



---

# Agenda

## Sustainability Task Force

A Committee of the Chico City Council

Meeting of Thursday, September 14, 2017 – 5:30 p.m.

Municipal Center - 421 Main Street, Conference Room No. 1 in the Council Chambers

---

1. **CALL TO ORDER AND ROLL CALL**
2. **APPROVE JUNE 22, 2017 MEETING MINUTES**  
*Draft 06/22/17 minutes attached.*
3. **COST-EFFECTIVENESS STUDY TO SUPPORT PROPOSED RESIDENTIAL REMODEL ORDINANCE (Leo DePaolo, Community Development Director and STF Chair tement)** – Last year, the STF and Building Official developed a draft residential remodel ordinance that would require a homeowner to install basic energy efficiency measures for the entire home if the remodel exceeded fifty percent of the existing floor area of the structure. The proposed ordinance closely mirrors the City's Residential Energy Conservation Ordinance, which requires similar energy efficiency upgrades at the time of sale of a home. In its review of the proposed ordinance language, the City Attorney's office determined that while the City is allowed to adopt energy standards that are more stringent than statewide standards, the adoption must be accompanied by a "cost-effectiveness" study. A draft study has been prepared by PG&E and will be shared with the STF. *Draft Cost-Effectiveness Study attached.*
4. **2017/18 CIVICSPARK INITIATIVE: CLIMATE ADAPTATION (Deputy Director Vieg and STF Chair Stemen)** – Both the CAP and state legislation direct the development of long-term strategies for mitigating anticipated local impacts of climate change. Next year's CivicSpark Fellow will coordinate with CSU, Chico, and City and Butte County staff, in the development of a Draft Climate Change Vulnerability Assessment that identifies risks climate change poses to the community, and also prepare draft adaptation and resiliency goals, policies and objectives. *Original CivicSpark application attached.*
5. **CHANGE DATE FOR OCTOBER 26<sup>th</sup> STF MEETING (Deputy Director Vieg)** – Due to scheduling conflicts it is necessary to identify an alternate date for the scheduled October 26<sup>th</sup> STF meeting. The proposed new date is November 9<sup>th</sup>.
6. **MILLION WATT CHALLENGE – UPDATE (Deputy Director Vieg and CivicSpark Member Goldstein)** – Update regarding the Million Watt Challenge.
7. **REPORTS & COMMUNICATIONS** - These items are provided for the STF's information. Although the STF may discuss the items, no action can be taken at the meeting. Should the STF determine that action is required, an item may be included on a subsequent agenda.
8. **BUSINESS FROM THE FLOOR** - Members of the public may address the STF at this time on any matter not already listed on the agenda, with comments being limited to three minutes. The STF cannot take any action at this meeting on requests made under this section of the agenda.
9. **ADJOURNMENT** - Next meeting scheduled for Thursday, October 26, 2017 (**SUBJECT TO CHANGE**).

**ATTACHMENT(S):** 06/22/17 Meeting Minutes (Draft), Draft Cost-Effectiveness Study, CivicSpark Application

Agenda available from the City's website at [www.ci.chico.ca.us](http://www.ci.chico.ca.us) under "**Meetings/Agendas**"

Prepared: 09/07/17  
Posted: 09/07/17  
Prior to: 5:30 pm

Community Development Department  
421 Main Street, 2<sup>nd</sup> Floor, Chico, CA 95928  
(530) 879-6800



Please contact the City Clerk at 896-7250 should you require an agenda in an alternative format or if you need to request a disability-related modification or accommodation in order to participate in a meeting. This request should be received at least three working days prior to the meeting in order to accommodate your request.

---

### **Sustainability Task Force Members:**

Cheri Chastain, Vice Chair  
Lucas RossMerz

Dave Donnan  
Mark Stemen, Chair

William Loker

**CITY OF CHICO SUSTAINABILITY TASK FORCE  
MINUTES OF THE MEETING OF  
JUNE 22, 2017**

Municipal Center  
421 Main Street  
Council Chambers, Conference Rm. 1

STF Members Present: Mark Stemen, Chair  
Cheri Chastain, Vice Chair  
Lucas RossMerz

STF Members Absent: William Loker  
Dave Donnan

Staff Members Present: Brendan Vieg, Principal Planner  
Bryce Goldstein, CivicSpark Member

Guests Present: Jim Pushnik, CSU, Chico  
Kim Jones, Butte College  
Chris Madden, Butte College  
Julie Kistle, CUSD  
Scott Grist  
Danielle Baxter  
Meredith Solomon

**1. CALL TO ORDER**

Chair Stemen called the meeting to order at 5:35 pm. STF members, City staff, and guests were present as noted.

**2. APPROVE MAY 11, 2017 MEETING MINUTES**

*The 05/11/17 STF Meeting Minutes were approved 3-0.*

**3. CHICO'S EDUCATIONAL INSTITUTIONS' EFFORTS TO REDUCE GHG EMISSIONS**

Jim Pushnik (CSU, Chico), Kim Jones (Butte College), Chris Madden (Butte College) and Julie Kistle (CUSD) provided updates on completed and planned efforts of those institutions to reduce GHG emissions (**see attachments for details regarding presentations**).

The following topics were discussed after each presentation:

### Chico Unified School District

- Integration of E/V fueling at parking lots for students and staff
- What level of Collaborative for high Performance Schools (CHPS) rating did CUSD's new buildings achieve
- Has CUSD prepared an assessment of energy saving. Staffing limitations are a problem, although attempts have been made to work with a program (Lucid)
- Possibility that CUSD could pursue a CivicSpark member, or Bryce may be of assistance
- Discussion regarding retention of trees. Due to irrigation reduction during the drought an issue arose regarding the health of exotic trees and the potential hazards they produce. Julie Kistle shared that new construction has included the planting of hundreds of trees far in excess of the trees that were lost.
- Discussion of CUSD's efforts regarding composting and recycling
- Question regarding the academic contact at CUSD re sustainability

### Butte College

- Integration of E/V fueling at parking lots for students and staff
- Ensure that Butte College gets credit for the donation of the land to Bikeway 99 project
- Has Butte College prepared an assessment of energy saving or measured GHG emission reductions. They focused on measuring reduced use metrics, but not at a macro level.
- A suggestion was made that Butte College look into recent state funding for tree replanting
- A broader discussion regarding Energy Storage Butte College has investigated the idea but is waiting for the economics to work out

### CSU, Chico

- All new buildings were built to LEED Silver standard. School is now moving towards consideration of retrofitting older buildings
- Integration of real-time building monitoring data with academic programs
- Chico State is involved in a South Campus planning process in collaboration with City of Chico, which is yielding excellent results
- Questions regarding how an institution can achieve climate neutrality when building new buildings – increase offsets, solar, and consolidation of building functions

## **4. CHANGE DATE FOR OCTOBER 26th STF MEETING**

Principal Planner Vieg highlighted the need to identify an alternative date for the scheduled October 26<sup>th</sup> STF meeting, and recommended that the date be changed to November 9<sup>th</sup>.

The STF requested that this item come back to the July 27<sup>th</sup> meeting when all STF members are present.

## 5. **MILLION WATT CHALLENGE – UPDATE AND FUTURE PLANNING/PRIORITIES**

CivicSpark Member Goldstein and Principal Planner Vieg provided the STF with an update regarding the Million Watt Challenge, including the addition of new Challenge partners, the neighborhood workshops, sustainable business expo, newspaper stories, and the effort to give away prizes for drawings.

The following topics were discussed:

- Need to get more folks to take the survey
- Need to create a QR Code for the survey and try it out at the Chico Bicycle Music Festival
- Ability to have folks complete paper survey at booth

## 6. **WE ARE STILL IN**

STF member Chastain shared that a coalition of US economic, education, and local government leaders recently announced they will continue to abide by the Paris Agreement regardless of America's withdrawal, forming the We Are Still In movement. **Attached** is the We Are Still In open letter showing the names of companies, investors, mayors, and governors declaring continued support to meet the Paris Agreement (webpage - <http://www.wearestillin.com/>)

The STF discussed how to get the City of Chico to declare its support for We Are Still In. It was agreed the best way to get on the Council agenda is to have a City Councilmember request the issue be agendized.

## 7. **REPORTS & COMMUNICATIONS**

STF member Chastain shared that a number of community organization are collaborating to write a grant application regarding food recovery with an emphasis on GHG emission reductions and requested that STF Chair Stemen provide a letter of support. The STF authorized submittal of a letter of support.

## 8. **BUSINESS FROM THE FLOOR**

STF member RossMerz requested that the Chico Tree Advocates and also the City's new urban forester be placed on a future agenda to discuss the health of urban forest.

STF Chair Stemen shared that 1) PG&E continues to make progress on the study that supports the draft Residential Remodel ordinance, 2) Building Official Leo DePaola is serving as interim Community Development Director, and 3) progress is being made with the 2018 CivicSpark

program.

Meredith Solomon inquired about a City contact for placing solar on city-owned buildings that are leased to private entities.

**9. ADJOURNMENT**

There being no further business from the STF, the meeting adjourned at 7:00pm to the meeting of Thursday, July 27, 2017.

\_\_\_\_\_  
Date Approved

Brendan Vieg, Principal Planner



# Chico Unified School District

## Sustainability Projects

1

## CUSD Sustainability Projects

- ❑ Districtwide Lighting Retrofit - Reduced lamps by 50%
- ❑ Chico High School New Classroom Building-CHPS Verified
- ❑ Chico High School Lincoln Center-CHPS Verified
- ❑ Pleasant Valley High School Yale Building-CHPS Verified
- ❑ Marsh Junior High School Multipurpose Building-CHPS Verified
- ❑ Marsh Junior High School Science Building-CHPS Verified
- ❑ Chico Junior High School Science Building-CHPS Verified
- ❑ Solar Photovoltaic Systems
- ❑ Automated/Centralized Energy Management System (EMS)
- ❑ H<sup>2</sup>O Conservation Initiatives
- ❑ Proposition 39-Energy Projects
  - LED Exterior Lighting
  - LED Interior Lighting
  - HVAC Package Unit Replacements

2

## Lighting Retrofit Projects

In 2008, reduced 4 lamp fluorescent fixtures to 2 lamps and changed bulbs to T-8's at every campus.

3

## What is CHPS (Collaborative for High Performance Schools)

Creating healthy, comfortable environments demands understanding how building elements affect one another. Integrated design focuses on these interactions, and creates environments that are energy and resource efficient. These increased efficiencies save money on utility bills and decrease our carbon footprint.

4

## Solar Phase One

Chico High School Parking Lot - 517 DC kW

Pleasant Valley High School Parking Lot - 622 DC kW

Chapman Elementary School Parking Lot - 483 DC kW

CUSD Corporation Yard Ground Mount System - 87 DC kW

Marsh Junior High School Ground Mount Systems - 316 DC kW

5

## Solar Phase Two

Bidwell Junior High Sport Field - 260 DC kW

Emma Wilson Elementary School Playground - 205 DC kW

Neal Dow Elementary School Playground - 112 DC kW

Rosedale Elementary School Playground - 149 DC kW

6



## Automated Energy Management System - EMS

Established District-wide set points 68/78 degrees  
Scheduling control (holidays and summer)

7

## H<sup>2</sup>O Conservation Initiatives

Irrigation water shut-off from November 1<sup>st</sup> through April 1<sup>st</sup> Annually  
Automated irrigation scheduling  
Low Impact Landscape Planning for new construction

8

## Proposition 39 "Clean Energy Act" Projects (5-Year Plan)

- 2015 - 120 Exterior Lighting Fixtures to LED  
New High Bay LED's Bidwell Junior High School Gymnasium
  
- 2016 - Chiller Replacement at Little Chico Creek Elementary School  
960 Exterior Lighting Fixtures to LED  
New High Bay LED's Chico Junior High School Gymnasium  
17 Classroom HVAC Replacements (CJHS, Citrus & BJHS)
  
- 2017 - Coming Soon! 48 HVAC Replacements (Chapman, McManus,  
Rosedale, & Neal Dow)

## Butte College Sustainability Efforts

- 2013 we upgraded our Building Automation System. This gives us greater control of the HVAC equipment and lighting and provide the ability to more closely match the operation of equipment with needs of the District users, resulting in reduced energy consumption.
- 2014 – 2016 we have installed building-level energy meters and recommissioned the mechanical equipment in 7 of the District's buildings. These meters allow us to measure energy consumption and identify buildings to focus our retro-commissioning efforts on.
- Summer 2016 we installed 157.68 Kw of covered parking solar panels (436 panels) at our Skyway Center.
- With both the Chico Campus Solar and the Main Campus Solar we are producing 76% of the electricity it uses on these three sites.
- As a part of our Bond construction program we will continue to design our buildings to meet and where possible, exceed the Title 24 requirements. As new buildings and major renovations are designed and constructed, the target will be to reach some level of Zero Net Energy. This will be done with a combination of energy efficient design and operation and the installation of on-site renewable energy.
- Our current plan is to design the new 57,000 square foot Welding building with approximately 340 Kw to help offset the increased utility load to the campus.
- We continue to collaborate with the City of Chico in preparation of the installation of a bike path behind our current Chico Center and Skyway Center.
- The District has funded a two-year faculty position to organize campus education & outreach on campus and to local high schools, help develop/adapt curriculum (to include more energy education), coordinate faculty mini-grants, and coordinate student internships. This summer his focus is on developing curriculum for the Sustainable Technologies Certificate.
  - Energize Colleges renewable energy curriculum development
  - Collaboration with CSU system development of a new Sustainability minor
  - Review and update our Sustainability Studies Certificate
- We continue to reduce our paper usage on campus by communicating electronically both in the classroom settings and through advertisement.
- The District has installed approximately 20 electric charging stations at the three different sites with a plan, once the infrastructure is in to install at least 10 more.
- We promote and have a very robust carpool system on campus and issue approximately 500 carpool parking passes each semester.
- We continually review and improve our student bussing system to align with class schedules working to encourage students to use our system rather than drive to school. We transport approximately 1300 students daily on our bus system.

### **Save the Dates:**

- ✓ **Fall Geography Conference campus tour** - Wednesday, Oct. 25<sup>th</sup>, 2017
- ✓ **Campus Sustainability Days** - Wednesday, Oct. 17<sup>th</sup> & Thursday, Oct. 18<sup>th</sup>, 2017

# Sustainability Steering Committee

## Monday, May 22<sup>nd</sup>

### 2017-2018 Modeling Sustainability Initiative Strategies

#### Strategy 1 - Educational Opportunities

Provide educational opportunities in the area of sustainability by:

Supporting, along with local and regional partners, opportunities for student and faculty applied research, development and implementation of innovative practices outside of the classroom.

- Collaboration with MESA applied research projects.
- Collaboration with Energize Colleges partnerships in the community
- Faculty curriculum summit

Developing sustainability-focused courses, certificates and degrees in transfer and career-oriented education outcomes.

- Energize Colleges renewable energy curriculum development
- Collaboration with CSU system development of a new Sustainability minor
- Review and update our Sustainability Studies Certificate
- Faculty curriculum summit

Increasing opportunities for campus internships that promote green practices.

- Energize Colleges internships
- Work experience at the Sustainability Resource Center

Providing Professional Development for faculty and staff in the area of sustainability.

- Energize Colleges faculty mini-grant projects
- Flex week workshops
- Conference attendance
- Faculty curriculum summit

Conducting campus and community education.

- Campus events, presentations and workshops

#### Strategy 2 - Carbon Footprint Reduction

Continue to reduce the college's carbon footprint by:

Focusing on reducing single passenger commuting practices including collaboration with external agencies to provide public transportation.

- Collaborate with the SRC to support publicity efforts to promote carpooling.

Educating faculty, staff and students on effective practices to reduce paper usage by implementing Image Now, emphasizing the use of MyBC and creating electronic forms for routine processes.

- Continue with these efforts

Considering greenhouse gases (GHG) effects during new construction.

- Discuss GHG impacts during decision making

Developing and implementing energy conservation and alternative energy production.

- Look at ways for FPM to increase efforts.
- Work with employees to conserve energy in classrooms and offices.

Creating EV charging capacity.

- Continue to increase infrastructure for electric vehicles.

Reducing the use of bottled water through education and accessible water stations.

- Continue to install water stations throughout the campus.

Researching best practices at other colleges, including but not limited to energy conservation, waste reduction and divestment campaigns

- Attend conferences and network with other institutions.

### **Strategy 3 - Water Conservation**

**Demonstrate environmental stewardship through water conservation by:**

1. Continue Xeriscaping to enhance the beauty of the campus through native plants and eco- grasses.

- Continue to implement the plan to transition existing landscape and turf to low/no irrigation landscape.
- Continue to implement state standards for irrigation (SB1881).
- Incorporate into new building standards use of native plants and/or drought tolerant landscaping.

2. Focus on campus water conservation and the elimination of water waste.

- Select plants that have low water requirements
- Closely manage the irrigation system and make adjustments as needed to make it as efficient as possible
- Repair leaks

THIS WAY TO SUSTAINABILITY CONFERENCE 2017

# RE-ENVISIONING THE FUTURE:

OUR PATH FORWARD  
THURSDAY, MARCH 23 - FRIDAY, MARCH 24

## THIS YEARS TOPICS

- Water Resources
- Climate Impacts on Food & Agriculture
- Lifestyles, Health, & Wellness
- Energy & the Environment
- Infrastructure & Transportation
- Population
- Student Engagement
- Community Partnerships & Action
- Education for Resilience
- Business & Economic Strategy



# California State University, Chico Campus As a Living Lab: Sense of Place – Connecting Courses in the Sustainability Pathway with Campus Utility Data

James C. Pushnik and Fletcher K. Alexander  
Colleen A. Hatfield, Kristen M. Kaczynski, David L. Brown, Eric ? Willard, Janine M. Stone, Thia ? Wolf, Nathaniel M. Millard  
Kevin Doyle, Neil Nunn, Dan Hayden, Mike Bates, Bob Smith, Dan Murphy, Curtis Sicheneder

## 1. CALL Objectives

- Establish a public point of access to campus building energy consumption data and foster an expanded dialogue between students, faculty, administration and facilities management regarding campus energy consumption and opportunities for conservation.
- Integrate real campus utility data into the sustainability pathway course curriculum with a focus on utilizing cutting-edge utility management software programs and analytics in new and innovative ways.
- Explore a range of strategies for engaging building occupants and residents in better understanding their buildings and the impacts of their interactions with them on campus energy consumption and compel them to act for conservation.

## 2. Program Partnerships

- Chico State Facilities Management & Services
- University Housing & Food Services
- Associated Students – Wildcat Rec Center















Institute for Sustainable Development

LOGO

- College of Natural Sciences
- Department of Biology
- Department of Geological & Environmental Sciences
- College of Behavioral & Social Sciences
- Department of Economics
- College of Undergraduate Education
- First Year Experience Program



## 3. Campus Building Integration & Academic Course Outcomes

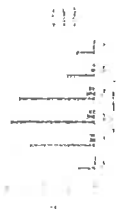
CALL IAY '14/'15	CALL II AY '15/'16	CALL III AY '16/'17
 O'Connell Academic 1990's	 Sutter Residential 2010's	 SSC Administrative 2010's
 Tehema Academic 1990's	 Shasta Residential 1950's	 WREC Rec Facility 2010's
 Holt Academic 1970's	 Lassen Residential 1950's	 Taylor II Academic 2010's
 Phys Science Academic 1970's	 Whitney Residential 1950's	 Butte Academic 1950's



Students in GEOS 330 have studied energy trends in the Physical Science building their classes are taught in.



GEOS 330 students have also compared consumption patterns across campus academic buildings.



Students in ENVL 105 have analyzed energy trends in three campus residence halls and the dining center.



Students in UNIV 105 have developed peer-to-peer outreach videos encouraging residents to act for conservation.

## 4. GE Pathway in Sustainability

General Education Pathway courses participating in CSU, Chico's CALL Project

- Lower Division (9 units required)**  
Foundation  
CHEM 100: Chemistry & Current Issues  
CIVL 175: Biological Processes in Envl Engineering  
GEOG 101 (I): Physical Geography  
GEOG 130: Intro to Environmental Science  
NSCI 101: Intro to Earth's Environment  
BIOL 102: Intro to Living Systems  
Area C1: Arts  
CMGT 275: Architectural History  
THEA 252: Politics, Performance & Power  
Area C2: Humanities  
ENGL 252 USD: American Indian Literature  
PHIL 129: Environmental Ethics  
RELS 247: Religion, Ethics & Ecology  
Area D1: Individual & Society  
GEOG 102 GC: Human Geography  
HIST 105 GC: Global Environmental History  
RECR 210: Natural Resources & the Informed Citizen  
Area D2: Societal Institutions  
ANTH 112 GC: Society, Time & Archaeology  
ANTH 116 GC: Power & Scarcity: Anthro of Change  
GEOG 106 USD: The American West  
Area E: Learning for Life  
ENVL 105 (I): Environmental Literacy  
NFSC 100: Basic Nutrition  
UNIV 105 (I): Self, Identity & Sustainability
- Upper Division (9 units required)**  
Natural Sciences  
BIOL 334: Conservation Ecology  
GEOG 330 (Z)/(I): Environmental Science - CAPSTONE  
PSSC 390 GC (F): Food Forever: Sust Food Production  
PSSC 392 GC (S): World Food & Fiber Systems  
Humanities  
ENGL 338 (Z)/(I): Environmental Rhetoric  
HIST 341 USD: American Environment  
PHIL 336 USD: American Indian Envl Philosophies  
Behavioral & Social Sciences  
ECON 365: Environmental Economics  
GEOG 304: Environmental Issues  
SOCI 420 USD: Environmental Sociology



# California State University, Chico Initiative for Resilient Cities: South Campus Neighborhood Project

## A Community Resilience Partnership Between the University and the City of Chico

James Pushnik and Fletcher Alexander

Colleen Hatfield, Kristen Kaczynski, Amanda Barret, David Eaton, Tim Sistrunk, Joni Meyer, LaDonna Krügge, Dean Fairbanks, Chris Fossen  
 City Partners: Brendan Ottoboni, Linda Herman, Dan Effeearf, Wyatt West, Dave Britz, Mark Orme, Ann Schwalb



### 1. The Initiative for Resilient Cities

- The Initiative for Resilient Cities is an EPIC-N affiliated program established by the Institute for Sustainable Development at CSU, Chico in 2016.



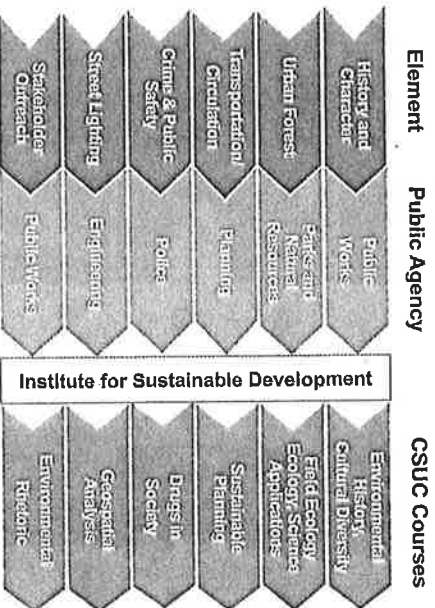
EST. 2006  
 California State University, Chico

- The Initiative's Mission is to partner with cities and counties across Northern California to connect faculty and courses across the University's curriculum with real community sustainability and resilience projects.

### 2. CSU, Chico & City of Chico 3-Year MSA

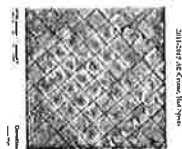
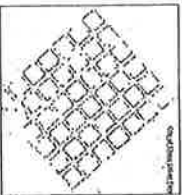
- Proposal submitted to Chico City Council in November, 2015 – approved 7-0.
- Three-year Master Services Agreement established between the City of Chico and the Institute for Sustainable Development – starting January 2016.
- The MSA and all Project Amendments are set up through the University's Research Foundation.
- The first project focuses on the South Campus Neighborhood, a six-by-seven square block area south of campus and west of downtown Chico.
- This partnership with the City of Chico builds on years of collaboration between the City and the University – in particular, the Institute for Sustainable Development – on community sustainability issues. This has included:
  - Supporting development of the City's 2020 Climate Action Plan.
  - Working with the City to track community-wide GHG emissions on an annual basis.
  - University representatives serving in various roles on the City's Sustainability Task Force.

### 3. The South Campus Neighborhood Project



**SCNP Phase I**  
 Neighborhood Existing Conditions Report  
 Spring & Fall 2016

**SCNP Phase II**  
 Neighborhood Improvement Plan  
 Spring 2017 & Academic Year '17-'18



Students in BIOL 350, BIOL 484 and GEOS 365 worked with Chico's Parks Division to develop and carry out a protocol to inventory all of the street trees in the neighborhood. This included assessing the size, age and health of the trees as well as recording any interference with sidewalks, power lines and street lights.

Students in HIST 105 researched the history of the neighborhood and developed a narrative of both its physical and cultural development. ANTH 113 students complemented these efforts by exploring the character of the space and how people identify with it.

Students in GEOG 411 worked with Chico PD to map crime in the neighborhood over a five-year period. They also collected sidewalk light readings (over 2,500 data points) throughout the neighborhood and mapped lighting levels. Working with PG&E, the City has since replaced all of the streetlights with high-power, high-efficiency LEDs.

### 4. The EPIC Model

The EPIC (Educational Partnerships for Innovation in Communities) Model originated as the Sustainable City Year Program at the University of Oregon in 2009. The Model has since been replicated by 25 Universities - and counting - across the United States, and the EPIC-Network (EPIC-N) has been established to share best practices and support efforts across participating campuses.



#### Key Tenets of the EPIC Model

- This is a university and community partnership.
- The program utilizes existing courses.
- The program is scaled for impact.
- It is based on faculty opt-in.
- Community partners are chosen through a deliberative selection process.
- Projects are defined by university and community consensus.
- There is a purposeful advancing of the social good as a core principal in this model.
- Students are actively engaged in the endeavor.
- The program is multidisciplinary in approach.
- There is a defined geographic focus.
- There is a defined time limit to the partnership.
- There is a mutual investment by the city and university.

### 5. Student Feedback

"On behalf of Professor Fossen's ENGL 358Z class we would like to formally thank you for the opportunity to work on the South Campus Neighborhood Project. This is a wonderful chance to improve a small, but very influential sector of downtown Chico. Many of us commute through, reside in, or do business within this area of concern." - Letter from Student Participants in ENGL 338

This is the real deal – as good an experience as my time in college has provided. The opportunity to put my skills learned in the classroom immediately to use on a significant, real world project right here in my own community has been incredibly valuable to me and an experience that will help define my time in Chico." - GEOG 411 Student Participant





## Overview

As soil loss and degradation and climate change threaten our natural and agricultural resources, the future depends on our ability to create healthy and sustainable food systems. Chico State is committed to leveraging its hands-on educational programs, applied research, and community and industry partnerships to investigate, develop, and disseminate regenerative farming practices that restore and enhance the resiliency and biodiversity of our food systems.

## You Can Transform Tomorrow's Food Systems

By investing in the CSU, Chico Regenerative Agriculture Initiative, you will help us create a model regenerative ecosystem at the University Farm, as well as study and promote regenerative methods of partner agricultural operations across the region. Our primary fundraising efforts are for Educational Outreach programs including conferences and seminar series on RA practices; establishment of RA demonstration sites for applied research and internship programs; and the development of RA curriculum.

## Make a Gift Today

Give online at [www.csuchico.edu/giving](http://www.csuchico.edu/giving).

Send a check, payable to:

**University Foundation - CSU Chico Regenerative Agriculture Initiative**

California State University, Chico  
400 West First Street  
Chico, California 95929-0999

*For more information, please contact:*

**Cynthia Daley**  
[cdaley@csuchico.edu](mailto:cdaley@csuchico.edu)  
530-898-5845 (office)  
530-518-4157 (cell)

**Timothy LaSalle**  
[tim.lasalle@gmail.com](mailto:tim.lasalle@gmail.com)  
530-235-3448 (cell)

**James Pushnik**  
[jpushnik@csuchico.edu](mailto:jpushnik@csuchico.edu)  
530-898-3331 (office)

**Garrett Liles**  
[gliles@csuchico.edu](mailto:gliles@csuchico.edu)  
530-898-4642 (office)



**CSU CHICO**  
INSTITUTE FOR  
SUSTAINABLE  
DEVELOPMENT

**Regenerative  
Agriculture  
Initiative**



**THE INSTITUTE FOR  
SUSTAINABLE DEVELOPMENT**  
CALIFORNIA STATE UNIVERSITY, CHICO  
CHICO, CA 95929-0633  
530-898-3333

## Leaders in

### Sustainable Agriculture

Recently ranked the nation's No. 1 sustainable college farm by College Values Online, the 800-acre Paul L. Byrne Agricultural Teaching and Research Center (known as the University Farm) has been a living laboratory for students, faculty, and staff for nearly 60 years. The Regenerative Agriculture Initiative is advancing the University Farm's leadership in organic and sustainable practices by connecting its work with that of the CSU, Chico Institute for Sustainable Development.

### A Vision for the Future

The Initiative for Regenerative Agriculture aims to be a global research center, demonstration site, and policy think tank by investing in research, practices, and policies that will allow farmers and ranchers to affordably build or rebuild soil carbon levels.

## Together, we will:

- Develop interdisciplinary teams to research innovative, practical, and highly transferable methods to regenerate soils and ecosystems
- Create a multi-sector network that includes academics, farmers, industry leaders, community members, and policy makers to implement and realize the benefits of regenerative strategies
- Develop and implement strategies for creating multi-scale food security, locally and globally
- Support policies that create equitable, healthy and resilient food systems

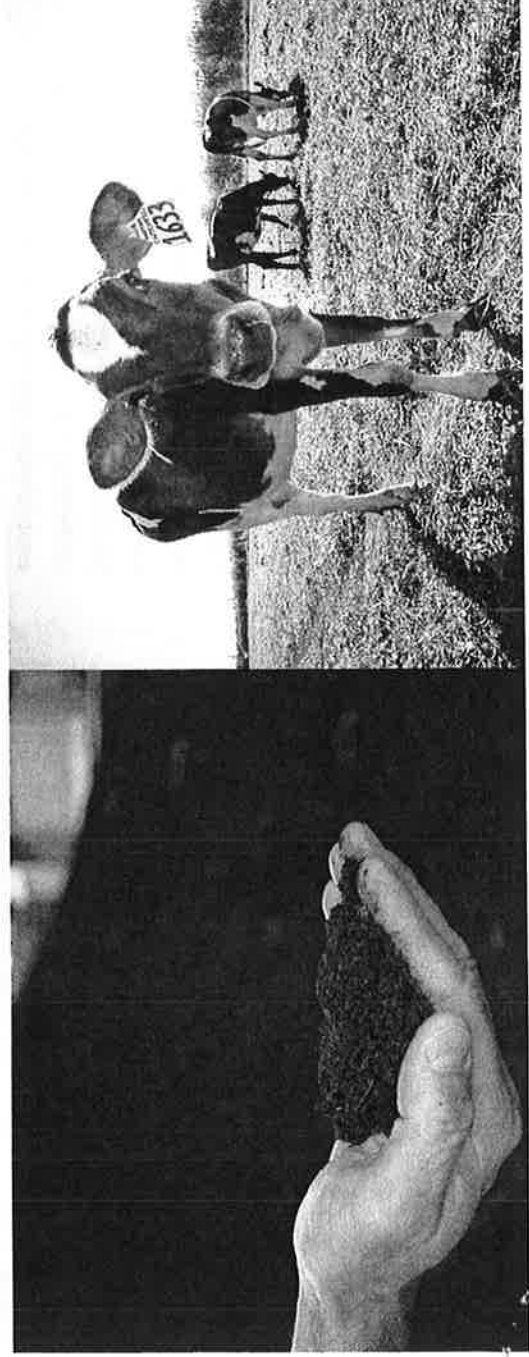
## Current Regenerative Agriculture Initiative programs include:

**Organic Dairy Education and Research Program (ODP)**, directed by Professor Cynthia Daley, provides students with hands-on learning in organic livestock production systems, including the interconnectedness of soil biology, nutrient dense forages and crops, and healthy livestock. ODP conducts applied research and hosts annual field days on organic production methods.

**Cultivating Communities Project**, directed by Professor Lee Altier, addresses food security needs in Butte County by supporting local farmers through workshops and educational outreach that aims to enhance a more local, nutrient dense, food supply.

**North Valley Food Hub**, directed by Professor Jake Brimlow, provides critical services to both growers and wholesale buyers that include consolidating transaction costs, creating a one-stop shopping platform for buyers and a marketplace for grower to post and promote their products.

**Institute for Sustainable Development**, directed by Professor Jim Pushnik, supports the Regenerative Agriculture Initiative as well as other campus-community projects that promote sustainability, including the initiative for Resilient Cities and Campus as a Living Laboratory.



# WE ARE STILL IN

## Open letter to the international community and parties to the Paris Agreement from U.S. state, local, and business leaders

We, the undersigned mayors, governors, college and university leaders, businesses, and investors are joining forces for the first time to declare that we will continue to support climate action to meet the Paris Agreement.

In December 2015 in Paris, world leaders signed the first global commitment to fight climate change. The landmark agreement succeeded where past attempts failed because it allowed each country to set its own emission reduction targets and adopt its own strategies for reaching them. In addition, nations - inspired by the actions of local and regional governments, along with businesses - came to recognize that fighting climate change brings significant economic and public health benefits.

The Trump administration's announcement undermines a key pillar in the fight against climate change and damages the world's ability to avoid the most dangerous and costly effects of climate change. Importantly, it is also out of step with what is happening in the United States.

In the U.S., it is local and state governments, along with businesses, that are primarily responsible for the dramatic decrease in greenhouse gas emissions in recent years. Actions by each group will multiply and accelerate in the years ahead, no matter what policies Washington may adopt.

In the absence of leadership from Washington, states, cities, colleges and universities, businesses and investors, representing a sizeable percentage of the U.S. economy will pursue ambitious climate goals, working together to take forceful action and to ensure that the U.S. remains a global leader in reducing emissions.

It is imperative that the world know that in the U.S., the actors that will provide the leadership necessary to meet our Paris commitment are found in city halls, state capitals, colleges and universities, investors and businesses. Together, we will remain actively engaged with the international community as part of the global effort to hold warming to well below 2°C and to accelerate the transition to a clean energy economy that will benefit our security, prosperity, and health.

Jump to section: [Cities and Counties](#) | [States](#) | [Higher Education](#) | [Businesses and Investors](#)

[Click here](#) to read full press release.

**Companies, investors, mayors and governors wishing to add their name to the statement can do so by registering [here](#). Colleges and universities wishing to add their name can do so by registering [here](#).**

## CITIES AND COUNTIES

Eric Garcetti, Mayor of Los Angeles  
Bill De Blasio, Mayor of New York City  
Kasim Reed, Mayor of Atlanta  
Kirk Caldwell, Mayor of Honolulu  
Martin J. Walsh, Mayor of Boston

Dow Constantine, Executive of King County (WA)  
Madeline Rogero, Mayor of Knoxville  
Adam Paul, Mayor of Lakewood  
J. Richard Gray, Mayor of Lancaster  
Pete Saenz, Mayor of Laredo

Sylvester Turner, Mayor of Houston  
 Jackie Biskupski, Mayor of Salt Lake City  
 Roy D. Buol, Mayor of Dubuque  
 Steve Benjamin, Mayor of Columbia  
 Chris Coleman, Mayor of Saint Paul  
 Trish Herrera Spencer, Mayor of Alameda  
 Kathy Sheehan, Mayor of Albany  
 Allison Silberberg, Mayor of Alexandria  
 Ed Pawlowski, Mayor of Allentown  
 Jeanne Sorg, Mayor of Ambler  
 Terence Roberts, Mayor of Anderson  
 Christopher Taylor, Mayor of Ann Arbor  
 Van W. Johnson, Mayor of Apalachicola  
 Susan Ornelas, Mayor of Arcata  
 Jeffrey Politis, Town Chair, Village of Arden  
 Jay Fisette, Chair, County Board of Arlington  
 Esther Manheimer, Mayor of Asheville  
 Steve Skadron, Mayor of Aspen  
 Hardie Davis, Jr., Mayor of Augusta  
 Steve Adler, Mayor of Austin  
 Catherine E. Pugh, Mayor of Baltimore  
 Kevin Kamenetz, County Executive, Baltimore County (MD)  
 Billy Keyserling, Mayor of Beaufort  
 Denny Doyle, Mayor of Beaverton  
 Kelli Linville, Mayor of Bellingham  
 Jesse Arreguin, Mayor of Berkeley  
 Robert Donchez, Mayor of Bethlehem  
 John Hamilton, Mayor of Bloomington  
 Gayle Brill Mittler, Mayor of Highland Park  
 Suzanne Jones, Mayor of Boulder  
 Carson Taylor, Mayor of Bozeman  
 Eric Mamula, Mayor of Town of Breckenridge  
 Joseph P. Ganim, Mayor of Bridgeport  
 Lori Liu, Mayor of Brisbane  
 Brenda Hess, Mayor of Buchanan  
 Miro Weinberger, Mayor of Burlington  
 E. Denise Simmons, Mayor of Cambridge, MA  
 John Tecklenburg, Mayor of Charleston  
 Jennifer Roberts, Mayor of Charlotte  
 Mike Signer, Mayor of Charlottesville  
 Rahm Emanuel, Mayor of Chicago  
 Mary Casillas Salas, Mayor of Chula Vista  
 Mayor Cranley, Mayor of Cincinnati  
 Ted Terry, Mayor of Clarkston  
 Patrick Wojahn, Mayor of College Park  
 Brian Treece, Mayor of Columbia  
 Biff Traber, Mayor of Corvallis

Kevin Haroff, Mayor and City Council Member of Larkspur,  
 Marin County  
 Richard J. Kaplan, Mayor of Lauderhill  
 Craig A. Moe, Mayor of Laurel  
 Leslie Soden, Mayor of Lawrence  
 Mark Stodola, Mayor of Little Rock  
 Robert Garcia, Mayor of Long Beach  
 Dennis Coombs, Mayor of Longmont  
 Greg Fischer, Mayor of Louisville  
 Pete Gerken, President of Board of Lucas County (OH)  
 Skylar Peak, Mayor of Malibu  
 Barry Greenberg, Mayor of Maplewood  
 Kirsten Keith, Mayor of Menlo Park  
 Philip Levine, Mayor of Miami Beach  
 Tom Barrett, Mayor of Milwaukee  
 Mark Gamba, Mayor of Milwaukee  
 Betsy Hodges, Mayor of Minneapolis  
 Isiah (Ike) Leggett, County Executive of Montgomery  
 County  
 John Hollar, Mayor of Montpelier  
 Malinda Miles, Mayor of Mount Rainier  
 Richard Thomas, Mayor of Mount Vernon  
 Ken Rosenberg, Mayor of Mountain View  
 Deborah Kafoury, Chair, Multnomah County  
 Megan Barry, Mayor of Nashville  
 Jon Mitchell, Mayor of New Bedford  
 Toni Harp, Mayor of New Haven  
 Mitch Landrieu, Mayor of New Orleans  
 Noam Bramson, Mayor of New Rochelle  
 Setti Warren, Mayor of Newton  
 Paul A. Dyster, Mayor of Niagara Falls  
 David Narkewicz, Mayor of Northampton  
 Todd Ford, Executive Director of Hampshire Council of  
 Governments  
 Libby Schaaf, Mayor of Oakland  
 Ronnie Rimbart, Mayor of Oberlin  
 Buddy Dyer, Mayor of Orlando  
 Greg Scharff, Mayor of Palo Alto  
 Jack Thomas, Mayor of Park City  
 Jim Kenney, Mayor of Philadelphia  
 Greg Stanton, Mayor of Phoenix  
 Shirley Washington, Mayor of Pine Bluff  
 William Peduto, Mayor of Pittsburgh  
 Ted Wheeler, Mayor of Portland  
 Tom Hughes, President, Metro Council of Greater Portland  
 (OR)

Steve Bennett, Supervisor of County of Ventura  
Jeffrey Cooper, Mayor of Culver City  
Savita Vaidhyanathan, Mayor of Cupertino  
Michael S. Rawlings, Mayor of Dallas  
Clay Lewis Jenkins, County Judge of Dallas County  
Michael Hancock, Mayor of Denver  
Frank Cownie, Mayor of Des Moines  
Mike Gaughan, Chair of Douglas County Commission (KS)  
Jason Leifer, Supervisor of Dryden  
Emily Larson, Mayor of Duluth  
William V. Bell, Mayor of Durham  
Mark Meadows, Mayor of East Lansing  
Salvatore J. Panto, Jr., Mayor of Easton  
Nancy Tyra-Lukens, Mayor of Eden Prairie  
David Kaptain, Mayor of Elgin  
Scott Donahue, Mayor of Emeryville  
Catherine Blakespear, Mayor of Encinitas  
Frank Huttler III, Mayor of Englewood  
Mark Poloncarz, Erie County Executive  
Lucy Vinis, Mayor of Eugene  
Stephen H. Hagerty, Mayor of Evanston  
Michael C. Tetreau, First Selectman, Fairfield (CT)  
Ed Malloy, Mayor of Fairfield (IA)  
Ray Stephanson, Mayor of Everett  
Lioneld Jordan, Mayor of Fayetteville  
Wade Troxell, Mayor of Fort Collins  
Jack Seiler, Mayor of Fort Lauderdale  
Tom Henry, Mayor of Fort Wayne  
Lily Mei, Mayor of Fremont  
Jud Ashman, Mayor of Gaithersburg  
Peter Benjamin, Mayor of Garrett Park  
Bryan Kennedy, Mayor of Glendale  
Rosalynn Bliss, Mayor of the City of Grand Rapids  
Steve Maas, Mayor of Grandville  
Sheila Morse, Selectboard Chair of Guilford  
Peter Swiderski, Mayor of Hastings-on-Hudson  
Shaun McCaffery, Mayor of Healdsburg  
Nancy Rotering, Mayor of Highland Park  
Dawn Zimmer, Mayor of Hoboken  
Joe Hogsett, Mayor of Indianapolis  
Jim Throgmorton, Mayor of Iowa City  
Svante Myrick, Mayor of Ithaca  
Steven M. Fulop, Mayor of Jersey City  
Janelle Rettig, Chairperson, Johnson County Board of Supervisors (IA)  
Sly James, Mayor of Kansas City  
Bernard Carvalho, Mayor of Kauai  
Rushern L. Baker, County Executive, Prince George's County (MD)  
Liz Lempert, Mayor of Princeton  
Jorge O. Elorza, Mayor of Providence  
Hillary Schieve, Mayor of Reno  
Levar M. Stoney, Mayor of Richmond (VA)  
Tom Butt, Mayor of Richmond (CA)  
Lovely Warren, Mayor of Rochester  
Bridget Donnell Newton, Mayor of Rockville  
Darrell Steinberg, Mayor of Sacramento  
Kim Driscoll, Mayor of Salem  
Ed Lee, Mayor of San Francisco  
Sam Liccardo, Mayor of San Jose  
Pauline Cutter, Mayor of San Leandro  
Gary Phillips, Mayor of San Rafael  
Helene Schneider, Mayor of Santa Barbara  
Javier Gonzales, Mayor of Santa Fe  
Ted Winterer, Mayor of Santa Monica  
Chris Coursey, Mayor of Santa Rosa  
Gary R. McCarthy, Mayor of Schenectady  
Ed Murray, Mayor of Seattle  
Christopher Roberts, Mayor of Shoreline  
Matt Larson, Mayor of Snoqualmie  
Mike Nichols, Mayor of Solana Beach  
Joe Curtatone, Mayor of Somerville  
Shirlee Zane, Chairwoman of Sonoma County, California Board of Supervisors  
Pete Buttigieg, Mayor of South Bend  
Margaret Healy, Town Council President of South Kingstown  
Philip Stoddard, Mayor of South Miami  
Lyda Krewson, Mayor of St. Louis  
Rick Kriseman, Mayor of St. Petersburg  
Glenn Hendricks, Mayor of Sunnyvale  
Daniel E. Dietch, Mayor of Surfside  
Timothy Kearney, Mayor of Swarthmore  
Stephanie A. Miner, Mayor of Syracuse  
Kate Stewart, Mayor of Takoma Park  
Darby Stricker, Mayor of Talent  
Andrew Gillum, Mayor of Tallahassee  
Bob Buckhorn, Mayor of Tampa  
Mohammed Hameeduddin, Mayor of Teaneck  
Mark Mitchell, Mayor of Tempe  
Michael E. Lane, Chair of Tompkins County Legislature (NY)  
Jonathan Rothschild, Mayor of Tucson  
Carol Dutra-Vernaci, Mayor of Union City (CA)

Nina Jonas, Mayor of Ketchum

Brian Stack, Mayor of Union City (NJ)  
 Shelley Welsch, Mayor of University City  
 Muriel Bowser, Mayor of Washington, DC  
 Joli McCathran, Mayor of Washington Grove  
 John Heilman, Mayor of West Hollywood  
 Jeri Muoio, Mayor of West Palm Beach  
 Christopher Cabaldon, Mayor of West Sacramento  
 Shawn Mauck, Mayor of West York Borough  
 Jim Marpe, First Selectman, Westport (CT)  
 Thomas Roach, Mayor of White Plains  
 Debora Fudge, Mayor of the Town of Windsor  
 Allen Joines, Mayor of Winston-Salem  
 Mike Spano, Mayor of Yonkers

## STATES

State of California  
 State of Connecticut  
 State of Hawaii  
 State of New York  
 State of North Carolina

State of Oregon  
 State of Rhode Island  
 Commonwealth of Virginia  
 State of Washington

## HIGHER EDUCATION

Christine Riordan, President of Adelphi University  
 Raymond Crossman, President of Adler University  
 Elizabeth Kiss, President of Agnes Scott College  
 Bruce Leslie, Chancellor of Alamo Colleges  
 James Mullen, President of Allegheny College  
 Sylvia Burwell, President of American University  
 Carolyn Martin, President of Amherst College  
 Sara Wenger Shenk, President of Anabaptist Mennonite  
 Biblical Seminary  
 Thomas Manley, President of Antioch College (OH)  
 Melinda Treadwell, Provost of Antioch University New  
 England  
 Michael Crow, President of Arizona State University  
 Paul Pribbenow, President of Augsburg College  
 Marjorie Hass, President of Austin College  
 Leon Botstein, President of Bard College  
 Robert Goldberg, Interm President of Barnard College  
 Clayton Spencer, President of Bates College  
 Mariko Silver, President of Bennington College

Joseph Aoun, President of Northeastern University  
 Carmen Fernandez, President of Northern Marianas  
 College  
 John Jasinski, President of Northwest Missouri State  
 University  
 Peter Hsieh, President of Northwestern Polytechnic  
 University  
 Morton Schapiro, President of Northwestern University  
 Marylou Yam, President of Notre Dame of Maryland  
 University  
 Marvin Krislov, President of Oberlin College  
 Jonathan Veitch, President of Occidental College  
 Lawrence Schall, President of Oglethorpe University  
 M. Duane Nellis, President of Ohio University  
 Rockwell Jones, President of Ohio Wesleyan University  
 Joseph Robertson, President of Oregon Health & Science  
 University  
 Edward Ray, President of Oregon State University  
 Stephen Friedman, President of Pace University-New York

Lyle Roelofs, President of Berea College  
 Ellen Kennedy, President of Berkshire Community College  
 Robert Kustra, President of Boise State University  
 Glen LeRoy, President of Boston Architectural College  
 Robert Brown, President of Boston University  
 Clayton Rose, President of Bowdoin College  
 Mickey Burnim, President of Bowie State University  
 Ronald Liebowitz, President of Brandeis University  
 John Sbraga, President of Bristol Community College  
 Thom Chesney, President of Brookhaven College  
 J. David Armstrong, Jr., President of Broward College  
 Kimberly Cassidy, President of Bryn Mawr College  
 John Bravman, President of Bucknell University  
 Katherine Conway-Turner, President of Buffalo State College, SUNY  
 Samia Yaqub, President of Butte College  
 Judie Wexler, President of California Institute of Integral Studies  
 Christopher Kimball, President of California Lutheran University  
 Jeffrey Armstrong, President of California Polytechnic State University-San Luis Obispo  
 Soraya Coley, President of California State Polytechnic University-Pomona  
 Mildred Garcia, President of California State University-Fullerton  
 Timothy White, Chancellor of California State University System  
 Horace Mitchell, President of California State University-Bakersfield  
 Erika Beck, President of California State University-Channel Islands  
 Gayle Hutchinson, President of California State University-Chico  
 Leroy Morishita, President of California State University-East Bay  
 Jane Conoley, President of California State University-Long Beach  
 William Covino, President of California State University-Los Angeles  
 Eduardo Ochoa, President of California State University-Monterey Bay  
 Dianne Harrison, President of California State University-Northridge  
 Robert Nelsen, President of California State University-Sacramento  
 John Cox, President of Cape Cod Community College  
 Allan Belton, President of Pacific Lutheran University  
 Thomas Ramage, President of Parkland College  
 Rajen Vurdien, President of Pasadena City College  
 Cathy Dove, President of Paul Smith's College  
 Eric Barron, President of Pennsylvania State University  
 Melvin Oliver, President of Pitzer College  
 David Oxtoby, President of Pomona College  
 Mark Mitsui, President of Portland Community College  
 Wim Wiewel, President of Portland State University  
 John Flicker, President of Prescott College  
 Thomas Schwarz, President of Purchase College, State University of New York  
 Carlee Drummer, President of Quinebaug Valley Community College  
 Peter Mercer, President of Ramapo College of New Jersey  
 Bradley Bateman, President of Randolph College  
 Rosanne Somerson, President of Rhode Island School of Design  
 William Troutt, President of Rhodes College  
 Gregory Dell'Omo, President of Rider University  
 Michael Violtt, Chancellor of Robert Morris University (Illinois)  
 William Destler, President of Rochester Institute of Technology  
 Donald Farish, President of Roger Williams University  
 Ali Malekzadeh, President of Roosevelt University  
 Phoebe Haddon, Chancellor of Rutgers the State University of New Jersey Camden Campus  
 Nancy Cantor, Chancellor of Rutgers the State University of New Jersey Newark Campus  
 Robert Barchi, President of Rutgers, The State University of New Jersey  
 James Dlugos, President of Saint Joseph's College of Maine  
 Jack Calareso, President of Saint Joseph's College, New York  
 John Neuhauser, President of Saint Michael's College  
 Eugene Cornacchia, President of Saint Peter's University  
 Janet Dudley-Eshbach, President of Salisbury University  
 Mary Papazian, President of San Jose State University  
 Stephen Sundborg, S.J., President of Seattle University  
 Michael Engh, S.J., President of Santa Clara University  
 Cheryl Roberts, President of Shoreline Community College  
 Helen Drinan, President of Simmons College  
 Kathleen McCartney, President of Smith College  
 Joe Bertolino, President of Southern Connecticut State University

Barbara Snyder, President of Case Western Reserve University  
 Gregory Smith, President of Central Community College  
 Bernard Ploeger, President of Chaminade University of Honolulu  
 Donald Laackman, President of Champlain College  
 William Guerriero, Interim President of Chandler-Gilbert Community College  
 David Finegold, President of Chatham University  
 Barbara Viniar, President of Chesapeake College  
 James Milliken, Chancellor of City University of New York (CUNY)  
 David Angel, President of Clark University  
 Anthony Collins, President of Clarkson University  
 Grafton Nunes, President of Cleveland Institute of Art  
 Ronald Berkman, President of Cleveland State University  
 David McInally, President of Coe College  
 Brian Casey, President of Colgate University  
 Mary Dana Hinton, President of College of Saint Benedict  
 Darron Collins, President of College of the Atlantic  
 Philip Boroughs, President of College of the Holy Cross  
 Lee Bollinger, President of Columbia University  
 Katherine Bergeron, President of Connecticut College  
 Laura Sparks, President of Cooper Union  
 Maria Thompson, President of Coppin State University  
 Carol Quillen, President of Davidson College  
 Stuart Baron, President of Delaware College of Art and Design  
 Jean Goodnow, President of Delta College  
 Adam Weinberg, President of Denison University  
 Neil Weissman, Acting President of Dickinson College  
 John Fry, President of Drexel University  
 Elsa Núñez, President of Eastern Connecticut State University  
 Mary Cullinan, President of Eastern Washington University  
 Donald Eastman, President of Eckerd College  
 Carl Strikwerda, President of Elizabethtown College  
 Lee Pelton, President of Emerson College  
 Janet Eisner, President of Emmanuel College  
 Jake Schrum, President of Emory & Henry College  
 John Nader, President of Farmingdale State College  
 Mark Rosenberg, President of Florida International University  
 Joseph McShane, President of Fordham University  
 F. Javier Cevallos, President of Framingham State University  
 Daniel Porterfield, President of Franklin & Marshall College

Paul LeBlanc, President of Southern New Hampshire University  
 Linda Schott, President of Southern Oregon University  
 David Evans, President of Southern Vermont College  
 Mary Campbell, President of Spelman College  
 Tuajuanda Jordan, President of St. Mary's College of Maryland  
 Nancy Zimpher, Chancellor of State University of New York (SUNY)  
 James Stellar, Interim President of State University of New York at Albany  
 Donald Christian, President of State University of New York at New Paltz  
 Samuel Stanley, President of State University of New York at Stony Brook  
 Erik Bitterbaum, President of State University of New York College at Cortland  
 Deborah Stanley, President of State University of New York College at Oswego  
 Quentin Wheeler, President of State University of New York College of Environmental Science and Forestry  
 Scott Evenbeck, President of Stella and Charles Guttman Community College  
 Nariman Farvardin, President of Stevens Institute of Technology  
 Harvey Kesselman, President of Stockton University  
 Kristine Young, President of SUNY Orange  
 L. Jay Lemons, President of Susquehanna University  
 Valerie Smith, President of Swarthmore College  
 Kent Syverud, Chancellor & President of Syracuse University  
 Celeste Schenck, President of The American University of Paris  
 R. Barbara Gitenstein, President of The College of New Jersey  
 Sarah Bolton, President of The College of Wooster  
 Steven Knapp, President of The George Washington University  
 David Van Zandt, President of The New School  
 Kim Schatzel, President of Towson University  
 Joanne Berger-Sweeney, President of Trinity College  
 Patricia McGuire, President of Trinity Washington University  
 Karin Hilgersom, President of Truckee Meadows Community College  
 Anthony Monaco, President of Tufts University  
 Stephen Ainlay, President of Union College (NY)  
 Melik Khoury, President of Unity College



Ronald Nowaczyk, President of Frostburg State University  
Elizabeth Davis, President of Furman University  
Angel Cabrera, President of George Mason University  
Joseph Marbach, President of Georgian Court University  
Janet Morgan Riggs, President of Gettysburg College  
Robert Kenny, Interim President of Goddard College  
James Brenneman, President of Goshen College  
José Bowen, President of Goucher College  
Robert Pura, President of Greenfield Community College  
Robert Allen, President of Green Mountain College  
Raynard Kington, President of Grinnell College  
Jane Fernandes, President of Guilford College  
Jonathan Lash, President of Hampshire College  
Kimberly Benston, President of Haverford College  
Nancy Gray, President of Hollins University  
Lisa Rossbacher, President of Humboldt State University  
Alan Cramb, President of Illinois Institute of Technology  
Jerry Corcoran, President of Illinois Valley Community College  
Benjamin Allen, Interim President of Iowa State University  
Thomas Rochon, President of Ithaca College  
James Troha, President of Juniata College  
Jorge Gonzalez, President of Kalamazoo College  
Dawood Farahi, President of Kean University  
Anne Huot, President of Keene State College  
Leslie Bellavance, President of Kendall College of Art and Design of Ferris State University  
Sean Decatur, President of Kenyon College  
Jorge Diaz-Herrera, President of Keuka College  
Alison Byerly, President of Lafayette College  
Linda Lujan, President of Lamar Community College  
Mary Spilde, President of Lane Community College  
Linda LeMura, President of Le Moyne College  
Lewis Thayne, President of Lebanon Valley College  
John Simon, President of Lehigh University  
José Luis Cruz, President of Lehman College, City University of New York  
David Ellis, Interim President of Lewis & Clark College  
David Livingston, President of Lewis University  
Thomas Hellie, President of Linfield College  
Jo Ann Rooney, President of Loyola University Chicago  
Kevin Wildes, President of Loyola University New Orleans  
Paula Carlson, President of Luther College  
Michael Cooper-White, President of Lutheran Theological Seminary at Gettysburg  
Brian Rosenberg, President of Macalester College  
Kevin Quigley, President of Marlboro College  
Kurt Schmoke, President of University of Baltimore  
Janet Napolitano, President of University of California  
Nicholas Dirks, Chancellor of University of California, Berkeley  
Ralph Hexter, Interim Chancellor of University of California, Davis  
Howard Gillman, Chancellor of University of California, Irvine  
Gene Block, Chancellor of University of California, Los Angeles  
Dorothy Leland, Chancellor of University of California, Merced  
Kim Wilcox, Chancellor of University of California, Riverside  
Pradeep Khosla, Chancellor of University of California, San Diego  
Sam Hawgood, Chancellor of University of California, San Francisco  
Henry Yang, Chancellor of University of California, Santa Barbara  
George Blumenthal, Chancellor of University of California, Santa Cruz  
Charles Ambrose, President of University of Central Missouri  
Susan Herbst, President of University of Connecticut  
Eric Spina, President of University of Dayton  
Dennis Assanis, President of University of Delaware  
Rebecca Chopp, Chancellor of University of Denver  
Louise Pagotto, Interim Chancellor of University of Hawai'i Kapi'olani Community College  
Helen Cox, Chancellor of University of Hawai'i Kaua'i Community College  
David Lassner, President of University of Hawai'i System  
J. Bruce Harreld, President of University of Iowa  
Jay Perman, President of University of Maryland Baltimore  
Freeman Hrabowski III, President of University of Maryland Baltimore County  
Donald Boesch, President of University of Maryland Center for Environmental Science  
Wallace Loh, President of University of Maryland College Park  
Juliette Bell, President of University of Maryland Eastern Shore  
Javier Miyares, President of University of Maryland University College  
Martin Meehan, President of University of Massachusetts  
Kumble Subbaswamy, Chancellor of University of Massachusetts Amherst

Samuel Hoi, President of Maryland Institute College of Art  
Melody Rose, President of Marylhurst University  
Matthew Shank, President of Marymount University  
David Podell, President of Massachusetts Bay Community College  
David Nelson, President of Massachusetts College of Art and Design  
James Birge, President of Massachusetts College of Liberal Arts  
Lou Anna Simon, President of Michigan State University  
Laurie Patton, President of Middlebury College  
John Anderson, President of Millersville University of Pennsylvania  
Grey Dimenna, President of Monmouth University  
Susan Cole, President of Montclair State University  
Bryon Grigsby, President of Moravian College  
Sonya Stephens, Acting President of Mount Holyoke College  
H. James Williams, President of Mount St. Joseph University  
Debra Derr, President of Mt. Hood Community College  
John Williams, President of Muhlenberg College  
Charles Lief, President of Naropa University  
Daan Braveman, President of Nazareth College  
Milan Milasinovic, President of New England Culinary Institute  
Kent Devereaux, President of New Hampshire Institute of Art  
Sue Henderson, President of New Jersey City University  
Joel Bloom, President of New Jersey Institute of Technology  
Michael Young, President of New York Film Academy  
Andrew Hamilton, President of New York University  
Christa Slejko, President of North Lake College  
Patricia Gentile, President of North Shore Community College  
Mark Erickson, President of Northampton Community College  
J. Keith Motley, Chancellor of University of Massachusetts Boston  
Peyton Randolph Helm, Interim Chancellor of University of Massachusetts Dartmouth  
Jacqueline Moloney, Chancellor of University of Massachusetts Lowell  
Julio Frenk, President of University of Miami  
Michelle Behr, Chancellor of University of Minnesota-Morris  
Mark Huddleston, President of University of New Hampshire  
Steven Kaplan, President of University of New Haven  
Michael Schill, President of University of Oregon  
Isiaah Crawford, President of University of Puget Sound  
David Dooley, President of University of Rhode Island  
Ronald Crutcher, President of University of Richmond  
Ronald Crutcher, President of University of Richmond  
Julie Sullivan, President of University of Saint Thomas  
Paul Fitzgerald S.J., President of University of San Francisco  
Harris Pastides, President of University of South Carolina Columbia  
Ronald Mason, Jr., President of University of the District of Columbia  
Ana Mari Cauce, President of University of Washington  
Bernie Patterson, Chancellor of University of Wisconsin-Stevens Point  
Robert Caret, Chancellor of University System of Maryland  
Jonathan Chenette, President of Vassar College  
Thomas Greene, President of Vermont College of Fine Arts  
Marc Mihaly, President and Dean of Vermont Law School  
Peter Donohue, President of Villanova University  
Scott Miller, President of Virginia Wesleyan College  
Nathan Hatch, President of Wake Forest University  
Steven Solnick, President of Warren Wilson College  
Mark Wrighton, Chancellor of Washington University in St. Louis  
Paula Johnson, President of Wellesley College  
Jonathan Gibraltar, President of Wells College  
Michael Roth, President of Wesleyan University  
John Dunn, President of Western Michigan University  
Rex Fuller, President of Western Oregon University  
Lee Rasch, President of Western Technical College  
Sabah Randhawa, President of Western Washington University  
Dennis Hanno, President of Wheaton College (MA)  
Kathleen Murray, President of Whitman College

# CA Statewide Codes and Standards Program

Title 24, Part 11  
Local Energy Efficiency Ordinances

## Chico Existing Building Efficiency Upgrade Cost-Effectiveness Study

**Prepared for:**

Marshall Hunt  
Codes and Standards Program  
Pacific Gas and Electric Company

**Prepared by:**

Davis Energy Group, Inc.  
Enercomp, Inc.  
Misti Bruceri & Associates, LLC

Last Modified: July 7, 2017



*Pacific Gas and  
Electric Company*<sup>®</sup>



SOUTHERN CALIFORNIA  
**EDISON**<sup>®</sup>

An EDISON INTERNATIONAL<sup>®</sup> Company



A Sempra Energy utility<sup>®</sup>



**SoCalGas**

A Sempra Energy utility

## **LEGAL NOTICE**

This report was prepared by Pacific Gas and Electric Company and funded by the California utility customers under the auspices of the California Public Utilities Commission.

Copyright 2017, Pacific Gas and Electric Company. All rights reserved, except that this document may be used, copied, and distributed without modification.

Neither PG&E nor any of its employees makes any warranty, express or implied; or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any data, information, method, product, policy or process disclosed in this document; or represents that its use will not infringe any privately-owned rights including, but not limited to, patents, trademarks or copyrights.

## **Table of Contents**

1	Introduction .....	1
2	Methodology and Assumptions .....	1
2.1	Building Prototypes .....	2
2.2	Efficiency Measures.....	4
2.3	Efficiency Packages .....	5
2.4	Measure Costs .....	5
2.5	Cost Effectiveness.....	7
3	Results .....	9
4	Recommendations & Discussion.....	12
4.1	Recommended Efficiency Measures for the Ordinance.....	12
4.2	Other Considerations .....	13
5	References .....	14
	Appendix A - Utility Rate Tariffs .....	15
	Appendix B – Standards Sections.....	17
	2016 Building Energy Efficiency Standards Section 150.2(b)1H .....	17
	2016 Building Energy Efficiency Standards Section 150.2(b)1E.....	17

## **List of Tables**

Table 1: Prototype Characteristics .....	2
Table 2: Efficiency Characteristics for Three Vintage Cases .....	3
Table 3: Measure Descriptions & Cost Assumptions – Per Unit.....	6
Table 4: IOU Utility Tariffs Used for Chico, CA .....	7
Table 5: Final Financing Assumptions .....	8
Table 6: Single Family Efficiency Upgrade Package Cost Effectiveness Results.....	10
Table 7: Multifamily Efficiency Upgrade Package Cost Effectiveness Results .....	11

## **List of Figures**

**No table of figures entries found.**

## **1 Introduction**

The California Building Energy Efficiency Standards Title 24, Part 6 (Title 24) (CEC, 2016b) is maintained and updated every three years by two state agencies, the California Energy Commission (CEC) and the Building Standards Commission (BSC). In addition to enforcing the code, local jurisdictions have the authority to adopt local energy efficiency ordinances, or reach codes, that exceed the minimum standards defined by Title 24 (as established by Public Resources Code Section 25402.1(h)2 and Section 10-106 of the Building Energy Efficiency Standards). Local jurisdictions must demonstrate that the requirements of the proposed ordinance are cost effective and do not result in buildings consuming more energy than is permitted by Title 24, Part 6. In addition, the jurisdiction must obtain approval from the CEC and file the ordinance with the BSC for the ordinance to be legally enforceable.

The City of Chico, California currently has in effect the Residential Energy Conservation Ordinance (RECO), which requires property owners to invest in certain energy and water conservation measures upon resale of residential properties. The City of Chico is interested in expanding RECO to include substantial remodels and requested support from the Statewide Codes and Standards Program to evaluate cost effectiveness.

Per City of Chico Municipal Code, Substantial Remodels are defined as follows:

Substantial remodel shall mean the alteration of any structure which combined with any additions to the structure, performed within any three (3) year period, affects a floor area which exceeds fifty percent (50%) of the existing floor area of the structure. When any changes are made in the building, such as walls, columns, beams or girders, floor or ceiling joists and coverings, roof rafters, roof diaphragms, foundations, piles or retaining walls or similar components, the floor area of all rooms affected by such changes shall be included in computing floor areas for purposes of applying this definition. This definition does not apply to the replacement and upgrading of residential roof coverings or exterior wall finishes.

This report presents the results from analysis of the feasibility and cost-effectiveness of requiring existing low-rise single family and multifamily buildings located in Chico, CA to exceed the 2016 Building Energy Efficiency Standards when completing a substantial remodel. The analysis includes scenarios of individual measure as well as package upgrades and identifies cost effective options based on the existing conditions of the building.

The intent of the proposed ordinance is to cover scenarios that are currently not covered by Title 24, Part 6, or, if already within the scope, to require a performance level more stringent than the code. For example, duct testing and sealing is required when heating or cooling equipment is replaced or altered under most circumstances. The proposed ordinance would additionally require duct sealing and testing for all substantial remodels, even when there are no proposed alterations to heating or cooling equipment.

This analysis does not evaluate the impact of retrofit measures on Title 24, Part 6 compliance margins, as the measures are required in addition to achieving project compliance. The analysis uses a customer-based lifecycle cost (LCC) approach for evaluating cost effectiveness of the proposed upgrades, which requires estimating and quantifying incremental costs and the energy and utility cost savings for each energy efficiency measure.

## **2 Methodology and Assumptions**

The general approach applied in this analysis is to evaluate performance and determine cost effectiveness of various energy retrofit measures, individually and as packages. Both single family and low-rise multifamily cases are considered, as well as three unique building vintages.

## 2.1 Building Prototypes

The CEC defines building prototypes which it uses to evaluate the cost-effectiveness of proposed changes to Title 24, Part 6 requirements. For the multifamily analysis, the CEC new construction prototype was used as it is representative of existing multifamily properties in Chico. Additional details on the multifamily prototype can be found in the ACM Approval Manual (CEC, 2016a). The most appropriate single family prototype is an existing home model developed for residential ACM testing<sup>1</sup> with the following revisions. The model includes an existing 1,440 square foot space and a 225 square foot addition. For this analysis, the features in the addition (i.e., insulation levels, glazing) were modified to be consistent with the existing home specifications, resulting in a total existing conditioned floor area of 1,665 square feet. Additions are not addressed in this analysis as they are already addressed by the Title 24, Part 6 code.

Table 1 describes the basic characteristics of each prototype.

**Table 1: Prototype Characteristics**

	<u>Single Family</u>	<u>Multifamily</u>
<b>Existing Conditioned Floor Area</b>	1,665 ft <sup>2</sup>	(4) 780 ft <sup>2</sup> & (4) 960 ft <sup>2</sup> units
<b>Num. of Stories</b>	1	2
<b>Num. of Bedrooms</b>	3	(4) 1-bed & (4) 2-bed units
<b>Window-to-Floor Area Ratio</b>	13%	15%

Three building vintages were evaluated to determine sensitivity of existing building performance on cost effectiveness of upgrades. For example, it is widely recognized that adding attic insulation in an older home with no insulation is cost-effective, however, newer homes will likely have at least some existing insulation in the attic reducing the potential savings from the measure. The building characteristics for each vintage were determined based on either prescriptive requirements from the Title 24, Part 6 code that was in effect or standard construction practice during that time period. Table 2 summarizes the assumptions for each of the three vintages.

Additionally, the analysis assumed the following features when modeling the prototype buildings:

- Slab-on-grade foundation for buildings built after 1978 and raised floor with crawlspace for pre-1978 vintages
- Vented attic
- HVAC ductwork located in the attic
- Split-system gas furnace with air conditioner; individual systems serving each multifamily apartment
- Small storage gas water heater; individual water heaters serving each multifamily apartment
- Gas cooking and clothes dryer

---

<sup>1</sup> Residential ACM test U12 can be accessed at the following website:  
<http://www.bwilcox.com/BEES/cbecc2016.html>

**Table 2: Efficiency Characteristics for Three Vintage Cases**

<b>Building Component Efficiency Feature</b>	<b>Vintage Case</b>		
	<b>Pre-1978</b>	<b>1978-1991</b>	<b>1992-2005</b>
<b><i>Envelope</i></b>			
Exterior Walls	2x4 16"oc wood frame, R-0	2x4 16"oc wood frame, R-11	2x4 16"oc wood frame, R-13
Foundation Type & Insulation	Raised floor, R-0	Uninsulated slab	Uninsulated slab
Ceiling Insulation & Attic Type	Vented attic, R-11 @ ceiling level	Vented attic, R-19 @ ceiling level	Vented attic, R-19 @ ceiling level
Roofing Material & Color	Asphalt shingles, dark	Asphalt shingles, dark	Asphalt shingles, dark
Radiant Barrier	No	No	No
Windows: U-Value / SHGC	Metal, single pane: 1.16/0.76	Metal, dual pane:0.79/0.70	Vinyl, dual pane Low-E: 0.55/0.40
House Infiltration	10 ACH50	10 ACH50	7 ACH50
<b><i>HVAC Equipment</i></b>			
Heating Efficiency	78 AFUE (assumes 1 replacement)	78 AFUE (assumes 1 replacement)	78 AFUE
Cooling Efficiency	9.7 SEER (assumes 1 replacement)	9.7 SEER (assumes 1 replacement)	9.7 SEER
Duct Location & Details	Attic, R-2.1, 30% leakage	Attic, R-2.1, 20% leakage	Attic, R-4.2, 20% leakage
Mechanical Ventilation	None	None	None
<b><i>Water Heating Equipment</i></b>			
Water Heater Efficiency	0.575 Energy Factor (assumes 2 replacements)	0.575 Energy Factor (assumes 1 replacement)	0.575 Energy Factor
Water Heater Tank	40gal uninsulated tank	40gal uninsulated tank	40gal uninsulated tank
<b><i>Appliance &amp; Lighting</i></b>			
Lighting Type	40% CFL hard wired, 60% incandescent	40% CFL hard wired, 60% incandescent	40% CFL hard wired, 60% incandescent



## 2.2 Efficiency Measures

The methodology used in the analyses for each of the prototypical building types begins with a design that matches the specifications as described in Table 2 for each of the three vintages. Prospective energy efficiency measures were modeled in each of the prototypes to determine the projected electricity and natural gas energy savings relative to the baseline vintage. In some cases, where logical, measures were packaged together.

The CBECC-Res 2016.2.1 (868) compliance simulation tool was used to evaluate energy savings for most measures, with the exception of those outside the code compliance scope. In these cases, other simulation tools such as the National Renewable Energy Laboratory's Building Energy Optimization (BEopt) software and the EnergyPlus simulation engine were used. Unless specified otherwise, all measures were evaluated using CBECC-Res.

Following are descriptions of each of the efficiency upgrade measures applied in this analysis.

**Attic Insulation:** Add attic insulation in buildings with vented attic spaces. Two levels of insulation were evaluated: R-30 and R-38.

**Air Sealing & Weather-stripping:** Apply air sealing practices throughout all accessible areas of the building. For modeling purposes, it was assumed that air sealing can reduce infiltration levels from 10 to 7 ACH50 in the two older vintages (pre 1991) and from 7 to 6 ACH50 in the newer vintage. These assumptions are applied in the energy model.

**Cool Roof:** Install a roofing product rated by the Cool Roof Rating Council to have an aged solar reflectance of 0.25 or higher. This measure only applies to buildings that are installing a new roof as part of the scope of the substantial remodel. This measure only evaluated steep slope roofs. Replacement of low-slope roofs will follow the requirements of Title 24, Part 6.

**Window Replacement:** Replace existing single pane windows with a dual pane product with a U-value equal to 0.32 or lower and an SHGC equal to 0.25 or lower. This measure was only evaluated for the pre-1978 vintage which is the only vintage assumed to have single-pane, metal-frame windows.

**Duct Sealing:** Air seal all ductwork to meet the requirements of the 2016 Building Energy Efficiency Standards (Title 24, Part 6) section 150.2(b)1E. For this analysis, a final duct leakage value of 15% was applied, which corresponds to Option i in the Title 24 code section referenced.

**Water Heater Blanket:** Add R-6 insulation to the exterior of existing storage water heaters. For the single family analysis, the water heater was modeled within an unconditioned space, such as a garage or an exterior closet. Water heaters located in conditioned space were also evaluated and were found to have similar water heating energy use savings. For the multifamily analysis the water heater was modeled within the conditioned living space. Savings are presented for water heating only, and don't include impacts on space conditioning. This measure was evaluated using EnergyPlus.

**Hot Water Pipe Insulation:** Insulate all accessible hot water pipes with R-3 pipe insulation. In certain buildings which have slab on grade construction and the majority of pipes either underground or within the walls, most of the pipes will be inaccessible. For the purposes of this analysis a conservative assumption that only 10% of the pipes could be insulated was applied. In buildings where pipes are located in the attic, crawlspace, or are otherwise more accessible, cost effectiveness is expected to improve relative to this analysis. This measure was evaluated using BEopt.

**Low Flow Fixtures:** Upgrade sink and shower fittings to meet current CALGreen requirements which require maximum flow rates of 2.0 gallons per minute (gpm) for showerheads, 1.2 gpm for bathroom faucets and 1.8 gpm for kitchen faucets. This measure was evaluated using BEopt and assumed the upgraded fixtures would reduce flow rates by 10% for showerheads and 20% for all faucets based on a 2010 water use study (ConSol, 2010).

**LED Lighting:** Replace screw-in incandescent lamps with screw-in LED lamps. This analysis was conducted external to the energy model assuming replacing a 45W halogen bulb with an 11 W LED bulb operating 620 hours annually. Annual hour estimates were based on whole building average hours of operation from a 2010 lighting study by KEMA (KEMA, 2010). Lifetime assumptions were 1,000 hours for incandescent bulbs and 25,000 hours for LED bulbs.

### ***2.3 Efficiency Packages***

A few of the measures described above were also evaluated as part of a package. Two packages were developed as described below.

**Package 1 – R38 Attic Insulation & Air Sealing:** Air sealing and insulation are very often applied as a package in building retrofits. The boundary between the living space and vented attics is where a significant amount of building air leakage can occur, and sealing these areas prior to covering the attic floor with insulation is both practical and effective. Air sealing and insulation also both directly address occupant comfort, as they reduce heat transfer, and result in more even temperatures within the building.

**Package 2 – Water Heater Blanket, Hot Water Pipe Insulation & Low-Flow Fixtures:** These three water heating measures are all relatively low cost and work together to reduce building hot water energy use.

### ***2.4 Measure Costs***

Table 3 summarizes the cost assumptions for each of the measures evaluated. Costs were obtained from various sources including local contractors, internet searches, past projects, and technical reports.

**Table 3: Measure Descriptions & Cost Assumptions – Per Unit**

Measure	Performance Level	Incremental Cost – Single Family			Incremental Cost - Multi-Family			Source	Notes
		Pre 1978	1978 – 1991	1992 - 2005	Pre 1978	1978 – 1991	1992 - 2005		
Attic Insulation	R-30	\$1,698	\$1,332	\$1,332	\$444	\$348	\$348	Retrofit contractor <sup>2</sup>	\$1.02/sqft ceiling area for full replacement \$0.80/sqft with R-19 existing insulation
	R-38	\$1,915	\$1,548	\$1,548	\$500	\$405	\$405	Retrofit contractor <sup>2</sup>	\$1.15/sqft ceiling area for full replacement \$0.93/sqft with R-19 existing insulation
Air sealing	7 ACH50	\$959	\$959	n/a	\$341	\$341	n/a	Retrofit contractor <sup>2</sup>	About 20% of total cost is material cost, the remainder is labor.
	6 ACH50	n/a	n/a	\$959	n/a	n/a	\$341		
Cool roof	Aged Reflectance = 0.25	\$577	\$577	\$577	\$167	\$167	\$167	Research report <sup>3</sup>	Based on \$0.32/sqft roof area for asphalt shingles plus a 10% markup. Higher reflectance values for lower cost are achievable for tile roof products
Window U-factor/ SHGC	0.32/0.25	\$9,810	n/a	n/a	\$5,873	n/a	n/a	Retrofit contractor <sup>4</sup>	Based on \$45/sqft window area
Duct sealing	15% of nominal airflow	\$457	\$457	\$457	\$337	\$337	\$337	HVAC contractor	Assumes 8 hours of labor for SF and 6 hours per MF apartment (\$54/hr HVAC labor rate) <sup>1</sup> + \$25 material for tape/mastic for SF and \$12.50 material for MF (per unit).
Water heater blanket	R-6	\$40	\$40	\$40	\$40	\$40	\$40	Internet search	\$20 blanket + ½-hr labor (\$40.30/hr laborer rate) <sup>1</sup>
Hot water pipe insulation	3/4” R-3	\$42	\$42	\$42	\$42	\$42	\$42	Internet search	\$0.20/ft of ¾” pipe insulation. 10ft total + 1-hr labor (\$40.30/hr common labor rate) <sup>1</sup>
Low flow fixtures	CALGreen	\$126	\$126	\$126	\$86	\$86	\$86	Retrofit contractor <sup>4</sup>	Showerheads at \$34.74 each + sink aerators at \$5.37 each + 1-hr labor (\$40.30/hr common labor rate) <sup>1</sup> . 2 showerheads & 3 aerators assumed for SF and 1 showerhead and 2 aerators for MF.
LED lamp	11W screw-in bulb	\$4	\$4	\$4	\$4	\$4	\$4	Internet search	\$4 for LED dimmable A19 lamp 60W equivalent. \$0.97 for an equivalent incandescent product which was used to estimate total replacement costs.

<sup>1</sup> Labor rates are estimated from RSMeans.

<sup>2</sup> Source: Retrofit contractor pricing, including labor. LA County Retrofit Program

<sup>3</sup> Codes and Standards Enhancement Initiative: Residential Roof Envelope Measures. 2013 California Building Energy Efficiency Standards.

[http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Residential/Envelope/2013\\_CASE\\_R\\_Roof\\_Measures\\_Oct\\_2011.pdf](http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Residential/Envelope/2013_CASE_R_Roof_Measures_Oct_2011.pdf)

<sup>4</sup> Source: Retrofit contractor pricing Stockton, CA neighborhood retrofit program.

## 2.5 Cost Effectiveness

A customer based approach to evaluating cost effectiveness was used based on past experience with Reach Code adoption by local governments. Current residential utility rates at the time were used to calculate utility costs for all cases and determine cost effectiveness for the proposed upgrades. Annual utility costs were calculated using hourly electricity and gas output from energy simulations and applying the utility tariffs summarized in Table 4. Appendix A - Utility Rate Tariffs includes the utility rate schedules used for this study. The standard E1 residential rate was applied in all cases.

**Table 4: IOU Utility Tariffs Used for Chico, CA**

Electric / Gas Utility	Electricity (Standard)	Natural Gas
PG&E	E1	G1

Cost effectiveness is presented according to lifecycle customer benefit-to-cost ratio. The benefit-to-cost ratio is a metric which represents the cost effectiveness of energy efficiency over a 30-year lifetime taking into account discounting of future savings and financing of incremental costs. A value of one indicates the savings over the life of the measure are equivalent to the incremental cost of that measure. A value greater than one represents a positive return on investment. The ratio is calculated as follows:

$$\text{Lifecycle Benefit Cost Ratio} = \frac{\text{Equation 1} \quad (\text{First year utility cost savings} * \text{Lifecycle cost factor})}{(PV_{\text{Incremental Cost}} * \text{Financing factor})}$$

$PV_{\text{Incremental Cost}}$  is the present value of the incremental cost of a measure, including replacement and maintenance costs, if applicable. This is calculated using Equation 2. For most measures this is equivalent to the incremental first cost only. Certain measures, such as LED lighting upgrades, will experience replacements during the analysis term for the upgrade and/or the basecase. When equipment life of the efficiency measures differ from the basecase, the replacement/maintenance costs as well as any residual costs (the remaining value of the measure at the end of the analysis term) must be taken into account.

$$\text{Equation 2} \quad PV_{\text{Incremental Cost}} = \text{Incremental first cost} + PV_{\text{Replacement/Maintenance Cost}} - PV_{\text{Residual Cost (at end of analysis term)}}$$

The PV of either the replacement or the residual cost is calculated according to Equation 3.

$$\text{Equation 3} \quad PV_{\text{Cost}} = \frac{C}{(1+disc)^y}$$

Where:

- $y$  = # of years into analysis term at which replacement/maintenance or residential cost occurs
- $C$  = replacement/maintenance or residential cost at year  $y$
- $disc$  = real discount rate of 3%

The lifecycle cost factor was calculated using Equation 4 as follows. No utility rate escalation is assumed (conservative assumption).

$$\text{Lifecycle Cost Factor} = \frac{1 - (1 + \text{disc})^{-n}}{\text{disc}} \quad \text{Equation 4}$$

Where:

- $n$  = analysis term of 30-years (note this may differ from the financing term)

The financing factor is calculated as follows:

$$\text{Financing Factor} = \frac{PV_{\text{Mortgage Increase}} - PV_{\text{Tax Savings}}}{L} \quad \text{Equation 5}$$

Where:

- $L$  = first incremental cost (\$)
- $PV_{\text{Mortgage Increase}}$  = Present value of increased mortgage costs
- $PV_{\text{Tax Savings}}$  = Present value of tax savings from additional interest payments due to increased mortgage

$PV_{\text{Mortgage Increase}}$  is calculated using Equations 6 and 7.

$$P = L \frac{\left[ \frac{c}{12} \left( 1 + \frac{c}{12} \right)^{nf \cdot 12} \right]}{\left[ \left( 1 + \frac{c}{12} \right)^{nf \cdot 12} - 1 \right]} \quad \text{Equation 6}$$

$$PV_{\text{Mortgage Increase}} = P * 12 \frac{1 - (1 + \text{disc})^{-nf}}{\text{disc}} \quad \text{Equation 7}$$

Where:

- $P$  = incremental monthly mortgage payment (\$)
- $c$  = loan interest rate
- $nf$  = financing term in years

$PV_{\text{Tax Savings}}$  is calculated using Equations 8 and 9.

$$\text{Annual Tax Savings} = \text{balance} * c * \text{taxrate} \quad \text{Equation 8}$$

$$PV_{\text{Tax Savings}} = \sum_{n=1}^{30} \text{Annual Tax Savings} * \frac{1}{(1 + \text{disc})^{nf}} \quad \text{Equation 9}$$

Where:

- $\text{taxrate}$  = average tax rate of 20% (to account for tax savings due to loan interest deductions)
- $\text{balance}$  = balance of incremental cost of mortgage at beginning of each year

Table 5 summarizes the financing assumptions and final terms that were applied in this analysis. The analysis term is 30 years in all cases.

**Table 5: Final Financing Assumptions**

	<b>Loan Term</b>	<b>Loan Rate</b>	<b>Lifecycle Factor (Equation 4)</b>	<b>Financing Factor (Equation 5)</b>
Single Family	30	5%	19.60	1.12
Multifamily	10	5%	19.60	0.95

The LED lighting upgrade is the only measure that is not assumed to be financed. The above equations and assumptions all still apply, except the financing factor is removed from Equation 1.

Simple payback is also presented and is calculated using the equation below.

$$\text{Simple payback} = \text{First incremental cost} / \text{First year utility cost savings} \quad \text{Equation 10}$$

Maintenance costs were not included for any measures because there are no incremental maintenance costs expected for any of the measures evaluated. Any maintenance requirements that would apply are similar to both the upgrade and the basecase. LED lamp upgrade is the only measure with assumed replacement costs. See the measures description in Section 2.2 for additional details.

### **3 Results**

Cost effective analysis was completed for the three vintages and both single family and multifamily prototypes. Evaluations looked to identify cost effective energy upgrades for existing buildings at the time of a substantial remodel.

Results of cost effectiveness analysis along with energy savings are presented in Table 6 and Table 7 for single family and multifamily buildings, respectively. Results are presented for each of the three vintages. Some measure results do not differ between the vintages such as LED lamp replacement and water heating upgrades. The lifecycle benefit-to-cost ratio threshold of one is roughly equivalent to a simple payback of 17 years for single family and 21 years for multifamily. Shaded rows in the tables reflect those cases which are not cost effective.

All of the individual measures are cost effective for both single family and multifamily with the exception of air sealing and hot water pipe insulation. While these are not cost effective on their own, when combined with other measures in the two packages they are. The most cost effective measures are LED lighting replacement, duct sealing, and low flow fixtures. For the multifamily cases the cool roof is also very cost effectiveness.

**Table 6: Single Family Efficiency Upgrade Package Cost Effectiveness Results**

	Measures	Electricity Savings (kWh)	Natural Gas Savings (therms)	Measure Cost	Utility Cost Savings	Simple Payback	Lifecycle Benefit-Cost Ratio
<b>Pre-1978 Vintage</b>	1: R-30 attic ins.	675	40	\$1,698	\$316	5.38	3.25
	2: R-38 attic ins.	793	46	\$1,915	\$367	5.22	3.35
	3: Cool roof	626	-14	\$635	\$201	3.16	5.53
	4: Windows	1547	46	\$9,810	\$617	15.90	1.10
	5: Air sealing	74	14	\$959	\$54	17.92	0.97
	6: Duct sealing	981	61	\$457	\$466	0.98	17.81
	7: DHW blanket	0	4	\$40	\$7	5.59	3.13
	8: Pipe ins	0	1	\$42	\$1	31.83	0.55
	9: Low flow fix.	0	29	\$126	\$51	2.49	7.01
	10: LED lamp	21	0	\$4	\$5	0.73	34.82
	Package 1: #2 & #5	875	61	\$2,874	\$422	6.81	2.56
	Package 2: #7, #8, & #9	0	18	\$208	\$38	5.42	3.22
<b>1978-1991 Vintage</b>	1: R-30 attic ins.	260	16	\$1,332	\$97	13.67	1.28
	2: R-38 attic ins.	371	21	\$1,548	\$137	11.29	1.55
	3: Cool roof	410	-10	\$635	\$92	6.89	2.53
	4: Windows	N/A					
	5: Air sealing	69	13	\$959	\$42	22.64	0.77
	6: Duct sealing	217	10	\$457	\$78	5.83	2.99
	7: DHW blanket	0	4	\$40	\$7	5.59	3.13
	8: Pipe ins	0	1	\$42	\$1	31.83	0.55
	9: Low flow fix.	0	29	\$126	\$51	2.49	7.01
	10: LED lamp	21	0	\$4	\$5	0.73	34.82
	Package 1: #2 & #5	875	61	\$2,508	\$177	14.18	1.23
	Package 2: #7, #8, & #9	0	18	\$208	\$38	5.42	3.22
<b>1992-2005 Vintage</b>	1: R-30 attic ins.	271	16	\$1,332	\$100	13.34	1.31
	2: R-38 attic ins.	374	21	\$1,548	\$137	11.27	1.55
	3: Cool roof	340	-10	\$635	\$75	8.42	2.07
	4: Windows	N/A					
	5: Air sealing	25	4	\$959	\$14	67.50	0.26
	6: Duct sealing	175	9	\$457	\$64	7.11	2.46
	7: DHW blanket	0	4	\$40	\$7	5.59	3.13
	8: Pipe ins	0	1	\$42	\$1	31.83	0.55
	9: Low flow fix.	0	29	\$126	\$51	2.49	7.01
	10: LED lamp	21	0	\$4	\$5	0.73	34.82
	Package 1: #2 & #5	875	61	\$2,508	\$152	16.49	1.06
	Package 2: #7, #8, & #9	0	18	\$208	\$38	5.42	3.22

**Table 7: Multifamily Efficiency Upgrade Package Cost Effectiveness Results**

	Measures	Electricity Savings (kWh)	Natural Gas Savings (therms)	Measure Cost	Utility Cost Savings	Simple Payback	Lifecycle Benefit-Cost Ratio
<b>Pre-1978 Vintage</b>	1: R-30 attic ins.	135	10	\$444	\$54	8.18	2.53
	2: R-38 attic ins.	164	12	\$500	\$65	7.71	2.69
	3: Cool roof	211	-3	\$184	\$50	3.66	5.66
	4: Windows	918	28	\$5,873	\$296	19.86	1.04
	5: Air sealing	39	13	\$341	\$30	11.19	1.85
	6: Duct sealing	322	17	\$337	\$118	2.85	7.27
	7: DHW blanket	0	4	\$40	\$6	7.12	2.91
	8: Pipe ins	0	1	\$42	\$1	52.07	0.40
	9: Low flow fix.	0	10	\$86	\$15	5.72	3.62
	10: LED lamp	21	0	\$4	\$5	0.73	34.82
	Package 1: #2 & #5	209	26	\$841	\$98	8.55	2.42
	Package 2: #7, #8, & #9	0	14	\$168	\$23	7.47	2.77
<b>1978-1991 Vintage</b>	1: R-30 attic ins.	56	4	\$348	\$22	15.54	1.33
	2: R-38 attic ins.	82	6	\$405	\$32	12.60	1.65
	3: Cool roof	161	-2	\$184	\$39	4.66	4.45
	4: Windows	N/A					
	5: Air sealing	44	17	\$341	\$37	9.23	2.25
	6: Duct sealing	84	3	\$337	\$28	12.14	1.71
	7: DHW blanket	0	4	\$40	\$6	7.12	2.91
	8: Pipe ins	0	1	\$42	\$1	52.07	0.40
	9: Low flow fix.	0	10	\$86	\$15	5.72	3.62
	10: LED lamp	21	0	\$4	\$5	0.73	34.82
	Package 1: #2 & #5	121	24	\$745	\$70	10.61	1.95
	Package 2: #7, #8, & #9	0	14	\$168	\$23	7.47	2.77
<b>1992-2005 Vintage</b>	1: R-30 attic ins.	57	4	\$348	\$23	15.41	1.34
	2: R-38 attic ins.	84	6	\$405	\$33	12.40	1.67
	3: Cool roof	132	-2	\$184	\$32	5.80	3.58
	4: Windows	N/A					
	5: Air sealing	16	6	\$341	\$13	26.12	0.79
	6: Duct sealing	70	3	\$337	\$24	14.27	1.45
	7: DHW blanket	0	4	\$40	\$6	7.12	2.91
	8: Pipe ins	0	1	\$42	\$1	52.07	0.40
	9: Low flow fix.	0	10	\$86	\$15	5.72	3.62
	10: LED lamp	21	0	\$4	\$5	0.73	34.82
	Package 1: #2 & #5	102	12	\$745	\$46	16.04	1.29
	Package 2: #7, #8, & #9	0	14	\$168	\$23	7.47	2.77



## **4 Recommendations & Discussion**

This analysis evaluated the feasibility and cost effectiveness of a retrofit ordinance requiring efficiency upgrades in existing homes undergoing a substantial remodel in Chico, California. A customer-based lifecycle cost (LCC) approach to evaluating cost effectiveness was applied quantifying the utility cost savings associated with energy efficiency measures compared to the costs associated with the measures.

### ***4.1 Recommended Efficiency Measures for the Ordinance***

Based on the cost effective analysis, the following measures or packages of measures are recommended for inclusion in the ordinance. In most cases, exceptions are defined which would exempt a particular building from a measure. These exceptions are based on both existing on-site conditions and cost effectiveness.

Window upgrades were found to be cost effective for the pre-1978 vintage building with existing single pane windows, but is not included as a recommended measure. The additional cost requirement for a typical building is significant and the margin for cost effectiveness is lower than most other measures.

**Air Sealing & Attic Insulation Package:** Add attic insulation to a minimum level of R-38 in vented attics. Using foam or caulking seal all accessible cracks, holes and gaps in the building envelope at walls, floors, and ceilings. Pay special attention to penetrations including plumbing, electrical, and mechanical vents, recessed can light fixtures, and windows. Weather-strip doors if not already present. A blower door is not required for verification. Verification shall be conducted by the building department following a prescriptive checklist (to be developed) which outlines what building aspects need to be addressed by the permit applicant and verified by an inspector.

Exception 1: Buildings without vented attic spaces and building with existing attic insulation levels greater than R-19 are exempt from the attic insulation requirements.

Exception 2: Buildings that can demonstrate blower door test results showing 5 ACH50 or lower, a 30% reduction from pre-retrofit conditions, or can otherwise demonstrate that air sealing meeting the requirements of this ordinance was conducted within the last 12 months are exempt from the air sealing requirements.

**Cool Roof:** Steep slope roof replacements shall install a roofing product rated by the Cool Roof Rating Council to have an aged solar reflectance equal to or greater than 0.25, or that is ENERGY STAR certified. Low slope roof replacements shall meet the requirements of the 2016 Building Energy Efficiency Standards section 150.2(b)1Hii, regardless of the compliance approach with Title 24, Part 6 (prescriptive or performance), which requires a roofing product with an aged solar reflectance equal to or greater than 0.63 and a thermal emittance equal to or greater than 0.73. This measure only applies to buildings that are installing a new roof as part of the scope of the substantial remodel. See Appendix B for additional details on the requirements per Title 24.

Exception 1: Projects that are not installing a new roof as part of the scope of the substantial remodel. Only areas of roof that are to be re-roofed are subject to the cool roof upgrade.

Exception 2: All exceptions as stated in the 2016 Building Energy Efficiency Standards section 150.2(b)1Hi for steep slope roofs and 150.2(b)1Hii for low slope roofs are allowed.

**Duct Sealing:** Air seal all ductwork to meet the requirements of the 2016 Building Energy Efficiency Standards section 150.2(b)1Ei, 150.2(b)1Eii, or 150.2(b)1Eiii, with the exception that duct testing is not required to be verified by a HERS Rater. The contractor conducting the air sealing must test duct leakage and complete a self-certification form (to be developed) to provide to the building department. The form must be accompanied with a photograph of the contractor's gauge indicating the leakage results. See Appendix B for additional details on the requirements per Title 24.

Exception 1: All exceptions as stated in the 2016 Building Energy Efficiency Standards section 150.2(b)1E are allowed.

**Water Heating Package:** Add exterior insulation meeting a minimum of R-6 to storage water heaters. Insulate all accessible hot water pipes with pipe insulation a minimum of ¾” inch thick. This includes insulating the supply pipe leaving the water heater, piping to faucets underneath sinks, and accessible pipes in attic spaces or crawlspaces. Upgrade sinks and showers to meet current CALGreen requirements.

Exception 1: Water heaters less than 20 gallons.

Exception 2: Fixtures with rated flow rates no more than 10% greater than current CALGreen requirements.

Exception 3: If application of a water heater blanket voids the warranty on the water heater.

**LED Lighting:** Replace all interior and exterior screw-in (A-base) incandescent and halogen lamps with screw-in LED lamps.

## 4.2 Other Considerations

A HERS Rater is not required to meet any of the requirements for the recommended measures. A Rater would only be required if the substantial remodel triggers HERS verification under the Title 24, Part 6 code. Measure installation shall be verified by a city building inspector or another third party inspector deemed appropriate by the building department. While a HERS Rater is not required, one could be used as an alternative to inspections by the building department

Implementation of many of the recommended measures will affect the pressure balance of the home which can subsequently impact the safe operation of existing combustion appliances as well as indoor air quality. Buildings with older gas appliances can present serious health and safety problems which may not be addressed in a substantial remodel if the appliances are not being replaced. It is recommended that the building department conduct inspections of all combustion appliances after completion of the retrofit work. It's also recommended that the city consider requiring combustion safety testing by a certified professional whenever air sealing and insulation measures are applied and existing combustion appliances are located within the pressure boundary of the building.

The city may also want to consider requiring mechanical ventilation in homes where air sealing has been conducted. In older buildings, outdoor air is typically introduced through leaks in the building envelope. After air sealing a building, it may be necessary to forcefully bring in fresh outdoor air using supply and/or exhaust fans to minimize issues associated with indoor air quality.

If any of the measures above are included in a performance Title 24, Part 6 compliance report, it's suggested that trade-offs be allowed as long as all minimum code requirements are met. For example, if a project is installing new windows and a new roof and insulating the attic and is demonstrating compliance with Title 24, Part 6 with a performance simulation run, it would be acceptable if the installed roof did not meet the requirements listed above as long as this was traded off with either an increase in attic insulation or better performing windows. This would also provide trade-offs for projects that are installing high impact measures, such as solar water heating or whole house fans. This would require two simulation runs; however it's not expected this approach would be utilized often. One run (#1) would evaluate the proposed building upgrades. This would also be the report submitted to the building department for the permit application demonstrating compliance with Title 24, Part 6. A second run (#2) would also be completed with the minimum ordinance requirements modeled for each of the affected building components. The applicant would need to demonstrate that the proposed upgrades (#1) would result in annual time dependent valuation (TDV) energy use equal to or less than the annual TDV energy use of the case based on the ordinance requirements (#2).

## **5 References**

CEC. 2016a. 2016 Alternative Calculation Method Approval Manual. CEC-400-2015-039-CMF. June 2015. California Energy Commission. <http://www.energy.ca.gov/2015publications/CEC-400-2015-039/CEC-400-2015-039-CMF.pdf>

CEC. 2016b. 2016 Building Energy Efficiency Standards for Residential and Nonresidential Buildings. CEC-400-2015-037-CMF. June 2015. California Energy Commission.

ConSol. 2010. Water Use in the California Residential Home. January 2010. [http://www.cbia.org/uploads/5/1/2/6/51268865/2010\\_-\\_chf\\_water\\_use\\_study.pdf](http://www.cbia.org/uploads/5/1/2/6/51268865/2010_-_chf_water_use_study.pdf)

KEMA. 2010. Final Evaluation Report: Upstream Lighting Program, Vol 1. KEMA, Inc. February 2010. [http://www.energydataweb.com/cpucfiles/18/finalupstreamlightingevaluationreport\\_2.pdf](http://www.energydataweb.com/cpucfiles/18/finalupstreamlightingevaluationreport_2.pdf)

## Appendix A - Utility Rate Tariffs

Following are the PG&E electricity, both standard and time-of-use, and natural gas tariffs applied in this study. The PG&E monthly gas rate in \$/therm was applied on a monthly basis for the 12-month period ending March 2016.



**Pacific Gas and Electric Company**  
San Francisco, California  
U 39

Cancelling

Revised  
Revised

Cal. P.U.C. Sheet No.  
Cal. P.U.C. Sheet No.

36706-E  
36470-E

### ELECTRIC SCHEDULE E-1 RESIDENTIAL SERVICES

Sheet 1

**APPLICABILITY:** This schedule is applicable to single-phase and polyphase residential service in single-family dwellings and in flats and apartments separately metered by PG&E; to single-phase and polyphase service in common areas in a multifamily complex (see Special Condition 8); and to all single-phase and polyphase farm service on the premises operated by the person whose residence is supplied through the same meter.

The provisions of Schedule S—Standby Service Special Conditions 1 through 6 shall also apply to customers whose premises are regularly supplied in part (but not in whole) by electric energy from a nonutility source of supply. These customers will pay monthly reservation charges as specified under Section 1 of Schedule S, in addition to all applicable Schedule E-1 charges. See Special Conditions 11 and 12 of this rate schedule for exemptions to standby charges.

**TERRITORY:** This rate schedule applies everywhere PG&E provides electric service.

**RATES:** Total bundled service charges are calculated using the total rates below. Customers on this schedule are subject to the delivery minimum bill amount shown below applied to the delivery portion of the bill (i.e. to all rate components other than the generation rate). In addition, total bundled charges will include applicable generation charges per kWh for all kWh usage.

Customers receiving a medical baseline allowance shall pay for all usage in excess of 200 percent of baseline at a rate \$0.04000 per kWh less than the applicable rate for usage in excess of 200 percent of baseline. No portion of the rates paid by customers that receive a Medical Baseline allowance shall be used to pay the DWR Bond charge. For these customers, the Conservation Incentive Adjustment is calculated residually based on the total rate less the sum of: Transmission, Transmission Rate Adjustments, Reliability Services, Distribution, Generation, Public Purpose Programs, Nuclear Decommissioning, Competition Transition Charges (CTC), New System Generation Charges,<sup>1</sup> and Energy Cost Recovery Amount. Customers receiving a medical baseline allowance shall also receive a 50 percent discount on the delivery minimum bill amount shown below.

Direct Access (DA) and Community Choice Aggregation (CCA) charges shall be calculated in accordance with the paragraph in this rate schedule titled Billing.

#### TOTAL RATES

Total Energy Rates (\$ per kWh)	
Baseline Usage	\$0.18212
101% - 130% of Baseline	\$0.24090 (I)
131% - 200% of Baseline	\$0.24090 (R)
201% - 300% of Baseline	\$0.39999 (I)
Over 300% of Baseline	\$0.39999 (I)
Delivery Minimum Bill Amount (\$ per meter per day)	\$0.32854
California Climate Credit (per household, per semi-annual payment occurring in the April and October bill cycles)	(\$28.14)

<sup>1</sup> Per Decision 11-12-031, New System Generation Charges are effective 1/1/2012.

(Continued)

Advice Letter No: 4810-E-A

Decision No. 15-07-001 and E-4782

Issued by  
**Steven Malnight**  
Senior Vice President  
Regulatory Affairs

Date Filed

May 31, 2016

Effective

June 1, 2016

Resolution No.

1C8



Pacific Gas and Electric Company  
San Francisco, California  
U 39

Revised  
Revised  
Cal. P.U.C. Sheet No. 32682-G  
Cal. P.U.C. Sheet No. 32620-G

**GAS SCHEDULE G-1  
RESIDENTIAL SERVICE**

Sheet 1

**APPLICABILITY:** This rate schedule\* applies to natural gas service to Core End-Use Customers on PG&E's Transmission and/or Distribution Systems. To qualify, service must be to individually-metered single family premises for residential use, including those in a multifamily complex, and to separately-metered common areas in a multifamily complex where Schedules GM, GS, or GT are not applicable. Common area accounts that are separately metered by PG&E have an option of switching to a core commercial rate schedule. Common area accounts are those accounts that provide gas service to common use areas as defined in Rule 1.

**TERRITORY:** Schedule G-1 applies everywhere within PG&E's natural gas Service Territory.

**RATES:** Customers on this schedule pay a Procurement Charge and a Transportation Charge, per meter, as shown below. The Transportation Charge will be no less than the Minimum Transportation Charge, as follows:

<u>Minimum Transportation Charge:**</u>		<u>Per Day</u>	
		\$0.09863	
		<u>Per Therm</u>	
	<u>Baseline</u>	<u>Per Therm</u>	<u>Excess</u>
<u>Procurement:</u>	\$0.20960 (R)		\$0.20960 (R)
<u>Transportation Charge:</u>	\$0.81592		\$1.30547
<b>Total:</b>	\$1.02552 (R)		\$1.51507 (R)

Public Purpose Program Surcharge:

Customers served under this schedule are subject to a gas Public Purpose Program (PPP) Surcharge under Schedule G-PPPS.

See Preliminary Statement, Part B for the Default Tariff Rate Components.

The Procurement Charge on this schedule is equivalent to the rate shown on informational Schedule G-CP—Gas Procurement Service to Core End-Use Customers.

**BASELINE QUANTITIES:** The delivered quantities of gas shown below are billed at the rates for baseline use.

Baseline Territories***	BASELINE QUANTITIES (Therms Per Day Per Dwelling Unit)	
	Summer Effective Apr. 1, 2016	Winter Effective Nov. 1, 2015
P	0.46	2.15
Q	0.69	1.98
R	0.46	1.79
S	0.46	1.92
T	0.69	1.79
V	0.69	1.79
W	0.46	1.69
X	0.59	1.98
Y	0.85	2.55

\* PG&E's gas tariffs are available online at www.pge.com.  
 \*\* The Minimum Transportation charge does not apply to submetered tenants of master-metered customers served under gas rate Schedules GS and GT.  
 \*\*\* The applicable baseline territory is described in Preliminary Statement, Part A.

(Continued)

Advice Letter No:	3715-G	Issued by	Date Filed	May 24, 2016
Decision No.	97-10-065 & 98-07-025	<b>Steven Malnight</b>	Effective	June 1, 2016
		Senior Vice President	Resolution No.	
		Regulatory Affairs		

1C6

## **Appendix B – Standards Sections**

### **2016 Building Energy Efficiency Standards Section 150.2(b)1H**

**Roofs.** Replacements of the exterior surface of existing roofs shall meet the requirements of Section 110.8 and the applicable requirements of Subsections i and ii where more than 50 percent of the roof is being replaced:

- i. Low-rise residential buildings with steep-sloped roofs, in Climate Zones 10 through 15 shall have a minimum aged solar reflectance of 0.20 and a minimum thermal emittance of 0.75, or a minimum SRI of 16.

**EXCEPTION TO 150.2(b)1Hi:** The following shall be considered equivalent to Subsection i:

- a. Air-space of 1.0 inch (25 mm) is provided between the top of the roof deck to the bottom of the roofing product; or
  - b. The installed roofing product has a profile ratio of rise to width of 1 to 5 for 50 percent or greater of the width of the roofing product; or
  - c. Existing ducts in the attic are insulated and sealed according to Section 150.1(c)9; or
  - d. Buildings with at least R-38 ceiling insulation; or
  - e. Buildings with a radiant barrier in the attic meeting the requirements of Section 150.1(c)2; or
  - f. Buildings that have no ducts in the attic; or
  - g. In Climate Zones 10-15, R- 2or greater insulation above the roof deck.
- ii. Low-sloped roofs in Climate Zones 13 and 15 shall have a 3-year aged solar reflectance equal or greater than 0.63 and a thermal emittance equal or greater than 0.75, or a minimum SRI of 75.

**EXCEPTION 1 to Section 150.2(b)1Hii:** Buildings with no ducts in the attic.

**EXCEPTION 2 to Section 150.2(b)1Hii:** The aged solar reflectance can be met by using insulation at the roof deck specified in TABLE 150.2-B.

### **2016 Building Energy Efficiency Standards Section 150.2(b)1E**

**Altered Space-Conditioning System - Duct Sealing:** In all Climate Zones, when a space-conditioning system is altered by the installation or replacement of space-conditioning system equipment, including replacement of the air handler, outdoor condensing unit of a split system air conditioner or heat pump, or cooling or heating coil; the duct system that is connected to the altered space-conditioning system equipment shall be sealed, as confirmed through field verification and diagnostic testing in accordance with the applicable procedures for duct sealing of altered existing duct systems as specified in Reference Residential Appendix RA3.1 and the leakage compliance criteria specified in Reference Residential Appendix Table RA3.1-2, conforming to one of the following requirements:

- iii. The measured duct leakage shall be equal to or less than 15 percent of system air handler airflow as determined utilizing the procedures in Reference Residential Appendix Section RA3.1.4.3.1; or
- iv. The measured duct leakage to outside shall be equal to or less than 10 percent of system air handler airflow as determined utilizing the procedures in Reference Residential Appendix Section RA3.1.4.3.4; or
- v. If it is not possible to meet the duct sealing requirements of either Section 150.2(b)1Ei or Section 150.2(b)1Eii, then, all accessible leaks shall be sealed and verified through a visual inspection and a smoke test by a certified HERS Rater utilizing the methods specified in Reference Residential Appendix RA3.1.4.3.5.

**EXCEPTION 1 to Section 150.2(b)1E: Duct Sealing.** Duct systems that are documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in the Reference Residential Appendix RA3.1.

**EXCEPTION 2 to Section 150.2(b)1E: Duct Sealing.** Duct systems with less than 40 linear feet as determined by visual inspection.

**EXCEPTION 3 to Section 150.2(b)1E: Duct Sealing.** Existing duct systems constructed, insulated or sealed with asbestos.

*This overview is provided to returning partners to help them organize their application content before starting the online application process.*

When you are ready to submit your application go to <http://civicspark.lgc.org/join-civicspark/project/> and click “apply now”

**Key to the overview content**

- Bold = header or question prompt
- Italics = guidance for specific sections or questions
- Bullet = needed content or response type

## **I. Organizational Information**

### **Organizational Details**

**City of Chico, Community Development Department**

411 Main Street, PO Box 3420, Chico, CA 95927

Community Development Director

530-879-6806

<http://www.ci.chico.ca.us/>

### **Contacts**

*Provide information for up to 3 contacts that will serve as Project Contact, Fellow Supervisor, and a Billing Contact – they can be the same people in multiple roles.*

**Director Level Contact**

Mark Wolfe

Community Development Director

530-879-6801

[mark.wolfe@chicoca.gov](mailto:mark.wolfe@chicoca.gov)

**Project Contact/Fellow Supervisor**

Brendan Vieg

Principal Planner

530-879-6806

[brendan.vieg@chicoca.gov](mailto:brendan.vieg@chicoca.gov)

**Billing Contact**

Kimberly Graciano

Account Tech II

530-879-7365

[kimberly.graciano@chicoca.gov](mailto:kimberly.graciano@chicoca.gov)

## **II. Project Description and Goals**

### **Project Details**

#### **Project Title (to be used on the CivicSpark website) \***

- Chico Climate Adaptation and Resiliency Initiative

#### **CivicSpark Project Description**

*CivicSpark focuses on building the capacity of local government — to collaborate across sectors and address pressing climate change or water management issues — through research, planning, and implementation projects.*

*Please provide a brief description (no more than 300 words) of your project, outlining the organizational background, the climate or water goals the project intends to address, and highlighting fellow's role in the project. The description should be as compelling and appealing as possible, to entice fellows applying for the program (your text will be used for the descriptions fellows see when applying).*

The City of Chico's 2020 Climate Action Plan (CAP) outlines strategies, organized within a flexible ten-year framework, for a significant reduction of greenhouse gas emissions that are directly and indirectly generated by local activities. The CAP identifies broad-ranging areas vulnerable to climate change, including impacts on agriculture, water resources, energy production, air quality, public infrastructure, sensitive species/habitats, public health and safety, and, as a result, multiple economic sectors. The CAP directs the development of a Climate Change Adaptation Plan to outline long-term strategies for mitigating anticipated local impacts of climate change.

Further, the City is aware of the need to update various City documents to comply with State sustainability legislation, including Climate Change Adaptation (SB 379, 2015) and 2030 GHG Emissions Target (SB 32, 2016). To meet the objectives outlined above, the City proposes to initiate updates to its General Plan Safety Element (2011) and Local Hazard Mitigation Plan (2014) to incorporate strategies for climate adaptation and resiliency. Work to be undertaken by the CivicSpark Fellow will support those updates, and all work product will be featured on the City's Sustainability website <http://chicosustainability.org/>

#### **CivicSpark Project Outcomes**

*Our goal for CivicSpark is to support local governments while fostering the next generation of climate and water professionals. What are the anticipated outcomes and/or desired deliverables from the fellow(s) service (as opposed to your proposed project as a whole)?*

*As above, provide a brief (no more than 300 words) description of outcomes, and try to make them as compelling as possible (your text will be used for the descriptions fellows see when applying). \**

The Fellow will work in a collaborative environment that will include interaction with City of Chico and Butte County staff, and geography students enrolled in CSU Chico's Fall 2017, GEOG 506 Community Service Practice in Geography class, taught by Dr. Mark Stemen (who is also the Chair of the City's Sustainability Task Force). The Fellow will act as a liaison to City



and County staff. Students in the GEOG 506 class will prepare a Draft Climate Change Vulnerability Assessment that identifies the risks climate change poses to the Chico community, the geographic areas at risk, including a set of adaptation and resilience goals, policies and objectives.

In partnership with the GEOG 506 students, the Fellow will develop a Draft Climate Change Preparedness Plan to address impacts of climate change on the City's economic and natural ecosystems and promote a climate resilient community.

The Fellow will be responsible for the following work:

In support of SB-32, researching the most effective GHG reduction measures and best practices used by jurisdictions in the State of California.

In support of SB-379, develop Draft Implementation Measures designed to carry out adaptation and resiliency goals, policies, and objectives, which will include avoiding or minimizing climate change impacts.

Sources for completing these tasks include:

- Internet based Cal-Adapt Tool
- Research of other communities efforts
- Chico 2030 General Plan Safety Element
- Collaboration with City Fire Department, Police Department, Public Works, and community stakeholders
- The California Adaptation Planning Guide
- Local agencies and special districts on the types of assets, resources, and populations that will be sensitive to various climate change exposures
- Historical data on natural events and hazards, including maps of areas subject to previous risk, areas that are vulnerable, and sites that have been repeatedly damaged

### **CivicSpark Fellow Desired Skills and Traits**

*In order to best identify the kind of fellow who will be most successful for your project please identify 2 traits or skills you would like your fellow(s) to have.*

*Desired Skills should be no more than 150 words. Please also consider that our primary demographic are recent college graduates, so we may not be able to accommodate a need for highly technical skills. As above, this will be used in the descriptions fellows see when applying. \**

The desired candidate should possess strong research abilities and writing skills and a working knowledge of sustainability practices and processes. The candidate should be comfortable in multi-tasking and setting work priorities and working in a collaborative environment as well as independently with minimal supervision. In support of this work, the candidate should have the ability to synthesize complex and sometimes unrelated information, and work creatively with City staff and CSU Chico students and instructors. As a liaison between the City, County, and

the CSU Chico class, the candidate should be adept at working with a variety of people in a professional and effective manner.

### **Focus and Desired Skills Dropdowns**

*For the next 4 questions, we ask you to pick from dropdown lists for your top two sector focus for the project, and your top 2 desired skills or abilities for fellows working on your project. Your selections on these items, help us to match more specifically with interests and skills provided by fellows on their applications.*

#### **Sector Focus 1: What is the primary focus of this project**

- Energy Efficiency / Renewable Energy
- Air Quality
- Alternative Transportation
- Public Health
- Waste Reduction / Composting
- Green Infrastructure
- Environmental Justice
- Greenhouse Gas Inventorying
- Climate Action Planning
- Climate Adaptation Planning
- Vulnerability Assessments
- Land-Use Planning/Management
- Local/Statewide Policy
- Water Conservation / Water Use Efficiency
- Water-Energy Nexus
- Water Supply Reliability
- Stormwater
- Groundwater
- Safe Drinking Water

#### **Sector Focus 2: What is the secondary focus of this project**

- Energy Efficiency / Renewable Energy
- Air Quality
- Alternative Transportation
- Public Health
- Waste Reduction / Composting
- Green Infrastructure
- Environmental Justice
- Greenhouse Gas Inventorying
- Climate Action Planning
- Climate Adaptation Planning
- Vulnerability Assessments
- Land-Use Planning/Management
- Local/Statewide Policy

- Water Conservation / Water Use Efficiency
- Water-Energy Nexus
- Water Supply Reliability
- Stormwater
- Groundwater
- Safe Drinking Water

**Project Skills 1: What are the primary skills or activities this project will require**

- Project Management
- Marketing/Communication
- Outreach/Community Engagement
- Education
- Research
- Technical Writing
- Facilitation
- Data Collection/Analysis
- Environmental Justice/Equity
- GIS/Mapping

**Project Skills 2: What are the secondary skills or activities this project will require**

- Project Management
- Marketing/Communication
- Outreach/Community Engagement
- Education
- Research
- Technical Writing
- Facilitation
- Data Collection/Analysis
- Environmental Justice/Equity
- GIS/Mapping

**Are you collaborating with any other organizations on this project? \***

- Yes / No

**CivicSpark Fellow Site Supervisor and Workspace Requirements**

*CivicSpark is committed to nurturing the next generation of sustainability leaders by providing a strong professional development experience for fellows. A critical part of that experience is placing fellows in an environment and under the guidance of a Site Supervisor who can help them learn, grow, and benefit from exposure to their organization and network.*

**Hosts may have local partners take a role in supervision, but as the host organization you are agreeing to identify one Site Supervisor for the fellow(s) during the 11-month service year. Site Supervisor responsibilities include: Conducting an initial and closing assessment**

**of the fellow's performance, supporting the creation of the fellow's professional goals, conducting weekly check-ins with fellows, overseeing their project work, and serving as a bridge to partners and your organization. \***

- **I agree**

**Will you have a suitable and dedicated workspace (desk, cubicle, shared office etc.) for your fellow(s)? \***

*Inability to provide suitable and dedicated workspace for your Fellow(s) may affect the project viability.*

- **Yes** / No (if no please explain working environment if not)

## **CivicSpark Climate Fellows - Cost and timing**

**Our organization is interested in hosting a fellow (or fellows) for the following duration: \***

*For additional details on costing and service information for each period refer to the "local government overview" page on our website.*

- **Half Fellow (\$13,000 for 650 project hours/member) - see below for timing options**
- Full Fellow (\$25,500 for 1300+ project hours/member)

**Number of Fellows requested for this project \***

*Note that total costs will be time period x number of members requested.*

**For the Half Fellow option, what is your desired start time and hours allocation?**

*Note availability of members for less than eleven month options is dependent on our ability to match with another project application in the same region who is also interested in a partial placement.*

- **Half time for 11 months Fall 2017 start**
- Full time for 6 months Fall 2017 start
- Full time for 6 months Spring 2018 start

## **III. Target Public Agencies for Fellow Services**

*This section asks for information about the target local public agencies for your project.*

- *If your organization is a public agency that a fellow will be supporting, respond with information about your own agency.*
- *If your organization is not a local public agency and/or the project is targeting a different public agency, provide information for that agency.*

*Note this information is required, and must be provided before the start of service.*

## **Eligibility and Exceptional Need Questions**

**Name of local public agency / agencies, or departments within a single agency receiving project support.**

*Note that the expectation is that you will identify at least 2 agencies or departments per fellow hosted. If multiple agencies are being targeted, we will need the following 6 questions answered separately for each. If multiple departments within a single agency are being served, the following 6 questions apply for all departments \**

City of Chico, Community Development Department  
City of Chico, Public Works Department

**Does this agency have a dedicated full-time sustainability staff?**

- Yes / **No**

**Has the governing body formally adopted a climate action plan or similar policy mechanism?**

- **Yes** / No

**Has the agency developed and is currently using specific mechanisms for tracking climate progress?**

*Tracking mechanisms will vary from community to community, but should be established systems and processes that allow the local government to 1) monitor implementation progress on all measures in the Climate Action Plan or similarly formal climate action policy 2) document GHG reduction results from implementation of each measure, and 3) update the inventory and revise targets and measures as needed to adjust to changing conditions. Tracking activities should be completed at least on an annual basis, and should include council/board level as well as department level reporting that allows for discussion of outcomes and formal discussion of any needed changes.*

- **Yes** / No

**Please provide annual data on a key community climate indicator (e.g. energy, water, waste) relevant to this project (e.g. community energy use) for the latest recorded year.**

Residential/Commercial Energy Use (2014)  
496,667,059

**Please provide numbers for the same key indicator climate (e.g. energy, water, waste) relevant to this project (e.g. community energy use) for the year prior to the one reported above.**

Residential/Commercial Energy Use (2015)  
488,471,699

**Units for the last 2 questions (e.g. kwh, therms, acre-feet etc.)**

kwh

## **IV. Fiscal and Contractual Understanding**

*AmeriCorps programs are funded by both the Corporation for National and Community Service and through participating local governments. CivicSpark or Water Corps support requires a fiscal contribution. Either public agencies or third parties can be the source for the fiscal contribution. This rate is all-inclusive (e.g. covers workers compensation, liability insurance, workplace costs, member personnel benefits, job travel support); and is only based on project work.*

*To proceed with services, LGC will require completion of a signed service agreement and a down payment of 10% of total project cost before the start of services. The remaining cost will be paid monthly throughout the term of service.*

**Please list known sources for the fiscal contribution. If sources are not yet known please indicate potential sources and expected timeframe for securing funding.\***

*Note if your organization is a nonprofit, we may ask for fiscal references or additional fiscal capacity information before contracting with you.*

Proposed FY2017/2018 capital project fund - General Plan Implementation

**Will any part of your fiscal contribution come from federal sources? If so, prior to the start of services, LGC will need confirmation that the federal agency providing funds approves of the use of funds for AmeriCorps services. \***

- Yes / **No**

**As a federally funded program, AmeriCorps programs are required to track service to participating public agencies (see here for more details). Please check below that you agree to provide necessary information and contacts as needed to comply with our program guidelines whether before or during the service year. \***

- I agree

**As a federally funded program, CivicSpark Fellows are prohibited from engaging in certain activities. Please review the list of prohibited activities. Once you have reviewed this list, please check below that you understand these prohibited activities and agree that Fellows will not engage in such activities during your project scope. \***

- I agree

**CivicSpark is committed to recruiting a strong and diverse cohort of fellows who can have a positive impact on the communities they serve. Part of our success in building a strong cohort is recruiting widely and locally. In support of this, we ask that all Project Partners regularly share information about the program and current fellowship openings through their local networks through online postings, sharing information at meetings, etc. Templates and flyers will be provided by LGC. Please check below that you agree to support fellow recruitment in your community. \***

- I agree