Research Performance Progress Report (RPPR) for DOE/EERE

Project Title:	National Community Solar Platform
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Working Partners:	
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Signature Date

Project Objective:

This project was created to provide a National Community Solar Platform (NCSP) portal known as Community Solar Hub, that is available to any entity or individual who wants to develop community solar. This has been done by providing a comprehensive portal to make CEC's solutions, and other proven community solar solutions, externally available for everyone to access – making the process easy through proven platforms to protect subscribers, developers and utilities. The successful completion of this project provides these tools via a web platform and integration APIs, a wide spectrum of community solar projects included in the platform, multiple groups of customers (utilities, EPCs, and advocates) using the platform to develop community solar, and open access to anyone interested in community solar.

CEC's Incubator project includes web-based informational resources, integrated systems for project information and billing systems, and engagement with customers and users by community solar experts. The combined effort externalizes much of Clean Energy Collective's industry-leading expertise, allowing third parties to develop community solar without duplicating expensive start-up efforts. The availability of this platform creates community solar projects that are cheaper to build and cheaper to participate in, furthering the goals of DOE's SunShot Initiative.

Background:

Clean Energy Collective (CEC) is the nation's leading developer of community solar solutions. CEC pioneered the model of delivering clean power-generation through large-scale solar PV facilities accessible to all utility customers. Since establishing the first community-owned solar garden in the country in 2010 near El Jebel, Colorado, CEC has built or has under development more than 100 community solar projects with 25 utility partners across 12 states, representing 130 MW of community solar capacity.

CEC's community-owned solar solutions expand accessibility to 100% of ratepayers (not just the 15% whose homes are properly sited and support onsite solar), provide 5 – 15 times more lifetime financial benefit to customers than onsite solar through low-cost medium scale solar facilities with customer acquisition and long-term (50 year) operational costs that are 80% lower than traditional solar. Simply, they cost less, produce more and last longer as a managed solution, driving down capacity ($ / watt) costs and lowering energy (kWh) costs.

Currently, there are more opportunities to develop community solar than a single company such as CEC can accommodate. CEC's unique business model has been difficult for most to duplicate, and as such, the NCSP project aims to expand the availability and scalability of this model in order to accelerate the adoption and implementation of Community Solar programs.

Since the award has been completed, we are now able to offer all of the information and tools necessary to enable someone interested in developing community solar to succeed with its implementation without becoming a direct CEC customer. Throughout the process of developing this platform, we have provided advocates with the information needed to

thoroughly understand community solar program concepts. EPCs and utilities are now able to access the tools that will simplify program implementation. Additionally, the integration tool that allows CEC's proprietary billing reconciliation tool, RemoteMeter, and third party billing systems that communicate and share data via an API has been built and is successfully functioning in several major utility billing systems.

1. Significant Achievements

The development and launch of NCSP platform was a success. We created billing software that integrates with any utility billing system, providing bill credits and production reports for community solar programs. We launched a fully functional web portal meeting all SOPO requirements ahead of schedule in D3; throughout the program, work continued to focus on talking to advocates and utilities about their plans to use NCSP tools for program implementation. Because the website was delivered ahead of schedule with no anticipated major changes to layout or content, a final round of feedback from the UAC was not gathered. However, we continue to engage with all users of the website taking their comments and feedback into consideration for possible future iterations. All technical goals were completed by the end of D5 which were the final versions of the SAP, generic SAS, and Oracle integrated billing systems. Our outreach efforts continue with significant traction due to receiving daily new registered users on the site representing utilities, advocates and EPCs. The NCSP tools are being used by two utilities and one EPC. Advocates use the Community Solar Hub site for information and interaction with other community solar professionals. We intend to keep the information on the platform updated in order to provide access to information and tools that will help drive down the soft costs of community solar program implementation and management costs.

2. Progress update

For ease of reference, progress report details are organized by each Task and Sub-Task described in the Statement of Project Objectives.

TASK 1 – Develop NCSP public website and integration API

Subtask 1.1 – Build public facing NCSP website

--Technical accomplishments

- Development test site and production environment was built during D1. Additionally, an initial database schema for the full production version was established
- D2 saw an overall revamp of the UI design with an enhanced user experience
- Database schema was finalized and was made operational during D3

--Work performed

- Public site was completed in D3
- Successfully deployed website, CMS, database and API components
- Throughout the entire project, continued to build out content using the CMS and looked for new potential product ideas or other ways to improve the site
- Continued to test and make improvements to the site as needed

Subtask 1.2 – Build API allowing integration of projects into NCSP

--Technical accomplishments

- The database schema was established in D1, identifying which data would be accessed via the API versus data that would reside within the CMS site.
- Production version of the website API was completed during D2
- First generation of the website API was completed during D3

--Work performed

- The database schema was completed and data requirements were gathered during D1
- All work performed was completed during D3. Completed user guide for the API. Functionality includes:
  - Ability to ingest project data
  - Register Users
  - Register and Edit Projects
  - Display project summary data on both US and state-by-state maps
- By the end of D6, 95 community solar projects located in 25 states have been entered into Community Solar Hub project map page
- Anyone requesting Premier Access has the ability to register their own community solar program details including a link to their website
- The project map displays information on any community solar array in the country registered on Community Solar Hub

Subtask 1.3 – Test website, components, and API with Beta users and improve based on feedback

--Technical accomplishments

- Completed thorough testing of website, website API and CMS

--Work performed

- All edits and adjustments were made to the website prior to launch in D3. All user feedback was integrated for the development of website
- Prior to the public launch of the website, three utility representatives and two EPCs performed Beta tests of the website

TASK 2 – Develop APIs for RemoterMeter™ integration into Oracle, SAS and SAP billing systems

Subtask 2.1 – Work with Oracle, SAP, and SAS to build billing system APIs to integrate with RemoteMeter™

--Technical accomplishments

- A great deal of research and assessment of Partner billing systems occurred during the development of this phase of the website, resulting in established formal partner relationships
- Test environment for SAP began development and testing D3
- Completed final testing of SAP and generic SAS billing system integration took place during D4
- Completed final testing of Oracle billing system integration during D5

--Work performed

- Final testing of APIs was presented at the end of D5

Subtask 2.2 – Test and integrate billing system APIs

--Technical accomplishments

- During D3, end-to-end testing occurred of the SAP billing integration and a test harness was established for future testing including Oracle
- Testing of SAP and generic SASbilling system was performed in D4
- Performed final test of Oracle integrated billing system in D5

--Work performed

- Final testing of API billing systems was completed by the end of D5
- Billing system APIs built out as part of RemoteMeter™
- Calls were made from RemoteMeter™ to pass customer credits to Oracle and SAP billing systems, thereby updating each solar customer's account within those systems with the associated credit
- The test harness is designed to test a variety of scenarios through a front-end application that allows the tester to enter different input values and see the resultant data inside the Oracle and SAP billing systems respectively

- Engaged with customers using SAP's billing system. Determining what other requirements a typical utility company might have in order to integrate with their solutions

Task 3 – Establish Utility Advisory Council

Subtask 3.1 – Recruit members of Utility Advisory Council

-- Business accomplishments

Secured participation from UAC members in D1 and continue to engage with each member ongoing.

- Kelly Magalsky – Avista Utilities, Washington
- Norm Weaver – Fort Collins Utilities, Colorado
- Jeff Wadsworth – Poudre Valley REA, Colorado

-- Work performed

- We continue to maintain the relationship and input with the UAC. Any feedback received from UAC is always considered for improvement upon future iterations of the website

Subtask 3.2 – Test NCSP and API components with UAC

-- Business accomplishments

- The first round of feedback and testing with the Utility Advisory Council for the early version of the website occurred in D2. Each member provided feedback and requests for specific function and features
- The second round of feedback and testing with the Utility Advisory Council for the launched version of website occurred in D4 with each member providing insight and requests for specific function and features

-- Work performed

- Engagement with UAC members remains ongoing, with any feedback or comments received considered for future iterations of website

Task 4 – Customer Engagement

Subtask 4.1 – Develop Customer Engagement strategy, support materials, and training package

-- Business Accomplishments

- A customer engagement strategy, support materials and training package was developed during D2. Informational resources including community

solar interest articles and blogs, community solar guides, and news articles were added during each Deliverable period and have been regularly updated to the Community Solar Hub website with the goal of keeping viewers informed and content current and relevant

- Any visitor to Community Solar Hub website can access the Resources section which provides information about how to implement a community solar program

-- Work performed

- Iterations of strategy and support materials continued to be refined throughout the award, and will be updated with future versions
- Engaged with Advocates regarding their plans to organize support for community solar programs within their communities, how they will accomplish each goal, and discussed obstacles and any plans to overcome these set-backs. Engagement continues as Advocates contact us through the Hub site
- Customer engagement is initiated through online inquiries and phone calls from interested EPCs and Advocates through Community Solar Hub, multiple social media platforms and CEC websites and sales call center. This continues to be an effective source of participants providing feedback for the continued development of the website and tools. Upon initial contact by EPC or Advocate, Customer Engagement Manager contacts participants by phone. The program is explained and participants are pointed to the website where they can register as users. All conversations are documented along with email correspondences

Subtask 4.2 – Recruit EPC, Utility, and Advocate initial customers

-- Business Accomplishments

- Continued to engage with and document feedback from EPC, Advocate and Utility participants
- Through social media engagement, continue to encourage participants to register as users on the website
- Continue to schedule phone interviews with registrants to discuss toolsets in detail and direct them to informational guides based on their specific requests

-- Work performed

- During the award period and continuing beyond completion of project, Advocates and EPCs continued to register on the website, requesting toolset information or Premier User access. Registrants used the project map and accessed informational documents that are updated regularly. As registrants provide their contact information and request detailed

information about toolsets, each inquiry is contacted by phone and email, and all conversations are documented for review. Many user types continue to engage with us and continue to assist in providing feedback on what tools the Community Solar Hub could provide that would be useful in their project development research.

- An interactive strategy that encourages EPCs and Advocates to engage with Community Solar Hub through email, social media, and phone conversations is utilized daily.
- Continue to engage with each interested participant through email exchanges and document phone conversations. Encourage detailed feedback regarding their own projects and accomplishments. Inform each participant of function of each toolset, posted informational documents and news articles and encouraged them to explore details of existing projects pinned to project map.
- Each participant type has displayed similar characteristics unique to EPCs, Utilities, and Advocates. Upon talking to each participant we have discovered the sales cycle and decision process of the utilities is much longer than originally anticipated. All utilities we've talked with about using NCSP tools since July 2015 are still engaged with us, but have yet to make buying decisions. EPCs are all similar in that they have experience in selling and building solar arrays, they are interested in community solar, but have very little understanding of the complexities involved in building and managing a program. Developers and EPC partners that we've engaged with have shown interest in developing projects in NY, MN, and CA markets. Regulatory slowdowns have prevented completion of those projects prior to the end of the Community Solar Hub project with DOE. We continue to engage with these partners by providing content through the platform. Developers, EPCs, and Advocates require ongoing consultation and education about all aspects of community solar programs.
- We are heavily engaged in all markets with a variety of partners

Subtask 4.3 – Work with utilities to utilize Community Solar Hub products

-- Business accomplishments

- Presented informational demonstrations to multiple utility executives considering using NCSP software for community solar programs. Entered into ten (10) non-disclosure agreements by the end of award period, examined utility goals, and provided customized proposals outlining their use of NCSP tools and services. Work with utilities continues, resulting in increased presentations, signed NDAs and pricing proposals for the use of NCSP tools and services.

-- Work Performed

- Executed an agreement with one utility by the end of D6 to use NCSP tools for community solar development. Since the end of award period we have executed an additional agreement with a utility and continue to present to many more
- CEC's Business Development and Community Solar Platform teams interact with utility executives daily and present information weekly about the tools offered through the website
- Documented all communications with interested utilities and documented interests of 3 utilities for the purpose of meeting all deliverables
- Analyzed data collected to determine which tools tend to be more popular with utilities, how to communicate the value of each toolset, and present to utilities what seems to be a solution to their primary concerns
- Encouraged utility representatives to register on Community Solar Hub website
- Continued to update communication and presentation materials based on feedback from utilities previously engaged with
- Demonstrated toolset functionality, distributed web links and brochure material that guides them through different phases of their project

Subtask 4.4 – Work with EPCs to utilize NCSP products

-- Business accomplishments

- Over the course of the project, we engaged with several EPCs, by phone and email, who registered on the Hub site requesting toolset information
- Continue to Provide multiple tools and services presentations to EPCs interested in implementing a community solar program. Continue to request that EPCs remain in communication providing emailed descriptions and any requirements of tools that would assist them in developing and managing their projects

-- Work Performed

- By the end of D6, we executed a licensing agreement with one EPC to use NCSP tools for community solar project development
- Phone conversations and email exchange continues with EPC representatives discovering what tools and services they need in order to successfully bid on community solar programs in their community. We have discovered that EPCs require information and an understanding about program models, ownership, policy from state to state, and the importance of partnering with utilities. They are less likely to be ready for

tool licensing and are benefiting from informational material and partner links provided on the website. The requirement of having 10 license agreements signed by 10 EPCs was not accomplished
- We continue to have discussions with EPC representatives, learning about their objectives, questions and concerns about community solar projects
- We continue to document all communications with interested participants
- We always encourage EPC representatives to register on Community Solar Hub website
- By the end of D6, we scheduled time for tool presentations, and made tool presentations to at least 15 EPCs
- Consultation and presentation of community solar concepts and software tools is ongoing

Subtask 4.5 – Work with Advocates to utilize NCSP products

-- Business accomplishments

- During the NCSP projectwe registered and spoke with more than 100 solar Advocates wanting to learn more about community solar
- During D2 – D6 conversations with Advocates and their plans to pursue community solar programs were documented as reports for research and analysis
- By the end of D6 we contacted 30 previous Advocate participants, gathered updates on each of their activities, progress, or setbacks
- Documented conversations, outlining the details of their plans and processes

-- Work Performed

- During D6 we created reports for 30 Advocates seeking to pursue community solar programs using Community Solar Hub tools and services
- Reports were generated from accumulation of conversations, emails, and written assessments of months' worth of engagement with Advocates
- Discussions with Advocates, learning about their objectives, questions and concerns about where to begin when attempting to bring community solar into an area where it does not yet exist. In most cases Advocates provided us with valuable feedback of what they feel they need from Community Solar Hub in order to advocate for a program. There have been specific requests for case studies that represent municipal, cooperative, and IOU sponsored programs. The informational resources are being updated based on specific requests
- Connected advocates with other advocates with the sense that some people would benefit by contacting others based on where they are in

their plans, what obstacles have been met, and how they've overcome some complications to their plans. People are usually very happy to share information, even if advocates are working in different communities.
- Confirmed details of each report with each participating Advocate
- Communicated with participants daily, documented feedback
- Distributed web links and brochure material

TASK 5 – Development, Control, and Distribution of Project Resources (Tools, Products)

Subtask 5.1 – Write Informational NCSP tools

--Business accomplishments

- Completed all content for Tools home page (Tools Landing Page) at end of D3
- Completed all content for individual detailed Tool pages by the end of D3
- Completed content for other community solar resources including third party links, news and learning resources by the end of D3

--Work performed

- Content writing was created and delivered ahead of schedule at the end of D3. On-going edits and additions to content such as new blogs and articles posted regularly during project and continues beyond award completion. Keeping content current helps drive traffic to the site through optimized searching and also positions the website as an up-to-date resource for visitors. The latest news and announcements about community solar is shared through the site and via social media. Community Solar Hub is becoming a recognized resource for anyone wanting to learn about community solar programs
- Social media content and conversations continue to be an active area of engagement with Advocates and EPCs

Subtask 5.2 – Format tools in appropriate fashion for distribution to both Basic and Premium NCSP users and achieving open data goals where possible.

--Technical accomplishments

- NCSP tools were formatted based on engagement performed with all users – Utilities, EPCs, and Advocates
- Basic registration allows user to express interest in and learn more details about NCSP tools
- Premier registration allows user to submit community solar project information which once verified will be pinned to the Project Map

--Work performed

- The needs of various classes have been assessed in determining the critical tools needed by each user
- Basic and Premium users provided feedback that helped determine tools and information best suited for their needs

Subtask 5.3 – Legal compliance and input on all tools and NCSP components

--Business accomplishments

- To date, the tools and resources we offer on the site have been previously vetted by legal and are proven products used internally by CEC. New products or tools in the future may require further legal assessment, but is not relevant at this time.

Subtask 5.4 – Software development

--Technical accomplishments

- Software was developed, managed, ad supported by CEC technical team
- Website was developed by contractor in collaboration with CEC
- During D5 software development was finalized and final testing was successfully performed on all three APIs

--Work performed

- Development was finalized on tools designed to allow for custom configuration of billing integration for utilities. This allows utilities using a variety of billing solutions, including SAP and Oracle, the configurability necessary to best fit the needs of their organization and market.

TASK 6 – Project Development and Administration

Subtask 6.1 – Oversee full project strategy, budget, and management

--Technical accomplishments

- This subtask is not a technical deliverable. However, all technical deliverables due were delivered on-time and within budget.

--Work performed

- CEC oversaw the development of the NCSP contract in responsible and effective manners by overseeing project participants
- CEC remained on task and within timelines during the development of NCSP contract
- Budget and project expenditures were successfully managed

Subtask 6.2 – Complete all required project meetings, paperwork, and administrative tasks

--Technical accomplishments

- N/A

--Work performed

- All reporting, requests for reimbursement and any other associated paperwork related to the project have been completed and successfully submitted on-time.
- Monthly check-in/project status updates with the DOE have been scheduled and regularly attended by key team members. Key deliverable meetings with the DOE took place in within 30 days of end of quarter.

3. Work and outcomes planned for the next quarter

All work towards the completion of technical tasks has ceased. Clean Energy Collective wishes to terminate the award.

4. Customer involvement, activity and feedback, and the adjustments that have been or are planned based on this feedback

- Engaged with at least 100 Advocates who initially contacted CEC and Community Solar Hub website, registering or requesting information on how they could start a community solar project in their area.
    - Documented phone conversations quoting specific needs and expectations from each Advocate
    - Discussed with at least 100 Advocates what NCSP tools would be available, how they will assist them with their projects and how they will be developed based on advocate feedback. Each participant has agreed to remain in contact, via email or phone, regarding their personal activities surrounding community solar
    - We learned that Advocates can be very influential in gathering community support but require guidance in how to spearhead projects. Advocates are looking for education about community solar. They are also looking for step-by-step instructions on how to gather support for programs.
- Engaged with at least 25 EPCs who initially contacted CEC and Community Solar Hub website, registering, or requesting information on how they could start a community solar project in their area
    - Documented phone and email conversations quoting specific needs and expectations from each EPC

- Discussed with at least 25 EPCs what NCSP tools would be available, how they will assist them with their projects and how they will be developed based on EPC feedback. Each participant has agreed to remain in contact, via email or phone, regarding their personal activities surrounding community solar
- Contract to use NCSP tools was executed with one EPCs by the end of award period
- EPCs receive NCSP presentations and proposals on a regular basis with goals to pursue partnerships and executed agreements to use NCSP tools
- We learned that EPCs also require education about how community solar program regulation, how programs operate, and how bill credits are applied to customer bills. Overall, they are confident in their own project construction and customer acquisition abilities.

- Engaged with at least 3 utilities who initially contacted CEC and Community Solar Hub website, registering or requesting information on how they could start a community solar project in their area
  - Documented phone and email conversations quoting specific needs and expectations from the utility
  - Discussed with at least 3 utilities what NCSP tools would be available, how they will assist them with their projects and how they will be developed based on utility feedback. Each participant has agreed to remain in contact, via email or phone, regarding their personal activities surrounding community solar
  - Contracts to use NCSP tools were executed with two utilities by the end of the award period
  - Utilities receive NCSP presentations and proposals on a regular basis with goals to pursue partnerships and executed agreements to use NCSP tools
  - We learned that utilities are interested in bill credit capabilities and program management. We have always been aware of, and are reminded that utilities are notoriously slow in implementing renewable energy programs unless mandated to do so.

5. Market interest; communications with partners, media attention and coverage

- Community Solar Hub received national attention during D3 due to the White House announcement about how community solar will assist lower income neighborhoods. Community solar programs continue to receive national attention by the print news media, covering stories of new programs to be offered by utilities, and programs that serve low-income communities. Registrants continue to visit the site due to interest generated through social media, and content updates. The release of Community Solar Hub information to the media and general public during late D3 did generate attention in the form of publication of the press release on solar industry sites and news articles, and continues to generate interest

- Partnerships with industry trade organizations such as Vote Solar and SharedRenewables.org contributed to new interest generated in Community Solar Hub during project development. Announcements about the program have been placed in industry trade group's newsletters, which has generated new interest in the site.
- Social Media interest
    - Facebook page receives traffic on daily basis. Information about community solar programs are posted regularly. Viewers participate in sharing and liking of the information
    - Twitter has become an active social media platform for sharing of information and connecting with advocates for community solar, renewable energy and climate change. Information is shared with our Twitter followers regularly and has become a great source of breaking news within the community solar industry
    - Industry trade magazine, Solar Today, has agreed to receive a quarterly article that features Community Solar Hub and user profiles
    - Industry groups are linking to the website, and helping promote Community Solar Hub via social media comments and conversations
- Website traffic driven by social media, editorial content, press announcements, and media coverage