State of California
California Energy Commission
Local Government Challenge

City of Chico Submission

March 6, 2017

maalka nbi new buildings institute GREEN STEPS

CALIFORNIA STATE UNIVERSITY Chico

XBRL Flexible Business Reporting Language
XBRL-CET
Construction
Energy
Transportation

SGIP SMART GRID INTEROPERABILITY PANEL
SGIP PAP25

I. PROJECT NARRATIVE

Existing buildings with aging equipment and infrastructure represent a tremendous opportunity for energy savings. The energy performance of public buildings is often cited when jurisdictions consider expenses. However, without a mechanism to identify inefficient buildings, prioritize upgrades and guide policy, it's difficult to know where to start.

In most California cities, Title 24 building energy codes are the primary way that energy performance of buildings is regulated. While codes can have significant impact on new buildings, the impact on existing buildings is limited to major renovation projects. Furthermore, the influence of energy codes ends before the building is occupied so they have limited impact on actual energy use over the life of the building. As jurisdictions begin to grapple with this issue, they are coming to recognize that their own publicly-owned portfolio of buildings represents an opportunity to both reduce energy use and to demonstrate leadership in targeting broader city sustainability and performance goals. In Chico, when the private sector is added in, there is a 95% greater resource to mine.

This is an application for funding the City of Chico in implementation of the Energy (buildings) portion of the City of Chico 2020 Climate Action Plan (CAP). The CAP identifies a potential reduction of 147,191 metric tons of carbon dioxide equivalent through building efficiency measures, which represents a 63% reduction in the City business as usual (no action) baseline. Overall, the locally controlled target[1] for reduction through development of an actionable implementation plan is 72,910 $MtCO^2e$ by year 2020.

Though the city currently has implemented programs for private sector residential energy use reduction[2], there are no non-city commercial building energy reduction requirements. Through this grant, the City proposes to develop an implementation plan for all commercial buildings, public and private in accordance with the requirements of the State of California and AB 802.

Demonstrated Need or Value

The City of Chico 2020 CAP set an overall reduction target of 309,755 $MtCO^2e$, of which buildings represent 47.8% of reduction potential. This reduction potential is equally split between residential and commercial buildings. So, the technical defined potential to date of commercial buildings is conservatively set at 20 $MtCO^2e$. This target and timeline will need to be extended and updated when all public and private commercial buildings are benchmarked.

[1] Locally controlled are actions directly under the design and control of the city and do not include actions such as state required codes (Title 24) or federal efficiency standards such as the CAFE standard for automobiles.

[2] By city ordinance, at the time of sell of an existing residential building, certain energy upgrades such as attic insulation, water heater insulation, and programmable thermostats are required. A program through PG&E targeted weatherization in 100 residential buildings.

ATTACHMENT 7
Project Narrative Form
City of Chico

With the exception of some point-of-sale residential reduction requirements and city-owned commercial building requirements such as retro/re commissioning, there is currently no comprehensive plan for an overall reduction in energy use (carbon) in the building sector. Commercial buildings use approximately one half of the total building energy within Chico but there are no efficiency requirements for buildings other than city owned. And the city owns only 5% of the total commercial building stock within its borders, leaving 95% of commercial buildings with no organized plan for energy use reduction.

Although AB 802 requires the access to whole building utility data for commercial building benchmarking, there is no city specific requirement for implementation of energy reduction measures within the legislation. Utilities are tasked with providing energy data, specifically for benchmarking using the Environmental Protection Agency Energy Star Portfolio Manager online database, and providing incentives for building owners who make investment to lower energy use including On Bill Finance. Benchmarking, much like building audits, does not in itself save energy. It only provides one metric for visualizing energy use over time and as compared to other buildings. Under this application, the City of Chico proposes to develop a commercial Strategic Energy Management Plan (SEMP) and Process that will identify those specific actions and develop specific activities or processes for:

1. Quantifying current commercial building energy use in the City through work with public and private sector building owners utilizing the Department of Energy Green Button;
2. Significantly reducing the current estimated cost of benchmarking for all public and private sector commercial buildings through use of an innovative online database that utilizes XBRL, FIBO, IEC, agcXML and other open industry standards to enable data interoperability;
3. Ensuring that data standards utilized, specifically the IEC 61724/62933 solar/energy storage system information and performance, are submitted to the Building Energy Data Exchange Specification, or BEDES, for incorporation into the catalog of standards
4. Ensuring that all public and participating private buildings are benchmarked and updated on a monthly basis.
5.
6. Provision of an online database with data interoperability for use in diagnostics of building efficiency, and prioritization of building maintenance, equipment upgrades, and retrofits;
7. Identification of resources and processes for ensuring building energy use reduction;
8. Creation of an online yearly report template for building energy use using an energy use index (EUI) of Kbtu per square foot per year.
9. Identification of utility program incentives for building efficiency upgrades and coordination with PG&E for investigating modifications to the On Bill Financing program to allow for solar systems and third party financing;

10. Engage with the CSU Chico STEM Educational Program/DOE Orange Button effort to improve solar bankability to identify financing, bonding and insurance mechanisms for building retrofit and renewable energy acquisition that will provide a sustainable resource to CAP implementation that accelerates construction of renewal energy projects.
11. Engage with the CSU Chico STEM Educational Program/XBRL-CET working group to research how data interoperability can enable innovations in risk management and improve access to surety and bank credit for small business, with an initial emphasis on local veteran owned solar installation companies.
12. Partner with the CSU Chico STEM Educational Program to broaden the outreach and awareness objectives by collaborating with other similar efforts funded by state and federal agencies, engage with various industry trade associations working on data interoperability, and extend an invitation to the City of Tracy and the neighboring cities around Camp Pendleton to collaborate with Chico as a model.

The project will provide benefits for public and private building owners through return on investment for energy improvements, through better understanding of operation and maintenance best practices and subsequent returns, and through provision of greater resiliency in local buildings. The city and private building owners will be able to clearly target and accurately measure commercial energy use and reduction over time, thus tracking the energy portion of the CAP with a high degree of accuracy. The state will be provided with accurate reporting on carbon reduction in the commercial energy (building) sector. Demand reduction through efficiency and renewables will benefit building owners, PG&E, and the state.

The City of Chico does not have the up-front financial resources to build out the above described SEMP on its own. Assistance through this grant will allow the city and private property owners to partner with the CSU Chico STEM education program and utilities in meeting requirements of demand reduction and the build out of renewable portfolios as required in California SB 350, with the build out by local small businesses assisted in part by this grant.

Approximately 24% of the City of Chico's proposed Climate Action Plan reductions are dependent on actions within the commercial building sector. And these are reductions that are in large part under local, though mostly privately-owned control. Without a viable management plan for city-wide commercial buildings, the current CAP will not be achievable. Under this proposal, the XBRL/FIBO data generated for benchmarking is the same data that enables innovations for financial markets and contractors to provide competitive pricing that promotes construction of renewable energy projects for achieving CAP objectives.

State Energy Goals

ATTACHMENT 7
Project Narrative Form
City of Chico

The Strategic Energy Management Plan will provide a methodology for accurate measurement of commercial building energy use, and use reduction over time, including estimated reductions that are an outcome of Title 24 requirements for existing building retrofit.

An online database (already created by vendor Maalka) will simplify benchmarking through Portfolio Manager and reduce the overall cost for building owners to benchmark and update building data. The Maalka database will also significantly increase the ability to run diagnostics on buildings, enabling cost-effective prioritization of operations, maintenance and building upgrades, with data interoperability based on XBRL, FIBO, IEC and agcXML.

Partnership with financial, insurance and surety markets to exploit data interoperability for promoting renewable energy projects through greater efficiencies and improved risk management that drive down construction costs and generate competitive financial terms to ensure that SB 350 goals are engaged.

Technical Approach

The contractor or vendor team for this project includes three business entities who teamed up approximately two years ago to provide Strategic Energy Management Planning to cities across the U.S. Maalka Inc. is a sophisticated and talented start up that has designed an online database with an open format API that enables energy data management in innovative and highly applicable ways. New Buildings Institute, a well-known and highly recognized non-profit out of Portland Oregon is the technical, policy and building diagnostic resource. GreenSteps LLC, Boise Idaho, is well experienced in facilitation and development of strategic energy management plans that are actionable. The City of Chico will provide project oversight and will contract with the GreenSteps/NBI/Maalka team and an on-the-ground Resource Conservation Manager to ensure on-going benefits are achieved. California State University, Chico will participate as a local resource for building data gathering and provide students with a real-world learning experience in SEM. Other partners, not in a contractor role, include the XBRL-CET working group , Smart Grid Interoperability Panel Priority Action Plan 25, and the International Electrotechnical Commission.

TASKS

Upon contract initiation, the Contractor team will:

1. Schedule a meeting with the City and partners/stakeholders to development project strategies and outline the SEMP process. GreenSteps facilitating with City, Chico State, NBI and Maalka participating;
2. The City schedules public hearings as required to kick off the process with private

building owners.

3. Public and private buildings will be identified and owners notified by the City of the availability of funding and expertise to enable benchmarking as defined in AB 802;
4. Chico State students will be trained to identify building meters and physically walk through buildings to record energy meters and other building characteristics for use in population of Portfolio Manager;
5. All participating buildings will be documented into Energy Star Portfolio Manager by the Resource Conservation Manager (RCM) with oversight by NBI and GreenSteps team;
6. The City and Maalka will work with PG&E to set up AB 802 defined monthly utility data transfer for each participating building;
7. The Maalka team will migrate Portfolio Manager data to their database;
8. Led by NBI, each building will undergo diagnostic analysis based on a minimum of one-year of data and an initial report will be run through the Maalka database.
9. The entire dataset of buildings will be assessed through the Maalka database and a prioritization of actions will be developed for a subset of buildings with the greatest carbon reduction potential;
10. With GreenSteps leading, a SEMP will be developed to identify funding resources and business processes, including ongoing monitoring, measurement and reporting activities;
11. A final meeting of the City and all contractors will turn over the SEMP;
12. Reports for each building will identify opportunities for energy savings and be distributed electronically, including the opportunity to download data in XBRL, FIBO or IEC, to building owners by the city contracted Resource Conservation Manager;
13. With data interoperability building owners can investigate multiple options from various entities to secure the best pricing and terms for acting on the opportunities identified;
14. Information on financing options, utility incentives, contractor selection, insurance and surety bonding will be available for project implementation and communicated to building owners;
15. City staff will take over monitoring and reporting with help from the RCM and ongoing support from Maalka;
16. The project RCM will work with building owners to ensure implementation of the SEMP.

II. SCOPE OF WORK

Once notified of a successful proposal and a contract is signed, the City of Chico will proceed with vendor contracting to initiate the benchmarking and strategic energy management work identified in this proposal and further clarified under this Scope of Work. Five contracts will be implemented. One with GreenSteps, the project lead, Maalka, NBI, CSU Chico, and a yet to be determined Resource Conservation Manager, whom will be an on-site engineering resource that works directly with property owners under the supervision of the city, and one with CSU Chico

University. GreenSteps will sub-contract with Maalka LLC, and New Buildings Institute to perform services as described in this scope.

Workplan and Services

GreenSteps, with Maalka and NBI (the Consultant Team) will be responsible for the overall project design, designation of team roles, development of an engagement process for the city and private building owners, development of a data plan, coordination with XBRL, FIBO and IEC, building diagnostic plan and all of the components of a Strategic Energy Management Plan. The Consultant Team has developed a SEM Spiral of Success that defines this process in eight steps:

1. Engagement
2. Goal setting
3. Benchmarking
4. Diagnostics
5. Targeted field analysis
6. Plan development
7. Implementation
8. Ongoing monitoring

Engagement is a critical process that brings the initial participants together for purposes of planning. Engagement includes design and facilitation of meetings with the city, Chico State, PG&E and other partners with the purpose of developing initial agreements on roles and actions and the approach to gathering data, soliciting private building owner participation, soliciting public input, etc. Protocols for data gathering will be developed and timelines set for deliverables. This step includes development of documentation of buildings, building types and size so that program potential can be estimated.

Though the city has goals in the Climate Action Plan, once the building sector is better-defined, new estimates for energy savings can be developed. Much of the initial work is performed at Engagement so that achievable goals are set.

Benchmarking is a major activity and will require significant effort. Though city buildings are benchmarked, they represent only 5% of the total commercial building stock. The key activity here is developing contact with private building owners and soliciting their participation in

benchmarking and SEM. There are many upsides to this engagement. Benchmarking will be paid for out of the grant, a significant savings to the building owner. Plus, the owner will receive a building SEMP that will prioritize energy saving actions that will lower operational costs and ultimately increase building resiliency. Chico State students will be taught how to perform building walk-throughs, capturing meter identification data and building characteristics that will be used to populate Portfolio Manager (PM). The RCM under contract will work with the Team and utilities to set up PM accounts and access electronic data to populate the database for each participating building. Embodied in this process is data permissions and data access.

Once a year's worth of energy data is uploaded into PM, it will be uploaded in the Maalka database for diagnostic analysis. At this point, we can break out individual buildings, or combine all office, fire stations, libraries, multifamily, etc., and establish a true normalized baseline for targeting reductions for individual buildings, building types or the entire city portfolio. The Maalka database will also allow de-aggregation of the building loads, showing heating, cooling, thermal, and lighting/plug loads. This provides useful "virtual audit" information for making determinations for targeted field analysis.

Targeted field analysis will be performed by the RCM based on prioritizations developed during the diagnostic phase. Many times this is a simple verification of equipment operation and function. Other times it may require deeper verification of lighting power densities, equipment set points, outside air and economizer operations, etc. This will be a very time consuming and hands on set of tasks.

Development of the SEMP will begin with engagement and continue through benchmarking, diagnostics and field studies. It is these previous activities that will inform the plan to the point of functionality and applicability. Plan development pulls together all of the data and process and puts it into a format that is implementable. GreenSteps will work closely with all team members to help to guide and capture the work product to ensure that the main deliverable, the SEMP, will provide the specific actions that will ensure the savings goal is met and, that the program becomes the new business as usual within the commercial sector of the city.

With help from the Team, the RCM will guide implementation activities with the building owners, utilities and other partners such as the surety bonding industry. This is the bottom line, most important activity of the plan. Implementation provides savings.

The Maalka team and database enabled with data interoperability will provide a building monitoring dashboard and a reporting format that building owners may use for specific buildings, and that the city can use for more aggregated reporting to the CEC and peer cities.

ATTACHMENT 7
Project Narrative Form
City of Chico

The City of Chico and the Team fully commit to sharing the SEMP and all developed processes with other California cities. The Maalka team will be available for the grant period to conduct online peer-to-peer dialogue with cities regarding the use of the Maalka database and its diagnostic capabilities.

PROJECT MILESTONES	DATE	DELIVERABLES
Kickoff meeting	September 2017	Notes
Public hearings	Sept - Dec 2017	Completed
Identify and contact all private building owners	September 2017	Commitment to participate
Resource Conservation Manager hired	October 2017	On board
Student meter and Portfolio Manager audits	Nov 2017 Jan 2018	Spreadsheet
All buildings in Portfolio Manager and Maalka	March 2018	Benchmarking complete
Building diagnostics using Maalka database and FirstView	May 2018	Baseline reports on each building
Action plans developed as part of the SEMP	June 2018	Actions for each building
SEMP complete	August 2018	Dynamic document

Participation by private commercial building owners is critical to the success of the project. The Contractor team and City believes that the opportunity to have buildings benchmarked at no cost will be a positive factor in eliciting participation. Even then, there will likely be a small subset of non-participants.

The City and Contractor team propose to use this process, the Maalka database outcomes, and a surety based risk management financing mechanism as a model that will be presented to the CEC as a way to make renewable energy more bankable to promote more investment and construction. City staff and Contractors will attend up to three California conferences to

showcase the project and outcomes over the contract period.

Project success will be measurable through changes in building energy use indices and through the uptake of building owner participation in the City.

Team Qualifications

While Chico plays a very small role in the global problem of climate change, the City of Chico is committed to reducing greenhouse gas (GHG) emissions as a part of its sustainability efforts. The Chico 2030 General Plan states this goal, and in support, calls for implementation of a Climate Action Plan (CAP or Plan). This ten-year Plan was developed, and now the city intends to implement more meaningful energy savings in commercial buildings through the tasks set out in this proposal with the identified contractors. We believe that implementation of a viable commercial building reduction plan will provide over 20% of the 25% baseline city-wide reduction identified in the 2020 CAP.

The project team includes Maalka, a group of brilliant programmers and White House innovation fellows who have developed an open platform online database that effectively takes building energy use data and translates it to usable information. New Buildings Institute is well known for their work with Net Zero and the creation of best practice energy efficiency programs for buildings. GreenSteps has been working with property managers and cities for nearly a decade in development of actionable Strategic Energy Management plans for building portfolios.

Under City of Chico contract, GreenSteps will lead the project development with Maalka, NBI, and Chico State providing data, technical and on the ground support for project development. The combined team of GreenSteps, Maalka and NBI have successfully developed SEMPs for the City of Boise, Idaho, and Tacoma, Washington, and are currently working with the Cities of Eugene, Oregon, Missoula, Montana and Providence, Rhode Island.

Project lead Ken Baker, GreenSteps Managing Partner, has been continuously designing and implementing energy efficiency programs since 1982. He has many thousands of hours of program management experience, as well as team facilitation. He was Conservation Bureau Chief or the Idaho Department of Water Resources for seven years, and has led the Northwest Energy Efficiency Alliance's Codes & Standards team for just under four years. In between he was a successful energy efficiency consultant and national educator on energy codes, with contracts in Nevada, California, Utah, Maryland, Iowa, Nebraska, Alabama, Idaho, Montana, Texas, Ohio and others.

ATTACHMENT 7
Project Narrative Form
City of Chico

Budget

Contractor	Year 1	Year 2	Year 3	Year 4	Year 5
City of Chico					
RCM					
Chico State U					
Maalka					
GreenSteps					
NBI					
Audit					
Equipment					
Totals by year					
Total Five Year					

Disadvantaged Communities

Chico is not an identified Disadvantaged Community, though Butte County has large disadvantaged areas.

Project Lead Resume - Other Team Resumes Attached

Kenneth Baker GreenSteps - 208-861-5736 - ken@kenergy.us General Background and Skills Highlights

Ken Baker has been working in building energy efficiency since 1978. His 1982 Master of Architecture degree from the University of Idaho focused on energy and resource efficient construction techniques and the use of local- based materials to create vernacular and sustainable buildings.

He is the co-author with Jana Kemp of Greenwood Publishing Co. book, *Building Community in Buildings, The design and Culture of Dynamic Workplaces*.

In April of 2008 Ken was appointed by Governor Otter to chair the Idaho Strategic Energy Alliance Energy Efficiency Task Force. The Task Force identified market-transforming opportunities for energy efficiency in Idaho. As an outcome of the task force Ken led the Idaho Office of Energy Resource staff in development and implementation of 18 million dollar K-12 energy efficiency program and developed contracts and managed contractor building audits and tune-ups for 37 million square feet, and HVAC and lighting retrofits for over 5 million square feet.

Through July of 2017 Ken will continue to manage the four-state codes and standards program for the Northwest Energy Efficiency Alliance (NEEA). Since 1986 he has developed curriculum for codes and standards training, developed code change language, and educated and trained building department staff and the commercial and residential construction industry throughout the U.S and worked on the Kingdom of Bahrain's first energy code through a World Bank contract. In 2010 he developed a white paper for Pacific Northwest National Lab on the effect of building orientation on commercial building energy use. Over a three-year period Ken contracted with the Pacific Northwest National Lab to provide train-the-trainer training on ASHRAE 90.1 and the IECC nationally. Ken was a chief contributor to development of the PNNL code compliance guides for states.

Through a Department of Energy Grant to NEEA Ken was able to facilitate formation of an NBI, Maalka and Eco Edge team to develop Community Building Renewal, a strategic energy management program for city management of their built environment. CBR provides cities with a roadmap for action on building renewal.

Ken has developed and led eco-charrettes for the City of Tolleson, Arizona, Ada County Idaho Parks and Recreation, Idaho State University, and the City of Post Falls Idaho. He has implemented several thousand hours of formal facilitation work for state agencies and other entities across Idaho, the northwest and the U.S.

During 2006 Ken served on Idaho's legislative subcommittee for Energy and Conservation in development of a new Idaho energy plan. Ken is a co-founder and advisory board member of the University of Idaho Integrated Design Lab, part of a four-state network of labs working to evolve the built environment into a low carbon future.

In 2009 Ken joined with Sharon Grant, Eco Edge, and Suzie Hall, Cornerstone Design, to form GreenSteps LLC. GreenSteps assists corporate, government and community clients in determining the breadth of their internal and external green culture.

State of California
California Energy Commission - Local Government Challenge

Funded

Not Funded

- Supporting the agile development of world class efficiency and renewable services
- Beneficiary of those services delivered around interoperable standards and best practices.

- Dashboard
- Lead the climate action plan development with partners and Develop the monitoring process for compliance with AB802
- Green button Data modeling for Orange Button
- Monitoring of solar and energy storage systems with IECRE 61724 / 62933

- Online Salesforce Prototype App for solar installation contractor company profile utilizing XBRL/FIBO – Updated Chico Common App
- Online Salesforce Prototype App for solar system performance utilizing IECRE 61724 / 62933

- Data Standards for Company Profile – Chico Common App
- IEC 61724 Solar System Information and performance measurement
- IEC 62933 Energy Storage System Information and performance measurement

---

- Coordination of volunteer collaborators
- Coordination of data standards
- Liaison with DOE Orange Button
- Develop strategy for promotion of solar system construction for SB350