**	**$580**
Operating Expenses and Equipment						
5301 - General Expense	0	48	48	48	48	48
5302 - Printing	0	6	6	6	6	6
5304 - Communications	0	6	6	6	6	6
5320 - Travel: In-State	0	12	12	12	12	12
5322 - Training	0	12	12	12	12	12
5324 - Facilities Operation	0	60	60	60	60	60
Total Operating Expenses and Equipment	**$0**	**$144**	**$144**	**$144**	**$144**	**$144**
Total Budget Request	**$0**	**$724**	**$724**	**$724**	**$724**	**$724**

Fund Summary

Fund Source - State Operations						
0465 - Energy Resources Programs Account	0	724	724	724	724	724
Total State Operations Expenditures	**$0**	**$724**	**$724**	**$724**	**$724**	**$724**
Total All Funds	**$0**	**$724**	**$724**	**$724**	**$724**	**$724**

Program Summary

Program Funding						
2385028 - Demand Analysis	0	724	724	724	724	724
Total All Programs	**$0**	**$724**	**$724**	**$724**	**$724**	**$724**

A. Budget Request Summary

This proposal requests the conversion of six limited-term positions to permanent to continue supporting the revival of fundamental energy data collection activities and the development of disaggregated energy demand forecasts needed to implement and support statewide energy decisions at the Energy Commission, California Public Utilities Commission (CPUC) and California Independent System Operator (CAISO). Current energy demand forecasts are inadequate for the complex energy decisions needed to meet California's energy demand to avoid shortages and blackouts.

The necessary data to support forecast improvements is currently in the hands of California utilities. The limited-term staff are tapping into the information and performing the critical analysis that will inform state policymakers so that billions of dollars in future energy efficiency and infrastructure investments can be made using the best information available[1]. The Energy Commission must continue to develop its current analytical capability to incorporate the wealth of new geographically-specific information created by smart meters and bring energy data collection and energy planning into the 21st century.

This proposal allows the limited-term staff to continue their efforts to meet policy and legislative obligations to forecast electricity and natural gas demand at more geographic detail. Staff are also improving the characterization of how, when, where, and by whom energy is used, and more robustly capturing the impacts of California's investments in preferred clean resources as they shape future power generation choices. Total funding request for this proposal is $724,000 from the Energy Resources Programs Account (ERPA).

B. Background/History

California has launched an unprecedented effort to reshape the electricity system to address global climate change and achieve major greenhouse gas (GHG) reductions. California's primary challenge is to maintain its growth while decreasing its contributions to GHG emissions. The primary mechanism to achieve these emission reductions is by reducing demand growth and shifting new electric generation away from fossil fuels toward low-carbon or zero-carbon sources such as wind, solar, biomass, and geothermal energy.

The Warren-Alquist Act created the Energy Commission as the central repository for energy data accessible to government agencies and the public, with additional authority to designate and maintain confidential data that are sensitive for privacy, trade secret, or marketing reasons. By the mid-1980s, the Warren-Alquist Act was modified to require independent, long-range forecasts adopted by the Energy Commission as California's official energy demand forecast.

This legislative authority resulted in codified data regulations which: standardized forms and instructions for data submittals; made explicit requirements for end-use customer surveys and load research regulations; and required the development of a common forecasting methodology as part of an integrated resource planning effort.

The Energy Commission developed a staff dedicated to managing and collecting electricity and natural gas data from utilities and carrying out end-use customer surveys in the residential, commercial, and industrial sectors. This data captured energy characteristics that permitted the analysis of electricity and natural gas consumption across different market sectors. The utilities and Energy Commission staff pooled resources to perform ongoing data collection activities for customer surveys required by Title 20 data regulations, with funding from utility energy efficiency budgets.

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[1] Assuming historic energy efficiency expenditures continue as anticipated, the future investments should exceed a few billion dollars. Estimated expenditures amount to over $5.5 billion since 2010.

- 10-12 EE program cycle: $2.508 billion - http://eestats.cpuc.ca.gov/Views/EEDataPortal.aspx
- 13-14 EE programs: $2.045 billion - http://www.cpuc.ca.gov/NR/rdonlyres/F0CAE811-C49E-416D-9DB7-BFD43C8D9C57/0/CPUCEEPrimer_.pdf
- 2015 EE programs: $0.95 billion - http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M107/K150/107150165.PDF

This changed in the mid-1990s when the Legislature restructured (deregulated) California's electric industry in the hope of lowering electric rates through Assembly Bill 1890 (Brulte, Chapter 854, Statutes of 1996). Vertically integrated utilities were unbundled and most generation assets were divested. California investor-owned utilities, who served about 70 percent of electric customers, no longer had a need to project growth in their service areas to plan for future electric generation needs. As a result, end-use forecasting and data units were disbanded, and the number of staff at the Energy Commission assigned to energy demand forecasting and analysis decreased steadily.

The energy crisis of 2000-2001 changed this thinking. The crisis once again demonstrated the need for policies and planning processes designed to prevent future energy shortages or excessive expenditures on supply resources. To deal with the uncertainty created in 2000-2001, the California Legislature initiated a new, biennial planning process, where information and analyses are to be used by state agencies in their energy decisions. Senate Bill 1389 (Sher & Bowen, Chapter 568, Statutes of 2002), requires the Energy Commission to prepare an *Integrated Energy Policy Report* (*IEPR*) with recommendations to the Legislature and Governor on California's most critical energy trends and issues. Analysis required under SB 1389 includes, but is not limited to, the demand forecast and estimates of load reduction from energy efficiency.

After the soaring July temperatures in 2005 and 2006 stressed California's electric distribution systems, causing blackouts in some areas, the energy agencies took steps to ensure year-ahead reliability or "resource adequacy." A shorter-term forecast was added to the 10-year forecast and the Energy Commission began to analyze short-term forecasts of nearly 40 load-serving entities (investor-owned utilities, publicly owned utilities, retail service providers, and community choice aggregators), adjust them based on the independent staff demand forecasts, and return the results to these entities in three months.

In 2006, the Legislature and Governor Schwarzenegger enacted Assembly Bill 32 (Nunez, Chapter 488, Statutes of 2006), lowering California's GHG emissions to the 1990 level by 2020. AB 32 placed reducing GHG emissions at the center of the State's agenda. In the following year, the *2007 IEPR* clearly identified energy efficiency as California's most important tool in slowing the rate of growth in GHG emissions. In 2014, the California Air Resources Board (ARB) updated their AB 32 scoping plan stating that meeting GHG reduction goals requires unprecedented levels of energy efficiency and clean distributed generation to reach their 2020 goal and a 2050 goal of near zero emissions. These requirements require adequate data collection to support accurate energy demand projections to analyze programs developed to meet these goals.

The CPUC reported to the Governor and Legislature in 2010 on plans and recommendations related to smart grid development in California. California is aggressively pursuing modernization of the state's electric generation system. Conventional customer meters are being replaced with smart meters that can provide detailed end-use data – amounting to thousands of terabytes – about electricity usage over all hours in a year. To date, California utilities have installed approximately 16 million smart meters.

A Renewable Action Plan was prepared by the Energy Commission for the *2012 IEPR* in response to Governor Brown's plan to "expedite permitting of the highest priority [renewable] generation and transmission projects." The Renewable Action Plan calls for the Energy Commission to evaluate methods to further disaggregate its demand forecast beyond the current utility planning area level to provide stakeholders with location-specific demand detail that can be matched with distributed generation development.

On June 6, 2013, a localized reliability concern arose in the Southern California region. Southern California Edison announced intentions to retire the San Onofre Nuclear Generating Station, clarifying that neither of the two 1,100 megawatts (MW) generation units would return to service. Issues such as the decommissioning of San Onofre Nuclear Generation Station highlight the need for localized forecasts of growing electric demand, and impacts of preferred resources in reducing demand, in order to maintain reliability.

California residential, commercial and industry customers use preferred resources, which include clean energy options such as energy efficiency, energy conservation, solar, wind, and energy storage, to meet all or part of their electricity needs. Although the utilities continue to have critical demand data, understanding electricity consumption in the context of diverse preferred resources requires other sources of data to understand how customers that produce their own electricity and sell to the utility any excess electricity generated, impact the reliability of California's electric system.

As the result of an approved Fiscal Year 2014/15 Budget Change Proposal, the Energy Commission's Energy Assessments Division established the Data Analysis and Survey Unit with six two-year limited-term positions. The purpose of this unit is to revive regular, ongoing, robust data collection efforts that support demand forecasts by providing needed information to adequately address the Energy Commission's changing forecasting role, including future energy efficiency and distributed generation impacts. This unit's charter is to collect new, more detailed, and geographically disaggregated information about electricity and natural gas demand necessary to implement the Governor's localized renewable distributed generation goals and support advancing California's energy-related policies and decisions.

The Energy Commission's ability to analyze and forecast energy demand is an essential element of our energy-monitoring function that serves as an early-warning system to determine if trends are consistent with state policies, and to maintain the long-term functioning and reliability of the electricity and natural gas delivery systems. This unit is addressing the needs of our changing energy portfolio by improving our understanding of: energy demand and efficiency impacts; evaluating the ramifications of shifting peak demand to another time of day (load-shifting); and capturing how customers are reducing their reliance on utility-supplied energy by using and quantifying the characteristic of how residential, commercial, and industrial customers use energy in California. Since utilities profit from the realization of their estimated efficiency savings and infrastructure needs, an independent and unbiased assessment of the magnitude and persistence of these savings is needed in making energy resource procurement decisions.

Resource History
(Dollars in thousands)

Program Budget	PY - 4	PY - 3	PY - 2	PY - 1	PY
Authorized Expenditures	N/A	N/A	N/A	$790	$778
Actual Expenditures	N/A	N/A	N/A	$790	$778
Revenues	N/A	N/A	N/A	N/A	N/A
Authorized Positions	N/A	N/A	N/A	6.0	6.0
Filled Positions	N/A	N/A	N/A	6.0	6.0
Vacancies	N/A	N/A	N/A	0	0

C. State Level Considerations

The Energy Commission, California Public Utilities Commission (CPUC), and California Independent System Operator (CAISO) work collaboratively to ensure that adequate, reliable, environmentally friendly, and reasonably-priced electrical power, natural gas supplies, and transmission resources are available for California's consumers and taxpayers. The *IEPR* proceeding brings together a wide variety of energy stakeholders in a transparent and public process to develop balanced energy policies and also ensures the use of consistent assumptions across the electricity, natural gas, and transportation sectors and considers cross-sector effects. Furthermore, the CPUC, Air Resources Board, and CAISO are directed by statute to "carry out their energy-related duties and responsibilities based upon the information and analyses contained in the [*IEPR*] report."

Every two years the Energy Commission is mandated to produce 10-year forecasts of electricity and natural gas demand, which are provided to the legislature and posted publicly as part of the *IEPR*.

Historical data from the CPUC, utilities, and CAISO are used to develop the demand forecasts, incorporate historical energy efficiency savings, estimate additional achievable energy efficiency savings, and analyze peak electricity demand. The forecasts are used by the agencies for the following purposes:

- the CPUC in its efficiency potential and goals studies, which guide future program and funding decisions for the investor-owned utilities;
- the CPUC and CAISO to make decisions on electricity procurement and transmission planning; and
- as the basis for CPUC and Energy Commission recommended portfolios of resources used in the CAISO's transmission planning process.

Since 2007, the Energy Commission and the CPUC have coordinated on demand forecasting issues through the Demand Analysis Working Group, with the CAISO more recently becoming actively engaged. This stakeholder group provides a forum for sharing information and discussing forecasting and energy efficiency savings issues, including scenarios of future energy efficiency investments, savings realized from building and appliance standards, and how to avoid the double-counting of savings. A key issue is the reliability of these estimates in actually reducing demand in specific locations. The three agencies are using this working group forum to come to agreement with stakeholders on forecast assumptions to be used in upcoming procurement and transmission planning proceedings.

As a result of the Governor's renewable distributed generation goals,[2] in July 2015, the CAISO issued initiatives to enable distributed resources and energy storage participants to compete with other generators in the CAISO electricity markets. These initiatives create issues surrounding how to measure electric load, and how to measure load reductions and changes resulting from commercial and industrial customers generating their own electricity. It is vital for the Energy Commission to collect data that measures the resulting load changes to make reliable energy demand forecasts.

The Energy Commission's demand forecasts are an integral part of the *IEPR* and are the official state forecasts used in several applications. The CPUC identifies the Energy Commission *IEPR* process as "the appropriate venue for considering issues of load forecasting, resource assessment, and scenario analyses, to determine the appropriate level and ranges of resource needs for load serving entities in California."[3] The Energy Commission forecasts are also used in the CAISO's local area electric grid studies and other transmission system planning studies and in electricity resource adequacy assessments.

Many entities rely on the Energy Commission's end-user characteristic and forecasting data to support energy research and implement their own energy policy objectives. The Energy Commission receives hundreds of requests annually from federal, state, local, and foreign governments, energy researchers, universities, consultants, private companies, and the public. For example, ARB routinely asks for information about types of energy using equipment and electricity and gas use estimates to develop air quality regulations and set GHG emission standards. Energy data collection at the federal level is significantly limited by the complexities of coordinating with the large number of utilities in the country; consequently, the data sources produced are not as comprehensive as those developed by the Energy Commission.

National labs also rely heavily on California energy data for a variety of research activities, including building benchmarking, evaluating efficiency program impacts, standards development, and furthering emerging energy technology development. Researchers at the national labs also collaborate with staff at the Energy Commission and project results frequently provide benefits directly to California ratepayers.

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[2] http://gov.ca.gov/docs/Clean_Energy_Plan.pdf

[3] Peevey, Michael. September 9, 2004, *Assigned Commissioner's Ruling on Interaction Between the CPUC Long-Term Planning Process and the California Energy Commission Integrated Energy Policy Report Process.* Rulemaking 04-04-003.

D. Justification

The Warren-Alquist Act clearly defines the responsibility of the Energy Commission to "undertake a continuing assessment of trends in consumption" and "independently analyze" collected data, including confidential data.[4] Since deregulation of the electricity market, the advances in data collection made in the 1980s and 1990s have been lost. Historical electricity and natural gas estimates are provided to the Energy Commission by utilities through the Quarterly Fuel and Energy Reports (QFER). These submittals, the backbone of the energy demand forecast, contain a number of deficiencies. The QFER historical record of energy consumption is unnecessarily aggregated by utilities, which significantly limits its usefulness and leaves Energy Commission analysts little ability to conduct quality control and implement fixes to suspected deficiencies.

Without a revived data collection effort, supported by adequate resources and access to needed data, the demand forecast no longer provides the information needed to adequately support the Energy Commission's changing forecasting role. The limited-term staff are developing surveys and starting a rulemaking to gather new, more detailed, and geographically disaggregated information about electricity demand. Analysis of this information is critical for determining how to reach the Governor's localized renewable distributed generation goals and support many energy-related decisions affecting California.

The need for disaggregation of electricity demand is driven by:

1. Energy efficiency is California's top strategy for reducing energy use. The CAISO electric grid operators and CPUC procurement planners need to reliably identify where load reductions from energy efficiency have and are likely to occur. These impacts could help avoid the need for costly new power plants or system upgrades at the distribution or transmission levels. This is further complicated by increasing policy interest in other preferred resources, such as demand response, customer-side distributed generation, and energy storage, which will further affect the amount of energy needed at different times of day and different seasons of the year.

2. Climate change impacts on electricity demand and on the electric grid can be analyzed more completely if these impacts (e.g. rising sea levels, increase in wildfires, and higher overnight temperatures) can be identified and assessed at the climate zone or smaller geographic level.

3. Governor Brown's Clean Energy Jobs Plan calls for adding 20,000 MW of new renewable capacity by 2020. The Renewable Action Plan was intended to diversify the electricity system and reduce growing dependence on natural gas, while increasing energy independence and protecting public health. The addition of that much capacity to the system at specific locations (close to consumer loads and available transmission) is challenging and requires a detailed understanding of where energy is consumed. Energy Commission demand forecasts provide this information and allow capacity additions to be incorporated in an efficient manner.

4. The *2012 IEPR Update* notes that increased geographic granularity in the demand forecast will contribute to better planning for distributed generation procurement and utility infrastructure planning. It also calls for incorporating the results of the disaggregated demand forecasts into distributed generation zones. Since this work aims to align local government land use planning and utility planning processes more closely, forecasts must be more granular—by zip code or an even smaller region.

[4] *The Warren-Alquist Act*, January 2015, Section 25216, subsection (a) and (b). www.energy.ca.gov/2015publications/CEC-140-2015-002/CEC-140-2015-002.pdf

5. The state GHG emission reduction goals call for a reduction of GHG to 40 percent of 1990 levels by 2030[5] by using renewables for half of the state's electricity, cutting petroleum use in half, and doubling the amount of energy efficiency by 2030. These emissions policies directly impact Energy Commission demand forecasts. In order to understand whether these reductions are occurring, the Energy Commission needs to collect and monitor energy consumption by all sectors and emerging demand sources, including plug-in electric vehicles, to assess regional impacts and potential benefits to the grid. Staff are engaged in identifying data sources, assessing the validity of the data, and planning strategies to analyze patterns revealed in the data that will best inform policymakers about progress to meet the Governor's GHG emission reduction goals.

Rebuilding a data infrastructure to meet current and future energy policy and planning objectives requires not only sufficient data showing time and location of energy use by specific types of customers, but also requires sophisticated models to produce more geographically specific scenarios that reflect the various conditions affecting energy. There are no commercially available models that produce the disaggregated forecasts required by the CPUC, CAISO, and Energy Commission policymakers.

Both the CPUC and the CAISO are requesting from the Energy Commission electricity demand forecasts with more geographic specificity. The requested permanent staff will continue focusing on improving the quality of the foundational forecasting data, supporting future forecasting disaggregation and analytical work, and supporting the ongoing data collection needed to maintain an understanding of energy consumption trends and influences. These activities will directly support needs of the CPUC and CAISO.

Establishing detailed analyses of how energy is consumed in California, by whom, and under what conditions through customer energy use data is the core of this proposal. New smart meter data, usage recorded hourly or in increments as small as 15 minutes makes this possible. Billions of ratepayer dollars have been spent to install meters and make information available to utilities and individual customers. The state's energy policy agencies need to benefit from this data as well. This information by itself is capable of transforming forecasting methods and drastically improving the quality of model inputs, which directly result in forecasts that are more robust and provide the ability to produce results at finer levels of disaggregation.

To support the Energy Commission's responsibilities to adequately characterize California energy consumption and to be successful with more disaggregated forecasts, the Energy Commission needs comprehensive and detailed customer billing data and energy consumption histories for all major utilities and market sectors. This includes all utility customer identifiers and records of historical electricity and gas use, particularly detailed energy use information collected at the hourly or sub-hourly level by advanced metering systems.

To accomplish these changes, the Energy Commission is requesting the conversion of six limited-term positions to permanent to continue their efforts in the following roles:

Energy Commission Specialist II – Program lead responsible for program development, monitoring, and communication. Establish, coordinate, and facilitate data collection procedures, data quality and management responsibilities, and ensure that a reliable, robust, and continuing data collection process is successfully developed and implemented. Advise management and policymakers on issues involving energy data collection including sound policies for collecting highly disaggregated data and maintaining privacy of customers. Oversee program budgets, manage contracts as needed, author procurement documents, and interface with stakeholders on data related issues.

Research Program Specialist II – Responsible for general research methodologies, survey and survey instrument design. Ensure demographic representativeness and survey validity. Identify disaggregated demographic and economic related inputs and correlate collected data with demographic forecast and input needs.

[5] http://gov.ca.gov/news.php?id=18938

Research Program Specialist I (GIS) - Handle all aspects of spatial analysis work including interfacing with staff to expand the forecasting capabilities to disaggregate the electricity demand forecast, scope spatial analysis opportunities, evaluate tools for spatial analysis, interface with stakeholders to acquire data, and automate process for data collection.

Associate Energy Specialist - Manage the input, editing, automation, refinement, expansion, and validation databases. Manage database related contracts, author database procurement contract documents.

Energy Commission Specialist II – Serve as subject matter expert in sample design theory for the development of surveys and related research, and make population estimates using statistical methods. Create robust data sets for analytical purposes. Assist with the development of load shape analyses for certain end-uses.

Mechanical Engineer - Oversee development of commercial and industrial survey methodologies, data collection protocols, implementation of energy consumption characterization, perform building energy simulations, and general energy consumption and equipment characterization by economic sector.

Staff in the limited-term positions are addressing critical and ongoing data collection needs. These efforts include the following:

1) Staff are drafting a scope of work for a commercial building energy end use survey and developing a process to perform the survey every four years. The results will support a much more disaggregated forecast by collecting detailed information on how energy is used over time in specific locations.
2) Staff are proposing a rulemaking that will specify the entities and detailed data that must be reported to the Energy Commission to develop a more disaggregated energy demand forecast, which is critical to determine the amount of energy resources needed to meet demand and prevent electric blackouts.
3) 3) Staff are conducting a pilot project to collect customer level advanced metering data from a utility to support research about customer and equipment energy use. This data set will reveal how energy is used, when it is used, what actions are used to reduce energy use, specific geographic location of the energy use and whether the utility accurately classifies the energy use by customer and industry type.[6]
4) Staff are collaborating with energy forecasters to explore the methodologies utilized and find areas of opportunity for increased precision and refinement of data collection efforts that will improve the accuracy and disaggregation of information used to support the IEPR and other department reports.
5) Staff are identifying prospective partners for data sets including, but not limited to, federal and state agencies/laboratories. These data sets are expected to provide valuable demographic, socio-economic, and other relevant information through interagency agreements that may be used for cross-comparison through comprehensive analysis.
6) Staff are exploring statewide and federal funding as potential short and long-term revenue sources to support ongoing, specific data collection and survey needs.
7) Staff are developing a database for information relevant to utility and survey data that is collected on a consistent basis to support disaggregated energy forecasts. This data will evolve into a clearinghouse for information used to analyze California's evolving energy demand in relation to the State's energy efficiency and GHG reduction policies and goals.
8) Staff are in the process of contracting with national research labs to produce load shapes for electric vehicle charging in specific geographic areas in California to support disaggregated forecasts. This electricity use is increasingly gaining importance for California's peak load

[6] One significant task identified is the validation of energy consumption attributed to the North American Industry Classification System (NAICS) codes. This highly detailed system is the standard used by federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. California utilities are known to assign NAICS codes that do not always accurately reflect their customers' business or industry type. Past research indicated as much as 30 percent of the codes could be mis-assigned. For Energy Commission staff to produce a reliable energy forecast at a disaggregated level, it is important that utility customers are assigned an accurate NAICS code. Using a subset of one utility's data, the limited-term staff validated the accuracy of energy attributed to NAICS.

forecasting as the numbers of electric vehicles have significantly increased in recent years. In addition to providing current data and analysis, the development of a methodology is part of this effort that will enable the Energy Commission to capture this data in future years. Staff will manage the research contract and actively participate in shaping the prescribed methodologies and survey techniques.

E. Outcomes and Accountability

Data Analysis and Survey Unit staff were hired on a limited-term basis as part of a FY 2014/15 Budget Change Proposal, and are successfully working on four primary outcomes, outlined below.

1) **Revive regular survey data collection**. The new unit is in the midst of procuring services on a contract to perform the first commercial sector energy consumption survey since the last survey was completed in 2005. Data Analysis and Survey Unit staff are working with forecasting staff to refine the scope and ensure the survey sample sizes are adequate to support the disaggregation of the commercial sector forecasts. The survey is only one of an ongoing set of data collection efforts needed to fully characterize energy consumption across all the forecast sectors, and although the survey effort is itself a milestone, future data collection will be at risk without adequate ongoing staffing.

2) **Develop new data collected under stricter quality control procedures**. The Data Analysis and Survey Unit is prototyping data collection and quality control procedures using a subset of historic smart meter data. The unit will expand the scope of the procedure development with additional data sources and will develop appropriate documentation and security features. Implementing the procedures and methods for future data collection efforts will require the continued engagement and monitoring of Data Analysis and Survey Unit staff. Without resources to implement the final procedures, the data quality benefits will never be realized.

3) **Collect more granular data**. The Data Analysis and Survey Unit continues to coordinate with other Energy Commission and state agency staff to develop detailed data sources for forecasting purposes. For example, staff are currently developing detailed regional plug-in electric vehicle load shapes to the support planning area peak electricity load forecasts, a potential significant electricity end-use not currently well characterized in the forecasts. The resulting data and analysis would vastly improve the current estimate of peak impacts attributed to plug-in electric vehicles in the demand forecasts. Continuing the work to identify, procure, clean, and validate new data sources will be dependent upon the continued availability of dedicated resources.

4) **Expand capability to disseminate energy data**. The Data Analysis and Survey Unit is exploring and evaluating existing methods for disseminating detailed data by other state agencies, internal programs, and developing an approach for disseminating data to stakeholders. For example, staff are evaluating geographic information data sets housed at a central State data website and determining if there would be a potential benefit to disseminating data at such a site. Concurrently, staff are developing strategies for safely securing and protecting confidential data that meet State information technology standards.

The realization of the benefits from the Data Analysis and Survey Unit will be jeopardized if there is not continued support to ensure completed implementation of the work and the continued identification of new resources to leverage support for the data collection effort.

F. Analysis of All Feasible Alternatives

Alternative 1: Do nothing

In 1996 deregulation passed (AB 1890), which triggered the electric industry restructuring, and the Energy Commission's energy characteristic data collection process became non-functional. The Energy Commission relied almost entirely on the state's utilities to manage and implement the studies it required and then to provide necessary data. A new data collection system has never been created to replace this loss. Due to the increase in smart meters and time-of-use metering in general, methods for

energy forecasting and modeling energy consumption are also out of date and based on low quality, low resolution data. The "do nothing" alternative would leave the Energy Commission continually trying to make sense of how utility customers use energy with minimal data, while at the same time, an unprecedented wealth of new data is available that could transform energy forecasting and planning.

If nothing is done, the benefits gained from the work of the six limited-term staff may be lost and it will be difficult to produce independent, consistent, unbiased energy use forecasts appropriate for energy policy analysis and planning within California.

Alternative 2: Approve the conversion of six limited-term positions to permanent to continue implementing the commercial sector electricity and natural gas survey, expanding survey and data collection efforts to include residential and industrial sectors, improving demand data quality and accuracy, developing studies and analyses directly supporting forecast disaggregation, resource adequacy, and demand side management activities. (Preferred)

The best way for California to reliably receive data appropriate for energy planning is to support the data collection activity directly. It is the best way to ensure consistent, dependable and efficient implementation of the basic requirements for fulfilling the Energy Commission's required responsibilities. Specific analyses that will benefit from the work proposed include:

- Forecasts of energy demand, which support energy power procurement decisions and transmission planning
- Electricity system adequacy and strategies to increase reliability
- Electricity and natural gas consumed in California homes and businesses, including amount, location and time.
- How to optimize the millions of dollars spent on energy efficiency and load reduction programs, and savings measurement and verification
- Potential impacts of increased time of use pricing and demand response programs
- Building and appliance standards development and assessment
- Electricity and natural gas price projections
- Early-warning system for impending or potential problems in the energy sector

Converting the six limited-term positions to permanent is essential to the long-term success of the proposal and would ensure continued collaboration and coordination with forecasters to integrate new data, and modernize forecasting models so they are more suited to modern energy policy objectives. Many complex issues must be coordinated with the CPUC to arrange transfer of confidential customer information from the utilities to the Energy Commission. It is essential that work to resolve confidential data concerns continue through vetted procedures by these six positions.

Alternative 3: Redirect existing Energy Commission staff
A redirection of current staff would mean reducing assessments of publicly owned utility energy efficiency progress (Senate Bill 1037 (Kehoe, Chapter 366, Statutes of 2005) and Assembly Bill 2021 (Levine, Chapter 734, Statutes of 2006)), abbreviated efforts to forecast energy efficiency forecast reductions from future programs, and postponing the new hybrid econometric modeling work recommended by the Energy Commission's panel of independent forecasting experts.

G. Implementation Plan

The six limited-term staff form the Data Analysis and Survey Unit, which is focused on implementing new data collection activities at the Energy Commission. These activities include evaluating detailed historical energy consumption data, developing new data quality procedures, evaluating and expanding the forecast supporting data collection efforts, and providing information for the continued disaggregation of the Energy Commission's electricity and natural gas demand forecasts.

Staff continue to evaluate and scope potential studies to support forecasting model improvements, explore opportunities to collaboratively fund surveys, improve document data handling and quality

assurance methods, develop materials to support a data regulations rulemaking, and continue evaluating the information technology infrastructure needs for smart meter data collection processes.

Table 1. Program Milestones and Estimated Completion Dates

Project Phase	Project Activities	Milestones	Estimated Completion Dates
Phase 1 NAICS	Planning	Evaluate the accuracy of NAICS business classification assignments, methodology, and data collection processes using a subset of utility data	August 2015
		Draft proposal to improve NAICS assignment methodology and data collection processes	September 2015
		As part of a pilot project, work with a utility to finalize draft methodology	October 2015
		Finalize NAICS Validation Study plan	November 2015
	Implementation	Collect selected utility meter data	December 2015
		Perform pilot of NAICS assignment and data collection processes	March 2016
		Revise data assignment procedures	April 2016
		Develop data conversion procedures	May 2016
		Draft final selected utility validation report and methodology recommendations	June 2016
Phase 2 NAICS	Planning	Revise NAICS and conversion methodologies for remainder of utility data	September 2016
	Implementation	Collect utility data	January 2017
		Perform NAICS assignment and data conversion	June 2017
		Draft final statewide report on NAICS validation and status	August 2017
Phase 1 Data Collection Rulemaking	Planning	Develop schedule and scope OIR	September 2015
	Implementation	Complete rulemaking activities	August 2016
		Submit rulemaking package to OAL	September 2016
Phase 2 Data Collection Rulemaking	Planning	Develop broad Energy Commission phase 2 data collection schedule and scope OIR	February 2017
	Implementation	Complete rulemaking activities	January 2018
		Submit rulemaking package to OAL	February 2018
Plug-in Electric Vehicle Load Shape Development	Procurement	Approve an agreement with INL and LBNL to perform plug-in electric vehicle (PEV) load shape analyses	September 2015
	Implementation	Develop and incorporate regional PEV load shapes into the 2015 IEPR demand forecast	November 2015
		Develop and evaluate methodology for forecasting regional load shapes	April 2017

Commercial Survey	Planning	Draft RFP	November 2015
	Procurement	Procure survey services	June 2016
	Implementation	Perform commercial survey	June 2017
Residential Survey	Planning	Define scope, funding, and research objectives	August 2016
		Draft RFP	January 2017
	Procurement	Procure contractor to perform residential survey data collection	September 2017
	Implementation	Perform residential survey	December 2018
Industrial Survey and Studies	Planning	Identify priority end-use consumption for focused study	December 2017
		Define research objectives for sector energy consumption characterization survey	January 2018
		Develop RFPs for both survey and focused studies	April 2018
	Procurement	Procure contractors to perform the survey and additional studies	December 2018
	Implementation	Perform industrial sector survey and analysis of focused industrial end-use	June 2020

H. Supplemental Information

None.

I. Recommendation

Approve Alternative 2.

The state can no longer rely on utilities to provide the fundamental data it needs to set energy policy and manage the electricity and natural gas industries. To fulfill the Energy Commission's legislatively mandated functions and implement the Governor's policies, energy characterization data needs to be collected to clearly identify who, when, where, and how energy is consumed in California. California's GHG reduction goals and policies to procure new energy generation assets using efficiency savings and renewables are complex and ambitious. These policies require that outdated data collection procedures be modernized.

The necessary data to disaggregate the forecast is currently in the hands of California utilities and has cost utility rate payers and tax payers billions of dollars[7]. This proposal requests the conversion of six limited-term positions to permanent to tap into that information so that billions of dollars in future energy

[7] According to The Edison Foundation as of July 2014 there are estimated to be nearly 12.5 million smart meter installed in California. (http://www.edisonfoundation.net/iei/Documents/IEI_SmartMeterUpdate_0914.pdf) For California IOUs the cost for installation is estimated at approximately 4.5 billion dollars.

- PG&E $1.6846 billion - http://docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/58362-05.htm#P164_21822
- PG&E $0.623 billion - http://docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/91154-01.htm#P115_4462
- SDG&E $0.572 billion - http://docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/91154-01.htm#P115_4462
- SCE $1.63 billion - http://docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/91154-07.htm#TopOfPage

efficiency and infrastructure investments can be made using the best information available[8]. The Energy Commission must continue to develop its currently outdated analytical capability to incorporate the wealth of new geographically-specific information created by smart meters and bring energy data collection and energy planning into the 21st century.

[8] Assuming historic energy efficiency expenditures continue as anticipated, the future investments should exceed a few billion dollars. Estimated expenditures amount to over $5.5 billion since 2010.

- 10-12 EE program cycle: $2.508 billion - http://eestats.cpuc.ca.gov/Views/EEDataPortal.aspx
- 13-14 EE programs: $2.045 billion - http://www.cpuc.ca.gov/NR/rdonlyres/F0CAE811-C49E-416D-9DB7-BFD43C8D9C57/0/CPUCEEPrimer_.pdf
- 2015 EE programs: $0.95 billion - http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M107/K150/107150165.PDF

Workload Documentation

	Energy Commission Specialist II	Energy Commission Specialist II	Research Program Specialist II	Mechanical Engineer	Associate Energy Specialist	Research Program Specialist I (GIS)
	Program lead responsible for program development, monitoring, and communication. Establish, coordinate, and facilitate data collection procedures, data quality and management responsibilities, and ensure that a reliable, robust, and continuing data collection process is successfully developed and implemented. Advise management and policymakers on issues involving energy data collection including sound policies for collecting highly disaggregated data and maintaining privacy of customers. Oversee program budgets, manage contracts as needed, author procurement documents, and interface with stakeholders on data related issues.	*Serve as subject matter expert in sample design theory for the development of surveys and related research, and make population estimates using statistical methods. Create robust data sets for analytical purposes. Assist with the development of load shape analyses for certain end-uses.*	*Responsible for general research methodologies, survey and survey instrument design. Ensure demographic representativeness and survey validity. Identify disaggregated demographic and economic related inputs and correlate collected data with demographic forecast and input needs.*	*Oversee development of commercial and industrial survey methodologies, data collection protocols, implementation of energy consumption characterization, perform building energy simulations, and general energy consumption and equipment characterization by economic sector.*	*Manage the input, editing, automation, refinement, expansion, and validation databases. Manage database related contracts, author database procurement contract documents.*	*Handle all aspects of spatial analysis work including interfacing with staff to expand the forecasting capabilities to disaggregate the electricity demand forecast, scope spatial analysis opportunities, evaluate tools for spatial analysis, interface with stakeholders to acquire data and automate process for data collection.*
Obtain data and resources to maintain ongoing survey and data analysis efforts supporting Energy Commission policy objectives.	301 (17%)	384 (22%)	273 (15%)	384 (22%)	296 (17%)	229 (13%)
Maintain and refine data quality, monitoring, and improvement for all survey and analytical activities including establishing data collection standards, performing data validation, defining data dictionaries, resolving data transmission challenges, defining error tolerance thresholds, and ensuring compliance with data usage policies.	759 (43%)	820 (46%)	881 (50%)	724 (41%)	468 (26%)	651 (37%)
Manage and maintain data repository procedures, access, and infrastructure.	152 (9%)	36 (2%)	78 (4%)	78 (4%)	696 (39%)	366 (21%)
Perform analyses to support survey scoping, data quality, and implementation. Provide analytical support to forecast disaggregation activities. Assess the availability and evaluate external data sets which may strengthen and enhance demand analyses. Manage the production, dissemination, scoping, and quality of analytical products.	224 (13%)	408 (23%)	345 (19%)	392 (22%)	129 (7%)	323 (18%)
Perform project and resource planning and management activities including communication, funding and resource planning.	300 (17%)	40 (2%)	76 (4%)	76 (4%)	64 (4%)	84 (5%)
Maintain staff knowledge and expertise as scope and priorities change over ongoing survey and analytical processes.	40 (2%)	88 (5%)	123 (7%)	123 (7%)	123 (7%)	123 (7%)

Energy Assessments Division Organization Chart

Demand Analysis Office (Current)

Energy Resources Specialist III (Managerial)
- o Sr. Mechanical Engineer
- o Sr. Mechanical Engineer
- o Research Specialist III
- o EC Specialist III
- o EC Specialist III
- o EC Specialist III
- o Office Technician

Demand Forecasting Unit
- o Sup II
- o EC Specialist II
- o EC Specialist II
- o EC Specialist I
- o EC Specialist I
- o EC Specialist I
- o EC Specialist I
- o Associate Energy Specialist
- o Associate Energy Specialist

Data Collection Unit
- o Sup II
- o EC Specialist II
- o EC Specialist I
- o EC Specialist I
- o EC Specialist I
- o EC Specialist I
- o EG System Specialist I
- o Associate Energy Specialist
- o Associate Energy Specialist
- o Management Services Technician

Data Analysis and Survey Unit
- o Sup II
- o EC Specialist II (Limited-Term)
- o EC Specialist II (Limited-Term)
- o Research Program Specialist II (Limited-Term)
- o Research Program Specialist I (Limited-Term)
- o Associate Energy Specialist (Limited-Term)
- o Mechanical Engineer (Limited-Term)

Transportation Energy Forecasting Unit
- o Sup II
- o EC Specialist II
- o EC Specialist II
- o EC Specialist I
- o EC Specialist I
- o Associate Energy Specialist
- o Energy Analyst

Demand Analysis Office (Proposed FY 2016/17)

Energy Resources Specialist III (Managerial)
- o Sr. Mechanical Engineer
- o Sr. Mechanical Engineer
- o Research Specialist III
- o EC Specialist III
- o EC Specialist III
- o EC Specialist III
- o Office Technician

Demand Forecasting Unit
- o Sup II
- o EC Specialist II
- o EC Specialist II
- o EC Specialist I
- o EC Specialist I
- o EC Specialist I
- o EC Specialist I
- o Associate Energy Specialist
- o Associate Energy Specialist

Data Collection Unit
- o Sup II
- o EC Specialist II
- o EC Specialist I
- o EC Specialist I
- o EC Specialist I
- o EC Specialist I
- o EG System Specialist I
- o Associate Energy Specialist
- o Associate Energy Specialist
- o Management Services Technician

Data Analysis and Survey Unit
- o Sup II
- o EC Specialist II (Permanent)
- o EC Specialist II (Permanent)
- o Research Program Specialist II (Permanent)
- o Research Program Specialist I (Permanent)
- o Associate Energy Specialist (Permanent)
- o Mechanical Engineer (Permanent)

Transportation Energy Forecasting Unit
- o Sup II
- o EC Specialist II
- o EC Specialist II
- o EC Specialist I
- o EC Specialist I
- o Associate Energy Specialist
- o Energy Analyst