

**BEFORE THE
CALIFORNIA ENERGY COMMISSION**

**COMPREHENSIVE ENERGY EFFICIENCY PROGRAM FOR EXISTING
BUILDINGS DRAFT ACTION PLAN STAFF WORKSHOP**

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COMMENTS ON ASSEMBLY BILL-758

IN SUPPORT OF OPEN DATA GATHERING AND ANALYSIS

Study after study has shown potential for huge savings and hefty cuts in carbon emissions from widespread adoption of energy efficient technologies. Yet these gains have failed to fully materialize. Scholars can't say why. Theories abound. Solutions remain elusive.

We are the E2e Project, an initiative that unites top researchers in economics, engineering and other fields and uses transparent and state-of-the-art analytical techniques to measure the returns to energy efficiency programs. Our mission is to solve one of the most perplexing energy puzzles of our time—the efficiency gap. E2e is supported by a generous grant from The Alfred P. Sloan Foundation, and is a joint initiative of the Energy Institute at the University of California at Berkeley's Haas School of Business and the Center for Energy and Environmental Policy Research at the Massachusetts Institute of Technology.

This document provides comments on the data gathering and analysis components of Assembly Bill 758. We believe consumers and citizens can profit if **state-of-the-art evaluations** and principles **are an integral part of energy efficiency programs**. In order *“to develop a comprehensive program to achieve greater energy efficiency in the state's existing buildings”* – AB-758's main goal, it is critical to uncover the energy efficiency investments that have the highest return. We believe that Assembly Bill 758 could bring gold-standard evidence to the energy efficiency investment policy space that would **ensure the success of energy efficiency policy in existing buildings**.

As economists at the E2e Project have extensive experience working on energy issues, including research that has relied on customer-specific energy usage data; we are pleased to be able to submit comments to this bill. **We support the push for data collection** the California Energy Commission staff scoping report introduces (Comprehensive Energy Efficiency Program for

Existing Buildings Scoping Report, Chapter 9) and we are writing to **provide comments** on several specific aspects of such a proposal.

APPLY STATE-OF-THE-ART EVALUATION TECHNIQUES TO THE CENTRALIZED DATA COLLECTION (P. 141): VALUABLE TO CONSUMERS AND RATEPAYERS

Assembly Bill 758's scoping report calls for centralized data collection. We strongly agree that an Energy Data Center that provides researchers access to highly disaggregated energy usage information would have **a number of benefits to the government and the consumers**. Highly disaggregated data can be used to provide rigorous insights into ratepayers' responsiveness to a wide variety of energy-related policies and can help identify the effectiveness of programs. Highly disaggregated data also allow researchers to estimate the impact of policies on different demographic groups to help policy-makers and regulators assess whether they are achieving the goals of their programs. Absent the availability of data representative of household-level or individual-level actions, researchers instead must rely on aggregated data that only allow very limited conclusions to be drawn.

We recommend that the proposed Energy Data Center would house **two types of data**: (1) **aggregated energy-usage** data to be released to the public after careful scrutiny to guarantee the aggregation sufficiently masks private identifying characteristics and (2) **highly disaggregated energy usage data** under an arrangement that would protect private or otherwise sensitive information for usage of researchers and policy-makers. In our experience, the ease with which highly disaggregated energy usage data is available to researchers varies widely. While we and some of our colleagues at the Energy Institute at Haas have had a number of successes in gaining access to energy usage data, those successes have come only after lengthy and idiosyncratic negotiations. Those successes also are tempered by an equally large number of failures.

When energy usage data have been obtained for research purposes, these **data have been used to inform a number of important and timely energy policy issues**. For example, in the case of the Mexican "Cash for Coolers" (C4C) program¹, UC Berkeley researcher Lucas Davis and his co-authors Alan Fuchs (UNDP) and Paul Gertler (UC Berkeley)² have used household-level electric billing records from the universe of 25+ million Mexican residential customers to find that refrigerator replacement reduces electricity consumption by 7%, about **one-quarter of what was predicted ex-ante based on engineering models**. The study also finds that air conditioning replacement increases electricity consumption. Overall, the study concludes that that the program is an expensive way to reduce externalities from energy use.

¹ Large-scale appliance replacement program in Mexico that since 2009 has helped 1.5 million households replace their old refrigerators and air-conditioners with energy-efficient models.

² Available at http://ei.haas.berkeley.edu/pdf/working_papers/WP230.pdf

As detailed in the table below, economic research relying on household-level energy usage data has been used to inform a wide range of policy issues including increasing-block tariff design and dynamic pricing.

Selection of Research Informed by Household-Level Utility Billing Data

Energy Policy Question	Description of Household-Level Data	Citation and Link
1. Which rate tariff do residential electricity consumers respond to?	Population of residential billing records between 1999 and 2007 from SCE and SDG&E	Koichiro Ito, "Do Consumers Respond to Marginal or Average Price? Evidence from Nonlinear Electricity Pricing," Energy Institute at Haas working paper #210 dated October 31, 2012. Available at http://ei.haas.berkeley.edu/pdf/working_papers/W210.pdf .
2. Was California's 20/20 energy conservation rebate program cost effective?	Population of residential billing records in 2004 and 2005 for SCE, PG&E, and SDG&E.	Koichiro Ito, "Does Conservation Targeting Work? Evidence from a Statewide Electricity Rebate Program in California," working paper dated July 2012. Available at http://www.stanford.edu/~itok/koichiro_ito/Research_files/Ito_Rebate.pdf
3. Why do residential customers resist time-varying pricing and how could an opt-in approach to dynamic pricing increase acceptance and effectiveness?	Stratified random samples of residential customers' hourly consumption data from PG&E between 2006 and 2009 and from SCE between 2004 and 2008.	Severin Borenstein, "Effective and Equitable Adoption of Opt-In Residential Dynamic Electricity Pricing" Energy Institute at Haas working paper #229 dated April 2012. Available at http://ei.haas.berkeley.edu/pdf/working_papers/W229.pdf .
4. How big is the tradeoff between efficiency and distributional effects for increasing block pricing tariff design?	Population of residential billing records in 2006 from SCE, PG&E and SDG&E	Severin Borenstein, "The Re-distributional Impact of Non-Linear Electricity Pricing" Energy Institute at Haas working paper #204R dated April 2011. Available at http://ei.haas.berkeley.edu/pdf/working_papers/W204.pdf .
5. How do residential households change their energy usage in response to different approaches to dynamic pricing, including critical peak pricing?	Hourly, residential household energy usage data from a random sample of households equipped with smart meters in Washington DC between July 2008 and March 2009.	Frank Wolak, "An Experimental Comparison of Critical Peak and Hourly Pricing: The PowerCentsDC Program" working paper dated March 2010. Available at http://www.stanford.edu/group/peec/cgi-bin/docs/policy/research/An%20Experimental%20Comparison%20of%20Critical%20Peak%20and%20Hourly%20Pricing.pdf .
6. By how much did residential electricity consumption decline as a result of an appliance replacement program?	Household-level electric billing records from the population of Mexican residential customers	Lucas Davis, Alan Fuchs, and Paul Gertler "Cash for Coolers", Energy Institute at Haas working paper #230, dated April 2012. Available at http://ei.haas.berkeley.edu/pdf/working_papers/W230.pdf .

WHAT IS A STATE-OF-THE-ART EVALUATION?

Policy-makers and organizations such as the DOE, CPUC and CEC have been systematically evaluating projects throughout the years. But **assessing the underlying human behavior factors behind the implementation, as well as the engineering aspects, is, in our view, essential** (as the C4C example above highlights it). Program assessments that include organizational reviews and process monitoring are fundamental but these do not estimate the magnitude, or additionally, of effects with clear causation. In this way, the central question that needs to be answered is what would have happened to those receiving the intervention had they not in fact received the program in order to learn about the realized rate of return to the funded projects. Such studies should account for actual human behavior, as opposed to just theoretical evaluations of what is possible given the technology.

Simple at first sight, this is in fact a **complex issue** that needs to be carefully thought out. This happens because we **cannot observe** this same group both with and without the intervention – there is no good counterfactual, or, in other words, comparison. The key challenge is to develop this counterfactual. In other words, a comparison group as similar as possible, to those receiving the intervention. **We suggest that the following mechanism is used for most of the projects (making sure spillovers are taken into consideration): given that there is a limited budget, during the pilot phase, those who receive the project funding first (amongst the ones who are eligible) should be decided by a random process. This ensures that the two groups of people are on average identical thus comparable.**

In this context, **planning the evaluation upfront is as important as collecting the data.** A well planned evaluation costs less, saves money in other projects, and provides reliable “best practices”. Additionally, a well conducted evaluation helps with **transparency and accountability** in the government.

Next we listed some examples of impact evaluation centers that follow the evaluation principles we have just articulated and that can help guide this project.

EXAMPLES OF IMPACT EVALUATION CENTERS

THE WORLD BANK’S DEVELOPMENT IMPACT EVALUATION INITIATIVE (DIME)³

Created in 2005, DIME systematically evaluates World Bank’s own projects. DIME started with 28 interventions and in 2011 it oversaw over 300. The initiative is centralized and independent.

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<http://web.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTDEVIMPEVAINI/0,,contentMDK:22728189~menuPK:3998294~pagePK:64168445~piPK:64168309~theSitePK:3998212,00.html>

UK BEHAVIORAL INSIGHTS TEAM

Often called the 'Nudge Unit', the team applies insights from academic research in behavioral economics and psychology to public policy and services. In addition to working with almost every government department, the team works with local authorities, charities, NGOs, private sector partners and foreign government, developing proposals and testing them empirically across the full spectrum of government policy, including a well-known program offering attic cleaning services with attic insulation.

INTER AMERICAN DEVELOPMENT BANKS'S OFFICE OF EVALUATION AND OVERSIGHT (OVE)

OVE conducts randomized controlled trials amongst other types of evaluations such as sector or corporate evaluations. OVE's topics include energy, electricity, and environment amongst others, focused in member countries.

COMPANIES SUCH AS OPOWER AND GOOGLE

Google's website states that they run anywhere from 50 to 200 online experiments at any given time all over the world. In 2010, for example, they ran a very small experiment in Google News called Editors' Picks. In this test, they allowing a small and random set of publishers to promote their original news articles through the Editors' Picks section.

PROTECTING THE CONFIDENTIALITY OF ENERGY USAGE DATA

In our experience, **there are a number of existing frameworks** that have been **successful** in making individual-level **data available to researchers while at the same time protecting the confidentiality** of those data. These existing frameworks provide useful guidance as it considers how to make customer-specific energy usage data available through an Energy Data Center.

A wide-range of mechanisms, including individual non-disclosure agreements (NDAs), are employed by agencies in the United States in order to make individually identifiable data available to scientific researchers under strict privacy-protecting procedures⁴. In addition, the Inter-University Consortium for Political and Social Research (ICPSR) at the University of Michigan has developed guidelines on how to prevent confidential data records from being linked to specific individuals, including guidelines for restricted access to data in situations in which the data cannot be modified to protect confidentiality without compromising the research potential of the data.⁵

⁴ A useful discussion of the provision of micro-data that has been stripped of individually identifiable information (e.g., names, addresses, social security numbers) is available at <http://emlab.berkeley.edu/~saez/card-chetty-feldstein-saezNSF10dataaccess.pdf>.

⁵ Guidelines ICPSR: <http://www.icpsr.umich.edu/icpsrweb/content/datamanagement/confidentiality/index.html>

Below we provide examples of other micro-data sets containing highly confidential individual-level information that have been made available for scientific research purposes while simultaneously protecting the disclosure of individually identifiable data.

UNITED STATES CENSUS RESEARCH DATA CENTER (RDC)

Household-level data collected by the U.S. Census Bureau available in an on-site, restricted-access environment.⁶ Highly sensitive household-specific information available in these datasets includes household income and net worth such as the dollar amount of assets held in an interest-earning account at a financial institution.

UNITED STATES BUREAU OF LABOR STATISTICS

Micro-data, such as the National Longitudinal Surveys of Youth and Consumer Expenditure Surveys, available to researchers⁷. Access to individually identifiable data requires a formal application. Highly sensitive individual-specific information available in these datasets includes hourly pay, weeks out of work, and health ailments such as heart disease, cancer, and diabetes.

PANEL STUDY OF INCOME DYNAMICS (PSID)

Micro-data available to academic researchers through the University of Michigan. Access is provided through a contractual arrangement after a formal application has been approved.⁸ Highly sensitive individual-specific information available in these datasets includes the amount of any monthly mortgage payment, current interest rate on the homeowner's mortgage loan, and whether the individual has ever had a loan denied.

CENTERS FOR MEDICARE AND MEDICAID SERVICES

Health-related micro-data available to researchers, including medical data containing Medicare beneficiary-specific and physician-specific information such as claims data and clinical data.⁹ Access to individually identifiable data requires approval of a formal request by the Centers for Medicare and Medicaid Services' Research Data Assistance Center (ResDAC). Highly sensitive individual-specific information available in these datasets includes patient diagnoses as well as medical procedures or other healthcare services provided to treat the diagnoses.

CHICAGO PUBLIC SCHOOLS (K-12)

The Chicago Public school system has made data available to researchers including pre-existing student-level micro-data as well as opportunities to conduct original field experiments.¹⁰ Access requires a formal approval process. Highly sensitive individual-specific information available in these datasets includes test scores and eligibility for free lunch programs.

⁶ U.S. Census RDC: <http://www.census.gov/ces/rdcresearch/rdcenvironment.html>.

⁷ U.S. Bureau of Labor Statistics procedures: <http://www.bls.gov/bls/blsresda.htm>.

⁸ PSID procedures: <http://psidonline.isr.umich.edu/Guide/FAQ.aspx?Type=3#710>.

⁹ ResDAC: <http://www.resdac.org/cms-data/request/cms-data-request-center> and at <http://www.cms.gov/Research-Statistics-Data-and-Systems/Files-for-Order/IdentifiableDataFiles/Downloads/CustomDisclaimer.pdf>.

¹⁰ For more details on the Chicago Public School system: <http://www.cps.edu/Research/Pages/Research.aspx>.

In addition to developing a standardized non-disclosure agreement with appropriate confidentiality procedures, we believe it is important for an Energy Data Center to develop protocols related to data security based on best practices. Best-practices related to data security measures should include guidelines on data encryption, data storage, the use of password protected computers that are internet-disabled and non-networked, laptop usage, as well as established procedures to follow in the event of a security breach.

Respectfully submitted,

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FOR MORE INFORMATION

E2e Mission and Strategy (<http://e2e.haas.berkeley.edu/>)

Supported by a generous grant from The Alfred P. Sloan Foundation, the E2e Project is a joint initiative of the Energy Institute at the University of California at Berkeley's Haas School of Business and the Center for Energy and Environmental Policy Research at the Massachusetts Institute of Technology. E2e unites top researchers in economics, engineering and other fields and uses transparent and state-of-the-art analytical techniques. Our mission is to solve one of the most perplexing energy puzzles of our time—the efficiency gap. Infusing the creation of knowledge with a commitment to non-partisan outreach, E2e aims to create a cheaper and greener future.