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STUDY ON THE JOB CREATION POTENTIAL OF CLEANPOWERSF

DRAFT REPORT

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I. Introduction

The objective of this report is to analyze the jobs that may be created by the launch of CleanPowerSF, the City and County of San Francisco's (CCSF) Community Choice Aggregation (CCA) program. The main focus of this analysis is to assess how many jobs may be created from the construction and operation of new and existing renewable energy projects due to the demand created by the program. In addition, this report will look at the pace at which other CCA's in California have started construction of new renewable energy facilities following their program launch.

The impetus for this report stems from a request from San Francisco Public Utilities Commission (SFPUC) General Manager Harlan L. Kelly, Jr. The SFPUC is responsible for the implementation and administration of CleanPowerSF. This study, undertaken pursuant to Government Code §56378 and San Francisco Local Agency Formation Commission (LAFCo) Policies on Special Studies §2.6, §2.62, §2.63, and §2.64, was conducted with the intent of providing an objective analysis of what jobs could be created with the launch of CleanPowerSF.

To prepare this report, LAFCo examined numerous previous reports done by both LAFCo and the SFPUC on CleanPowerSF and the build out of new energy infrastructure. In addition, LAFCo conducted a review of other CCA programs across California to determine the impacts other CCA programs had on jobs creation, and to get ideas on maximizing job creation while still fulfilling the other goals of the CCA program.

II. Executive Summary

This report examines the potential for job creation from CCSF's implementation of CleanPowerSF program during Phase 1 while looking forward to future phases of the program. We first look at how the other operating CCA programs have fared in this regard when launching their programs. What we find is that neither of the Bay Area CCA programs, Marin Clean Energy (MCE) or Sonoma Clean Power (SCP), created new construction jobs when they first launched programs. Both MCE and SCP initially relied on existing energy generation facilities to supply their power.

MCE was the first CCA program and, for several years, was the only such program. At its beginning, MCE focused mostly on establishing a good business model and working out all the kinks in the system, such as PG&E billing system issues. After a while, MCE was able to add new construction jobs because of its energy procurement activities. SCP built its program based on the good work of MCE and was able to get to job creation quicker. Lancaster Choice Energy (LCE), being the third CCA to launch, took a similar approach to both MCE and SCP. LCE however was able to get one new project under contract that will lead to its construction as part of its very first group of energy contracts. LCE does have one big advantage over the Bay Area CCA programs in that Lancaster is located in what is considered to be one of the best places in the country for low cost solar generation. This allows them to build more local solar projects then other parts of California at a more competitive cost to other sources of energy. While the development of new renewable energy projects has been a goal of each program, all three CCAs have initially had to rely on operating projects. While each CCA got to build-out of new renewable generation at different points in the program they have all started procuring energy from new renewable energy projects after launch.

For more than ten years, CCSF has been working to launch CleanPowerSF. One of the goals of the CleanPowerSF program is to be a green job creator. The track records of the other CCA programs demonstrate that the creation of green jobs is possible under CCA. The CCA model being used in California allows for local governments, such as San Francisco, to create clean energy jobs by investing local electricity sales revenues into both energy efficiency and new renewable generation projects. Indirectly any CCA program that has a higher Renewable Portfolio Standard (RPS) then the Investor Owned Utility will also cause more renewable generation facilities to be created as current energy providers will need to find other sources to fulfill the state's increasing RPS compliance targets.

In January 2015, LAFCo released the final version of the EnerNex report which shows that over time CleanPowerSF has the ability to create a large number of jobs. The EnerNex report included job creation rates for various types of clean energy projects. Table 1 below summarizes

the EnerNex job estimates in both jobs per million dollars of project cost and jobs per megawatt installed. The jobs per megawatt installed figures are estimated by LAFCo using technology cost estimates provided by the SFPUC.

Table 1: Renewable Energy Technology Job Estimates

Technology	Geography	Jobs per M$		Jobs per MW**	
		Construction	O&M*	Construction	O&M*
Large Scale Solar	SF	4.9	0.05	12.3	0.1
	Regional	5.1	0.05	10.2	0.1
	California	6.4	0.05	11.2	0.1
Distributed Solar	All	6.6	0	19.8	0
Wind	California	2.3	0.07	5.8	0.2
Geothermal	Regional	2.7	0.24	13.5	1.2
	California	6.3	0.29	31.5	1.5

* Operation and Maintenance
**Assumes: Large Scale Solar installed costs of $2.50/watt (SF), $2.00/watt (Regional), and $1.75/watt (CA); Distributed Solar installed costs of $3.00/watt (All); Wind installed costs of $2.50/watt (CA); and Geothermal installed costs of $5.00/watt (Regional and CA).

The EnerNex report also mentioned that there were still several more things that needed to be done before a more complete jobs report could be produced, particularly estimating the amount of revenue that would be available for higher cost local renewable energy purchases and what type of energy efficiency programs would be targeted first. The SFPUC has been working very diligently based on the recommendations of the EnerNex report and the path laid out by previous CCAs.

CleanPowerSF has a significant advantage compared to the other CCAs in that it is being formed within an existing electric power utility, the SFPUC's Power Enterprise. This means that it will be able to leverage existing expertise and organizational resources. However, CleanPowerSF is a large undertaking – potentially growing to more than three times the energy sales of the existing Power Enterprise retail service – and it will need to add additional employees to ensure a successful launch and on-going operations.

The SFPUC's December 2015 CleanPowerSF Business Plan estimates that over time the initial phase of the program has the potential to create approximately 300 jobs as a result of the procurement of new renewable energy supplies along with demand side programs. Extending the SFPUC's estimate of job creation for its initial phase to full service throughout the city, we

estimate that approximately 4,600 to 9,700 jobs could be created from the program's purchase of renewable energy. More work needs to be done to understand the job creation potential for demand side (energy efficiency) programs.

There is still more work to be done, but SFPUC staff is working very hard to ensure that all necessary programs are in place when the CCA launch occurs. For example, the SFPUC approved a Net Energy Metering (NEM) schedule on April 26th and staff is working on a Feed-In Tariff (FiT) program, which is expected to be available in mid-to-late 2016. These programs are intended to foster the development of local distributed renewable energy projects and will allow the private sector – local residents, businesses and renewable energy developers – to help by developing new projects to meet CleanPowerSF customer energy demand. In addition, the SFPUC can look to the other CCAs to see where their programs can be utilized. For example MCE has a community solar share program that could be used to help generate new local renewable energy jobs.

In order to develop and operate the first phase of the CleanPowerSF program, the SFPUC estimated it would need to fill approximately 10.5 full time equivalent (FTE) staff positions. While some positions have been filled others are still waiting to be filled. CCSF should ensure new and/or vacant positions are filled as quickly as possible as these positions will directly support the development of the key job creating programs people are looking for CleanPowerSF to have.

Job creation by CleanPowerSF may be hindered by the December 17th California Public Utilities Commission (CPUC) decision on the Pacific Gas and Electric (PG&E) Power Charge Indifference Adjustment (PCIA). While the CPUC seems to acknowledge the PCIA needs to be changed, it still allowed for an unprecedented doubling of the PCIA in 2016. Given that one of the policy goals for CleanPowerSF is not to have a higher bill for customers, this means the program had to lower its rates to make up the difference. The doubling of the PCIA has cut significantly into the margin CleanPowerSF might otherwise have for additional funding of new energy efficiency and clean energy programs.

While the SFPUC has dealt with the change of the PCIA and the loss of revenue, it still has other potential options for new funding sources to ensure a successful program. The CPUC has funding sources that are collected from rate payers for energy efficiency programs. While the San Francisco Department of the Environment already receives some funds for specific programs through PG&E, with a CCA program it can apply to CPUC for those funds directly. If the CCSF identifies other qualifying programs, it can also apply to the CPUC for additional funds. In addition to CPUC grants, there are grants and programs that CleanPowerSF can apply for at the

federal and state level. These types of programs come and go so it is important to have somebody keeping an eye out for opportunities when they present themselves. Following the guidance of the EnerNex report, the SFPUC now has completed supply contracts for Phase 1 and now knows costs for the program.

The roll-out of future phases, based on the December 2015 business plan, is not scheduled to happen until 2019. Once the Opt-Out period has ended for Phase 1, the SFPUC should revisit this timeframe. If the program proves to be successful with a low opt-out rate, it may be possible to find new renewable generation projects and have roll out to new group of customers occur as they are brought on-line. Also with a successful launch, it will show the energy markets that this new program is popular which can lead to the favorable financing needed to bring on more energy production while not putting the overall program at risk.

All three current CCA's have shown in order to have a successful build-out you need to have a stream of funds to pay for a green jobs build-out. The SFPUC has the desire to do the most robust build-out possible while staying within a cost structure that keeps its pricing at launch just under PG&E price. LAFCo staff finds the SFPUC approach to be a smart plan to both get to new construction, which brings with it new green jobs, while ensuring a long term successful program.

III. Job Creation From Other CCA's

In this section, we will look at jobs created by being able to build new sources of energy, energy efficiency, and other load demand work.

The three other CCAs have different ways of measuring and reporting the jobs created by their programs. Marin has done the most work in this area, given that it has been around now for more than 6 years. Sonoma, on the other hand, has never done a job creation analysis since its launch in May of 2014. Lancaster, still in its first year, has also not done a full job analysis for its program. However, both Sonoma and Lancaster have reported that they have contracted to buy power from new renewable energy projects.

A. Marin Clean Energy (MCE)

MCE was launched in May of 2010 and is the oldest CCA operating in California. As such, it provides the greatest amount of historical information to guide San Francisco as CCSF looks to launch its program. MCE has prepared a detailed chart of all the construction sites and jobs created by the program. (See Attachment A) Many of these projects have already been constructed and are now operating or are scheduled to begin operating soon.

Table 2: MCE Job Creation In Construction By Year

Year	Construction Jobs	O&M* Jobs	Total for Year
2012	48	19	67
2013	46	35	81
2014	78	6	84
2015	1276	40	1316
2016	1037	9	1046
Total	2485	109	2594

* Operation and Maintenance

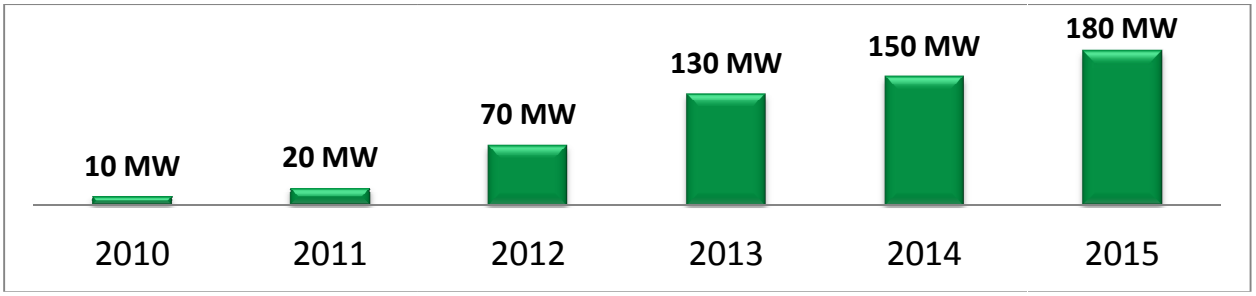
The MCE chart is from March 2015 and gets updated once a year after they have done their annual request for projects. It should be noted that because of a project delay, some of the 2015 jobs will be created in 2016. Also, after the 2016 request for projects is completed, we could see the number of jobs in 2016 increase as some new projects might be started later this year depending on how the 2016 call for new projects goes.

Since MCE was the very first CCA to operate in California it rightfully focused its attention in the start up phase to do the core work of a CCA, generating the correct amount of energy for its customers and ensuring its bills got paid. In 2012, we start to see new construction occurring as a direct result of MCE's programs being in place. For years 2012-2014, we see a small growth pattern occur each year and then in 2015 we see a large increase of jobs being created. As noted

above, job growth in 2016 could be higher depending on how its current call for projects goes. While the job growth is in part due to MCE great work in proving that CCA's can be a viable business model here in California outside factors also supported the ability to increase job growth. The availability of the Investment Tax Credit along with new renewable projects coming down in price compared to the cost of conventional power were among those outside factors.

MCE also started with a 10 MW program for its very first phase when it launched in 2010. In 2011 it doubled in size to 20 MW and since has grown dramatically.

Figure 1: Size of MCE Program By Year



One takeaway when comparing Table 1 to Figure 1 is that there would appear to be a point where a program's size becomes important to job creation. It is not until 2012 that we see new construction projects creating jobs which also happens to be the year when you see the program grow in size from 20 MW (2011) to 70 MW(2012). This is due in part to the fact that the more energy you are selling allows you to better leverage your customer revenues for more projects.

B. Sonoma Clean Power (SCP)

SCP has never done a jobs creation analysis for its program. From its point of view, job creation is important, but SCP only reports auditable information, such as the dollars spent locally. Discussions with SCP staff revealed that none of its first round contracts were for new renewable projects. Three months after launch, SCP did bring in its first new project and now, over the 23 months since launch, a number of contracts have been signed for new renewable development. Due to contractual agreements SCP is not able to share the level of detail that would be needed to run a jobs analysis similar to the EnerNex Report.

What is publically known is that SCP has contracted to build almost 16 MW of production capacity within Sonoma County. Roughly 12.5 MW, or 75% of that total, comes from installing floating solar systems on docks floating in irrigation water storage ponds. Based on a review of the work done by EnerNex and SFPUC, it does not appear we have a similar situation within San Francisco. Rather there are a good number of smaller projects and a couple of large projects in the region but cost per MW hour would likely be higher than the Sonoma projects. The rest of the projects within Sonoma County are in the 1 MW or smaller category.

SCP has also contracted for 70 MW of new solar in the Central Valley that is almost complete, and has other renewable contracts in negotiation, with the expectation that an additional 30 to 50 MW of new renewables will be under long-term contract by June 2016. Had the 70MW new solar project been online at the start of 2016 it would amount to an estimated 7% of its expected load forecast for 2016.

C. Lancaster Choice Energy (LCE)

LCE is in its first year of operation, having first launched service to just its own municipal customers in May 2015, and then all other customers in its service territory in October 2015. In total between the May and October groups they are now serving approximately 52,000 customers. LCE has not completed a full jobs analysis since it is focusing on the launch of the program. However, as part of its power procurement strategy, LCE did sign a contract for 10MW of capacity for a local solar project that should go online in Fall 2016. According to a LCE staff report, the construction phase states "75 – 80 local jobs will be created, and approximately 8,500 hours of development work, such as engineering and surveying, will be awarded to local Antelope Valley businesses. Long term, SPower will add 2 – 3 permanent jobs to their Antelope Valley staff that will be allocated to this project. SPower estimates that this project will produce $ 6.9 million in direct benefits, such as jobs, earnings, and sales tax; $ 2.6 million in indirect benefits, such as industry to industry spending and subcontracts; and $ 3.1 million in induced benefits, such as employee spending."

LCE has been able to use a smart power procurement strategy to establish a job creation program at launch. Finally it should be noted that Lancaster happens to be one of the best spots in the country for solar generation, making it more cost effective to do local solar projects there than in the San Francisco Bay area. Therefore, it is likely that more local solar projects will ultimately be brought on line in Lancaster than could be done in San Francisco. When you also take into consideration that this 10MW project is twice as large as San Francisco's Sunset Solar project it becomes clear that Lancaster also has much more opportunity to develop large projects that San Francisco.

LCE is also located in a Southern California Edison (SCE) service territory. SCE has a much lower PCIA charge for its departing load customers then does PG&E. This means that instead LCE has some ability to pay for slightly more expense new renewable projects and still have its customer's bill not go up.

IV. CleanPowerSF Job Creation Review

The concept behind CleanPowerSF has been discussed in the City for over a decade now. One of the many goals of CleanPowerSF, since its early days, has been the creation of green jobs. Green job creation has been the subject of several reports done by LAFCo and the SFPUC. Some of these reports have been prepared internally by LAFCo and SFPUC staff while other studies have been conducted by outside consultants. Given the passage of more than a decade, the program has changed several times. This report will simply focus on the current iteration of CleanPowerSF.

While three current CCAs are now fully launched to all customers in their service territories, CleanPowerSF will only be launching to a smaller part of the City in its first phase. This report considers job creation in Phase 1 while also projecting forward as the program expands.

A. EnerNex Report

In 2014, LAFCo contracted with independent consulting firm EnerNex to complete a long term build-out strategy for the CleanPowerSF program. In January of 2015, EnerNex completed the report and found that over the long term the program could possibly create 9,232 jobs. This was based on already-known projects that the SFPUC had identified as possible projects for the future. It is very important to note that this was meant to be a 20-30 year projection. Also equally important is that not all the projects may end up getting built.

EnerNex in this report also noted that there are other areas where the program could create jobs, but more work was needed before a jobs analysis of those other areas could be completed. EnerNex gave a list of suggested next steps for the City to get the program to launch. The SFPUC has followed many of those suggestions over the past year as it has implemented CleanPowerSF, currently scheduled to launch in May 2016.

B. CleanPowerSF Jobs Estimate

The SFPUC included a list of internal jobs that will be created to manage and administer the program in the CleanPowerSF Business Plan and Risk Assessment (December 2015). To implement and manage the initial 50 MW program, the SFPUC has identified the need for 10.5 new FTE positions to oversee and execute a successful program. Table 3 below, summarizes these positions and their functions.

Table 3: CleanPowerSF Phase 1 Positions and Functions

Positions	Functions	FTEs
CleanPowerSF Program Director (1) Management Assistant (1) Utility Specialists (2) Utility Analysts (2)	▪ Program Management, Budgeting and Oversight ▪ Power Supply and Service Contract Management ▪ Key Account Management ▪ Regulatory ▪ Integrated Resource Planning ▪ Complimentary Program Development and Administration (e.g., energy efficiency; net metering; feed-in tariff)	6
Communications Manager (1) Outreach Coordinator (1) Public Relations Officer (0.5)	Outreach, Marketing and Communications	2.5
Senior Power Generation Technician (1)	Power Purchasing, Scheduling and Portfolio Management Support	1
Utility Specialist (0.5)	Energy Data Systems Support	0.5
Utility Specialist (0.5)	CAISO Settlements	0.5
TOTAL		**10.5**

In addition to internal staff required to operate the CleanPowerSF program, the SFPUC estimated the number of local and regional jobs that could be created by the program due to the purchase of renewable energy and the provision of energy efficiency services. Table 4 below summarizes this estimate.

Table 4: CleanPowerSF Phase 1 Job Creation

Job Type	Job-years [1] Created
Local and regional construction from new renewables [2]	167
CleanPowerSF role as energy efficiency administrator	3
Energy efficiency implementation jobs from direct CleanPowerSF funding	28
Energy efficiency implementation jobs from customer leveraged funding [3]	84
TOTAL	**282**

[1] Job-years refers to the number of jobs created by an investment or activity for the duration of one year.
[2] This projection assumes that approximately 5% of CleanPowerSF's Phase 1 annual energy requirements are, over time, supplied by local/regional solar projects (about $31 million of local and regional solar investment and about 5 construction job-years created per million dollars invested). See EnerNex Report (2015): http://www.sfbos.org/Modules/ShowDocument.aspx?documentid=50676.
[3] Assumes that as a program implementer CleanPowerSF receives approximately $500,000 per year in energy efficiency funding in Phase 1and that energy efficiency expenditures create approximately 7 job-years per million dollars invested. As an energy efficiency program administrator, CleanPowerSF estimates that $4 million per year in funding will generate approximately 28 direct jobs-years and about 112 leveraged job-years (i.e., from customer energy efficiency investments). See EnerNex Report (2015): http://www.sfbos.org/Modules/ShowDocument.aspx?documentid=50676.

The SFPUC's job estimates above were prepared by using the job creation data presented in LAFCo's EnerNex report. LAFCo staff has reviewed and agrees with the SFPUC's estimates.

Projecting job creation beyond the initial phase can be challenging due to a number of factors, which are difficult to forecast with a high level of certainty, e.g., program revenues over the long-term; power supply and renewable energy costs; and access to state energy efficiency funding. However, using the phasing scenario presented in CleanPowerSF's December 2015 Business Plan and Risk Assessment (Figure 2), has estimated that approximately 4,800 to 9,700 jobs could be generated over a 10 year period as a result of CleanPowerSF's purchase and/or construction of new solar energy facilities (Table 5). This projection assumes that CleanPowerSF acquires an energy supply portfolio that is 100% renewable and/or GHG-free by 2030.

Figure 2: Phasing Scenario for CleanPowerSF Expansion (Dec. 2015)

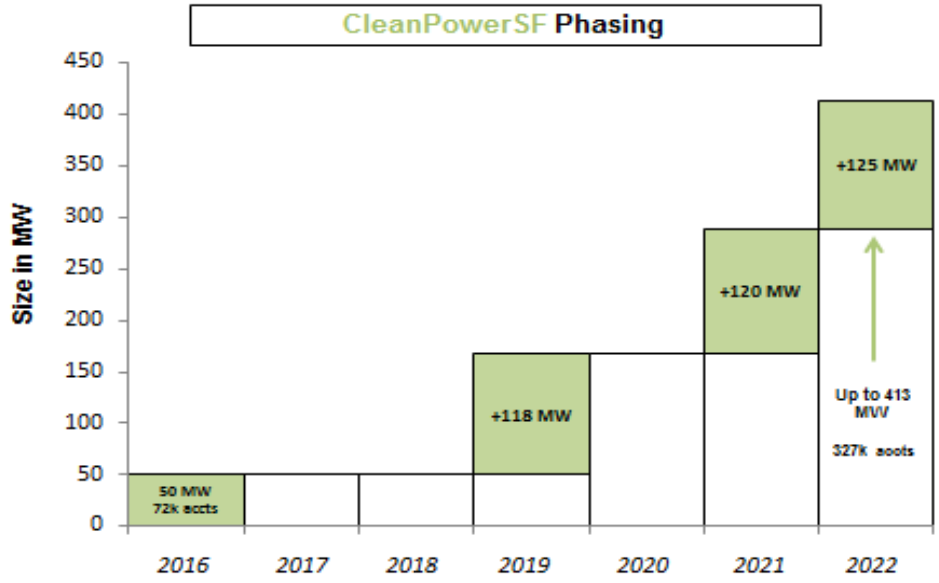


Table 5: Potential Renewable Energy Job Creation Due to CleanPowerSF Power Procurement

	Case	Year		
		2018	2023	2030
New Solar Capacity (MW)	25%	15	263	470
Solar Jobs (Construction & O&M)		158	2,707	4,838
New Solar Capacity (MW)	50%	31	526	939
Solar Jobs (Construction & O&M)		317	5,415	9,675

The low end of this estimate assumes that CleanPowerSF acquires approximately 25% (2.5% per year) of its annual energy supply requirement from new renewable energy resources, constructed as a result of CleanPowerSF, by 2030. The high end of this estimate assumes that CleanPowerSF is able to build, over the same time period, a portfolio from which 50% (5% per year) of the program's energy supply comes from new renewable energy resources.

C. Possible Jobs Created Depending On Early Programming

GoSolarSF

There are already City programs that could be expanded, reprogrammed, or repurposed. Take, for example, the GoSolarSF program. In the early years of GoSolarSF, some roof tops did not get fully maximized due to then-existing design incentives. Some of the early solar projects were designed and built to a size that worked best for the incentive given by the program. In some cases, roof tops were not fully maximized for production. When the SFPUC finalizes the NEM and FiT programs, it would be worthwhile to communicate with all GoSolarSF installers and customers to see where more panels could be put on roofs that they had previously installed. For some of these roofs, more panels may be able to fit based on rooftop size. Furthermore, it is possible that the equipment to support the new panels may already fit within other parts of the system since the system is oversized for current usage. This means you only need to add some additional panels to the roof possibly making it cost effective today for a NEM or FiT program. A more thorough review would need to be done to determine how many roof would qualify and if it makes financial sense for each roof.

California Public Utilities Commission Funding

Another area where more jobs could be created will depend on final decisions on how the City wishes to proceed with requesting funding from the CPUC for energy efficiency, demand side, and other similar programs. Currently both the Counties of Marin and Sonoma receive ratepayer funds to do this type of work. PG&E collects this money from ratepayers on behalf of the CPUC, and the CPUC decides who will receive funds and operate programs. It assigns funds to PG&E, who then partners with others, like counties, to operate programs. Once a CCA is established it can request funds from the CPUC directly as well.

MCE and SCP have taken different approaches to this. MCE recently decided to request money to run some programs that are similar in nature to PG&E programs, with their own local twist. So instead the communities who are part of MCE having to go through PG&E to get these programs, MCE would run them directly. This would allow more local control of those funds and not require any of the MCE communities to have to request changes with PG&E but rather just work directly with CPUC through MCE. SCP on the other hand has decided that it would rather just send its customers to the PG&E-run programs in Sonoma County and request smaller amounts of money from the CPUC to run programs not being done by PG&E. One of the

reasons SCP decided to do this goes to its underlying goals of green house gas (GHG) emissions reductions. In Sonoma County, the biggest way to reduce emissions is not through electricity consumption but rather from transportation. For this reason SCP has decided to focus its program on pilot programs to get people to shift from fossil fuel based transportation to electric vehicle (EV) systems. This is not to say that SCP is not interested in helping reducing energy consumption but rather to get the biggest reduction in GHG they need to focus on EV systems.

San Francisco Environment (SFE) already runs several programs with money from the CPUC that go through PG&E. Discussions are currently occurring between SFPUC and SFE on whether it makes sense to emulate MCE or SCP, or to create some hybrid of those two systems. Either way, SFE has some new ideas for which it would be worthwhile to determine whether CPUC funding is available. Once SFPUC determines which funding model it wishes to pursue, a better jobs creation analysis can be prepared.

Job Training Programs

As mentioned in the previous item, SFE runs several programs already using multiple sources of funds to help businesses and residents to reduce energy usage. The SFPUC is still working on its program design for this work but, once figured out, it could either create its own system or expand on the current programs. For example SFE currently has a job training program called Environment Now which is a two year training program made up entirely of San Francisco residents. Once the previously-mentioned CPUC funding issue gets finalized, if the SFPUC requests additional money and it works out, then the SFPUC could utilize the SFE Environment Now program. The job trainees in the Environment Now program inform businesses and residents of energy saving opportunities and possible programs that help pay for the costs. So while the people in the program are learning good job skills they are also helping promote the creation of other local jobs. This is done by encouraging those businesses and residents to make changes in lighting, heating, water or other systems that, in themselves, create more jobs for people in those fields.

Local Solar Share

A local solar share program has been discussed in the past by advocates but still needs more work done. A local solar share program is where multiple people combine to build or purchase the energy from one solar system. This is normally done offsite from where the energy is used. These programs allow those that want to generate their own solar but don't have the means to do so. Normally some kind of bill credit is given for the offsite energy production to help cover the costs of building the new system. Solar production in San Francisco is more costly than buying energy or building new production in other parts of the state. For this reason it can be hard to get large amounts of local solar energy into the CleanPowerSF power mix if you wish to keep costs

competitive with PG&E. MCE may have found a way to increase local solar production without raising the average customer's bill that may be replicable in San Francisco. MCE created a program called "Local Sol" which allows people to buy into a specific local solar installation located in its service territory. This is a premium product that costs more, but should customers choose to participate, then they would get a fixed-rate structure that provides certainty in future rates for many years out. If San Francisco were to create a similar program, it could help fund more expensive local projects that would otherwise have to wait until they become more cost competitive. SFPUC's current 10-year capital plan includes a project known as the "University Mound Solar Project" that could be used as a SF version of Local Sol. According to the EneNex report, this project would average about 113 construction jobs. The SFPUC 10 year capital plan also identified Tesla which, while outside of San Francisco, would yield 76 construction jobs. The SFPUC would need to do some homework on how much more customers would be willing to pay, but it could be possible to add additional sites. The EnerNex report identified three additional solar sites in San Francisco (Hunters Point, Sutro Reservoir and Piers 90-94) and three other sites in the area but outside of San Francisco (SFO Parking Lot, Pulgas Resevoir, and Sunol). The below chart from the EnerNex report shows the potential jobs from each project.

Table 6 Solar Project Economic Impact Summary[4]

Project	Average Construction Phase Jobs	Average O&M* Phase Jobs	Average Capacity (MW-AC)
Sunol Valley	570	4.7	17.5
Tesla Portal	76	0.7	2.8
SFO Parking Lot	385	2.7	10.0
Hunters Point - Parcel E	212	1.8	6.5
University Mound - North Basin	113	0.8	2.9
Sutro Reservoir / Summit Pump Station	94	0.6	2.4
Pulgas Balancing Reservoir	99	0.7	2.5
SF Port- pier 90-94	104	0.8	3.1
Local/Regional total	***1,653***	***12.8***	***47.7***

* Operation and Maintenance

[4] See EnerNex Report (2015): http://www.sfbos.org/Modules/ShowDocument.aspx?documentid=50676

As stated previously, a cost evaluation would be needed to determine just how much potential customers of this program would be willing to pay and which projects could be built within that amount. Furthermore it would be good to determine whether projects need to be physically located in San Francisco, or whether a regional approach would work. Finally, there are also 5 regional wind projects that could also be built. Having a mixture of wind and solar could help keep overall costs down. Therefore, it will be important to gauge customers' willingness to pursue wind projects as well as solar projects. This mixed energy approach could lead to more projects being built quicker assuming you have the customer base to support a large program.

Back Office Functions

CleanPowerSF will start off with Noble America operating some of the back office functions, such as billing interface with PG&E, since SFPUC does not currently have the system in place to do this work. SFPUC staff goal of the program is to bring this work in house. In order to do that, the SFPUC will need to build and test its own system. It was not clear in the SFPUC December 2015 Business Plan as to whether this new system will be built in house, with outside consultants, or some combination of those two. Either way, jobs will be created to develop this large multi year project.

D. Future Jobs Creation Needing More Research

As the SFPUC moves forward with a launch, there are also other programs that need more work. For example SFE currently is working on a project that looks to identify key parts of the City that would need uninterrupted electricity service during an emergency. Currently, emergency service locations have the ability, through backup generators, to be self sustaining for 72 hours. Lessons learned from places like New Orleans have shown that in some cases you may need to operate longer than 72 hours. So the goal of the SFE report is to identify locations where several services are located and generate a plan to make them self sustaining past the 72 hour timeframe. While the SFE resiliency report is still being drafted, one of the ways to do this would be to have solar hooked up to battery storage and local wires connect these systems together. It would be extremely costly to build and maintain a solar and battery storage system simply to be used in the case of emergencies, which are hopefully years apart. One possible solution would be to have CleanPowerSF either directly own or agree to buy the energy and use of the energy storage for its usage when not needed for those emergency situations. The cost is not yet known for these projects but they will likely be good candidates for the previously mentioned community solar program as people who are willing to pay the premium might also like knowing they are helping ensure emergency services in the time of need.

V. Funding Sources For Build-Out

In order to have a successful build-out you need to have a stream of funds to pay for a green jobs build-out. The SFPUC has the desire to do the most robust build-out possible while staying within a cost structure that keeps its pricing at launch just under PG&E price. The recent CPUC ruling on the PG&E PCIA has made it difficult for the year-one robust build-out previously envisioned. Given this, the SFPUC will need to have a multi funding strategy to make up for the loss of funds that are now needed to cover the higher PCIA costs to consumers.

California Public Utilities Commission Funding

Every electricity consumer, as part of his/her PG&E electricity bill, pays into a fund that is administered by the CPUC. Currently, San Francisco gets this funding through PG&E and administered by SFE. With the establishment of CleanPowerSF, San Francisco can now apply directly to the CPUC for some of these funds. As mentioned in the previous section, other CCA programs use this resource differently. MCE is looking to run the programs itself, giving it more control of energy efficiency and load shaping programs. SCP has instead decided to use those funds to try a new pilot program to help them in shifting Sonoma County towards more EV transportation systems. The SFPUC and SFE are reviewing current programs and potential programs to determine if CleanPowerSF should apply for these funds directly, like MCE, or to continue to leverage existing ratepayer funded programs, like SCP. No matter what SFPUC decides, CleanPowerSF should determine whether this CPUC fund is available to pilot new programs or to expand existing programs.

Federal and State Grants

Both at the Federal and State level there are grants that from time to time become available that CleanPowerSF could apply for. While these grants in themselves do not necessarily create jobs they can allow the program to study some new ideas that could lead to new programs being created that can create new jobs. These programs tend to look for leading edge and pilot programs. They do not necessarily pay for the full program but help fund parts of the program helping reduce costs. Take for example the previously mentioned resilience planning that is being done by SFE. While the initial report looks to just find sites, this report could create new opportunities for job creation. SFPUC along with other departments, such as SFE, should be looking for more opportunities like this. While it would be great to have all the money needed to test out new ideas, sometimes it is more cost effective to first do reviews that if they pan out can get us more jobs later.

Energy Supply and Customer Rates

The energy supply that CleanPowerSF uses is a source for jobs in two different ways. First a portion of the price that is charged to the consumer can be used to give the program the funding needed to construct new renewables. Second the energy supply itself can be used to finance

either a Power Purchase Agreement with a third party or a City-owned project. Other CCAs have used this approach. The SFPUC in its December 2015 business plan estimated 167 jobs can be created doing this.

A recent decision by the CPUC authorized a doubling of PG&E's PCIA to customers already served or departing to new CCA programs, like CleanPowerSF (increasing the fee from about 1.1 cents per kilowatt-hour (kWh) to 2.3 cents per kWh). CleanPowerSF has made a commitment to offer competitive service that does not increase consumers' bills at program launch. The doubling of the PCIA has cut significantly into the margin CleanPowerSF might otherwise have for additional funding of new energy efficiency and clean energy programs. To accommodate the PCIA charge that its customers must pay PG&E, CleanPowerSF must be able to offer rates that are significantly lower than PG&E's rates. At current PCIA rates, it is estimated that approximately $9.5 million per year less will be collected by CleanPowerSF in the initial phase to accommodate for PG&E PCIA fees.

Depending on what type of project the money would have been used to construct , along with if it was a San Francisco or regional based program, you see anywhere from 4.9-6.7 constructions jobs created per million spent. This does not include the operational and maintenance jobs created from that construction.

Table 7 Construction Benefits[5]

Project Type	Location	Potential Labor Impacts (Jobs per $Million)
Utility Scale Solar	San Francisco	4.9
	Regional	5.1
Small Hydro	San Francisco	6.3
	Regional	6.7
Behind Meter EE, DR & DER[6]	San Francisco	6.6

Special Self Funding Programs

Mentioned in a previous section was the creation of a community solar share program similar to MCE Local Sol program. With a well-established community solar share program, CleanPowerSF will be able to have a self-funded program that can create jobs once the program

[5] See EnerNex Report (2015): http://www.sfbos.org/Modules/ShowDocument.aspx?documentid=50676
[6] Estimates based on residential photovoltaic installation as a proxy for other behind-the-meter project types.

is established with participation agreements from enough customers. While the community share program is one idea, other possibilities exist. For example, with some more thought and work, perhaps EV charging station could be built around the City with the customers paying the CCA program for the electricity used to charge their EVs. A lot more research would be needed to determine who should own the charging station, be that CleanPowerSF directly, SFPUC, CCSF, a private third party company or some combination of those. Any program of this type that is created will likely involve more expensive electricity costs. Such programs should only be launched if they can prove to be self sustaining programs that will not increase the cost for the base product to the customer of CleanPowerSF.

VI. Concluding Remarks And Next Steps

The one constant when talking with the three CCA's that have already launched was that focusing on core issues (power procurement and ensuring all costs for the program are covered) should be the first priority of the program. While not all three CCAs track job creation, it is apparent that simply by launching a program job creation will follow. The pace and amount can vary based on decisions the program makes. We do see the two other Bay Area CCAs did not have any new construction at launch but have layered them in over time. Since MCE was the very first program in place, it took the longest to get new renewables into its mix. This in many ways is very understandable for several reason. MCE was being the first CCA program in California market seemed to be wary of Marin since they were entering a brand new market type for many in this industry. MCE since its launch has also seen the price of new renewable dropped during its program history, along with PG&E price increase for standard power, which has allowed MCE to be more aggressive in getting new renewable generation sites created. This has also been helped by the availability of the Investment Tax Credit. MCE has now set itself on a strong path for new renewable construction and the jobs associated with them. SCP was able to build off early work by MCE and able to get to new projects at a quicker pace. While at the time of this writing, the contracts for power procurement to launch Phase 1 of CleanPowerSF are not public it does appear the SFPUC is following suit with the two other Bay Area CCAs.

While the SFPUC Power Enterprise has been using some of its current staff to help with the launch of the program, it does face limitations on how much it can do at the current staffing level. One of the hurdles the SFPUC will face is the City process for hiring new positions. The Board of Supervisors and the Mayor's office should do what they can to help expedite the hiring of these new positions at the SFPUC. The SFPUC through expansion of its own staff to deal with the new work load of CleanPowerSF can help lay the ground work for even more job creation through new program offerings.

The next question is how quickly the SFPUC either creates some of the new programs mentioned in this report. For example the NEM and FiT programs can lead to private sector growth of new generation if correctly established. In addition to the 10 new positions that CCA creates, it might be worth adding one or two more to help with special programs, like a local solar share type program, similar to MCE Local Sol. Having this type of new program could expedite the jobs creation in the early parts of the program. The SFPUC does need to pay attention to its bottom line, but it could be possible to have the new position(s) paid for out of the cost charged to customers of the local share program. The position(s) would be responsible for various activities surrounding that program, one of which should be getting customers to sign up.

The roll-out of future phases, based on the December 2015 business plan, is not scheduled to happen until 2019. Once the Opt-Out period has ended for Phase 1, the SFPUC should revisit this timeframe. If the program proves to be successful with a low opt-out rate, it may be possible to find new renewable generation projects and have roll out to new group of customers occur as they are brought on-line. Also with a successful launch, it will show the energy markets that this new program is popular which can lead to the favorable financing needed to bring on more energy production while not putting the overall program at risk.

It is LAFCo staff's opinion at this time that the SFPUC's main focus should be on a successful launch of Phase 1. With a successful launch, other CCAs have shown job creation will follow. This is not to say that the creation of programs should not move forward as we move towards launch. The more products CleanPowerSF offers to customers (i.e. NEM/FiT or Local Sol type program), the more likely it is to have customers want to stay with CleanPowerSF. This is why it is extremely important to get the new positions filled at the SFPUC Power Enterprise for CleanPowerSF. Once the Opt-Out period for Phase 1 has ended, a full review of future phases should occur. While some new jobs will be created with Phase 1, the other two CCAs that have been around more than a year show that it's with the addition of new customers after launch where job creation can really get ramped up.

VII. Abbreviation Codes

CCA: Community Choice Aggregation

CCSF: City and County of San Francisco

CPUC: California Public Utilities Commission

EV: Electric Vehicle

FiT: Feed-In Tariff

FTE: Full Time Equivalent

GHG: Green House Gas

LAFCo: San Francisco Local Agency Formation Commission

LCE: Lancaster Choice Energy

NEM: Net Energy Metering

MCE: Marin Clean Energy

PG&E: Pacific Gas and Electric Company

PCIA: Power Charge Indifference Adjustment

RPS: Renewable Portfolio Standard

SCE: Southern California Edison

SCP: Sonoma Clean Power

SFE: San Francisco Environment

SFPUC: San Francisco Public Utilities Commission

Appendix A: Projects Built By Marin Clean Energy

MCE California Renewable Energy

OVERVIEW 2015

Marin Clean Energy (MCE) has committed $515.9 million to 195 MW of new California renewable energy projects. This includes $353.9 million for solar, $44.7 million for wind, and $117.2 million for waste-to-energy projects. Below is the current list of all California renewable resources currently under contract with MCE.

Resource Type*	Generator	Location	Installed Capacity (MW)	MCE Service Start Date	Contract Length	Jobs Impact**	
						Con***	O&M***
Solar, PPA	RE Kansas	Kings Co.	20 MW	2014	3 years	78	6
Solar, PPA	EDF Cottonwood	Kings Co./ Kern Co.	23 MW	2015	25 years	746	7
Solar, PPA	EDF Cottonwood	Novato, Marin Co.	1 MW	2015	25 years	30	0
Solar, PPA	RE Mustang	Kings Co.	30 MW	2016	15 years	973	9
Solar, PPA	MCE Solar One	Richmond, Contra Costa Co.	10.5 MW	2015	25 Years	341	3
Solar, PPA	EDF	Novato, Marin Co.	1 MW	2016	25 years	32	0
Solar, FIT	San Rafael Airport	San Rafael, Marin Co.	1 MW	2012	20 years	32	0
Solar, FIT (Local Sol)	Cooley Quarry	Novato, Marin Co.	1.5 MW	2015	20 years	49	0
Solar, FIT	Cost Plus	Larkspur, Marin Co.	0.25 MW	2015	20 years	8	0
Solar, FIT	Self Storage	Novato, Marin Co.	1 MW	2016	20 years	32	0
Wind, PPA	EDP, Rising Tree III	Kern Co.	99 MW	2015	4 years	63	14
Landfill Gas, PPA	G2 Energy	Solano Co.	1.6 MW	2013	18 years	23	11
Landfill Gas, PPA	G2 Energy	Yuba Co.	1.6 MW	2013	18 years	23	11
Landfill Gas, PPA	Genpower	Lincoln, Placer Co.	4.8 MW	2012	20 years	16	19
Landfill Gas, PPA	Redwood Landfill	Novato, Marin Co.	3.5 MW	2015	20 years	39	16
Geothermal, PPA	Calpine	Sonoma Co./ Lake Co.	3 MW	2013	1 year (multiple)	N/A	N/A
Geothermal, PPA	Calpine	Sonoma Co./ Lake Co.	10 MW	2013	10 years	N/A	13

*PPA = Power Purchase Agreement; FIT=Feed-In Tariff

**MCE uses the National Renewable Energy Laboratory's (NREL) Jobs and Economic Development Impacts (JEDI) Model best suited to each generating project/contract and may adjust to more accurately reflect the nature of MCE's relationship with the generator and/or actual jobs statistics provided by generator owners.

***Con = construction; O&M = operations and maintenance