

Phase I Comprehensive Renewable Energy Plan Executive Summary Report

September 2016



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ACRONYMS AND ABBREVIATIONS

AFV	Alternative fuel vehicle
ARB	California Air Resources Board
BMP	Best management practices
Board	County of San Diego Board of Supervisors
CALGreen	California Green Building Standards
CAP	Climate Action Plan
CCA	Consumer Choice Aggregation
CEC	California Energy Commission
CO ₂	Carbon dioxide
County	County of San Diego
CREB	Clean Renewable Energy Bond
CREP	Phase I Comprehensive Renewable Energy Plan
DA	Direct Access
DOE	Department of Energy
DRECP	Desert Renewable Energy Conservation Plan
EAP	Energy Assurance Plan
ECR	Enhanced Community Renewables
Empower Report	Phase I Comprehensive Renewable Energy Plan Report
EPAct	Energy Policy Act of 1992
EPAct 2005	Energy Policy Act of 2005
ESP	Electric service provider
ESCo	Energy Service Company
EVSE	EV supply equipment
FHFA	Federal Housing Finance Agency
FIT	Feed-in-Tariff
GHG	Greenhouse gas
GTSR	Green Tariff Shared Renewables
HERO	California Home Energy Renovation Opportunity
IEPR	Integrated Energy Policy Report
IOU	Investor-owned utility
kW	Kilowatt
kWh	Kilowatt per hour

LCE	Lancaster Choice Energy
MCE	Marin Clean Energy
MW	Megawatts
NEM	Net energy metering
OPR	Governor’s Office of Planning and Research
P2P	Peer-to-peer
PACE	Property Assessed Clean Energy
PG&E	Pacific Gas and Electric
PPA	Power Purchase Agreement
PTC	Production tax credit
QECB	Qualified Energy Conservation Bond
REN	Regional energy network
SCE	Southern California Edison
SCEF	Sonoma County Efficiency Financing
SCP	Sonoma Clean Power
SDG&E	San Diego Gas and Electric
SEU	Sustainable Energy Utility
TAC	Technical Advisory Committee
WIOA	Workforce Innovation and Opportunity Act
ZEV	Zero-emission vehicles
ZNE	Zero net energy

1 EXECUTIVE SUMMARY

In July 2015, the Phase I Comprehensive Renewable Energy Plan (CREP) Report (Empower Report) was prepared in response to the County of San Diego (County) Board of Supervisor's (Board) direction to research and develop renewable energy options in the County. This summary report presents the key points from the Empower Report. The Empower Report can be found in Attachment A.

Covering the residential, commercial, and industrial sectors of the County, with a particular focus on unincorporated areas, the CREP presents a comprehensive approach to renewable energy and energy efficiency. The Empower Report considers technology, appropriate zoning and development standards; and fiscal and financial impacts and community benefits, including costs to consumers.

This summary highlights the most pertinent information from the Empower Report, beginning with a review of existing conditions, which includes an updated energy-related regulatory settings section, and a preliminary overview of existing renewable energy resources within the County (see Section 2). Section 3 of this summary report analyzes the most commonly used alternative energy models that provide customer options beyond the traditional investor-owned utility (IOU) model that the County could pursue: Community Choice Aggregation (CCA), Direct Access (DA), and Sustainable Energy Utility (SEU). It also provides an overview of the financing mechanisms the County could use to implement these models. Section 4 summarizes the various programs, policies, and efforts that constitute best management practices (BMPs) for promoting sustainable renewable energy development in other jurisdictions. The County could choose to focus on a mix of these BMPs in its renewable energy planning effort. Section 5 summarizes the results of the economic analysis performed in the Empower Report, which explores the current patterns of economic activity and energy consumption. Finally, Section 6 summarizes key conclusions from the Empower Report.

1.1 SUMMARY OF CREP AND CLIMATE ACTION PLAN RELATIONSHIP

The County's CREP and Climate Action Plan (CAP) efforts are separate, but related projects. Increasing renewable energy use is one of many actions the County can take to reduce greenhouse gas (GHG) emissions and is one component of climate action planning. The County is currently in the outreach phase of drafting a new CAP. The purpose of the CAP will be (1) to address issues related to growth and climate change and (2) work alongside objectives in the CREP.

Integration of CREP BMPs, including identification of alternative energy models, can be pursued through CAP reduction measures and actions. By integrating objectives of the CREP with renewable energy components of the CAP, commitments can be tied to a plan and specific GHG reductions associated with renewable and energy efficiency projects. More information on the relationship between the CREP and CAP can be found in the CAP Alignment Memo. Initial recommendations for BMPs that can better align with the County CAP are summarized below.

1.2 RECOMMENDATIONS

The Empower Report provides a thorough assessment of BMPs to provide a variety of potential programs, policies, and models that the County could later adopt and implement as part of the CREP. Determining which mix of BMPs will work best for the County depends on a number of social, economic, and political factors. Each BMP is analyzed in Sections 4 and 6 of this report, with summary tables that more thoroughly consider the costs and benefits of implementation (i.e., advantages, disadvantages, financing options, and implementing body), along with the overall return on investment to the County. A ranking system, based on overall return on investment was used to determine the mix of BMPs anticipated to be most effective for the County. A low, medium, or high return on investment ranking was assigned based on a number of social,

economic, and political factors. For more information on how rankings were determined, see Section 4 of this summary report.

- ▲ **Focus on BMPs with Medium or High Return on Investment Rankings.** While all of the BMPs can arguably provide value and promote more renewable energy development in the County, it is important for the County to focus on the BMPs that will provide the highest return on investment, or the most benefit for the money spent. The summary tables and analyses in Sections 4 and 6 of this report provide an initial ranking of the cost and benefits. For further consideration in the CREP process, the County should focus on the BMPs that have medium or high return on investment rankings.
- ▲ **Top BMP Recommendations for Phase II of the CREP.** Based on an assessment of cost, financing options, advantages, disadvantages, and overall opportunity to increase renewable energy development, the following four BMPs have been identified as the top recommendations for the County to pursue in Phase II of the CREP.

 - **Develop a CCA Feasibility Study (BMP #3).** Compared to other alternative energy models proposed (i.e., Direct Access (DA), Sustainable Energy Utility (SEU)), pursuing development of a CCA through a feasibility study would be the best use of County resources. Given current restrictions, the ability for a DA program to increase renewable energy development is limited. The County could lobby both the California Public Utilities Commission (CPUC) and/or the State legislature to open up DA beyond its current limits, but this could be time extensive and results are not guaranteed. Regarding an SEU, a CCA could provide a similar energy integrator role and financing opportunities. The County could explore developing an SEU if it doesn't choose to pursue a CCA program, but it is important to keep in mind that SEUs still require legislative action in order to implement.

There are a number environmental, economic, and administrative advantages to creating a CCA. Given the significant amount of investment, resources, and staffing needed to establish, run, and operate a CCA, it is important that the County conduct a feasibility study before arriving at a decision. However, to avoid duplicated efforts and to ensure more unified results, the County should consider other CCA feasibility studies being prepared in the region before drafting its own study. The City of Solana Beach recently completed a feasibility study in April 2016. Also, the City of San Diego is in the beginning stages of drafting a citywide CCA feasibility study. The County should coordinate and work with the City of San Diego on these efforts to determine ways to supplement information on a county-wide level.

The County's feasibility study should be clear in its objectives for the program, sources of funding, and economic viability. The study should consider San Diego Gas and Electric (SDG&E) load data and renewable resource assessments to identify potential projects; assess the potential size of the program in terms of number of customers and electricity sales; develop a financial and cash-flow model; predict the overall return on investment; quantify the jobs created under various procurement scenarios; and outline how start-up costs would be financed. If the feasibility study finds that a CCA program would be viable for the County, the benefits could well outweigh the costs.

- **Create a Renewable Energy Overlay (BMP #10).** By reducing planning process time and by providing more certainty to investors, a renewable energy overlay zone can save both the developer and the government money. It also sends a signal to investors that the County wants to see renewable energy in specific locations in the County. While it may be difficult to secure funding for an overlay zone, the potential benefits for creating an overlay zone are worth considering. The County could better direct renewable energy development and identify opportunity areas that consider current and proposed land uses and environmental conditions.
- **Track Community Solar Initiative Legislation (BMP #14).** Because many people are not able to install solar photovoltaic (PV) systems on their rooftops for a number of reasons (i.e., limited or no space, financial restrictions, living in a rental or multi-family unit, or poor rooftop solar orientation), Community Solar can help consumers gain access to solar opportunities. It also minimizes the usual

high upfront solar costs and supports the local solar industry. Community Solar could also promote the development of more solar developments in the County. The County should be involved in tracking the regulatory decisions established by Senate Bill (SB) 43 and consider how it could implement a Community Solar initiative in the future. The county should also look to other cities that have implemented Community Solar (e.g., City of Carlsbad).

- ▲ **Establish a Microgrid and Develop Policies Related to Microgrids (BMP #15).** Microgrids, which are self-contained power systems that have on or more power sources (often renewable), offer a number of economic, environmental, power quality, and security benefits. The primary benefit of a microgrid is reliability and its ability to keep critical infrastructure, such as transportation systems, hospitals, data centers, water treatments facilities, police and fire departments, operating, particularly during times of crisis. As an example, Borrego Springs was funded through a variety of agencies and partners (i.e., Department of Energy [DOE], SDG&E, California Energy Commission [CEC], IBM, Motorola), suggesting that microgrids are an important asset and worth investing in. The County could begin by partnering with SDG&E and University of California San Diego (UCSD) on microgrid policies and identifying potential sites in the County where microgrids would be ideally suited.
- ▲ **Additional Recommendations with a Medium or High Return on Investment Ranking.** A high return on investment ranking, was given to BMPs that the County could most feasibly finance and gain support on at a political or organizational level. BMPs that had a clear path to implementation, or clear action items to determine feasibility, were also given a high ranking. Finally, BMPs with the highest potential to increase renewable energy opportunities in the County, were given a higher ranking, even if associated costs were high. A medium return on investment ranking was given to BMPs where some uncertainty existed as to whether the County could feasibly finance and gain support at a political or organizational level. BMPs with high start-up costs, and/or with less certain potential to increase renewable opportunities, were also given a medium ranking.

The following BMPs with a medium or high return on investment ranking should also be considered by the County:

- BMP #4: Establish Financing Capacity (i.e., Property Assessed Clean Energy [PACE] and Bonds)
- BMP #5: Develop a Solar Energy Workforce Development Initiative
- BMP #7: Increase the County's Percentage of Energy Derived from Various Renewable Energy Technologies
- BMP #13: Increase Renewable Energy Education and Outreach
- BMP #16: Establish Electric Vehicle Programs
- BMP #17: Develop a Legislative Strategy to Support Renewable Energy Programs
- ▲ **Avoid Costly BMPs That Require Too Many Existing Resources or New Staffing.** A low return on investment ranking was given to BMPs that had more disadvantages than advantages and/or required a significant amount of additional research to determine feasibility of implementation. BMPs that were costly (or costs were undetermined) and had low potential to increase renewable energy opportunities in the County were also given a low ranking. A number of BMPs presented in this summary were ultimately given a low return on investment rating due to the level of new and existing staff time and resources needed for implementation and execution. These include:
 - BMP #2: Establish a New Office of Sustainability
 - BMP #8: Establish a Renewable Energy Group Procurement Initiative

- BMP #9: Participate in the Creation of a New Regional Energy Network
- BMP #11: Develop a Building Energy Disclosure Program

A number of these BMPs are administrative in nature and also require large operating budgets that may prove difficult to fund. For example, the expenditures required to keep an Office of Sustainability (BMP #2) in operation are extensive and would put additional pressure on existing staff and resources that oversee it. Not only is a significant amount of research needed to determine whether a Group Procurement Initiative (GPI) would be feasible for the County (BMP #8), it may not be the best use of current staff time and resources due to the high level of coordination needed to implement a GPI. The same is true for creating a new regional energy network (REN) (BMP #9); the administrative burden placed on current staff as a result of extensive coordination and time needed to get a REN up and running makes it a less desirable option for the County to pursue. Finally, the actual coordination and manpower needed to create, implement, and oversee a Building Energy Disclosure Program (BMP #11) is quite high for the overall end gain.

- ▲ **Some BMPs are Better Addressed in the County's CAP.** A number of the BMPs address ways the County can increase renewable energy opportunities by creating additional planning documents. While plans help to consolidate policies and convey a unified approach to an issue, they can also be costly and hard to finance (i.e., unless the County can secure grant money). Because the County is already working on a CAP, the same objectives proposed in certain BMPs can be addressed in the CAP. For example, rather than prepare an Energy Element for the County's General Plan (BMP #1), it would be better to align renewable energy directives with the upcoming CAP and to ensure its consistency with the General Plan. While an Energy Assurance Plan (EAP) addresses energy security (BMP #6), other planning documents (e.g. Hazard Mitigation Plan and the County's CAP) may be better positioned to begin to outline key assets and ways to increase energy supply resiliency.

Additionally, certain policy and program BMPs should be addressed in the CAP to ensure their implementation and GHG reduction potential. The advantages associated with increasing the renewable energy mix in the County are important environmentally and will also help towards achieving legislative targets. Because the County is currently using a relatively small amount of renewable energy, there is an opportunity to increase this percentage mix by implementing changes (BMP #7). The exact percentage reduction should be aligned with Renewable Portfolio Standard (RPS) requirements and should also help achieve GHG reduction targets identified in the CAP. Also, the establishment of additional Electric Vehicle (EV) programs (BMP #16) have important implications to the reductions of GHGs in the County. Programs should be included in the County's CAP to quantify their GHG reduction potential.

- ▲ **Focus on Partnership and Collaborations.** Some BMP programs would be more effective if the County chose to partner and collaborate with other agencies, entities, and organizations. Identifying appropriate partnership and collaboration opportunities will not only help implementation of certain BMPs, but strengthen existing programs that currently exist. The County should continue to support PACE programs (BMP #4) and help educate residents about the availability of these programs and encourage participation as a means to help reduce the region's electricity demand. The County should also explore how it might support efforts to create a PACE district in San Diego administered by the Ygrene Energy Fund or a similar entity. Regarding whether the County should develop a Solar Energy Workforce Development Initiative (BMP #5), there are already a number of other organizations providing workforce development in the County. Rather than developing an entirely new initiative, it may be more beneficial to build upon existing programs and partner with other agencies and organizations who are already offering similar services. Furthermore, the County could also look to partner with other agencies and organizations that are already focused on renewable energy education and outreach to further success with BMP #13. Finally, the County could take advantage of legislation that supports renewable energy programs by working with the Office of Strategy and Intergovernmental Affairs (OSIA) to develop a legislative strategy that builds upon their existing legislative review process (BMP #17).

1.3 NEXT STEPS

The CREP marks an important step in identifying the most effective tools to promote renewable energy. The County needs to consider which mix of renewable energy policy options outlined in the BMPs would garner the highest returns on investment and most effectively promote renewable energy development in the County. Information gathered from the Empower Report, this Summary Report, and feedback from the CREP's Technical Advisory Committee (TAC) will inform the County's Staff Report to the Board. The Board will provide policy direction for the CREP in late 2016 or early 2017.

2 EXISTING CONDITIONS

2.1 REGULATORY SETTING

2.1.1 Federal

ENERGY POLICY ACT OF 1992

The Energy Policy Act of 1992 (EPAAct) was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAAct requires certain federal, state, and local government and private fleets to purchase a percentage of light duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are included in EPAAct. Federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the act to consider a variety of incentive programs to help promote AFVs.

ENERGY POLICY ACT OF 2005

The Energy Policy Act of 2005 (EPAAct 2005) was signed into law on August 8, 2005. EPAAct 2005 provides for renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for a clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

2.1.2 State

GREENHOUSE GAS LEGISLATION

In September 2006, Governor Schwarzenegger signed Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006. AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on GHG emissions and is being implemented through the California Cap-and-Trade regulation starting in 2012, along with other regulations and programs.

In December 2008, the California Air Resources Board (ARB) adopted its Climate Change Scoping Plan, which contains the main strategies California will implement to achieve GHG reductions of approximately 22 percent from the State's projected 2020 emission levels under a business-as-usual (BAU) scenario. In 2014, ARB adopted the First Update to the Climate Change Scoping Plan to identify the next steps in reaching AB 32 goals and evaluate the progress that has been made between 2000 and 2012. According to the update, California is on track to meet the near-term 2020 GHG limit and is well positioned to maintain and continue reductions beyond 2020. The update also reports the trends in GHG emissions from various emission sectors.

In September 2016, Governor Brown signed Senate Bill (SB) 32 and AB 197 to extend California's GHG reduction programs beyond 2020. SB 32 authorizes ARB to achieve a statewide GHG emission reduction of at least 40 percent below the AB 32 2020 limit by no later than December 31, 2030. SB 32 codified the target established by Executive Order (EO) B-30-15 for 2030, which sets the next interim step in the state's continuing efforts to pursue the long-term target of 80 percent below 1990 emission levels by 2050. SB 32 does not include an authorization to extend the Cap-and-Trade program beyond the existing 2020 targets; this program is currently continuing under existing statutory authority in AB 32. AB 197 was written to

accompany SB 32 and establishes new statutory directions, including creating a six-member Joint Legislative Committee on Climate Change Policies to make recommendations to the Legislature. ARB is required to appear before this committee annually to present information on sectors covered by the Scoping Plan. AB 197 also requires ARB to consider social costs when adopting emission reduction rules and policies; prioritize direct emission reductions at large stationary sources and mobile sources; and identify ranges of GHG and air pollution reductions for every emissions reduction measure identified in subsequent Scoping Plan updates.

ADVANCED CLEAN CARS PROGRAM

In January 2012, ARB approved the Advanced Clean Cars program which combines the control of GHG emissions and criteria air pollutants, as well as requirements for greater numbers of zero-emission vehicles (ZEV), into a single package of standards for vehicle model years 2017 through 2025. The new rules strengthen the GHG standard for 2017 models and beyond. This will be achieved through existing technologies, the use of stronger and lighter materials, and more efficient drivetrains and engines. The program's ZEV regulation requires battery, fuel cell, and/or plug-in hybrid electric vehicles to account for up to 15 percent of California's new vehicle sales by 2025. The program also includes a clean fuels outlet regulation designed to support the commercialization of zero-emission hydrogen fuel cell vehicles planned by vehicle manufacturers by 2015 by requiring increased numbers of hydrogen fueling stations throughout the state. The number of stations will grow as vehicle manufacturers sell more fuel cell vehicles. By 2025, when the rules will be fully implemented, the statewide fleet of new cars and light trucks will emit 34 percent fewer GHG emissions and 75 percent fewer smog-forming emissions than the statewide fleet in 2016 (ARB 2011).

SENATE BILL 1389, INTEGRATED ENERGY POLICY REPORTS

SB 1389 requires CEC to prepare a biennial integrated energy policy report that contains an assessment of major energy trends and issues facing the state's electricity, natural gas, and transportation fuel sectors and provides policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the state's economy; and protect public health and safety (Public Resources Code § 25301[a]). The CEC prepares these assessments and associated policy recommendations every two years, with updates in alternate years, as part of the Integrated Energy Policy Report (IEPR). Preparation of the IEPR involves close collaboration with federal, state, and local agencies and a wide variety of stakeholders in an extensive public process to identify critical energy issues and develop strategies to address those issues. (CEC 2012a).

ENERGY IMPROVEMENT AND EXTENSION ACT OF 2008

The Energy Improvement and Extension Act of 2008 provides a one-year extension of the production tax credit (PTC) for wind energy, keeping the credit in effect through 2009. The bill also provides a two-year PTC extension, through 2010, for electricity produced from geothermal, biomass, and solar energy facilities, as well as trash-to-energy facilities, small hydropower facilities using irrigation water, capacity additions to existing hydropower plants, and hydropower facilities added to existing dams. In addition, the bill creates a new PTC for electricity produced by marine and hydrokinetic renewable energy systems (also called advanced water power systems) with a rated capacity of at least 150 kilowatt (kW) and placed in service by 2011. To help on the financing end, the bill authorizes \$800 million in new Clean Renewable Energy Bonds for all of the above technologies.

CALIFORNIA LONG-TERM ENERGY EFFICIENCY STRATEGIC PLAN

On Sept. 18, 2008, the CPUC adopted California's first Long Term Energy Efficiency Strategic Plan, presenting a single roadmap to achieve maximum energy savings across all major groups and sectors in California. This comprehensive Plan for 2009 to 2020 is the state's first integrated framework of goals and strategies for saving energy, covering government, utility, and private sector actions, and holds energy

efficiency to its role as the highest priority resource in meeting California's energy needs. The plan was updated in January 2011 to include a lighting chapter.

CALIFORNIA BUILDING ENERGY EFFICIENCY STANDARDS (TITLE 24, PART 6)

Buildings in California are required to comply with California's Energy Efficiency Standards for Residential and Nonresidential Buildings (i.e., Title 24, Part 6 of the California Code of Regulations), established by the CEC to institutionalize energy conservation standards. The standards were first adopted in 1978 and are updated approximately every three years. All buildings for which a building permit is submitted on or after July 1, 2014 must follow the 2013 standards (CEC 2012b). The CEC Impact Analysis for California's 2013 Building Energy Efficiency Standards estimates that the 2013 Standards are 23.3 percent more efficient than the previous 2008 standards for multi-family residential construction and 21.8 percent more efficient for non-residential construction (CEC 2013:3). CEC adopted the 2016 Building Energy Efficiency Standards in 2015. The 2016 Title 24 standards will go into effect on January 1, 2017. For single-family residences, the 2016 Title 24 standards will result in about 28 percent less energy use for lighting, heating, cooling, ventilation and water heating than the 2013 Title 24 standards (CEC 2015a). For non-residential land uses, the 2016 standards would result in 5 percent less energy use than those built to 2013 standards (CEC 2015b).

CALIFORNIA GREEN BUILDING STANDARDS (TITLE 24, PART 11)

The California Green Building Standards (CALGreen) feature regulations for energy efficiency, water efficiency and conservation, material conservation and resource efficiency, and environmental quality. CALGreen has mandatory provisions for commercial, residential, and public school buildings, along with appendices with voluntary provisions. Mandatory provisions for nonresidential buildings require that buildings facilitate future installation of EV supply equipment (EVSE), by including the proper wiring and electrical components needed for EV charging stations. Provisions further dictate the number of required EV charging spaces that are required, based on number of actual parking spaces.

CALIFORNIA ZERO NET ENERGY BUILDING GOALS

In 2007, the CPUC set a goal that all new residential construction in California will be zero net energy (ZNE) by 2020, and all new commercial construction will be ZNE by 2030. The CPUC reiterated its commitments to these goals when it adopted the California Long Term Energy Efficiency Strategic Plan in 2008. The California Energy Commission adopted the goal to achieve zero net energy building standards by 2020 for homes and 2030 for commercial buildings in its 2007 Integrated Energy Policy Report (IEPR), and reaffirmed that goal in its 2011 IEPR. The Zero Net Energy Building goals have also been supported in the California Energy Action Plan, the AB 32 Scoping Plan, the Governor's Clean Energy Jobs Plan, and the Clean Energy Futures Vision. In order to effectively implement each of the California Long Term Energy Efficiency Strategic Plan's goals, the CPUC has initiated individual goal area Action Plan efforts to create work plans and to continue the stakeholder engagement process that was used in the strategic plan. In 2011, the CPUC launched a ZNE Commercial Building Action Plan, which is designed to help commercial building owners in the state take advantage of the latest technologies and financial incentives to help reduce building energy use to "net-zero" through greater efficiency and on-site clean energy production. CPUC and CEC drafted the Zero Net Energy Action Plan in June 2015 specifically for new residential construction. The Action Plan provides a foundation for the development of a robust and self-sustaining ZNE market for new homes over the next five years, supports future codes and standards for ZNE, and inspires voluntary actions to meet California's goal.

ASSEMBLY BILL 758, COMPREHENSIVE ENERGY EFFICIENCY PLAN FOR EXISTING BUILDINGS

AB 758 (Skinner, Chapter 470, Statutes 2009) requires the CEC, in collaboration with the CPUC and stakeholders, to develop a comprehensive program to achieve greater energy efficiency in the state's existing buildings. The Existing Buildings Energy Efficiency Action (EBEE) Plan was released in 2015 and provides a 10-year framework to focus state and local governments, the building, contracting industries, and

real estate industries, financial market actors, and other key stakeholders on achieving much greater energy and water efficiency in existing residential, commercial, and public buildings. The EBEE Action Plan covers all existing buildings in the single-family, multifamily, commercial, and public buildings sectors

SENATE BILL X1-2, THE CALIFORNIA RENEWABLE ENERGY PORTFOLIO STANDARD

SB X1-2 of 2011 requires all California utilities to generate 33 percent of their electricity supply (portfolio) from renewables by 2020. SB X1-2 sets a three-stage compliance period requiring all California utilities, including independently owned utilities, energy service providers, and community choice aggregators, to generate 20 percent of their electricity from renewables by December 31, 2013; 25 percent by December 31, 2016; and 33 percent by December 31, 2020. SB X1-2 also requires the renewable electricity standard to be met increasingly with renewable energy that is supplied to the California grid from sources within, or directly proximate to, California. SB X1-2 mandates that renewables from these sources make up at least 50 percent of the total renewable energy for the 2011-2013 compliance period, at least 65 percent for the 2014-2016 compliance period, and at least 75 percent for 2016 and beyond. The CPUC and the CEC jointly implement the statewide RPS program through rulemakings and monitoring the activities of electric energy utilities in the state.

SENATE BILL 350, THE CLEAN ENERGY AND POLLUTION REDUCTION ACT OF 2015

In consideration of the approaching expiration of SB X1-2 goals, SB 350 of 2015 calls for 1) a new objective for procure 50 percent of the state's electricity from renewables by 2030 and 2) a doubling of statewide energy efficiency savings in electricity and natural gas final end uses of retail customers by January 1, 2030 with annual targets established by the CEC.

CALIFORNIA QUALIFYING FACILITY AND COMBINED HEAT AND POWER PROGRAM SETTLEMENT

In December 2010, the CPUC approved California's Qualifying Facility and Combined Heat and Power (CHP) Program Settlement, which established a CHP framework for the state's investor-owned utilities. The settlement established a near-term target of 3,000 megawatts (MW) of CHP for entities under the jurisdiction of the CPUC, although this target includes not just new CHP, but capacity from renewal of contracts due to expire in the next three years. The CPUC has also adopted a settlement agreement that includes reforms to the Electric Rule 21 interconnection process to provide a clear, predictable path to interconnection of distributed generation while maintaining the safety and reliability of the grid. Electric Rule 21 is a tariff that describes the interconnection, operating, and metering requirements for generation facilities to be connected to a utility's distribution system, over which the CPUC has jurisdiction (CEC 2013).

ALTERNATIVE AND RENEWABLE FUEL AND VEHICLE TECHNOLOGY PROGRAM

AB 118 (Statutes of 2007) created the CEC's Alternative and Renewable Fuel and Vehicle Technology Program. The statute, subsequently amended by AB 109 (Statutes of 2008), authorizes the CEC to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's climate change policies. The statute allows the CEC to use grants, loans, loan guarantees, revolving loans, and other appropriate measures. Eligible recipients include: public agencies, private businesses, public-private partnerships, vehicle and technology consortia, workforce training partnerships and collaboratives, fleet owners, consumers, recreational boaters, and academic institutions. The CEC must prepare and adopt an Investment Plan and convene an Advisory Committee to assist in preparing the Investment Plan.

SENATE BILL 43, THE GREEN TARIFF SHARED RENEWABLES PROGRAM

SB 43, passed in 2013, directed the CPUC to implement the Green Tariff Shared Renewables (GTSR) program to expand customer access to "all eligible renewable energy resources to all ratepayers who are

currently unable to access the benefits of onsite generation.” The law sets a sunset date of January 1, 2019 for the GTSR program, unless extended. The GTSR program applies to the three largest IOUs (i.e., Pacific Gas and Electric [PG&E], Southern California Edison [SCE], and SDG&E) and mandates that they administer the GTSR program in their service territory. The GTSR program allows both a Green Tariff Option and Enhanced Community Renewables (ECR) option to facilitate shared solar in California. SB 43 does not mandate how procurement should be divided between the Green Tariff and ECR programs. In 2015, the CPUC approved GTSR programs for SDG&E, PG&E, and SCE (EPIC 2015).

SAN DIEGO GAS & ELECTRIC INDEPENDENT MARKETING DIVISION COMPLIANCE PLAN (CPUC RESOLUTION E-4874)

In July 2016, the CPUC approved SDG&E’s proposal to form an Independent Marketing Division (IMD) to lobby or market against CCAs. Under SB 790 (signed in 2011), the CPUC was required to create a Code of Conduct, which prohibited utilities from lobbying against CCAs, unless it forms an IMD that is funded exclusively by its shareholders. The IMD must also be functionally and physically separate from ratepayer divisions. SDG&E chose to house its IMD inside an already existing affiliate, Sempra Services Corporation (SSC). SDG&E is the first utility in the state to apply for approval from the CPUC for such a division (CPUC 2016a).

GUIDANCE FOR INITIAL ENERGY EFFICIENCY ROLLING PORTFOLIO BUSINESS PLAN FILINGS (CPUC DECISION 16-08-019)

In August 2016, the CPUC passed a decision addressing next steps for RENs, the appropriate baselines to be used to measure energy savings for specific programs and measures, transition for statewide and third-party programs, and changes to the evaluation and shareholder incentive frameworks. The decision states that RENs will retain their designation status as pilots and are requested to submit business plans in coordination with the other energy efficiency program administrators. REN proposals will also need to be vetted through the stakeholder process at the California Energy Efficiency Coordinating Committee (CAEECC) prior to submission to the CPUC. REN programs, and therefore administrative expenses, will only be funded to the extent that they are determined by the CPUC to provide value (or the promise of value) to ratepayers in terms of energy savings and/or market transformation results for energy efficiency (CPUC 2016b).

2.1.3 Local

SAN DIEGO COUNTY GENERAL PLAN

The Conservation Element of the San Diego County General Plan (2011) contains policies related to energy efficiency and renewable energy development. Policies range from encouraging development projects to use renewable energy (COS-14.7); requiring County facilities to meet “green building” programs (COS-15.3), requiring development to meet Title 24 Energy Standards (COS-15.4); encouraging energy efficiency audits (COS-15.5); incentivizing low- and zero- emission vehicles and equipment (COS-16.3); and exploring the development of alternative fuel sources (COS-16.4).

SAN DIEGO COUNTY STRATEGIC ENERGY PLAN

The Strategic Energy Plan provides high-level energy and sustainability objectives and goals in the areas of energy and water conservation and efficiency, sustainable design, energy supply, distributed generation, vehicular transportation, energy and sustainability education and outreach, energy consumer choice, recycling and landfill diversion, and GHG emissions reductions. The Strategic Energy Plan applies to County municipal operations only and is based on a three to five-year cycle with updated plans developed to address regulatory, technical, economic and societal changes. The latest Strategic Energy Plan was released in 2015 and covers priorities for 2015-2020.

SAN DIEGO GAS & ELECTRIC CONNECTED TO THE SUN PROGRAM

San Diego's Connected to the Sun Program allows business and residential customers to have the option to purchase 100 percent renewable energy. This program was approved by the CPUC on January 29, 2015 and is administered through SDG&E. The Program includes two pilot program options: Share the Sun and SunRate. Share the Sun allows bundled customers to work directly with solar providers to acquire rights to a portion of the energy produced by a specific solar power facility and receive a bill credit for the value of that energy. SunRate allows bundled customers to buy some or all of their energy from local solar projects already under contract with SDG&E through a "green tariff." SunRate implementation is targeted for early 2016 and Share the Sun will take a couple years after signing an agreement with a solar provider.

DESERT RENEWABLE ENERGY CONSERVATION PLAN

Initiated in 2008 by Executive Order S-14-08, the Desert Renewable Energy Conservation Plan (DRECP), includes 22.6 million acres across seven California counties, with the eastern portion of San Diego County included in the impact area. The general purpose of the DRECP is to streamline siting and construction of renewable energy power facilities and transmission lines through streamlined environmental review and permitting, while conserving and managing plant and wildlife communities in the desert regions. This desert conservation and renewable energy and transmission focus will be covered through three separate components of the DRECP: A U.S. Bureau of Land Management Land Use Plan Amendment; a U.S. Fish and Wildlife Service General Conservation Plan; and a California Department of Fish and Wildlife Natural Communities Conservation Plan. Proponents of the DRECP are looking for a comprehensive, landscape approach that considers an entire region for development versus the project-by-project approach that tends to dominate planning efforts in many California counties today. The DRECP was driven early in part by the intent to meet the State's 33 percent by 2020 RPS. DRECP proponents plan to develop 20,000 MW of renewable energy power over the next 25 years, which is a significant undertaking.

2.2 EXISTING RENEWABLE ENERGY RESOURCES

2.2.1 County-Owned Facilities

As of 2016, the County is supplying 2.5 percent of its annual electricity needs through a number of small photovoltaic (PV) systems at local parks and recreation centers as well as through a Power Purchase Agreement (PPA) completed in 2011. Construction was completed on the new Alpine Library, the County's first ZNE building. As a ZNE building, the total amount of energy used by the Alpine Library on an annual basis is roughly equal to the amount of renewable energy created on the site. The Imperial Beach Library is currently under construction to be the next ZNE County facility.

Table 2-1 shows the list of renewable energy systems at County facilities installed since 2009.

Table 2-1 List of Renewable Energy Systems at County Facilities Installed Since 2009				
Facility	City/Community	Completed	Nominal Output (kW)	Annual Output (kWh)
Spring Valley Community Center	Spring Valley	2009	10	15,000
Lakeside Community Center	Lakeside	2010	45	67,500
Fallbrook Community Center	Fallbrook	2010	25	37,500
Ramona Library	Ramona	2011	50	75,000
Sheriff Crime Lab	San Diego	2011	45	67,500
Wilderness Gardens Preserve	Pala	2012	5	6,750
Sweetwater Regional Park	Bonita	2012	185	277,500
Guajome Regional Park	Oceanside	2013	100	150,000
Lincoln Acres	Lincoln Acres	2013	30	45,000
COC Conference Center	San Diego	2013	18	26,400
Alpine ZNE Library ¹	Alpine	2016	N/A	N/A
Imperial Beach ZNE Library ²	Imperial Beach	2016	N/A	N/A
Older Systems (pre-2009)			285	427,500
Sub-Total			661	916,500
Photovoltaic System Power Purchase Agreement				
East Mesa Detention Facility-Juvenile Detention	San Diego	2011	1,000	1,500,00
TOTAL SYSTEMS SERVING COUNTY FACILITIES			1,661	2,416,500
Hosting SDG&E PV System				
COC Parking Structure A	San Diego	2011	425	637,500
Owned Solar Thermal Systems				
COC Conference Center	San Diego	2012		1,050 ³
Notes: kW = kilowatt, kWh = kilowatt-hour, PV = photovoltaic, ZNE = zero net energy, N/A = Not Available				
¹ In 2016 construction was completed on the new Alpine Library, the County's first zero net energy building. As a zero net energy building, the total amount of energy used by the Alpine Library on an annual basis is roughly equal to the amount of renewable energy created on the site.				
² The Imperial Beach Library is currently under construction to be the next zero net energy County facility.				
³ Amount reported is in therms.				
Source: San Diego County (2009)				

2.2.2 Non-County Owned Facilities

From fiscal years 2014 to 2016, there was an average of 6,555 PV permits issued each year in the unincorporated area of the County, with a 90 percent increase from 2014 to 2016. In 2015 the County Board of Supervisors approved ordinances amending County Building Code to promote photovoltaic, wind energy and electric vehicle charging systems and to streamline processing of small, residential, rooftop solar energy permits. The County has permitted more than 189 Mega Watts of renewable energy in the unincorporated area, saving approximately 133 Metric Tons of greenhouse gas emissions from entering the atmosphere

3 ALTERNATIVE ENERGY MODELS

There are a number of alternative energy models that provide consumers options beyond the traditional investor-owned utility model. This chapter summarizes these institutional arrangements, along with potential financial mechanisms that could help the County diversify its energy mix. For more specific information regarding alternative energy models, see Section 4 of the Empower Report. BMP #4 (Establish an Institutional and Financing Capability), described below in Chapter 4.3, assesses the costs and benefits of each model and financing mechanism.

3.1 COMMUNITY CHOICE ALTERNATIVES

Alternative energy models, or institutional arrangements, are organizational and administrative entities that help foster investment in renewable energy and overall energy efficiency.

3.1.1 Community Choice Aggregation

CCA allows city and county governments to aggregate or pool electricity customers to purchase and develop power, while also allowing them to administer energy programs on behalf of their residents and businesses. A CCA works in partnership with a region's existing utility, which continues to deliver power, maintain the grid, and provide consolidated billing and other customer services. Considered to be a hybrid-approach to the provision of energy services, a CCA is part IOU and part municipal public utility. This alternative energy model allows a local community to shape the CCA program to prioritize desired benefits, including but not limited to, increased investment in renewable energy sources and energy efficiency, economic development, carbon reduction strategies, and workforce development efforts. It is important to note that only the electricity portion of energy services can be provided by a CCA entity. To date, CCAs have been established by law in six states (California, Illinois, Massachusetts, New Jersey, Ohio, and Rhode Island).

REGULATORY BACKGROUND

In 2002, the California Legislature passed AB 117, which enacted legislation permitting the creation of CCA programs. Under the legislation, a city, county, or Joint Powers Authority (JPA), comprised of two or more cities and counties, may implement a CCA program. Governor Jerry Brown signed California SB 790 in October 2011, which also allowed a CCA to be formed by the Kings River Conservation District, the Sonoma County Water Agency, and any California public agency possessing authority to generate and deliver electricity at retail within its designated jurisdiction. In January 2012, the authority to form a CCA was furthered expanded by SB 4, which allows special districts to also become community choice aggregators. For additional detail on how a CCA functions, see Section 4.2.1 of the Empower Report.

ADVANTAGES OF COMMUNITY CHOICE AGGREGATION

CCA programs offer a number of local, economic, environmental, and social benefits. Advantages include, but are not limited to the following:

- ▲ **Revenue-Based Financing.** CCAs are not reliant on tax dollars or public funds and are financed from revenues received from customers.
- ▲ **Community-Based Investment.** CCAs redirect revenue streams previously under IOU control and place them under local control, allowing for reinvestment back into the community and for targeted renewable energy and energy efficiency investments and programs.

- ▲ **Economic Benefits.** An entity could enjoy significant economic benefits due to the reduction in electricity consumption and a resource mix that drives down costs on electricity services. These savings could also lead to job creation in renewable energy for the region.
- ▲ **Increased Choices.** CCAs increases customer choice, by allowing the option to receive electricity from a CCA or an IOU.
- ▲ **Centralized Energy Services.** Through public-private partnerships, a CCA can leverage private capital and coordinate efforts of third-party programs for more centralized community energy services.
- ▲ **Reduced GHGs.** CCAs can substantially reduce GHGs associated with electricity consumption.
- ▲ **Rate Stability.** By increasing the amount of power obtained from long-term contracts or self-owned generation facilities, a CCA program may be able to lock-in electricity prices and provide improved stability to its customers.

DISADVANTAGES OF COMMUNITY CHOICE AGGREGATION

Despite the number of advantages that a CCA program provides, there are also risks associated with CCA program development. Risks can be divided into the following three categories:

- ▲ **Planning and Implementation Risks.** Establishing a CCA requires a number of political, engineering, legal, and financial steps. A detailed implementation plan, which often requires technical consultants, also needs to be submitted and certified by the CPUC. Start-up costs could range between \$1 to \$3 million. Funds expended from these start-up costs are not always recoverable.
- ▲ **Operational Risks.** If CCA energy costs exceed that of IOU rates, customers may choose to opt out of the program. If this occurs, there is a risk that the CCA will have contracted more electricity than it can sell to residents, and will have to sell excess electricity to a third party at a loss. Furthermore, customer rates are subject to the prevailing market price of electricity, but if the CCA has locked in electricity prices, customers could end up paying higher rates than what the market dictates. Changes in rules and tariffs administered by the CPUC could also adversely affect rates.
- ▲ **Regulatory Oversight Risks.** In contrast to the high-degree of regulatory oversight that IOUs face, the CPUC has limited oversight of CCA programs. Rather than have rate increases determined at a CPUC proceeding, CCAs rely on a Board of Directors to make such decisions. Therefore, it is critical that the CCA Board be made up of knowledgeable professionals that will conduct CCA-related matters in an open and transparent way.

STATEWIDE USE

Since its passing in 2002, a number of CCA programs have been proposed in the State, including programs in San Francisco (CleanPowerSF), the East Bay (Oakland, Berkeley, and Emeryville), and the San Joaquin Valley (San Joaquin Valley Power Authority). The first CCA program to operate in California, Marin Clean Energy (MCE), was formed in Marin County and began serving customers in May 2010. Sonoma County launched Sonoma Clean Power in 2014 and the City of Lancaster, through Lancaster Choice Energy (LCE), began offering service to select customers in May 2015, with broad public enrollment in late 2015.

REGIONAL USE

Locally, the cities of San Diego, Encinitas, Del Mar, Solana Beach, and Carlsbad are considering the formation of a CCA to provide an alternative energy source than what is provided by SDG&E. For Del Mar, the option to join a CCA is an option outlined in its CAP, which was adopted by City Council in June 2016 (Del Mar 2016). Also, the City of San Diego CAP has a goal to achieve 100 percent renewable electricity by 2035

city-wide, with a commitment to complete a city-wide CCA Feasibility Study (City of San Diego 2014). The City is currently in the beginning stages of drafting a feasibility study. Solana Beach in April 2016 completed a technical report analyzing the feasibility of a CCA. The report concluded that a CCA could be feasible, but that additional research is needed if the City decides to pursue a CCA (Solana Beach 2016). Most recently, the CPUC approved SDG&E's proposal to form an independent district to lobby or market against CCAs. Under State law, utilities are prohibited from lobbying against CCAs unless it forms an independent district that is funded by shareholders, not ratepayers. SDG&E is the first utility in the State to apply for approval from the CPUC (KPBS 2016).

Summaries of the most prominent CCAs currently operating in California are provided below. For a more extensive review of CCA examples, see Section 4.2.7 of the Empower Report.

Marin Clean Energy

MCE offers its customers three different product offerings: Light Green, Deep Green, and Local Sol. Customers in the MCE service territory are automatically enrolled in Light Green, which provides customers with 50 percent renewable energy from sources such as solar, wind, bioenergy, geothermal, and small hydroelectric power facilities. In addition to the three product offerings, MCE also serves as a platform for several local energy programs that encourage the development of distributed energy resources, which are described below:

- ▲ **Net Energy Metering.** Net energy metering (NEM) is a billing arrangement that provides credit to customers with solar PV systems for the full retail value of the electricity their system generates. Under NEM, the customer's electric meter keeps track of how much electricity is consumed by the customer and how much excess electricity is generated and sent back to the utility grid. MCE pays its customers a \$0.01/kWh premium over the retail rate paid by the local IOU, PG&E.
- ▲ **Feed-in-Tariff.** The Feed-in-Tariff (FIT) program is a wholesale renewable energy purchase program designed to provide competitive, predictable energy prices for local small-scale renewable energy developers over a 20-yr contract term. This standard agreement provides a high level of certainty with respect to the revenue stream generated by the project and eliminates the need for contract negotiations, keeping transaction costs low. MCE's first FIT-supported project was at the San Rafael Airport in October 2012. This project created three new locally-based full-time employees, used materials manufactured in the area, and was financed locally.
- ▲ **Energy Efficiency Programs.** MCE manages energy efficiency programs for residential and commercial customers, integrating diverse program offerings under one umbrella. These programs are designed to maximize investments in a property, reducing energy use, water use, and GHGs. They also provide participants with a single point of contact from initial contact to project completion. Rebates and financing options are also available.
- ▲ **Workforce Development Program.** MCE's workforce development program provides workers, including those in disadvantaged communities, with a broad spectrum of transferrable skills to work in a variety of "green" jobs. MCE also works with local experts to align, leverage, and influence existing training programs and markets in the MCE service territory.

Sonoma Clean Power

Sonoma Clean Power (SCP) participants include the cities of Windsor, Cotati, Sebastopol, Santa Rosa, Sonoma, Cloverdale, Rohnert Park, Petaluma, and the unincorporated area of Sonoma County. As of December 2014, service is provided for 20,000 commercial customers and 200,000 residential customers, with an 89 percent retention rate.

SCP provides two product offerings to its customers: CleanStart and EverGreen. CleanStart is SCP's default service and provides 33 percent renewable power from sources such as geothermal, solar, and wind. EverGreen is 100 percent local renewable energy initially comprised of geothermal power sourced from

facilities in northeastern Sonoma County. By 2018, 23 percent of SCP's resource portfolio will come from geothermal power. To help stimulate local energy projects and use, SCP offers NetGreen, which is a NEM program that is structured similarly to MCE'S NEM program. ProFIT is SCP's feed-in tariff renewable energy purchasing program which sets the rules and price for SCP to purchase electricity from small-scale wholesale renewable electricity projects within SCP's service territory. Similar to MCE's feed-in tariff program, standard 10- or 20-year contracts are offered to keep costs low.

Lancaster Choice Energy

LCE is the latest CCA program in California starting May 7, 2015. Phase one of the program roll-out encompassed more than 850 accounts including all municipal accounts as well as residents and businesses that have elected to enroll early in the program. Phase two began in November 2015 with small commercial accounts joining the program, with the remaining customers enrolling in Early Spring 2016. Lancaster's City Council will oversee the program and be responsible for various elements of the program, including rate setting. Customers still receive their bills from SCE. Under LCE's default program, Clear Choice offers customers 35 percent renewable energy and an on average 3 percent savings on their monthly bill. LCE's Smart Choice rate plan offers customers the option of choosing a 100 percent renewable energy option. Currently, renewable energy generated is from wind sources, but LCE has plans to add solar and hydroelectric into their renewable energy mix (City of Lancaster 2016).

3.1.2 Direct Access

Through DA, eligible retail customers have the choice to purchase electric power directly from an independent electric service provider (ESP) rather than through an IOU exclusively. While similar to a CCA program, DA is different in that it is: (1) not available to residential customers; and (2) by law (i.e., SB 695) is capped to a set number of gigawatt-hour (GWh) ESPs from which an individual commercial or industrial customer can purchase its power. This limits the County's ability to ensure that a DA program could deliver increased levels of renewable energy and energy efficiency, as well as reduced levels of GHGs. The County currently participates in a DA program, in which it contracts with a third party to provide electricity on the open market. The County's contractor provides the cheapest electricity, which may not always include renewable energy. To date, DA has saved the County approximately \$3 million, freeing up Department of General Service (DGS) funds for use in other energy-related projects.

REGULATORY BACKGROUND

DA was first instituted as an option for retail electric service in 1998, as part of an electric industry restructuring program to bring retail competition to the California electricity market. However, in 2001 DA transactions were suspended due to the electricity crisis. Subsequently, in 2009, SB 695 was signed into law, reauthorizing the DA program. This allowed only individual retail non-residential end-use customers to acquire electric service from other providers in each electrical corporation's (i.e., all providers) distribution service territory, up to a maximum allowable total kWh annual limit. This limit, or cap, is currently managed through a wait list process by the CPUC that is reset each calendar year. The CPUC also currently sets rates for DA (SDG&E 2016).

ADVANTAGES OF DIRECT ACCESS

There are a number of advantages to a DA program, which include, but are not limited to the following:

- ▲
Customer Savings. Through a DA program, participating customers have an opportunity to save money by procuring electricity from an ESP instead of through a bundled IOU. Between 2009 and 2012, the County saved \$3.7 million, or approximately 9 percent, average savings for County facilities over bundled service from SDG&E using DA electricity procurement.

- ▲ **Increased Choice.** DA programs offer participating customers more choices for their energy sources.
- ▲ **Reduced GHGs.** DA programs can reduce GHGs associated with electricity consumption by providing renewable energy options.

DISADVANTAGES OF DIRECT ACCESS

While DA programs offer more choice and savings to customers, there are a number of downsides that are described below:

- ▲ **Limited Customers.** Currently DA is only available to nonresidential customers and due to current caps, the number of customers that can participate is limited.
- ▲ **Small Portion of Electricity Consumption.** Given current restrictions, DA accounts for a relatively small portion of electricity consumption. The capped load allowance only permits ESPs to serve approximately 13 percent of the total IOU load in California.
- ▲ **Less Certain Focus on Renewables.** Current restrictions provide little incentive to drive investment in renewable energy and energy efficiency.

3.1.3 Sustainable Energy Utility

An SEU is an independent and financially self-sufficient entity responsible for delivering energy efficiency, energy conservation, and customer-sited renewable energy to end users. SEUs target all sectors and fuels, including electricity, transportation, and heating. Through an SEU, energy users throughout a city or state can build a relationship with a single organization whose direct interest is to help residents and businesses use less energy and generate their own clean energy. As a nonprofit umbrella entity at a city, county, or state level, an SEU relies on a third-party management model, competitive contracting, and performance incentives to deliver sustainable energy services across all sectors and customer classes. As such, an SEU is publicly accountable and can be financially self-sufficient. It also has access to a range of potential funding sources and revenue streams, and can achieve energy savings without raising taxes or utility rates.

A typical SEU would capitalize a fund with relatively low-interest state or municipal bonds and use that capital to contract with private Energy Service Companies (ESCOs) to conduct energy audits and perform building energy efficiency and renewable energy upgrades. Once the project is completed, the energy customer would share the savings resulting from lower energy costs with the SEU to repay the bond and to fund the SEU's activities. Because it can aggregate a large amount of demand for ESCo services, the SEU can help lower costs further by standardizing offerings, negotiating bulk discounts, and otherwise streamlining the process of identifying and executing cost-effective energy efficiency and renewable energy upgrades.

REGULATORY BACKGROUND

The State of Delaware first adopted the SEU model along with bond financing structure in 2007 as an independent, non-profit organization to foster a sustainable energy future. Development of the SEU model began in 2006. In 2011, Delaware's SEU issued the Energy Efficiency Bond Series. This financing created over \$145 million in guaranteed dollar savings to enable a host of state buildings and higher education facilities.

ADVANTAGES OF SUSTAINABLE ENERGY UTILITY

There are a number of advantages to an SEU program, which include, but are not limited to the following:

- ▲ **Central Coordination.** An SEU provides a single point-of-contact for efficiency and self-generation in the same way that conventional utilities are the point of contact for energy supply.
- ▲ **Comprehensive Programs.** Programs target efficiency, conservation, and renewable energy across all fuels (e.g., electricity, heating, transportation) and customer classes (e.g., low-income, government, industrial, commercial, residential), regardless of utility service territory.
- ▲ **Flexible Incentives.** Sustainable energy services are not constrained by strict programmatic criteria that might exclude, or inadequately serve, certain customer groups.
- ▲ **Financial Self-Sufficiency.** A financing plan ensures long-term self-sufficiency by generating revenue through the supply of customer-sited sustainable energy services.
- ▲ **Competitive Procurement.** A governance system is based on competitive contracting of independent management services.
- ▲ **Job Creation.** An SEU can facilitate increased investments in energy efficiency and customer-sited renewable systems, which in turn, can help facilitate a more robust regional economy. The Delaware SEU created nearly 980 jobs in construction, project engineering, and building management.
- ▲ **Economic Growth.** The SEU model can continuously organize investments, creating significant potential for the model to meaningfully impact the regional energy economy. At the same time, an SEU keeps value in the local economy due to the employment of local contractors and its emphasis on local production of the equipment used to meet energy needs.

DISADVANTAGES OF SUSTAINABLE ENERGY UTILITY

While there are a number of advantages to starting an SEU program, there are also some disadvantages to consider:

- ▲ **Legislative Action Needed.** Forming an SEU requires legislative action in order to implement, which can require a large amount of time, money, and resources to build political consensus and support.
- ▲ **Few SEU Examples.** Since few SEUs have been established since the Delaware SEU was created in 2007, there are not a lot of examples of SEUs to consider for BMPs.
- ▲ **High Costs.** Start-up and implementation costs to create an SEU program could be high and may not be recovered (Katz 2011).

STATEWIDE USE

Sonoma County Efficiency Financing Program

The Sonoma County Water Agency partnered with the Foundation for Renewable Energy & Environment to develop the Sonoma County Efficiency Financing (SCEF) Program. The SCEF is a scaled-down model that does not require legislative action and under this program participating organizations contract with a private ESCo to complete energy and water conservation measures. Improvements can include street lighting, building lighting, system controls, water pumps, heating, ventilation and air condition (HVAC) systems; boilers, chillers, and others. The participating organizations receive substantial utility cost-savings, including a contractual guarantee sufficient to cover the full cost of all retrofit work. The program uses tax-exempt bonds to finance projects. For more details on financing a SCEF, see Section 4.4.3.5 of the Empower Report.

3.2 FINANCING MECHANISMS

This section describes the financing mechanisms that are most often used to direct capital for investment and subsequent deployment of energy efficiency and renewable energy systems. An alternative energy model could be financed through one or more of the mechanisms described below.

3.2.1 Property Assessed Clean Energy Financing

Property Assessed Clean Energy (PACE financing is a loan alternative designed to encourage the installation of distributed renewable energy systems and energy efficiency measures by helping property owners overcome the barrier of high up-front energy equipment and installation costs. Under PACE programs, jurisdictions form special tax districts that allow property owners to finance efficiency (i.e., energy and water) and renewable energy projects on existing and, in some cases, new residential and commercial structures through a voluntary special tax assessment. These energy efficiency or renewable energy assessments are tied directly to the house or commercial property and repaid via the property owner's tax bill. Because the assessment and lien are tied directly to the property, they can be transferred upon sale. PACE assessments are not legally considered loans. Property owners who invest in energy efficiency measures and small renewable energy systems typically repay these assessments over 15 to 20 years via additional payments on their property tax bills. During the repayment period, the property owner realizes reduced electric utility bills as a result of the energy investment. Not unlike a mortgage, homeowners receive a tax deduction for the interest on a PACE assessment, but not for the principal.

PACE financing can help state and local governments address two major roadblocks to clean energy development at both the commercial and residential level: (1) lack of capital and (2) reluctance to make long term energy efficiency and/or renewable energy investments. PACE assessments are transferable, which provides property owners the opportunity to recoup their investment upon sale.

A critical design element of the PACE financing model is the use of special tax districts known as clean energy assessment districts. These districts are regularly used in the financing of traditional local government projects (e.g., sewers and streetlights), and they provide two benefits for jurisdictions. First, the special district shields the jurisdiction from risk, ideally helping to protect its overall debt rating. Second, the special district allows the additional assessment to be placed only on properties whose owners opt to participate in the program.

REGULATORY BACKGROUND

PACE financing programs can be established and administered under two different statutory frameworks: The Improvement Act of 1911 (as amended by AB 811) or the Mello-Roos Act (under a city's charter authority or as amended under SB 555). Both acts authorize creation of special tax districts, voluntary contractual agreements for financing between an authorized entity and the property owner, use of available funding from any source including existing bond issuing statutes and attachment of the assessment for payment of the assessment to the property (as opposed to the individual owner). For more information on the differences between the Mello-Roos Act and the Improvement Act see Section 4.5.3.1 of the Empower Report.

Residential PACE financing has faced opposition as early as 2009 from the Federal Housing Finance Agency (FHFA), which regulates Fannie Mae and Freddie Mac. In 2010, the FHFA issued a determination that PACE programs presented significant safety and soundness concerns to existing mortgages and therefore to the entities that underwrite or insure those mortgages. In 2011, FHFA affirmed that Fannie Mae and Freddie Mac would no longer purchase mortgages secured by a property with an outstanding PACE assessment that originated after July 6, 2010. This effectively stopped residential PACE financing programs in California and

only recently have programs begun offering residential financing again. For more information regarding the obstacles facing residential PACE financing, see Section 4.5.3.2 of the Empower Report.

PACE IN SAN DIEGO COUNTY

There are several different PACE programs currently available to the County residents and businesses, which are determined by the County's Finance and General Government Group. In 2013, The County Board of Supervisors approved the expansion of the County's commercial PACE Program. CaliforniaFIRST, California Home Energy Renovation Opportunity (HERO), and Figtree's OnDemand program all offer PACE financing for commercial properties in the County. In July 2014, HERO financing was extended to residential properties in the San Diego area. As of July 2014, the HERO program has funded 206 residential projects, worth \$4.9 million, in cities within the County. The program continues to show signs of accelerating and has received over 1,200 loan applications from the area since inception.

Clean Energy San Diego is a coalition of business leaders, environmentalists, and San Diego citizens working with Ygrene Energy Fund to create a PACE district in San Diego. Ygrene is already operating in Chula Vista, with 50 projects worth \$4.5 million completed or under construction in 2014. In January 2015, Ygrene announced that local governments can join its program in as little as 30 days, under a new arrangement with a local housing finance authority in Sacramento named Golden State. Ygrene is the only PACE lender in California offering 30-year solar loans to homeowners at this time. The loan carries an interest rate of 8.49 percent. Ygrene's interest rate on a five-year loan is 5.99 percent while that on a 20-year loan is 8.25 percent.

3.2.2 Bonds

QUALIFIED ENERGY CONSERVATION BONDS

A Qualified Energy Conservation Bond (QECB) is a bond that enables qualified state, tribal, and local government issuers to borrow money at attractive rates to fund energy conservation projects. QECBs are taxable bonds, which means investors must pay federal taxes on QECB interest they receive. Most QECBs are issued as direct subsidy bonds and are among the lowest-cost public financing tool because the U.S. Department of the Treasury subsidizes the issuer's borrowing costs. The U.S. Congress authorized \$3.2 billion of QECB issuance capacity, which has been allocated to jurisdictions based on population.

CLEAN RENEWABLE ENERGY BONDS

Clean Renewable Energy Bonds (CREBs) are primarily used in the public sector to finance renewable energy projects. The bondholder receives federal tax credits in lieu of a portion of the traditional bond interest, resulting in lower effective interest rate for the borrower. The issuer remains responsible for repaying the principal on the bond. CREBs differ from traditional tax-exempt bonds in that the tax credits issued through CREBs are treated as taxable income for the bondholder. The tax credit may be taken each year the bondholder has a tax liability as long as the credit amount does not exceed the limits established by the federal Energy Policy Act of 2005.

Through allocations by the Energy Improvement and Extension Act of 2008 and the American Recovery and Reinvestment Act of 2009, \$2.4 billion are available for CREBs. With close to \$1.4 billion in volume cap for new CREBs remaining, in February 2015, the IRS announced a March 5, 2015 opening of the rolling volume-cap application window for governments.

MUNICIPAL BONDS

A municipal bond is issued by a local government or its agencies. There are two basic types of municipal bonds: General Obligation Bonds and Revenue Bonds. General obligation bonds often require voter assent and tend to have lower interest rates than revenue bonds. This is because the principal and interest are secured by the credit of the issuer and usually supported by the issuer's taxing power. With revenue bonds, the principal and interest is secured by revenues derived from tolls, charges, or rents from the facility built with the proceeds of the bond issuance. Revenue bonds typically do not require electorate assent.

3.2.3 Peer-to-Peer Lending/Crowdfunding

Over the past ten years, Crowdfunding and peer-to-peer (P2P) lending organizations have emerged as financing mechanisms that offer easy, efficient, and low-cost sources for capital investments, loan repayment, and project funding. Crowdfunded projects use large groups of people pledging money to their cause to reach a monetary goal, without the promise of repayment. P2P lending is geared towards individuals seeking financing for investments, loans, and new businesses, with the promise that the lenders will get their money paid back to them in a timely manner.

Everybody Solar was created in Santa Cruz in 2011 to help nonprofits use solar energy to lower their operating costs. Everybody Solar is involved from the beginning stages of raising funds to the installation of the solar panels (through a partnership with a nonprofit solar installer). Everybody Solar, which uses a crowdfunding model, solicits donations online. While donations can come from anywhere, much of the fundraising outreach is focused in the communities where projects are proposed. Besides protecting the environment, Everybody Solar provides additional benefits. By lowering nonprofits operating expenses those organizations have more resources to put towards meeting their stated objectives (Mosaic 2012). In 2009, a renewable P2P lending company named Mosaic was launched in Oakland and has since become the third largest renewable specific lender in the world. Since its public launch in 2013, Mosaic has helped finance \$7 million for 20 solar energy projects with a combined capacity of 18 MW. Mosaic gets investments from people or companies who want to finance solar energy projects, and give that money to the borrowers who want to construct a project. The typical payback period to investors is 10 years with a 5 percent return on investment.

4 BEST MANAGEMENT PRACTICES

The Best Management Practices (BMPs) summarized below are meant to provide a range of potential programs and policies that could later be adopted and implemented as part of the CREP. The programs, policies, and financial mechanisms presented have been proven to be innovative and effective tools and strategies for supporting renewable energy and energy efficiency advancement across several jurisdictions the nation. Each BMP is outlined below, with summary tables that consider overall advantages and risks of implementation. Where possible, more detail regarding costs, financing options, and responsible parties are provided. A ranking system, based on overall return on investment, was used to determine which mix of BMPs are anticipated to be most effective for the County. A low, medium, or high return on investment ranking was assigned based on a number of social, economic, and political factors:

- ▲ **High Return on Investment.** Top priority, or a high return on investment ranking, was given to BMPs that the County could most feasibly finance and gain support on at a political or organizational level. BMPs that had a clear path to implementation, or clear action items to determine feasibility, were also given a high ranking. Costs of implementation were also considered in rankings, but BMPs with a high potential to increase renewable energy opportunities in the County were given a higher ranking, even if associated costs were high.
- ▲ **Medium Return on Investment.** A medium return on investment ranking was given to BMPs where some uncertainty existed as to whether the County could feasibly finance and gain support at a political or organizational level. A medium ranking was also given to BMPs that might require additional collaboration or partnerships for proper implementation. BMPs with high start-up costs, and/or with less certain potential to increase renewable energy opportunities, were also given a medium ranking.
- ▲ **Low Return on Investment.** A low return on investment ranking was given to BMPs that had more disadvantages than advantages and/or required a significant amount of additional research to determine feasibility of implementation. BMPs that were costly (or costs were undetermined) and had low potential to increase renewable energy opportunities in the County were also given a low ranking.

See Section 5 of the Empower Report for more in-depth discussion of each BMP.

4.1 BMP #1: AMEND THE GENERAL PLAN AND ADD AN ENERGY ELEMENT

The General Plan expresses the County’s development goals and embodies public policy relative to the distribution of future land uses, both public and private. The County’s General Plan was last updated in 2011. Under State law, every local general plan must include seven elements: land use, circulation, housing, conservation, open space, noise, and safety. The Governor’s Office of Planning and Research (OPR) recommends adding an eighth element in General Plans that cover energy (OPR 2003).

4.1.1 Costs and Benefits

Table 4-1 BMP #1: Amend the General Plan and add an Energy Element							
BMP Type	Responsibility	Cost	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Planning	Planning & Development	Varies	CEC Grant Funding	Pursue Grant Funding with CEC	<ul style="list-style-type: none"> - Consolidation of Policies - Commitment to Renewable Energy 	<ul style="list-style-type: none"> - Staff Time and Resources - Start-Up and Implementation Costs 	Low

Notes: CEC = California Energy Commission
 Source: Empower Devices (2015) and Ascent Environmental (2016)

Table 4-1 summarizes the key components of BMP #1. While adding an Energy Element to the County’s General Plan has a number of advantages (i.e., consolidates major energy production and consumption policies, and reflects a commitment to renewable energy), preparation costs will vary depending on staff availability and the need to hire a consultant to do the work. Other timing considerations also include time and resources associated with developing a proposal, cost to prepare environmental documentation for the General Plan Element, expected time for public review and comment, and other actions associated with amendments to a General Plan. The CEC, through Assembly X1 13, has already awarded \$3.3 million in renewable energy planning grants to five counties in 2013. Considered one of the 15 qualified counties to receive this grant funding, the County is eligible to receive any remaining funds (CEC 2016). The grant money can be applied to preparing an Energy Element, but can also be used to revise policies, ordinances, and to create streamlining programs.

4.1.2 County Actions and Recommendations

Although an Energy Element could provide a clear vision for energy-related decision-making, without further research and funding, an Energy Element could remain vague and lack specificity. If the County wants to pursue adding an Energy Element to the General Plan, it would be advisable to apply for grant funding through the CEC, or other grant funding that is available. However, because the County’s current General Plan does include policies that support renewable energy (see Section 2.1.3), it may be more worthwhile to align renewable energy directives with the upcoming Climate Action Plan and to ensure its consistency with the General Plan rather than prepare a new, potentially redundant Energy Element.

4.2 BMP #2: ESTABLISH A NEW OFFICE OF SUSTAINABILITY

A local Office of Sustainability is a centralized authority responsible for developing and implementing sustainability programs and policies that advance energy, economic, and environmental priorities. The presence of an Office of Sustainability is now a prerequisite for many federal, state, and private funders, as many prefer to see a centralized office to execute their funded initiatives.

4.2.1 Costs and Benefits

Table 4-2 BMP #2: Establish a New Office of Sustainability							
BMP Type	Responsibility	Cost	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Administrative	<ul style="list-style-type: none"> - DGS - Planning & Development - Executive's Office 	<ul style="list-style-type: none"> - \$595,000 (Wages) - \$400,000-\$3.5M (Budget) - 1-6 FTEs 	<ul style="list-style-type: none"> - General Fund - Special Fees - EECBG - Grants 	<ul style="list-style-type: none"> - Office Could Implement CREP - CREP TAC Could Advise New Office 	<ul style="list-style-type: none"> - Commitment to Renewable Energy - Centralized Data Collection, and Consolidation - Attention from Funding Entities 	<ul style="list-style-type: none"> - Staff Time and Resources - Start-Up, Implementation, and Operating Costs - Reorganization of County Departments/Structure 	Low

Notes: DGS = Department of General Services, EECBG = Energy Efficiency and Conservation Block Grant, FTE = Full-Time Equivalents, TAC = Technical Advisory Committee, M = Million

Source: Empower Devices (2015) and Ascent Environmental (2016)

Table 4-2 above summarizes the main features of BMP #2. Establishing an Office of Sustainability has a number of advantages attributed to consolidation and centralization of data, programs, resources, information, outreach, and funds. It would also demonstrate a commitment to a comprehensive approach to sustainability and would potentially increase attention from funding entities. However, samples from other Offices of Sustainability around California demonstrate that not only are there high costs associated with start-up and implementation, but ongoing operation and staffing would be expensive as well. Furthermore, a new centralized office does not fit within the County's current organizational structure and could dismantle or cause confusion on current interdepartmental coordinated sustainability efforts.

4.2.2 County Actions and Recommendations

While there are a number of advantages to creating a new Office of Sustainability, the expenditures required to keep such an office running are extensive and finding the right funding mechanism would be critical. Creating a new office would also put additional pressure on staff and resources that oversee it if it not appropriately staffed and funded. The County has an opportunity to build upon and formalize interdepartmental coordination already occurring on sustainability efforts, without restructuring the County's organizational framework. A sustainability task force or working group can be formalized to promote, track, and report on department-wide sustainability efforts. A task force has the opportunity to achieve the intended advantages of a new Office of Sustainability without the high costs associated with establishing an entirely new office.

4.3 BMP #3: ESTABLISH INSTITUTIONAL CAPACITY

Institutional arrangements can be described as the organizational and/or administrative entities that help foster investment in renewable energy and energy efficiency. It may also include increasing the number of renewable energy sources and/or providers, which provides additional choices for consumers.

4.3.1 Costs and Benefits

The institutional arrangements, or alternative energy models, examined in the CREP are CCA, DA, and SEU. These models are described in additional detail in Section 3 of this document and are summarized below in Table 4-3.

Table 4-3 BMP #3: Establish an Institutional and Financing Capability							
BMP Type	Responsibility	Cost	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Community Choice Aggregation (CCA)							
Organizational/ Institutional	- JPA - County - Special District	- \$400,000 (Feasibility Study) - \$1-3M (Start-Up) - 21 FTEs	- Loans - Revenue	Authorize Development of a CCA Feasibility Study	- Increases Renewable Energy Sources - Reduces GHGs - More Consumer Choice - SDG&E Continues Services	- High Start-Up Costs - Relies on High Customer Participation - Vulnerable to Market Risks	High
Direct Access (DA)							
Organizational/ Institutional	CPUC	Varies	Varies	- Support Enhanced Customer Choice Through and Expanded DA	- Reduces GHGs - More Consumer Choice	- Staff Time and Resources - Implementation Costs - N/A to Residential Customers - Capped Enrollment - Limited Control	Medium
Sustainable Energy Utility (SEU)							
Organizational/ Institutional	- Nonprofit - Water Agency	Varies	- Tax-Exempt Bonds - Other Bond Financing Structures	- Explore the Formation of a Down-Scaled SEU Model	- Creates Jobs - Localized Economic Investment - Increases Investments in Energy Efficiency - Single Point of Contact	- Requires Legislative Approval - Staff Time and Resources - Start-Up and Implementation Costs	Medium
Notes: JPA = Joint Powers Authority, CPUC = California Public Utilities Commission, SDG&E = San Diego Gas & Electric, M = Million, N/A = Not Applicable							
Source: Empower Devices (2015) and Ascent Environmental (2016)							

4.3.2 County Actions and Recommendations

CCA. As outlined in Section 3 of this summary and in Table 4-3 above, there are a number of environmental, economic, and administrative advantages to creating a CCA. Given the significant amount of investment, resources, and staffing needed to establish and operate a CCA, it is important that the County conduct a feasibility study before arriving at a decision. However, to avoid duplicated efforts and to ensure more unified results, the County should consider other CCA feasibility studies being prepared in the region before starting to draft their own. The City of Solana Beach recently completed a feasibility study in April 2016. Also, the City of San Diego is in the beginning stages of drafting a citywide CCA feasibility study. The County should coordinate and work with the City of San Diego on these efforts to determine ways to supplement information on a county-wide level.

This feasibility study should be clear in its objectives for the program, sources of funding, and economic viability. The study should also use SDG&E load data and renewable resource assessments to identify potential projects; assess the potential size of the program in terms of number of customers and electricity sales; develop a financial and cash-flow model; predict the overall return on investment; quantify the jobs created under various procurement scenarios; and outline how start-up costs would be financed. The plan could also determine staffing requirements and examine the risks associated with establishing a CCA and how those risks would be mitigated. Feasibility studies could cost about \$400,000 to complete. If the feasibility study finds that a CCA program would be viable for the County, the benefits could very well outweigh the costs.

DA. Given current restrictions, DA accounts for a small percentage of the electricity consumed in the County (i.e., 3 percent) and the ability for customers to participate is limited. The County could consider lobbying both the CPUC and/or the State legislature to open up the DA beyond its current limits.

SEU. Although a CCA program could provide a similar energy integrator role and financing opportunities, the County may wish to further explore how an SEU model can help it attain its climate goals, particularly if the County does not pursue the formation of a CCA program. Because forming an SEU requires legislative action in order to implement, The County may wish to replicate a scaled-down version of an SEU (e.g., SCEF).

4.4 BMP #4: ESTABLISH FINANCING CAPACITY

A financial mechanism is a tool for directing capital for investment and subsequent deployment of energy efficiency and renewable energy systems.

4.4.1 Costs and Benefits

PACE, Bonds, and P2P Lending/Crowdfunding are mechanisms that could be used to finance renewable energy and energy efficiency projects. These financing mechanisms are examined in detail in Section 3 of this document and are summarized below in Table 4-4.

Table 4-4 BMP #4: Establish an Institutional and Financing Capability							
BMP Type	Responsibility	Cost	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Property Assessed Clean Energy (PACE)							
Financial	- JPA - COGs - Private Companies - County	N/A	- Private - Municipal Bonds - Revenue Bonds - Banks	Continue to Support PACE Programs	- Accessible Renewable Energy and Energy Efficiency Programs for County Residents - Reduces High Up-Front Costs	- Staff Time and Resources - Implementation Costs	Medium
Bonds							
Financial	Lenders	Amounts Vary	- Federal - Revenue	Use Various Bonds to Help Finance Energy Projects	- Tax Exemptions - Lower Interest Rates - Electoral Assent Not Required - High Impact - Repayment Through Savings	Staff Time and Resources	Medium
Peer-to-Peer (P2P) Lending/Crowdfunding							
Financial	Private	N/A	- Private - Individuals	Explore a PPP with a P2P Lending Entity to Establish a RE and EE specific P2P Lending Program	- Low Cost - Distributes Capital Throughout the Region - Residents Have Ownership in Energy Investment	- Start-Up and Implementation Costs - Staff Time and Resources	Low
Notes: JPA = Joint Powers Authority, COG = Council of Government, N/A = Not Available, PPP = Public Private Partnership,							
Source: Empower Devices (2015) and Ascent Environmental (2016)							

4.4.2 County Actions and Recommendations

PACE. Despite the challenges with FHFA over the lien priority of PACE assessments, PACE financing in the residential sector is experiencing a resurgence in California. Commercial PACE financing, not having faced the same hurdles, has continued to prove successful. The County currently has an opportunity to help educate residents about the availability of these programs and encourage participation as a means to help reduce the region’s electricity demand. Increased competition among the various PACE programs should result in better product offerings for County residents. As such, the County should explore how it might support efforts to create a PACE district in the County. With additional research to determine feasibility, a PACE district could be administered by Ygrene Energy Fund, another qualified entity, or by the County.

Bonds. The County should investigate harnessing revenue bonds to help finance energy projects. In the context of renewable energy systems, revenue streams from the sale of electricity would be tied to the repayment of the bonds. In the context of energy efficiency, the bonds would be repaid via energy savings achieved through the project.

P2P and Crowdfunding. Given that P2P and Crowdfunding are relatively new, and most examples are focused on solar energy, successful models for all types of renewable energy are still uncertain. Continued research is needed to identify additional applications of Crowdfunding and P2P renewable energy projects to help determine County feasibility and its role in the process. In regards to P2P, the County could explore a public-private partnership with Mosaic, or a similar P2P lending entity, to establish a renewable and energy efficiency specific P2P lending program. Such a program could harness distributed capital throughout the region while also allowing residents to have a sense of ownership in the region's energy investments. The County could also explore a partnership with Everybody Solar, to help crowdfund solar projects in the County.

4.5 BMP #5: DEVELOP A SOLAR ENERGY WORKFORCE DEVELOPMENT INITIATIVE

The County could use Workforce Innovation and Opportunity Act (WIOA) funds to develop an initiative to create more renewable energy jobs. As part of a larger Solar Energy Workforce Development Initiative, the County could work with local partners on a major sector-driven approach to workforce development that focuses on the needs of regional employers within the renewable energy industry.

4.5.1 Costs and Benefits

Table 4-5 BMP #5: Establish a Solar Energy Workforce Development Initiative								
BMP Type	Responsibility	Duration	Cost	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Programmatic	<ul style="list-style-type: none"> - DGS - Office of Education - Partner Organizations 	<ul style="list-style-type: none"> - 1-3 Years (Implementation) - 3-6 Months (Start-Up) 	\$500,000 to \$8.5M (Budgets)	WIA, via the WIOA	Determine Workforce Needs in Phase II of the CREP	<ul style="list-style-type: none"> - Creates Jobs - Reduces Industry Costs - County Could Partner with Organizations 	<ul style="list-style-type: none"> - Staff Time and Resources - Start-Up Costs - High Cost of Training Programs - Time to Build Support 	Medium

Notes: DGS = Department of General Services, WIA = Federal Workforce Investment Act, WIOA = Workforce Innovation and Opportunity Act, M = Million

Source: Empower Devices (2015) and Ascent Environmental (2016)

As outlined above in Table 4-5, near-term costs associated with starting a Solar Workforce Initiative are high, with significant staff time required to generate support from existing and new foundational partners for the initiative. Building support at the local, regional, state, and federal levels for redirecting money for such an initiative can also take time and requires careful organizing.

4.5.2 County Actions and Recommendations

Ultimately, more research is needed to determine whether a separate Solar Energy Workforce Development Initiative is needed in the County. The County in Phase II of the CREP could identify more specific renewable energy workforce needs and opportunities, while also determining how WIOA funds could help fund these efforts. There are also a number of other organizations providing workforce development in the County. SDG&E works with the County and nonprofits on a number of market and skill building programs and the County’s Office of Education works with trade schools, community college network and four-year colleges on workforce development efforts. Rather than developing an entirely new initiative, it may be more beneficial to build upon existing programs and partner with other agencies and organizations who are already offering similar services. The County should investigate how WIOA funds could help support existing programs and how they could be expanded to support clean-sector jobs.

4.6 BMP #6: BUILD AN ENERGY ASSURANCE PLAN

An Energy Assurance Plan (EAP) is an emergency management plan that ensures that key assets within the community will remain operational in the event of a power outage. An EAP would explore how energy is used across the County and would identify key assets and mitigate negative impacts to energy disruption on these assets. It could also help the County discover ways to reduce its energy demand and make its energy supply more resilient.

4.6.1 Costs and Benefits

Table 4-6 BMP #6: Build an Energy Assurance Plan (EAP)								
BMP Type	Responsibility	Duration	Cost	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Planning	<ul style="list-style-type: none"> - Planning & Development - DGS 	6 months (Draft EAP)	<ul style="list-style-type: none"> - \$250,000 (Budget) - 1 FTE 	Potential Grant Opportunities	<ul style="list-style-type: none"> - Prioritize Development of an EAP - Identify Projects That Could Increase Energy Resilience 	<ul style="list-style-type: none"> - Furthers Direction on HMPs, CAPs, EEPs, or COOPs - Addresses Energy Disruption - Increases Energy Supply Resiliency - Reduces Energy Demand - Supports Public Health - Identifies Key Assets 	<ul style="list-style-type: none"> - Staff Time and Resources - Start-Up and Implementation Costs - High Overall Costs 	Low

Notes: DGS = Department of General Services, FTE = Full-Time Equivalents HMP = Hazard Mitigation Plan. CAP = Climate Action Plan, EEP = Energy Emergency Plan, COOP = Continuity of Operations Plan

Source: Empower Devices (2015) and Ascent Environmental (2016)

Developing an EAP would identify ways to address energy disruption in the event of a crisis and increases energy supply resiliency. An EAP would also further direction on a number of planning documents, including CAPs. Similar to other planning documents, an EAP could cost around \$250,000 to produce and require an average of 6 months (with consultant help) to draft.

4.6.2 County Actions and Recommendations

While energy security is a major issue, other planning documents (e.g., Hazard Mitigation Plan and CAPs) may be better positioned to begin to outline key assets and ways to increase energy supply resiliency rather than an EAP. SDG&E is also already pursuing methods to address energy disruption, so collaboration on information and tactics is important. Because financing options are not clearly laid out to fund an EAP, the same issues could be addressed in future planning or updates to pertinent documents.

4.7 BMP #7: INCREASE THE COUNTY’S PERCENTAGE OF ENERGY DERIVED FROM VARIOUS RENEWABLE ENERGY TECHNOLOGIES

As described in Section 2.2 the County is currently capturing 2.3 percent of its annual electricity needs through a number of small PV systems as well as through a PPA completed in 2011. The County could increase its percentage of energy derived from various renewable energy technologies through policies and administrative actions.

4.7.1 Costs and Benefits

Table 4-7 BMP #7: Increase the County’s Percentage of Energy Derived from Various Renewable Energy Technologies							
BMP Type	Responsibility	Cost	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Administrative	<ul style="list-style-type: none"> - Planning & Development - DGS 	<ul style="list-style-type: none"> - \$4,000 - \$30,000 (Residential Wind Turbines) - \$24,000 - 34,000 (PV Systems) - \$4,000- \$8,000 (Solar Water Heaters) 	<ul style="list-style-type: none"> - Incentives - Federal Income Tax Credits (Residents) 	<ul style="list-style-type: none"> - Analyze Long-Term Costs and Benefits of Increasing the Percentage of Renewable Energy Used - Review Permitting Process for Solar Water Heaters 	<ul style="list-style-type: none"> - Reduces GHGs - Controls Utility Costs - Achieves Emissions Targets - Could Align with CAP Targets 	<ul style="list-style-type: none"> - Staff Time and Resources - Start-Up and Implementation Costs 	High

Notes: DGS = Department of General Services, PV = Photovoltaic, GHG = Greenhouse Gas, CAP = Climate Action Plan
 Source: Empower Devices (2015) and Ascent Environmental (2016)

Table 4-7 summarizes the main components of BMP #7. Costs associated with installing specific renewable energy technologies vary, but can be made more affordable to residents and building owners through incentives and tax credits. However, it would be important to streamline permitting processes for renewable technologies and a significant amount of staff time and resources would be needed.

4.7.2 County Actions and Recommendations

Increasing the renewable energy mix in the County would provide environmental co-benefits and would also help towards achieving legislative targets. Because the County is currently using a very small amount of renewable energy, there is an opportunity to increase this percentage mix by implementing small changes. The exact percentage reduction should be aligned with RPS requirements and should also help achieve GHG reduction targets identified in the CAP.

4.8 BMP #8: ESTABLISH A RENEWABLE ENERGY GROUP PROCUREMENT INITIATIVE

4.8.1 Costs and Benefits

A Renewable Energy Group Procurement Initiative (GPI) is a regional, multi-agency collaborative purchase of renewable energy equipment (e.g., rooftop solar PV panels) for public agency facilities (e.g., city halls, fire stations, libraries, and community centers).

Table 4-8 BMP #8: Establish a Renewable Energy Group Procurement Initiative (GPI)							
BMP Type	Responsibility	Cost	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Administrative	<ul style="list-style-type: none"> - DGS - Third Party (Owner of Property) 	<ul style="list-style-type: none"> - Varies - ½ FTE for 3 Months, then 10 Hours per Month for 1-3 Years - Technical, Financial, and Legal Costs. 	PPA	<ul style="list-style-type: none"> - Research lessons learned from SV-REP - Research GPI Implementation Along with CCA - REN & Microgrid Projects - Encourage SANDAG to pursue a GPI - Consider Tribal Members in a County-Led GPI 	<ul style="list-style-type: none"> - Economies of Scale - Reduces Redundancies - Increases Purchasing Power - Economic Activity - Creates Jobs 	<ul style="list-style-type: none"> - Staff Time and Resources - Start-Up and Implementation Costs - Staffing Budget 	Low

Notes: DGS = Department of General Services, FTE = Full-Time Equivalents, PPA = Power Purchase Agreement, CCA = Community Choice Aggregation, SV-REP = Silicon Valley Renewable Energy Project, REN = Regional Energy Network, SANDAG = San Diego Association of Governments

Source: Empower Devices (2015) and Ascent Environmental (2016)

Table 4-8 summarizes the main attributes of BMP #8. A major benefit of a GPI is the ability to obtain significant discounts when purchasing products and services in bulk. Group purchasing can also lower transaction costs, staff time, organizational burden, and risk for each participant. The major disadvantage of a GPI is that the amount of collaboration needed amongst stakeholders, staff, and participants in order to implement a successful program is significant.

4.8.2 County Actions and Recommendations

A significant amount of research is still needed to determine whether a GPI would be feasible for the County, including how GPI implementation would work alongside a CCA or Microgrid (see BMP #15). While there is potential for cost savings, this may not be the best use of current staff time and resources due to high level of coordination needed to implement a GPI. There are also a number of technical, financial, and legal costs to consider. For more information on costs see Section 5.9.1.4 of the Empower Report.

4.9 BMP #9: PARTICIPATE IN THE CREATION OF A NEW REGIONAL ENERGY NETWORK

First introduced in California in 2012, RENs were designed to give local governments more flexibility and independence in managing rate-payer funded energy efficiency programs. A REN is a formal collaboration between local governments in which they act as energy efficiency program administrators. A REN can design and implement energy efficiency programs and can submit proposals directly to the CPUC. REN programs are designed to supplement, not supplant existing IOU efforts in energy efficiency programs.

4.9.1 Costs and Benefits

Table 4-9 BMP #9: Participate in the Creation of a New Regional Energy Network (REN)								
BMP Type	Responsibility	Cost	Duration	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Programmatic	- DGS - Partners	\$18.6 M - \$22.4 M (Yearly Budget)	2 Years (Start Up)	SDG&E Funding via rate-payers as required by CPUC	- Approach CPUC as a Third Pilot REN with SANDAG - Participate in REN Development Opportunities in the Region	- Funding Resource Outside IOU - Formalizes County Commitment to Renewable Energy - Reduces Redundancies	- Staff Time and Resources - Long Start-Up	Low

Notes: DGS = Department of General Services, M = Million, SDG&E = San Diego Gas & Electric, REN = Regional Energy Network, SANDAG = San Diego Association of Governments, IOU = Investor-Owned Utility

Source: Empower Devices (2015) and Ascent Environmental (2016)

Table 4-9 summarizes the key components of BMP #9. Through a REN, there is the potential to raise energy funds outside of traditional IOU channels with greater ease. It also formalizes the County’s commitment to renewable energy, and creates less duplication among jurisdictions. However, full development of a REN could take years and costs associated with implementation are high, with budgets ranging from \$18 to 22 million for other RENs. Existing RENs in California (i.e., SoCalREN and BayREN) currently only target energy efficiency and do not address opportunities to advance renewable energy.

4.9.2 County Actions and Recommendations

The County should continue to monitor CPUC regulations for any changes related to the formation of a REN and the role of Local Government Partnerships. Because other RENs do not specifically address opportunities to advance renewable energy, additional efforts would be needed to identify if a REN could advance renewable energy in the County. Staff time and resources needed to coordinate the start-up of a REN should be considered. The County could continue to collaborate with regional partners, such as SANDAG and other cities, to identify future opportunities to create a REN.

4.10 BMP #10: CREATE A RENEWABLE ENERGY OVERLAY / COMBINING ZONE

Overlay zoning is a regulatory tool used to streamline the planning process so that renewable energy project construction can occur more expediently. Implemented by amending the County’s existing zoning code, an overlay zoning ordinance would provide a supplemental layer of regulations for purposes of renewable energy development. A renewable energy overlay would be placed over existing base zone(s) and would identify requirements and allowable uses for renewable energy development. The process for adopting an overlay zone are the same for adopting a zoning or rezoning provision. The overlay provisions, as well as any changes to the County’s zoning map, must be approved by the Board of Supervisors for adoption. The overlay zone must also be in line with objectives of the County’s General Plan.

4.10.1 Costs and Benefits

Table 4-10 BMP #10: Create a Renewable Energy Overlay / Combining Zone							
BMP Type	Responsibility	Cost	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Planning	Planning & Development	\$100,000 - \$250,000	General Fund	- Define the Purpose, Identify Areas, and Rules of the Overlay Zone District.	- Reduces Processing Time for Renewable Energy Projects - Saves Developers Time and Money - Allows for Better Siting of Renewable Energy Development	- Staff Time and Resources - High Start-Up Costs	High

Source: Empower Devices (2015) and Ascent Environmental (2016)

Table 4-10 above summarizes the main features of BMP #10. An overlay zone is an alternative to the existing segmented approach of re-writing the zoning code to approve a specific use in a particular area. Creating an overlay zone can help speed-up the permitting process by saving time and certainty for both developers and County staff. It can also help ensure renewable energy projects are sited thoughtfully considering both near- and long-term uses and also environmentally sensitive areas.

4.10.2 County Actions and Recommendations

A renewable energy overlay zone can save the developer and the government money by reducing planning process time and providing more certainty to investors. It also indicates to investors that the County wants to develop renewable energy resources in specific locations in the County. While it may be difficult to secure funding for an overlay zone, the potential benefits for creating an overlay zone are worth considering. The County could better direct renewable energy development and identify opportunity areas that consider current and proposed land uses and environmental conditions.

4.11 BMP #11: DEVELOP A BUILDING ENERGY DISCLOSURE PROGRAM

Building energy disclosure involves the analysis and documentation of a building’s energy performance as a way to drive improvements in energy efficiency and reduce energy use. Establishing a program would help to incorporate a home or commercial building’s energy performance into its overall value, thus further incentivizing energy efficiency improvements.

4.11.1 Costs and Benefits

Table 4-11 BMP #11: Establish Building Energy Disclosure Policies

BMP Type	Responsibility	Cost	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Policy	<ul style="list-style-type: none"> - DGS - Building Services 	<ul style="list-style-type: none"> - Monitoring and Verification Costs - Consultant Fees - Incentive Payments to Building Owners - 1 FTE - Residential: \$200-500 (Energy Ratings) and \$200-\$400 (Energy Audit) 	General Fund	<ul style="list-style-type: none"> - Inventory Commercial Buildings - Research Role of Incentives in Disclosure Policies - Create Database of Building Performance 	<ul style="list-style-type: none"> - Buyers Access Property Data - Sellers Can Distinguish Themselves 	<ul style="list-style-type: none"> - Staff Time and Resources - Start-Up and Implementation Costs - Staffing Requirements - Potentially Significant Costs to Homeowners - Costs Vary Depending on Building Type 	Low

Notes: DGS = Department of General Services, FTE = Full-Time Equivalents
 Source: Empower Devices (2015) and Ascent Environmental (2016)

Table 4-11 summarizes the key components of BMP #11. By providing information on energy-related costs, building owners can make more informed decisions on cost-effective improvements. Home sellers also benefit by being able to distinguish themselves from similar homes in the market. Building energy disclosure is especially beneficial in the commercial sector as energy costs can affect their bottom line. A disadvantage to this program is that the monitoring and verification needed for implementation would be quite expensive for the County. Collecting data to support the program would also be costly and hiring an outside consultant may be needed for proper project oversight and implementation.

4.11.2 County Actions and Recommendations

To begin to develop a Building Energy Disclosure Program, the County could start by creating an inventory of commercial buildings and a database of building performance. The County could also research the role of incentives in disclosure policies. While a Building Energy Disclosure Program could provide the County with a lot of relevant data, the actual coordination and manpower needed to create, implement and oversee the program is quite high for the overall end gain. It would take time and money to develop an appropriate rating system and the County would likely need to incentivize customers joining the program (e.g., subsidizing meters for building owners).

4.12 BMP #12: PROMOTE MORE AGGRESSIVE BUILDING STANDARDS INCLUDING THE SIGNIFICANT RETROFIT OF EXISTING BUILDINGS

Building energy efficiency standards in California are designed to generally ensure new and existing buildings achieve energy efficiency and preserve outdoor and indoor environmental quality. Building energy codes set minimum standards to which buildings can be constructed. These measures are listed in Title 24 Part 6 of the California Code of Regulations. The County could establish a stronger array of programs and policies for new construction and for significant retrofits of existing buildings.

4.12.1 Costs and Benefits

BMP Type	Responsibility	Cost	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Policy	<ul style="list-style-type: none"> - DGS - Building Services 	Additional \$2,300 to New Residential Construction ¹	General Fund	<ul style="list-style-type: none"> - Create ZNE definition and policy for County - Work to Include Rewiring for EVs for Residential and Commercial Buildings 	<ul style="list-style-type: none"> - Creates Market Solutions - Building Professional Training - Implementation Costs Can Be Recovered Through Energy Savings - Reduces GHGs 	<ul style="list-style-type: none"> - Staff Time and Resources - Start-Up and Implementation Costs - Additional New Construction Costs 	Low

Notes: DGS = Department of General Services, ZNE = Zero Net Energy, EV = Electric Vehicle, GHG = Greenhouse Gas

¹ Costs to Implement 2013 Title 24 added \$2,300 to New Residential Construction Projects

Source: Empower Devices (2015) and Ascent Environmental (2016)

Table 4-12 above summarizes the main details of BMP #12. By establishing more aggressive building standards including significant retrofits of existing buildings, the County can cost-effectively meet its own renewable energy goals. By continuing to adopt advanced energy standards the County can continue to lead by example by promoting stricter construction practices. Costs to implement 2013 Title 24 standards added \$2,300 to new residential construction projects, which homeowners saved in energy costs within the first 18 months of occupancy. Energy efficient construction provides multiple long-term benefits to building owners and occupants.

4.12.2 County Actions and Recommendations

While there is an opportunity to achieve cost-savings and energy efficiency through stricter building standards, as outlined in Section 2.1.2 of this summary, the State has already approved more aggressive building standards and this BMP is already being addressed. The 2016 Title 24 standards (effective January 1, 2017) will result in about 28 percent less energy use for lighting, heating, cooling, ventilation and water heating than the 2013 Title 24 standards for single-family residences. For non-residential land uses, the 2016 standards would result in 5 percent less energy use than those built to 2013 standards. Additionally, the 2016 CALGreen Building Standards (effective January 1, 2017) will require pre-wiring for electric vehicles. The State has also established ZNE building goals to have all new residential construction be ZNE by 2020 and all new commercial construction be ZNE by 2030. In regards to retrofits of existing buildings, there is opportunity to reduce energy use, but defining what constitutes a “significant” retrofit could prove to be controversial. Implementation of such standards would also increase staff time and resources who would have to deal with implementation.

4.13 BMP #13: INCREASE RENEWABLE ENERGY EDUCATION AND OUTREACH

Education and outreach programs support and often enable technology-heavy renewable energy programs and policies by educating public policy makers and citizens about potential options, thus resulting in more exposure (and sometimes more funding) for these practices. Education and outreach efforts are often considered a separate and distinct program under government operations area since they tend to cut across multiple sectors. Education and outreach programs can be grouped into five categories; meetings and special events; general renewable energy campaigns and outreach products; internet-based outreach; publications; and technology and issue-specific campaigns, including financing information.

4.13.1 Costs and Benefits

Table 4-13 BMP #13: Increase Renewable Energy Education and Outreach							
BMP Type	Responsibility	Cost	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Programmatic	<ul style="list-style-type: none"> - Planning & Development - DGS - Other County Departments 	Varies. \$10,000 - \$1M ¹	<ul style="list-style-type: none"> - General Funds - Pursue Grant Funding - Partnerships 	<ul style="list-style-type: none"> - Update County's Website for RE Efforts - Consider Mobile Apps with Resources - Partner to Leverage Marketing and Outreach 	<ul style="list-style-type: none"> - Educates Residents and Policy Makers - Increases Funding Opportunities - Encourages Innovation 	<ul style="list-style-type: none"> - Staff Time and Resources - Start-Up and Varied Implementation Costs 	Medium

Notes: DGS = Department of General Services, RE = Renewable Energy, M = Million

1 Outreach Can Account for 10 Percent of Program Budgets

Source: Empower Devices (2015) and Ascent Environmental (2016)

Table 4-13 summarizes the key components of BMP #13. Greater awareness of renewable energy leads to enhanced customer knowledge and increased renewable energy use. This can lead to more renewable energy projects, particularly rooftop solar applications. Varying substantially in costs, education and outreach programs can range from a \$10,000 renewable energy information kiosk in a public library to a \$1 million energy awareness project for local governments managed by IOUs. Other energy outreach programs in California can range anywhere from \$50,000 to \$250,000. Education and outreach programs can account for 10 percent of total program costs on large multi-year renewable energy projects.

4.13.2 County Actions and Recommendations

There are a number of resources in the County that are already providing education and outreach programs in clean energy (e.g., SDG&E). There is an opportunity to promote solar PV and EVs in the County through education and outreach. The County could also utilize its own website to promote these programs. Sonoma County, Los Angeles County, San Francisco, and Santa Monica all have websites that invite participation in renewable energy programs, while also educating the public about energy issues. Given that education and outreach costs can vary by so much, it is important that the County identify what types of programs would be most successful and cost effective. The County could also look to partner with other local agencies and organizations that are already focused on renewable energy education and outreach. If the County chose to pursue a REN, a number of outreach programs could also be implemented through the REN framework.

4.14 BMP #14: START A COMMUNITY SOLAR INITIATIVE

Community Solar is an innovative approach to reducing GHG emissions and lowering the cost of solar PV electricity through economies of scale. Community Solar helps avoid the traditionally high upfront costs of solar by spreading the investment among several customers. Community Solar programs range in size from those small enough to be installed on a building’s rooftop to larger ground-mounted systems that can be located on acres of land.

4.14.1 Costs and Benefits

Table 4-14 BMP #14: Start a Community Solar Initiative							
BMP Type	Responsibility	Cost	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Programmatic	<ul style="list-style-type: none"> - Utility - Privately-Owned - Non-Profit 	N/A	<ul style="list-style-type: none"> - Private Investment - Community Investment - Pursue Grant Opportunities 	<ul style="list-style-type: none"> - Encourage County Subscription to Community Solar - Reserve Portion of Projects to Low-Income Customers - Get Involved with Discussion Surrounding SB 43 	<ul style="list-style-type: none"> - Limits Upfront Solar Costs - Supports Solar Industry - Reduces Utility Transmission and Distribution Costs - Compatible with CCA - Keeps Revenue with County - Reduces GHGs 	<ul style="list-style-type: none"> - Staff Time and Resources - Start-Up and Implementation Costs 	High

Notes: CCA = Community Choice Aggregation, GHG = Greenhouse Gas, N/A = Not Available
 Source: Empower Devices (2015) and Ascent Environmental (2016)

Table 4-14 above summarizes the main attributes of BMP #14. Because many people are not able to install solar PV systems on their rooftops for a number of reasons (i.e., limited or no space, financial restrictions, living in a rental or multi-family unit, or poor rooftop solar orientation). Community Solar can help consumers gain access to solar opportunities. It also minimizes the usual high upfront solar costs and supports the local solar industry. In 2015, through SB 43, the CPUC began implementation of the Green Tariff Shared Renewables program to expand access of renewable energy resources for consumers through the use of community renewable programs. Because regulations following passage of SB 43 have yet to be finalized, specific costs for the program are unknown.

4.14.2 County Actions and Recommendations

Community Solar offers consumers better access to solar opportunities and could also promote the more solar development in the County. The County should be involved in tracking the regulatory decisions established by SB 43 and consider how it could implement a Community Solar initiative in the future. The County should also look to other cities that have implemented Community Solar (e.g., City of Carlsbad).

4.15 BMP #15: ESTABLISH A MICROGRID AND DEVELOP POLICIES RELATED TO MICROGRIDS

A microgrid is a self-contained power system set up for a small geographic region. It usually has one or more power sources (often renewable), advanced energy storage, and an intelligent energy management system. Microgrids tend to be cleaner and more efficient than traditional power sources because they often utilize solar, wind, and/or combined heat and power to generate power. A microgrid can operate while connected to the main grid, but can automatically disconnect itself if the main grid goes down. When disconnected, the microgrid can continue to operate, providing electricity, heat, and cooling. There are several microgrid projects in the San Diego region set up by the U.S. Department of Defense and universities in Southern California. The University of California San Diego (UCSD) microgrid is one of the larger, premier, state-of-the-art microgrid projects in the world ensuring reliable power to 45,000 people and 450 buildings.

4.15.1 Costs and Benefits

Table 4-15 BMP #15: Establish a Microgrid and Develop Policies Related to Microgrids							
BMP Type	Responsibility	Cost	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Programmatic/ Policy	- Utility - Partners	\$15.1M ¹	- US DOE - SDG&E - CEC - Other Partners	- Partner with SDG&E and UCSD on Microgrid Policy Development - Identify Sites in the County that Could be Tied Into a Microgrid - Identify Potential Locations for Microgrid Siting	- Continued Operation if Main Grid Fails - Increases Efficiency - Increases Security and Safety - Reduces GHGs	- Staff Time and Resources - Start-Up and Implementation Costs - Staffing Requirements	High

Notes: M = Million, DOE = Department of Energy, SDG&E = San Diego Gas & Electric, CEC = California Energy Commission, UCSD = University of California San Diego, GHG = Greenhouse Gas

¹ Cost to Build a 4MW Demonstration Microgrid in Borrego Springs, Which Was Not 100 Percent RE.

Source: Empower Devices (2015) and Ascent Environmental (2016)

Table 4-15 summarizes the key components of BMP #15. Microgrids offer economic, environmental, power quality, and security benefits. The primary benefit of a microgrid is reliability and its ability to keep critical infrastructure, such as transportation systems, hospitals, data centers, water treatments facilities, police and fire departments, operating, particularly during times of crisis. Microgrids work well for large institutions like universities, hospitals, and multiple-unit government facilities because of the significant amount of electricity demand concentrated in one area. Microgrids can be expensive; a 4 MW demonstration microgrid project in Borrego Springs cost \$15.1 million to build.

4.15.2 County Actions and Recommendations

Increasing the number of microgrids in the County could have a number of benefits to the County. Borrego Springs was funded through a variety of agencies and partners (i.e. DOE, SDG&E, CEC, IBM, Motorola), suggesting that microgrids are an important asset and worth investing in. Microgrids need to be connected and part of a larger renewable energy plan and direction to be effective. The County could begin by partnering with SDG&E and UCSD on microgrid policies and identifying potential sites in the County where microgrids would be ideally suited.

4.16 BMP #16: ESTABLISH ELECTRIC VEHICLE AND CHARGING PROGRAMS

As the first step toward integrating a more complete review of transportation services, the County could establish EV and charging programs. California plug-in vehicles sales represent more than 40 percent of the national market and is continuing to grow. This growth necessitates development of additional infrastructure (i.e., charging stations) to support this new type of market. Because EVs both consume and produce electricity, they are also potential sources of intermittent power and a place to store electric power.

4.16.1 Costs and Benefits

Table 4-16 BMP #16: Establish Electric Vehicle (EV) and Charging Programs							
BMP Type	Responsibility	Cost	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Programmatic	<ul style="list-style-type: none"> - DGS - Planning & Development 	\$4,000 per EV Parking Space	<ul style="list-style-type: none"> - Rebates for EVs - CEC - CSE 	<ul style="list-style-type: none"> - Consider Public EV Charging Stations as Future Revenue Generation - Promote a Solar- and EV-Ready Ordinance - Work with SDG&E on Siting EV Charging Stations - Encourage Prewiring for Level 2 EVSE as a Percentage of Total Spaces in Multi-Family Buildings - Standardize Permitting and Inspection Processes 	<ul style="list-style-type: none"> - Improves AQ and Health - Reduces GHGs in line with the CAP - Reduces Dependence on Petroleum - Reduced Fuel Costs - Increases Availability of Charging Station Infrastructure - State and Local Rebates 	<ul style="list-style-type: none"> - Staff Time and Resources - Start-Up and Implementation Costs 	High

Notes: DGS = Department of General Services, EV = Electric Vehicle, CEC = California Energy Commission, CSE = Center for Sustainable Energy, AQ = Air Quality, GHG = Greenhouse Gas

Source: Empower Devices (2015) and Ascent Environmental (2016)

Table 4-16 above summarizes the main attributes of BMP #16. EV initiatives and programs can help the County meet CAP-related and other GHG emission reduction goals. The San Diego region already has an extensive EV network in place, so further investment in programs will continue to build market share and could help expand EVs into the County. While costs of specific programs are not available, the cost for an EV parking space is about \$4,000. There are also a number of rebates and incentive programs to encourage EV development and use.

4.16.2 County Actions and Recommendations

In 2012, the San Diego Association of Governments (SANDAG) established the Regional Electric Vehicle Infrastructure (REVI) Working Group which assessed planning and siting issues and typical barriers to EV development. The County could collaborate with the REVI Working Group, who has already done a lot of research on creating and adopting a formal plug-in vehicles program. The County could also work with SANDAG to identify optimum future locations for public EV charging stations that are in line with long-term development and growth areas. From a planning process perspective, the County could also work with the County’s Air Pollution Control District (APCD) and other County Departments to coordinate a larger regional program with incorporated towns and cities to develop standardized permitting and inspection processes, include EVs in parking standards, and streamline zoning codes. Given that the EV market is only expected to grow and more money will likely be provided to support EVs, the County should consider ways to further promote EVs.

4.17 BMP #17: DEVELOP A LEGISLATIVE STRATEGY TO SUPPORT RENEWABLE ENERGY PROGRAMS

Legislative outreach that supports renewable energy programs was recommended by the CREP TAC on August 17, 2016. The recommendation aims to enact legislative proposals and respond to Federal and State legislation that supports renewable energy programs.

4.17.1 Costs and Benefits

Table 4-17 BMP #17: Develop a Legislative Strategy to Support Renewable Energy Programs							
BMP Type	Responsibility	Cost	Financing Options	CREP Actions	Advantages	Disadvantages	Return on Investment
Policy	- OSIA	\$250,000	- General Funds	<ul style="list-style-type: none"> - Sponsor Renewable Energy Policy - Prioritize Renewable Energy Advocacy Efforts - Develop Legislative policy and guidelines 	<ul style="list-style-type: none"> - Educates Residents and Policy Makers - Increases Renewable Energy Opportunities 	<ul style="list-style-type: none"> - Staff Time and Resources - Start-Up and Implementation Costs 	Medium

Notes: OSIA = Office of Strategy and Intergovernmental Affairs
 Source: Ascent Environmental (2016)

Table 4-17 summarizes the key components of BMP #17. A legislative strategy could help educate residents and policymakers on pertinent legislation that supports renewable energy development that the County can take advantage of. The County of San Diego has an Office of Strategy and Intergovernmental Affairs (OSIA) that manages a Legislative Program for the Board of Supervisors. Development and implementation of legislative strategy to support renewable energy is estimated to cost \$250,000.

4.17.2 County Actions and Recommendations

A legislative strategy can help the County take advantage of legislation that supports renewable energy programs. The County could work with OSIA to develop a legislative strategy that builds upon their existing legislative review process. The County could develop a strategy to address legislation that supports: Consumer Choice Alternative Energy Models such as CCAs, DA and SEU; financing and funding opportunities such as PACE, P2P, Lending, Crowdfunding and Greenhouse Gas Reduction Fund monies; Community Solar Initiatives; Net Energy Metering; Microgrids; and Regional Energy Networks, among others.

5 ECONOMIC ANALYSIS

5.1 ENERGY EXPENDITURES IN THE COUNTY

The economic analysis, summarized here and provided in full in Section 3 and Appendix A1 of the Empower Report, examines the possible economic benefits within the unincorporated areas of the County if households and businesses were to shift away from current investment patterns to pursue a more productive and cleaner energy future. More specifically, the benefits of renewable energy and energy efficiency resources are assessed, while also looking at the scale of investment necessary to drive those improvements.

With an estimated 505,000 residents, the unincorporated areas account for about 16 percent of the County's total population. Table 5-1 looks at the summary of energy expenditures in 2012 for the County as a whole, as well as the unincorporated areas. The County spends an estimated \$9 billion for energy, while the unincorporated County spend around \$1.6 billion. Transportation expenditures are the highest for the entire County, accounting for 60 percent of total energy costs. Natural gas and electricity account for 15 and 39 percent, respectively, of total energy costs. Given the large amount of energy expenditures with the County's current energy mix, there is opportunity for reduction by investing in renewable energy and overall energy efficiency.

Table 5-1 Summary of Energy Expenditures in 2012¹

	Natural Gas	Electricity	Transportation	Total Energy ²
San Diego County ³	\$389 M	\$3,141 M	\$5,485 M	\$9,014 M
Unincorporated Areas	\$40 M	\$504 M	\$1,025 M	\$1,569 M
Total Expenditures from Unincorporated Areas	10.3%	16.0%	18.7%	17.4%

Notes: For more detailed analysis, see Empower Report. M = Millions

¹ Numbers are presented in 2012 dollars

² Total energy does not include use of coal, propane, compressed natural gas, and marine fuels, among other sources

³ Includes both the incorporated and unincorporated areas of the County

Source: Empower Devices (2015)

5.2 METHODOLOGY

Using different economic scenarios with different patterns of energy use, known as "Innovation Scenarios," the analysis compares how different investments and technologies might benefit jobs, income, and net gains in overall economic activity in the County. In addition to the four Innovation Scenarios, a future "Reference Case" is used as a baseline for what the economy might look like assuming no further changes in the region's energy makeup (i.e., business-as-usual). These four Innovation Scenarios provide different insights into future energy production and consumption patterns. Analysis of the four scenarios uses the DEEPER Modeling System to determine the net economic benefits of the different investment patterns.

While there are many new emerging technologies that will undoubtedly shape future energy markets, the following innovation scenarios only explore the known and more established set of renewable energy and energy efficiency technologies:

- Reference Case.** The Reference Case assumes that from 2015-2050 the unincorporated areas of the County will continue to follow current trends in 2012. It assumes the regional population, employment, and overall economy are projected to grow annually at about 1.1 percent, 1.5 percent, and 2.6 percent, respectively. Electricity use is projected to grow 1.4 percent annually. Natural gas consumption is

projected to grow at a slower pace, about 0.5 percent per year. Real costs of energy are anticipated to escalate 1.3 percent and 3.2 percent for electricity and natural gas, respectively. The combined energy expenditure will expand at an average 2.8 percent per year, or about 0.2 percent faster than the economy as a whole. It also assumes that the State's RPS will continue to require that 33 percent of all electricity sales be provided with renewable technologies through 2050.

- ▲ **Innovation Scenario I.** Innovation Scenario I assumes that the RPS requirement of having a 33 percent renewable energy mix by 2050 will be met. It also assumes that efficiency of electricity will increase to 20 percent above the normal rate of improvement, and natural gas will increase to 15 percent by 2050.
- ▲ **Innovation Scenario II.** Innovation Scenario II assumes that the RPS requirement will be increased to 50 percent by 2030, as proposed by Governor Jerry Brown in his inaugural address on January 5, 2015 and in compliance SB 350, The Clean Energy and Pollution Reduction Act of 2015. It assumes that energy efficiency will reach 25 percent of total electricity consumption above the normal rate of improvement and natural gas will increase to 15 percent by 2050.
- ▲ **Innovation Scenario III.** Innovation Scenario III assumes that the RPS requirement will reach 50 percent in 2030, and then 80 percent in 2050. Again, electric energy efficiency is assumed to increase to 25 percent and natural gas to 15 percent by 2050.
- ▲ **Innovation Scenario IV.** Innovation Scenario IV explores the prospect of an RPS that climbs to 50 percent in 2030, and then to a full 100 percent in 2050. Electric efficiency is assumed to increase to 25 percent and natural gas to 15 percent by 2050.

5.3 RESULTS

5.3.1 Economic Benefits

Table 5-2 below shows the comparison of energy expenditures for the Reference Case and four Innovation Scenarios from 2015-2050 (in 2012 dollars). Assuming energy bill expenditures would be the same in 2015, all four Innovation Scenarios show decreasing expenditures as time passes, with ultimate reductions ranging from 16 percent in Scenario I to as much as 49 percent in Scenario IV by 2050 as compared to the Reference Case. The findings are consistent with the notion that each Scenario would provide increasing mixes of renewable energy options and efficiency, which would in turn translate to lower energy bill expenditures in the County as soon as 2025.

Table 5-2 Energy Bill Expenditures in the Unincorporated County (2015-2050)¹

Energy Expenditure	2015	2025	2040	2050	% Change Reduction in 2050 to Reference Case
Reference Case	622	821	1,200	1,547	0%
Scenario I	622	801	1,106	1,294	16%
Scenario II	622	797	1,031	1,132	27%
Scenario III	622	796	967	922	40%
Scenario IV	622	796	934	797	49%

Notes: Numbers may not add up due to rounding. For more detailed analysis, see Empower Report. M = Millions

¹ Numbers are presented in 2012 dollars

Source: Empower Devices (2015)

Table 5-3 below summarizes the key economic impacts for each Innovation Scenario, in terms of annual average and cumulative costs and savings. The analysis weighs the costs of each Innovation Scenario, with the economic benefits that each scenario provides. Costs include policies or programs needed to implement each scenario, along with technological investments needed to increase energy efficiency and create more renewable energy options. Economic benefits include net energy savings and net job creation. Scenario I offers the highest benefit-cost ratio of 5.3, with minimal investment and program costs, for potential average energy savings of \$53 million a year. Compared to the Reference Case, this activity supports an average annual gain of 600 jobs for the County. As the mix of renewable energy increases in the scenarios, so do costs associate with program development and technological investments. This does, however, translate to larger net energy savings (e.g., Scenario IV net energy savings is three times that of Scenario I) and more jobs created.

For more detailed analysis, including specific breakdown of economic impacts by 5-year increments, refer to Section 3.3.2.2 of the Empower Report.

Table 5-3 Annual Average and Cumulative Economic Impacts of Innovation Scenarios								
	Benefit-Cost Ratio	ANNUAL AVERAGE ¹					CUMULATIVE ¹	
		Program/Policy Costs	Technological Investments ²	Energy Bill Savings ³	Net Energy Savings ⁴	Net Job Creation	Investments	Energy Bill Savings
Scenario I	5.3	\$2 M	\$17 M	\$71 M	\$53 M	600	\$500 M	\$2,600 M
Scenario II	2.3	\$5 M	\$45 M	\$120 M	\$99 M	1,000	\$1,900 M	\$4,300 M
Scenario III	1.9	\$9 M	\$84 M	\$167 M	\$137 M	1,500	\$3,100 M	\$6,000 M
Scenario IV	1.9	\$11 M	\$103 M	\$192 M	\$161 M	1,800	\$3,700 M	\$6,900 M

Notes: Numbers may not add up due to rounding. For more detailed analysis, see Empower Report. M = Millions

¹ Annual and cumulative numbers are presented as 2012 dollars

² Technological investments include investments that promote energy efficiency and renewable energy

³ Energy bill savings include savings from the industrial, residential, and commercial sectors

⁴ Net Energy savings subtract policy/program costs (1st column) with technological investments (2nd column).

Source: Empower Devices (2015)

5.3.2 Environmental Benefits

In addition to economic benefits, reducing energy waste and converting to a larger mix of renewable energy sources, would have environmental benefits to consider as well. As shown in Table 5-4, implementation of each Innovation Scenario would result in reduced carbon dioxide (CO₂) emissions.

Table 5-4 Environmental Benefits of Innovation Scenarios	
	CO ₂ Emissions as Percent of 2050 Reference Case (%)
Scenario I	75
Scenario II	61
Scenario III	35
Scenario IV	19

Notes: Source: Empower Devices (2015)

The combination of renewable energy and energy efficiency technologies would equate to emissions reduction of 0.45 million metric tons of CO₂ by 2050, which is 75 percent of the Reference Case. Scenario IV, would reduce emissions by 1.34 million metric tons of CO₂ by 2050, which is 19 percent of the Reference Case. For additional environmental benefits for Scenario IV, see Table 3-5 of the Empower Report.

6 CONCLUSION

The CREP was initiated as a major first step towards promoting renewable energy in the County. The County has a number of options to consider for later adoption and implementation as part of the CREP. Table 6-1 below summarizes the BMPs proposed, sorted first by “top priority” BMPs, or ones that offer the most benefit and opportunities for renewable energy development and growth. The list is then summarized by return on investment potential. For more analysis regarding recommendations, see the Executive Summary of this report.

Table 6-1 Summary of CREP BMPs			
BMP #	Title	Conclusion	Return on Investment
3	Establish Institutional Capacity	Top Priority: Develop a CCA Feasibility Study	High ¹
14	Start a Community Solar Initiative	Top Priority: Track Community Solar Legislation	High
15	Establish a Microgrid and Develop Policies Related to Microgrids	Top Priority: Develop Policies & Identify Sites for Future Microgrids	High
10	Create a Renewable Energy Overlay / Combining Zone	Top Priority: Reduces Planning Process Time & Increases Certainty	High
7	Increase the County’s Percentage of Energy Derived from Various Renewable Energy Technologies	Better Addressed in the County’s CAP	High
16	Establish Electric Vehicle Programs	Better Addressed in the County’s CAP	High
4	Establish Financing Capacity	Establish Appropriate PACE Partnership/Collaboration	Medium ²
5	Develop a Solar Energy Workforce Development Initiative	Establish Appropriate Partnership/Collaboration	Medium
13	Increase Renewable Energy Education and Outreach	Establish Appropriate Partnership/Collaboration	Medium
17	Develop a Legislative Strategy to Support Renewable Energy Programs	Establish Collaboration with OSIA	Medium
1	Amend the General Plan and add an Energy Element	Better Addressed in the County’s CAP	Low
2	Establish a New Office of Sustainability	High Admin/Operating Costs	Low
6	Build an Energy Assurance Plan	Better Addressed in the County’s CAP	Low
8	Establish a Renewable Energy Group Procurement Initiative	High Level of Coordination Needed	Low
9	Participate in the Creation of a New Regional Energy Network	High Administration Burden	Low
11	Develop a Building Energy Disclosure Program	High Admin/Operating Costs	Low
12	Promote More Aggressive Building Standards Including the Significant Retrofit of Existing Buildings	Current Legislation Already Addresses Issue	Low

Notes: CCA = Community Choice Aggregation, CAP = Climate Action Plan, OSIA = Office of Strategy and Intergovernmental Affairs
¹ CCA was determined to have a “high” return on investment ranking, DA, and SEU were both determined to have a “medium” return on investment ranking
² PACE and Bonds were determined to have a “medium” return on investment ranking. P2P/Crowdfunding was determined to have a “low” return on investment ranking.
 Source: Empower Devices (2015)

7 REFERENCES

ARB. See California Air Resources Board.

California Air Resources Board. 2011b. *Facts About the Advanced Clean Cars Program*. Available at http://www.arb.ca.gov/msprog/zevprog/factsheets/advanced_clean_cars_eng.pdf. Accessed August 16, 2016.

California Energy Commission. 2012a. *Integrated Energy Policy Report Update*. Available: <http://www.energy.ca.gov/2012publications/CEC-100-2012-001/CEC-100-2012-001-CMF.pdf>. Accessed: August 16, 2016.

_____. 2012b (May). *Building Energy Efficiency Standards: Frequently Asked Questions*. Available: http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/2013_Building_Energy_Efficiency_Standards_FAQ.pdf. Accessed August 18, 2016.

_____. 2013 (July). *Impact Analysis - California's 2013 Building Energy Efficiency Standards*. Available: <http://www.energy.ca.gov/2013publications/CEC-400-2013-008/CEC-400-2013-008.pdf>. Accessed August 18, 2016.

_____. 2015a. *2016 Building Energy Efficiency Standards: Frequently Asked Questions*. Available: http://www.energy.ca.gov/title24/2016standards/rulemaking/documents/2016_Building_Energy_Efficiency_Standards_FAQ.pdf. Accessed August 18, 2016.

_____. 2015b. (June). *2016 Building Energy Efficiency Standards: Adoption Hearing*. Presentation on June 10, 2015. Available: http://www.energy.ca.gov/title24/2016standards/rulemaking/documents/2015-06-10_hearing/2015-06-10_Adoption_Hearing_Presentation.pdf. Accessed August 18, 2016.

_____. 2015c. (December). *Renewable Energy Projects in Development with Existing and Approved Transmission Lines*. Available: http://www.energy.ca.gov/maps/renewable/renewable_development.pdf. Accessed August 18, 2016.

_____. 2016. *Renewable Energy and Conservation Planning Grants*. Available: http://www.energy.ca.gov/maps/renewable/renewable_development.pdf. Accessed August 22, 2016.

CEC. See California Energy Commission.

California Public Utilities Commission. 2016a (August). *Resolution E-4874*. Available: <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M166/K269/166269927.PDF>. Accessed September 27, 2016.

_____. 2016b (August). *Decision Providing Guidance for Initial Energy Efficiency Rolling Portfolio Business Plan Filings*. Available: <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M166/K232/166232537.PDF>. Accessed: September 27, 2016.

CPUC. See California Public Utilities Commission.

Del Mar, City of. 2016 (May) *Del Mar Climate Action Plan*. Available: <http://www.delmar.ca.us/DocumentCenter/Home/View/2388>. Accessed August 22, 2016.

Energy Policy Initiatives Center for Center for Sustainable Energy. 2015 (June). *Community Solar in California*. Available: http://www.sandiego.edu/law/documents/centers/epic/Community%20Solar%20Final_2.2.16.pdf. Accessed August 20, 2016.

Governor's Office of Planning and Research. 2003. *State of California General Plan Guidelines*. Available: https://www.opr.ca.gov/docs/General_Plan_Guidelines_2003.pdf. Accessed August 23, 2016.

- Kats, Greg. 2011 (October). *Energy Efficiency Financing – Models and Strategies*. Prepared by Capital E for the Energy Foundation.
http://newbuildings.org/sites/default/files/EnergyEfficiencyFinancing_ModelsStrategies201110.pdf. Accessed September 2, 2016.
- KPBS. 2016 (June). *SDG&E Gets OK to Market on Alternative Energy Program*. Available:
<http://www.kpbs.org/news/2016/jun/16/sdge-gets-ok-market-alternative-energy-program/>. Accessed September 23, 2016.
- Lancaster, City of. 2016. *Community Choice Aggregation*. Available;
<http://www.cityoflancasterca.org/residents/lancaster-choice-energy>. Accessed August 23, 2016.
- Mosaic. 2012 (December). *Solar Crowdfunding in California: Part 2, Everybody Solar*. Available:
<https://joinmosaic.com/blog/solar-crowdfunding-california-part-2-everybody-solar/>. Accessed September 23, 2016.
- San Diego, City of. 2014 (September). *City of San Diego Climate Action Plan*. Available:
<https://www.sandiego.gov/sites/default/files/legacy/mayor/pdf/2014/climateactionplan2014.pdf>. Accessed August 20, 2016.
- San Diego, County of. 2009. *County of San Diego Strategic Energy Plan*. Available:
http://www.sandiegocounty.gov/reusable_components/images/dgs/Documents/Energy_StrategicEnergyPlan.pdf. Accessed August 20, 2016
- San Diego Gas and Electric. 2016 (September). *Direct Access FAQ*. Available: <http://www.sdge.com/customer-choice/electricity/direct-access-faq>. Accessed September 22, 2016.
- Solana Beach, City of. 2016 (April). *City of Solana Beach: Community Choice Aggregation Technical Analysis*. Available:
<http://solana-beach.hdso.net/docs/CAC/CAC-SB-CCA.pdf>. Accessed September 20, 2016.