PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

I.D. # 11039

ENERGY DIVISION **RESOLUTION E-4470**

March 8, 2012

R E S O L U T I O N

Resolution E-4470. This Resolution names the winning grant recipients of the California Solar Initiative (CSI) Research, Development, Deployment and Demonstration (RD&D) Program's Solicitation #3, with a primary focus on grid integration of solar energy and a secondary focus on improved photovoltaic (PV) production technologies and business development and deployment. Pursuant to Decision (D.) 07-09-042, this Resolution requires Commission approval.

Proposed Outcome: Program Manager will enter into grant agreements with seven selected recipients for a total of up to $7.85 million. These will be paid from the CSI RD&D Program Budget.

Estimated Cost: No additional cost is associated with this Resolution, as funds were authorized by a previous decision.

SUMMARY

This Resolution, made pursuant to D.07-09-042, formally names the winning grant recipients of the CSI RD&D Program's Solicitation #3, with a primary focus on grid integration of solar energy and a secondary focus on improved photovoltaic (PV) production technologies and business development and deployment. Resolution E-4470 orders the CSI RD&D Program Manager, Itron, Inc., to enter into grant agreements which will provide CSI RD&D grant funding to the winning recipients up to the stated award amounts, and to monitor and report on these recipients' activities pursuant to D.07-09-042.

BACKGROUND

Senate Bill (SB) 1 (Murray, 2006) authorized the Commission to allocate up to $50 million of the CSI program funds for research, development, demonstration, and

deployment of solar technologies. The RD&D portion of the CSI program was adopted in September 2007 via D.07-09-042. In that decision, the Commission approved the "Adopted CSI RD&D Plan" which identifies the goals and objectives of the CSI RD&D program, sets forth allocation guidelines, and establishes criteria for solicitation, selection and funding RD&D projects. It also establishes the guidelines for the RD&D program administration and RD&D program evaluation.

To implement the Adopted CSI RD&D Plan, the Energy Division oversaw the competitive selection of Itron, Inc. as the CSI RD&D Program Manager, approved via Resolution E-4179 in July of 2008. The CSI RD&D Program is overseen by Energy Division staff, in accordance with D.07-09-042. Operational administration of the CSI RD&D Program is carried out by Itron, Inc. Energy Division staff is responsible for monitoring the Program Manager's expenses and assuring that they act in compliance with D.07-09-042, as well as participating as members of the Scoring and Selection Committees. The Commission authorizes funding awards via Resolution, as recommended by staff and the contract Program Manager. The contract Program Manager is responsible for maintaining program data, developing grant solicitations, evaluating grant requests, entering into grant agreements (after approval by Commission Resolution), monitoring progress on all approved projects, and reporting on approved projects. The CSI RD&D Program Manager maintains a program Web site: www.CalSolarResearch.ca.gov

The CSI RD&D Program has a budget of $50 million, running through 2016 and funded by the electric ratepayers of California's three largest investor-owned utilities, namely Pacific Gas and Electric (PG&E), Southern California Edison (SCE), and San Diego Gas & Electric (SDG&E).

The Adopted CSI RD&D Plan lays out the seven key principles of the CSI RD&D Program. These principles include:

1. Improve the economics of solar technologies by reducing technology costs and increasing system performance;
2. Focus on issues that directly benefit California, and that may not be funded by others;
3. Fill knowledge gaps to enable successful, wide-scale deployment of solar distributed generation technologies;
4. Overcome significant barriers to technology adoption;

5. Take advantage of California's wealth of data from past, current, and future installations to fulfill the above;
6. Provide bridge funding to help promising solar technologies transition from a pre-commercial state to full commercial viability; and
7. Support efforts to address the integration of distributed solar power into the grid in order to maximize its value to California ratepayers.

The Adopted CSI RD&D Plan (D.07-09-042) establishes the recommended allocation of funding across different types of RD&D. Demonstration projects should receive the largest portion of the RD&D budget, followed by research, development and deployment. The majority of funds will also be awarded to low-risk projects with project results expected within 1-3 years time.
The Adopted CSI RD&D Plan also establishes guidelines for match funding. Applicants with projects close to commercialization are expected to bring a higher level of match funding.

Within the CSI RD&D Program, grant funding is further allocated into three target areas:

- Grid integration
- Production technologies
- Business development and deployment

In March of 2010, the Commission adopted E-4317 for Solicitation #1, which awarded $9,320,472 in funds to 8 projects focused on grid integration.

In September of 2010, the Commission adopted E-4354 for Solicitation #2, which awarded $14,630,058 in funding to 9 projects focused on improved photovoltaic (PV) production technologies and innovative business practices.

NOTICE

This Resolution is presented on motion of the Energy Division and not in response to an Advice Letter.

PROTESTS

This Resolution is not the result of an Advice Letter; therefore there were no protests or responses.

DISCUSSION

Focus of the Third Grant Solicitation

The Adopted CSI RD&D Plan suggests that 50-65 percent of CSI RD&D Program funds be allocated to grid integration projects, with 10-25 percent allocated to production technologies and 10-20 percent be allocated to business development and deployment projects.

The third CSI RD&D Program solicitation was released on July 14, 2011 and had a primary focus on grid integration and a secondary focus on improved photovoltaic (PV) production technologies and innovative business practices[1].

The primary objectives for this solicitation include:

- Overcoming existing barriers to integrating high penetration PV into the electricity grid, and
- Accelerating the integration and interconnection of high penetration PV into the grid.

The secondary objectives for this solicitation include:

- Improving the economics of solar technologies and increasing system performance, and
- Addressing key market barriers thereby increasing market penetration of solar installations in California to meet and exceed the CSI generation capacity goals.

The CSI RD&D Program Manager used various information resources to identify critical areas to target within the third solicitation and refine the priority areas identified above. These information resources include:

- The joint California Energy Commission and California Public Utilities Commission Solar Photovoltaic Research Plan (Roadmap)[2], which highlighted issues important to California, provided RD&D approaches, and set milestones.

[1]The CSI RD&D Program third solicitation document is available here:
http://www.calsolarresearch.ca.gov/images/stories/documents/CSIRDD_Third_Solicitation_07142011.pdf

[2] Solar Photovoltaic Research Plan, California Energy Commission, CEC-500-2007-038-SD, September 2007.

- Direct contact with over two dozen entities involved in solar RD&D efforts[3] to ensure that the RD&D program's efforts are not duplicative.

[3] Contact with other organizations involved in solar RD&D included: California Energy Commission, U.S. Department of Energy (Solar American Initiative and Solar American Board of Codes and Standards), U.S. Department of Energy national laboratories (NREL, Sandia), NYSERDA, New Jersey's Edison Innovation Commercialization Fund and Clean Energy Manufacturing Fund, Massachusetts Technology Collaborative Congestion Relief Pilots, Oregon Department of Energy, Hawaii Clean Energy Initiative, Sacramento Municipal Utility District's ReGen Program, Los Angeles Department of Water and Power's Sunshares program, a variety of California universities (including California Institute of Technology, Stanford University, UC San Diego, UC Davis, UC Merced, and UC Santa Cruz), a variety of universities in other states (including Arizona State University, Colorado State University), and leading solar industry companies.

Timeline of the Grant Solicitation

The following outlines the timeline and process for the third grant solicitation.

- On June 9, 2011, the third solicitation and CSI RD&D grant agreement was issued in Draft form for public comment by the CSI RD&D Program Manager to the service list of R.08-03-008, as well as to a mailing list maintained by the CSI RD&D Program Manager.
- On June 28, 2011, comments on the third solicitation were received from stakeholders. Comments were considered prior to the release of the final solicitation documents.
- On July 14, 2011, the revised third solicitation was issued, including the Grant Agreement document. The solicitation was issued to the service list of R.08-03-008, as well as to a mailing list maintained by the CSI RD&D Program Manager.
- On August 2, 2011 a bidder's conference webinar was held by the CSI RD&D Program Manager to review the intent and goals of the program, and to allow prospective bidders to ask questions.
- By August 2, 2011, written questions were submitted to the CSI RD&D Program Manager regarding the solicitation.
- On August 12, 2011, responses to submitted questions were posted on the CSI RD&D Program website by the CSI Program Manager.
- On September 1, 2011, proposal responses were due to the CSI RD&D Program Manager. A total of 32 proposals were received. Of these, 8 did not pass the initial screening and were eliminated. The remaining 24 proposals, which requested $27,102,234 in CSI RD&D funds and contributed $31,280,867 in match funds, passed the initial screening.
- In September and October 2011, the 24 proposals that passed the initial screening performed by the CSI RD&D Program Manager underwent technical review. This initial technical review assessed the practical feasibility, path to implementation, and funding level requested of the various proposals.
- The Scoring Committee comprised of Itron personnel, the California Energy Commission, industry experts and representatives of the CPUC evaluated the 24 proposals using the Proposal Evaluation criteria described in Table 1.
- In late November 2011, the Scoring Committee made recommendations to the CPUC. In January 2012, the CPUC's Energy Division made the final determination of the recommended proposals identified in Table 2 (See page 11).

Proposal Evaluation Criteria for Grant Solicitation

The grant solicitation identified the proposal evaluation criteria. All 24 proposals were scored using the proposal evaluation criteria identified in Table 1. Proposals needed to obtain 75 percent (or 150 points) of the possible 200 points to be considered for funding. Of the 24 proposals that were evaluated by the Scoring Committee, seven passed the minimum 75 percent passing score and are recommended for funding.

Table 1: Proposal Evaluation and Scoring Criteria

SCORING CRITERIA	MAX. POINTS POSSIBLE
1. How well does the proposed research address the seven key principles in the CSI RD&D Plan? (See pg 1-2 of this solicitation). (Section 2)	30
2. Are the performance and cost objectives well defined and appropriate? (Section 3)	10
3. Is the approach outlined in Section 4 appropriate to meeting the project goals and objectives? Is there enough detail to understand the specifics of what work will be done?	20
4. Is the proposed team for the project highly qualified to conduct the working being proposed? Do they have prior experience conducting similar work? (Section 5)	20
5. Does the proposed project include utility participation? Is participation and match funding from the utility partner substantiated and appropriate for the proposed project? (Section 6)	10
6. Are the amounts and uses of the funding requested appropriate for the work to be performed? Is the funding request reasonable? Is the funding request in-line with the potential benefits that can be realized? (Section 7)	10
7. How well does the proposed project leverage funds from other organizations? How well has the proposal demonstrated the match-funding component of the proposed project? Does the proposed project provide added value by collaborating and coordinating with other RD&D organizations? (Section 8)	20
8. Are the proposed deliverables of value to the California market? Will they support the goals of the CSI program? (Section 9)	20
9. Does the proposed project address an important barrier to achieving the goals of the CSI RD&D Program? Is the proposed project sound from a technical, economic, policy, and market perspective? (Section 10)	30
10. How close is the proposed project to commercialization? Are the project results expected in the 1-3 year horizon? Is the proposed	20

path to market for the results of this research practical and achievable? (Section 11)	
11. Does the proposed project have an educational, technical transfer, or informational component? Are the research products valuable? Is there a plan for effective dissemination of information gained from the project? (Section 12)	10
Total Points Possible	**200**
Points Needed to Pass (75% of total)	**150**

Proposals Recommended for Funding from Grant Solicitation #3

The proposals recommended for funding are identified in Table 2. Each proposal recommended for funding is described in greater detail in Appendix A of this Resolution. As shown in Table 2, the proposals recommended for funding total $7,624,154 in grant funding and $7,850,797 in match funding

As described in Appendix A on a project by project basis, the Scoring Committee recommended reducing certain project funding levels from the amounts originally requested in order to maximize project benefits, not fund work being done by others and to meet or exceed the cost share guidance provided in the grant solicitation. The guidance was consistent with the cost share guidance adopted in D.07-09-042. The level of cost-sharing achieved in the selected grants is sufficient both on an overall and per project basis.

The CSI Program Manager will finalize Grant Agreements with each of the recommended proposers. Awards from this grant solicitation will be contingent on the grantees finalizing this Grant Agreement and entering into contract with the Program Manager within 120 days of the Commission decision.

Table 2: Recommended proposals and funding summary

Project ID	Project Title	Applicant	Requested Funding	Recommended Funding (up to)	Match Funding Provided
327	Quantification of Risk of Unintended Islanding and Re-assessment of Interconnection Requirements in High-Penetration of Customer-Sited Distributed PV Generation	General Electric International, Inc. Energy Consulting	$629,100	$629,100	$632,700
316	Screening Distribution Feeders: Alternatives to the 15% Rule	Electric Power Research Institute, Inc.	$1,978,239	$1,978,239	$1,978,239
322	Tools Development for Grid Integration of High PV Penetration	BEW Engineering	$2,000,000	$964,500	$1,077,100
307	Integrating PV into Utility Planning and Operation Tools	Clean Power Research	$999,351	$852,260	$875,000
314	High-Fidelity Solar Forecasting Demonstration for Grid Integration	U.C. San Diego	$1,548,148	$1,548,148	$1,548,148
309	Solar Energy & Economic Development Fund (SEED Fund)	Strategic Energy Innovations	$300,000	$300,000	$341,150
306	Integrating Smart Inverters and Energy Storage into Zero Net Energy Demonstrations	Southern California Edison	$1,351,907	$1,351,907	$1,398,460
	Total		**$8,806,745**	**$7,624,154**	**$7,850,797**

Proposal Summaries for Projects Recommended for Funding

The following discussion provides a short summary of each project recommended for funding. A brief comparison of the proposals recommended for funding within each of the focus areas is also provided.

Primary Focus Area: Grid Integration

1. Proposal 327: General Electric International, Inc. Energy Consulting

Proposal 327 from General Electric International, Inc, (GE) seeks to accelerate integration of high penetration PV into the grid by assessing an important utility concern regarding anti-islanding of inverters and Rule 21. The project, a collaboration between GE and PG&E, will quantify the risks of unintended islanding in distribution circuits with high penetration of customer-sited distributed PV generation. The GE/PG&E team will use full-scale laboratory testing to determine the risks to both utility and customer equipment that may result from an unintended islanding situation. Additionally, the team will review PG&E's interconnection requirements with respect to islanding and simplify them based on the findings from this project.

The results of this research will inform PG&E's interconnection requirements and will also be of value to the other utilities (both investor-owned and publicly-owned). This research can also inform the CPUC in making decisions regarding interconnection requirements relating to anti-islanding operations of PV inverters (Rule 21). Inverter manufacturers will gain knowledge of situations and conditions where unintentional islanding may occur.

2. Proposal 316: Electric Power Research Institute, Inc.

Proposal 316 from the Electric Power Research Institute (EPRI) seeks to support the integration and interconnection of high penetration PV into the grid by providing California utilities with a useable way of determining available capacity for PV generation on existing distribution feeders. The EPRI team will create feeder screening criteria and use actual feeder data provided by utility partners to validate results against measured data. The penetration limits of California feeders will be examined to identify the level at which PV penetration becomes an issue for utility operation. A refined screening process will be developed and validated which can reduce both interconnection study time and costs to stakeholders.

The EPRI project has excellent utility participation ensuring that the research products will be valuable. This new methodology will allow California utilities to more quickly screen new applications and accept new PV projects without risk of grid impacts.

3. Proposal 322: BEW Engineering

Proposal 322 from BEW Engineering (BEW) addresses the lack of high quality, high resolution, field measured PV data to inform modeling of high penetration

PV on the utility system. The BEW team will develop methods and software for evaluating high-penetration PV on the distribution grid and this work builds on work that was funded by the CSI RD&D solicitation #1. The methods and processes will be used by utilities to facilitate expansion of PV into the grid without negatively impacting system performance. The three utility partners (SMUD, PG&E and Hawaiian Electric Company (HECO)) will select different feeder configurations to demonstrate, evaluate and validate high PV penetrations under a variety of scenarios. The tools and approaches build on past work and will be combined with existing commercial distribution software used by utilities. Efforts will be made to extend these tools to the other investor-owned and publicly-owned utilities in the state.

4. Proposal 307: Clean Power Research

Proposal 307 from CPR builds directly upon the CSI RD&D Solicitation #1 project "Advanced Modeling and Verification for High Penetration PV." For this project, CPR will extend the enhanced resolution solar resource database and incorporate a cloud vector motion method to increase the temporal resolution to one-minute. This solar resource database will be used to forecast PV fleet performance. PV fleet simulation methodology will then be validated with data from actual PV fleets. Once validated, the PV fleet simulation methodology and high resolution solar resource database will be integrated into five utility software tools currently used by distribution engineers. The CPR team will also develop a website showing real-time energy production from the California fleet.

5. Proposal 314: University of California, San Diego

Proposal 314 from the University of California, San Diego (UCSD) will seek to demonstrate that solar resource forecasting is the most cost effective strategy for integrating large amounts of PV into the distribution grid. The UCSD team will demonstrate forecast performance under conditions that have the most impact on aggregate PV output on SDG&E distribution feeders. The demonstration will be conducted on five typical feeders with variations in PV penetration, location/meteorology and voltage regulation equipment. It is expected that the findings from these demonstrations will result in improved accuracy and confidence in the ability to forecast such events. Ultimately, the UCSD team believes that if improved forecast models were used operationally, ancillary services costs could decrease by 50% per additional MW of solar PV on the grid.

A best practices manual for solar forecasting utility operations is one of the project deliverables. All California investor-owned utilities, Sacramento Municipal Utility District (SMUD) and the California Independent System Operator (CAISO), are participating in the project. This project builds on past work and is focused on issues that are important to California.

Secondary Focus Areas: Production Technologies and Business Development and Deployment

6. Proposal 309: Strategic Energy Innovations

Proposal 309 from Strategic Energy Innovations will demonstrate an innovative solar procurement business model that utilizes a public-private revolving fund mechanism to support public entities (municipalities and schools) in adopting solar technologies. Public entities are motivated to adopt PV, however the upfront costs and lack of technical capabilities can impede this adoption. The Solar Energy & Economic Development Fund (SEED) aims to demonstrate that a 1-2% upfront investment in collaborative RFP and bid evaluation processes will result in 10-12% reduction in project costs. These projected savings arise from bulk purchases, reduced risk, and lower transaction costs per project.

The initial project procurement will involve 15 public partners and up to 100 potential sites resulting in a minimum of 5 megawatts (MW) of solar contracts. The primary audience for this project includes public entities in Marin and Sonoma Counties interested in adopting PV. The project will demonstrate SEED Fund viability, thereby providing private markets and other public partners the evidence they need to utilize the model at a broader scale.

Project that address both the Primary Focus Area (Grid Integration) and the Secondary Focus Areas (improved PV production technologies and business development and deployment

7. Proposal 306: Southern California Edison

Proposal 306 from Southern California Edison addresses both the primary focus area (grid integration) as well as the secondary focus areas (production technologies and business development and deployment). The SCE team will demonstrate the feasibility and effectiveness of advanced, smart inverters for both

single-phase and small scale (less than 100 kilowatts (kW)) three-phase applications in zero net energy (ZNE) buildings. The smart inverters will have on-board intelligence, providing additional capabilities for voltage regulation, VAR support and communication between the utility and the energy management systems.

The project will also focus on deploying integrated demand side management (IDSM), energy efficiency, demand response, and energy storage with PV in residential and low-rise office buildings. These buildings will be used to demonstrate control strategies for end-use loads, PV and energy storage which support ZNE, maintain grid reliability and minimize costs to customers. This project supports several goals that are important to California including the California Solar Initiative and the CPUC's Energy Efficiency Strategic Plan[4] for achieving ZNE.

Overall comparison of Primary Focus Area (Grid Integration)

There are 5 proposals recommended for funding that focus solely on the grid integration focus area and 1 proposal that shares this focus with improvements in business development and deployment aspects as well.

Projects from both GE and EPRI address utility interconnection of PV and research that supports assessing and streamlining the interconnection process. The project with GE will quantify the risks of unintended islanding and use this work as a basis to simplify PG&E's interconnection requirements. The EPRI project has a much broader focus and seeks to develop a methodology that will allow utilities in California to more quickly screen new interconnection applications and accept new PV projects without the risk of negatively impacting the grid. All investor-owned utilities in California along with SMUD are partners in this project. Both the GE and EPRI projects will help inform CPUC decision-making regarding interconnection and operating requirements related to anti-islanding operations of PV invertors (Rule 21).

[4] The Energy Efficiency Strategic Plan is a roadmap to maximize achievement of cost effective energy efficiency through 2020 and beyond. The Energy Efficiency Strategic Plan is available here: http://www.cpuc.ca.gov/NR/rdonlyres/A54B59C2-D571-440D-9477-3363726F573A/0/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf.

The projects with BEW Engineering, CPR and UCSD support research in the grid integration focus area and build on work that was funded from the first CSI RD&D solicitation. The BEW team will develop methodologies and software for evaluating high-penetration PV on the distribution grid. The methods and tools will be validated with actual feeder data by the three utility partners (SMUD, PG&E and HECO) and the tools and approaches will be combined with the existing commercial distribution software used by utility engineers.

The UCSD and CPR projects will build on their current CPUC-funded solar forecasting research to improve and extend forecasting capabilities and tools used by California utilities. The UCSD project will improve forecast performance and conduct demonstrations on 5 typical SDG&E feeders with variations in PV penetration, location, meteorology, and voltage regulation equipment. The UCSD team supports the belief that improvements in the accuracy and confidence of solar forecasting can result in reductions in utility ancillary service costs.

The CPR project will extend the enhanced solar resolution database developed with previous CSI RD&D funding and use it to forecast PV fleet performance. The PV fleet simulation method will then be validated with actual fleet data from the CAISO, PG&E and SMUD. Once validated, the simulated method and solar resource database will be integrated into five utility software tools. Both solar forecasting projects have strong utility and CAISO partnerships which ensures that the research will be appropriately targeted to address the needs of their intended audience.

The cross-cutting project with SCE includes both grid integration and business development and deployment focus areas. SCE will research and demonstrate the feasibility and effectiveness of advanced smart inverters for residential and small commercial buildings and indentify optimization strategies for advanced inverter control. The SCE team will also deploy integrated demand side management, energy efficiency, demand response, and energy storage along with PV in residential applications as well as low-rise office buildings. These buildings will be used to demonstrate control strategies for end-use loads, PV and energy storage in order to achieve ZNE while maintaining grid reliability and minimizing customer costs. This project is well-aligned with the CPUC's goals related to ZNE.

Overall comparison of Secondary Focus Area (Production Technologies and Business Development and Deployment)

Only one project with the sole focus on the solicitation's secondary area is recommended for funding. The Strategic Energy Innovations project will demonstrate an innovative business model for procuring PV for schools and municipalities. The project will demonstrate that a 1-2% upfront investment in collaboration will result in 10-12% savings in project costs, lower project risks and reduce transaction costs. The revolving fund will be replenished with a modest fee on successful projects and those funds will be made available for additional rounds of collaborative procurement for public projects.

The seven proposals recommended for funding cut across various topic areas as shown in Table 3 below.

Table 3: Comparison of Proposals by Focus Area

Proj	Title	Applicant	21/Interconnection related	Solar Forecasting	Utility Tools	Integration (PV, EE, DR &ES)	Business Model
327	Quantification of Risk of Unintended Islanding and Re-Assessment of Interconnection Requirements in High-Penetration of Customer-Sited Distributed PV Generation	General Electric International, Inc. Energy Consulting	■		■		
316	Screening Distribution Feeders: Alternatives to the 15% Rule	Electric Power Research Institute, Inc.	■		■		
322	Tools Development for Grid Integration of High PV Penetration	BEW Engineering			■		
307	Integrating PV into Utility Planning and Operation Tools	Clean Power Research		■	■		
314	High-Fidelity Solar Forecasting Demonstration for Grid Integration	The Regents of the Univ. of Calif., U.C. San Diego		■	■		
309	Solar Energy & Economic Development Fund (SEED Fund)	Strategic Energy Innovations					■
306	Integrating Smart Inverters and Energy Storage into Zero Net Energy Demonstrations	Southern California Edison				■	■

CSI Program Manager Responsibilities

The CSI RD&D Program Manager will create a grant agreement with each proposer recommended for funding, based upon the submitted scope of work.

The CSI RD&D Program Manager will review the budgets of each proposal prior to finalizing a Grant Agreement with each recipient. During the months since the proposals were submitted, the funding levels may have shifted if, for example, a proposer has since received funding from another source for the same work. Therefore, the CSI RD&D Program Manager will ensure that the funding levels are still accurate in light of any potential changes to project partners, project scope, or matching funds. If projects have received funding from another source

(or lost matching funds) since the submittal of the proposal, the budget will be modified to reflect this new information, while remaining within boundaries of matching fund requirements.

Finally, nearly all of the proposals received by the CSI RD&D Program in the third solicitation will likely benefit from collaboration committee meetings. Several California utility representatives and industry stakeholders have offered to participate in informal collaboration committees to aid the award recipients in the success of the RD&D projects selected under this solicitation. As discussed above, several selected proposals will work in similar areas using different methods and it is logical that the different recommended winners should have an opportunity to share their approaches and work products. The CSI RD&D Program Manager will work to create a collaboration committee process to aid in the success of the CSI RD&D Program grant recipients. This process will ensure that input is provided to the grant recipients early in their projects, as the project progresses, and through a forum to share results and products when the project is complete. The CSI RD&D Program Manager will ensure this activity is included in all grant agreements via the scope of work.

The CSI RD&D Program Manager will reach a final grant agreement with each of the award recipients approved for funding within 120 days of the effective date of this Resolution. The Commission's Energy Division can extend this deadline or cancel an award if an agreement is not signed within 120 days of the Commission decision. The grant agreement will codify the scope identified in the proposal, enhanced or modified by the Scoring Committee and in the best judgment of the CSI RD&D Program Manager under the oversight of the Commission's Energy Division. The grant agreement will specify a CSI RD&D Program funding amount that is consistent with this Resolution and modified in a mutually agreeable manner as specified above and in the best judgment of the CSI RD&D Program Manager under the oversight of the Commission's Energy Division.

COMMENTS

Public Utilities Code section 311(g)(1) provides that this Resolution must be served on all parties and subject to at least 30 days public review and comment prior to a vote of the Commission. Section 311(g)(2) provides that this 30-day period may be reduced or waived upon the stipulation of all parties in the proceeding.

Accordingly, this draft resolution was emailed to parties for comments, and will be placed on the Commission's agenda no earlier than 30 days from today.

FINDINGS

1. The CSI RD&D third grant solicitation with a primary focus on grid integration and a secondary focus on improved PV production technologies and business development and deployment was carried out in accordance with the Commission direction establish in D.07-09-042.
2. The CSI RD&D Program Manager, under Energy Division oversight, reviewed the grant proposals in a manner consistent with the plan set forth in D.07-09-042.
3. The CSI RD&D Program Manger undertook a two part process, including a Technical Review and Scoring Process, consistent with the direction set forth in D.07-09-042.
4. The scoring process resulted in seven proposals that meet the 75 percent scoring threshold and are recommended for funding. These seven grant recipients, described in detail in Appendix A to this Resolution, have submitted proposals which will fulfill the goals of the RD&D Program as described in D. 07-09-042.
    i. Proposal 327 – General Electric International, Inc. Energy Consulting – up to $629,100
    ii. Proposal 316 – Electric Power Research Institute – up to $1,978,239
    iii. Proposal 322 – BEW Engineering – up to $964,500
    iv. Proposal 307 – Clean Power Research – up to $852,260
    v. Proposal 314 – Regents of the University of California, San Diego – up to $1,548,148
    vi. Proposal 309 – Strategic Energy Innovations – up to $300,000
    vii. Proposal 306 – Southern California Edison – up to $1,351,907
5. The CSI RD&D Program Manager will ensure that the funding level for each project is accurate, and determine whether revisions are needed due to potential changes to project partners, project scope, or matching funds.
6. The CSI RD&D Program Manager will work to create a collaboration committee process to aid in the success of the CSI RD&D grant recipients. This process will provide input to the grant recipients early in their projects, provide an opportunity for peer review of projects while in

process, and create a forum to share results towards the end of projects when results have been achieved.

THEREFORE IT IS ORDERED THAT:

1. The CSI RD&D Program Manager shall execute Grant Agreements with the following recommended 7 proposers, contingent upon their meeting all requirements detailed in the ordering paragraphs:
   - Proposal 327 – General Electric International, Inc. Energy Consulting – up to $629,100
   - Proposal 316 – Electric Power Research Institute – up to $1,978,239
   - Proposal 322 – BEW Engineering – up to $964,500
   - Proposal 307 – Clean Power Research – up to $852,260
   - Proposal 314 – Regents of the University of California, San Diego – up to $1,548,148
   - Proposal 309 – Strategic Energy Innovations – up to $300,000
   - Proposal 306 – Southern California Edison – up to $1,351,907
2. The CSI RD&D Program Manager shall monitor and report on the progress of grant awards to the Commission pursuant to D.07-09-042.
3. The Energy Division shall continue its ongoing oversight of the CSI RD&D Program by reviewing all Grant Agreements prior to their execution.
4. The Grant Agreements will not be subject to negotiation, and each grantee's award is contingent on signing this agreement. Minor modifications to the Grant Agreements with governmental entities will be considered to ensure consistency with state and federal law. No other modifications to the grant agreement will be accepted.
5. Awards from the CSI RD&D third grant solicitation will be contingent on the grantees entering into an agreement with the CSI RD&D Program Manager within 120 days of the effective date of this Resolution. The Commission's Energy Division can extend this deadline or cancel an award if an agreement is not signed within 120 days of the Commission decision.
6. The CSI RD&D Program Manager will finalize Grant Agreements with each proposal's Principal Investigator based upon the submitted scope of work and budget. The Grant Agreement will be for the scope identified in the proposal, enhanced or modified by the Scoring Committee and in the best judgment of the CSI RD&D Program Manager under the oversight of the Commission's Energy Division. For some recommended awards, the scope of the project and

the recommended funding levels shall be reduced from what was requested in the proposal.

7. This Resolution is effective today.

I certify that the foregoing Resolution was duly introduced, passed and adopted at a conference of the Public Utilities Commission of the State of California held on March 8, 2012; the following Commissioners voting favorably thereon:

_____

Paul Clanon
Executive Director

Appendix A

Project_ID	327
Project Title	Quantification of Risk of Unintended Islanding and Re-Assessment of Interconnection Requirements in High-Penetration of Customer-Sited Distributed PV Generation
Applicant	General Electric International, Inc. Energy Consulting
Principal Investigator	Jovan Bebic
Partners	General Electric Global Research, PG&E Distribution Engineering, Planning and Operations, PG&E Applied Technology Services
Utility partner	PG&E
Requested Funding	$629,100
Recommended Funding	$629,100
Proposed Match Funding	$632,700
Recommended Match Funding	$632,700
Target Area	Grid Integration
Project Summary	The project will quantify the risks of unintended islanding in distribution circuits with high penetration of customer-sited distributed PV generation. Based on the insights from that work, the GE team will review and simplify PG&E's interconnection requirements relative to islanding concerns. The project will evaluate the risk of islanding and reassess the PG&E interconnection requirements in light of those risks. Specifically, the project will: • Quantify the probability that, in the event a feeder or portion of a feeder is tripped, islanding does occur. • Use comprehensive full-scale laboratory testing to ascertain the extent of time which an island will persist in an energized state and the risks to utility and customer equipment that may result from an unintended islanding situation. • Take a critical look at the interconnection requirements at PG&E with respect to islanding and simplify them to reflect the findings from this project.
Deliverables	Project deliverables include: Summary report on Statistical Analysis of PV Generation and Load Balance – Summary report on Aggregate PV Inverter Islanding Performance Testing – Report on the Risks of Islanding and Development of Recommendations for PG&E Interconnect Requirements – Presentations at technical conferences – Final Report
Market Connection/ Audience	The results of this research will feed directly into PG&E's interconnection requirements and will also be of value to IOUs and POUs. This research also can inform the CPUC in making decisions regarding interconnection and operating requirements related to anti-islanding operations of PV inverters (Rule 21). Inverter manufacturers will also benefit from this research with the increased knowledge of situations and conditions where unintentional islanding may occur.

Recommendation	Recommend for funding up to $629,100. The Scoring Committee supports this strong collaboration between GE and PG&E to address an important utility concern regarding anti-islanding of inverters and Rule 21.

Project_ID	316
Project Title	Screening Distribution Feeders: Alternatives to the 15% Rule
Applicant	Electric Power Research Institute, Inc.
Principal Investigator	Thomas Key
Partners	NREL, Sandia National Lab, Clean Power Research
Utility partner	SDG&E, PG&E, SMUD, SCE
Requested Funding	$1,978,239
Recommended Funding	$1,978,239
Proposed Match Funding	$1,978,239
Recommended Match Funding	$1,978,239
Target Area	Grid Integration
Project Summary	This project seeks to provide utilities in California with a useable and accurate way to determine the available capacity for PV generation on existing distribution feeders. The methodology will allow California utilities to more quickly screen new applications and accept new PV projects without risk of grid impacts. Additionally, project developers and potential PV system owners will be able to identify locations best suited to accommodate adding PV without high capital cost for grid infrastructure. The approach to be developed is an application- and criteria-specific method to determine penetration for any individual feeder. The team will create the feeder screening criteria and use actual feeder data provided by utility partners to validate results against measured data. With completion of the validation, the team will examine the penetration limits of California feeders to identify the level at which PV penetration becomes an issue for proper utility operations. The project team will then develop and validate a refined screening process which will reduce interconnection study time and costs to stakeholders.
Deliverables	Project deliverables include: Report on current utility screening practices and available tools – Report on the range of distribution feeder configurations for participating utilities – Report on feeder model development – Report on high penetration PV scenario assessment – Screening criteria and methods for interconnection – Report on the screening method validation using site measurement and feeder data – Analysis of the effects of new operational resources on penetration limits – Final Report
Market Connection/ Audience	The excellent utility participation with this project will ensure that the research products are valuable. Utilities are providing both cost-share and consulting which demonstrates their strong commitment and plans for adopting the recommended screening procedures for interconnection of PV. Another audience for this research are system

	integrators that install PV systems.
Recommendation	Recommended for funding up to $1,978,239. The Scoring Committee recommends funding Tasks 1-7 and omitting Task 8 and using the budget associated with Task 8 to increase feeder sample population.

Project_ID	322
Project Title	Tools Development for Grid Integration of High PV Penetration
Applicant	BEW Engineering
Principal Investigator	Ronald Davis
Partners	University of CA San Diego, University of Hawaii, Neo Virtus Eng., AWS TruePower, Clean Power Research, Green Power Labs, Sandia National Lab, EPRI, 3TIER, CAISO (letter of support)
Utility partner	SMUD, PG&E, Hawaiian Electric Company (HECO)
Requested Funding	$2,000,000
Recommended Funding	$964,500
Proposed Match Funding	$2,192,600
Recommended Match Funding	$1,077,100
Target Area	Grid Integration
Project Summary	This project addresses the lack of high quality, high resolution, field measured PV data to inform adequate modeling of high-penetration PV on the utility system. This research targets the development of methodologies and software for evaluating high-penetration PV on the distribution grid and builds on work conducted by a CSI RD&D Solicitation #1 project. The BEW team will explore a nodal approach for locating PV strategically, by integrating the distribution grid and a global visual mapping tool into an expanded locational value analysis. The visual map locates potential PV development areas such as roof space and vacant lots. The nodal approach aggregates and assesses impacts across the system from a strategic development and grid enhancement perspective. The methodology and process will be used by utilities to facilitate expansion of PV into the grid without negatively impacting system performance. The three utility partners for the project will select different feeder configurations to demonstrate, evaluate and validate high PV penetrations under steady-state, contingency and dynamic scenarios. The project also plans to conduct case studies for evaluating PV penetrations on the distribution grid.
Deliverables	Project deliverables include: Report on the results of data collection and validation techniques – Summary report on the input modeling assumptions - Methodology for studying impacts of high PV penetrations – Report on the tool demonstration at various utilities – Final Report
Market Connection/ Audience	The tools and approaches build on past work funded by both the CEC and CPUC combined with existing commercial distribution software used by utilities. The tools and approaches will be validated using data from SMUD, PG&E and HECO, all partners in the project. Efforts will be made to extend these tools to the other IOUs and POUs.
Recommendation	Recommended for funding up to $964,500. The Scoring Committee

	supports Tasks 1-3 but recommends elimination of Task 4 (Nodal Estimating of Solar Energy Production) and associated budget ($1,035,500). The task is found to be duplicative with other ongoing efforts at the state, national and regional level.

Project_ID	307
Project Title	Integrating PV into Utility Planning and Operation Tools
Applicant	Clean Power Research
Principal Investigator	Thomas Hoff
Partners	CAISO, UC San Diego, Electric Power Research Institute, State University of New York, Solar Electric Power Association
Utility partner	PG&E, SMUD
Requested Funding	$999,351
Recommended Funding	$852,260
Proposed Match Funding	$1,000,000
Recommended Match Funding	$875,000
Target Area	Grid Integration
Project Summary	This project builds directly upon the Solicitation#1 funded CSI RD&D project "Advanced Modeling and Verification for High Penetration PV." The two key accomplishments for that project were a publicly available enhanced solar resource database (SolarAnywhere) for every location in California and the development of a methodology to simulate PV fleet power production. For this project, the CPR team will: 1. Extend the enhanced resolution solar resource database (1 km x 1 km grid, half hour observations) and incorporate a cloud vector motion method to increase the temporal resolution to one minute. This solar resource database will be used to forecast PV fleet performance. 2. Validate the PV fleet simulation methodology with actual PV fleets. Measured data will come from CAISO, SMUD and PG&E. 3. Integrate the PV fleet simulation methodology powered by the high resolution solar resource database into five utility software tools. This aggregated PV fleet data will be a more useable input to CAISO's models.
Deliverables	Project deliverables include: Enhanced High Resolution SolarAnywhere data – Report on validation of solar irradiance data – Reports on PV fleet simulation methodology validation (CAISO, SMUD, PG&E) – Reports on PV fleet simulation integration into utility software tools results – High resolution PV simulation data integrated into a publicly available tool – Website showing real-time energy production from California PV fleet – Final Report
Market Connection/ Audience	Integrating the utility partners (SMUD and PG&E) and the CAISO into this project will ensure that research results will be useful and valuable to the target audiences. The fleet simulation capabilities will be integrated into the current tools used by distribution engineers.

Recommendation	Recommended for funding up to $852,260. The Scoring Committee recommends eliminating Subtask 4.5 and all of Task 5 and the budgets associated with these tasks. The Committee believes that PG&E should fund the solar calculator work in this task. The Committee also recommends that Task 5 (Technology Transfer) be funded by other project partners as match.

Project_ID	314
Project Title	High-Fidelity Solar Forecasting Demonstration for Grid Integration
Applicant	University of California San Diego
Principal Investigator	Jan Kleissl
Partners	Green Power Labs, Clean Power Research, SCE (letter of support) SMUD, National Renewable Energy Lab (NREL), Power Analytics
Utility partner	SDG&E
Requested Funding	$1,548,148
Recommended Funding	$1,548,148
Proposed Match Funding	$1,548,148
Recommended Match Funding	$1,548,148
Target Area	Grid Integration
Project Summary	The project will demonstrate solar resource forecasting as the most cost effective strategy for integrating large amounts of PV into distribution systems. The UCSD team will improve and demonstrate forecast performance under meteorological conditions that have the greatest impact on aggregate PV output on distribution feeders in the SDG&E territory. The demonstration will be conducted on five typical feeders with variations in PV penetration, location/meteorology, and voltage regulation equipment. On these feeders, fast demand response potential based on peak demand forecasting and dynamic loading will be demonstrated. At the system level, resource adequacy applications of solar forecasting will be demonstrated at higher and higher generation levels. CAISO will be provided deep situation awareness of aggregate distributed PV generation and impending ramp events that require extensive regulation up or down. The accuracy and confidence with which such events can be forecast will be improved. Ultimately the UCSD team believes that if their forecast models were used operationally, it would decrease the ancillary services cost per additional MW of solar PV on the grid by 50%.
Deliverables	Project deliverables include: Report which catalogues largest PV ramp rates in 2009 and 2010, forecast error and mitigation – Report evaluating the SDG&E weather station network – Marine layer cloud forecast model – Report evaluating day ahead solar forecast model for marine layer clouds – Software tool for distribution feeder forecasts, actuation, and automatic demand response – Localized solar forecasting and distribution feeder modeling – Solar Power and Net load forecasting across SDG&E service territory – Best practices manual for solar forecasting utility operations – Final Report

Market Connection/ Audience	This project exhibits a very strong market connection as all California investor-owned utilities, SMUD and the CAISO will be engaged with the project.
Recommendation	Recommended for funding up to $1,548,148. This project builds on past work and is focused on issues that are important to California.

Project_ID	309
Project Title	Solar Energy & Economic Development Fund (SEED Fund)
Applicant	Strategic Energy Innovations
Principal Investigator	Kif Scheuer
Partners	Optony, Inc., First Flatiron Fund LLC, Marin County CDA, Sonoma County General Services, Regional Climate Protection Authority, City of Novato, City of Larkspur (letter of support), Larkspur Corte Madera School District (letter of support)
Utility partner	PG&E
Requested Funding	$300,000
Recommended Funding	$300,000
Proposed Match Funding	$341,150
Recommended Match Funding	$341,150
Target Area	Business Model
Project Summary	This project will demonstrate an innovative solar procurement business model that utilizes a public-private revolving fund mechanism to support public entities (municipalities and schools) in adopting solar technologies. Public entities are motivated to adopt PV. However, the upfront costs and lack of technical capabilities serve as barriers to adoption. The SEED Project will demonstrate that a 1-2% upfront investment in collaboration results in a 10-12% project cost savings, lower project risks with higher returns, reduced transaction costs and reduced administrative efforts. In addition to the revolving fund mechanism, the SEED team will provide expert technical support. The initial project procurement activities will involve 15 public partners with up to 100 potential sites resulting in a minimum of 5 MW of solar contracts. The revolving fund will be replenished through a modest fee on projects moving forward and this fund will then be available for additional rounds of collaborative procurement.
Deliverables	The deliverable will be a business model which addresses project technical services and collaboration support. The project will demonstrate SEED Fund viability, thereby providing private markets and other public partners the evidence they need to utilize the model at a broader scale. Specific deliverables available to the broader market include a financial model, MOU templates, RFP template for soliciting projects, draft contract template, marketing materials and a Final Project Report

Market Connection/ Audience	The primary audiences for this project's deliverables are public entities (schools and municipalities) in Marin and Sonoma Counties who are interested and motivated to adopt PV technologies. This project exhibits a strong market connection with the primary audience for the research fully integrated as project partners. The business model and all deliverables will be made available to other municipalities and school districts considering this collaborative approach to procuring PV technologies.
Recommendation	Recommended for funding up to $300,000. The Scoring Committee supports this innovative method of using a revolving fund to procure PV for public agencies. This demonstration can provide the 'proof of concept' for replication by other municipalities and school districts.

Project_ID	306
Project Title	Integrating Smart Inverters and Energy Storage into Zero Net Energy Demonstrations
Applicant	Southern California Edison
Principal Investigator	Gregg D. Ander
Partners	EPRI, inverter manufacturer (TBD), production home builder (TBD)
Utility partner	Collaboration between SCE's Transmission and Distribution and Customer Service
Requested Funding	$1,351,907
Recommended Funding	$1,351,907
Proposed Match Funding	$1,398,460
Recommended Match Funding	$1,398,460
Target Area	Grid Integration, Production Technologies
Project Summary	This project will demonstrate the feasibility and effectiveness of advanced, smart inverters for both single-phase and small scale (less than 100 kW) three-phase applications in ZNE buildings. The smart inverters will have on-board intelligence, providing additional capabilities for voltage regulation, VAR support, and communication between the utility and energy management systems. In addition SCE will investigate the control strategies associated with deploying advanced energy storage (ES) technologies in conjunction with PV and smart inverters. These control strategies will be informed by grid modeling performed by SCE for high penetration levels of conventional single-phase inverters. The project will focus on deploying Integrated Demand Side Management (IDSM), incorporating Energy Efficiency (EE) and Demand Response (DR), with PV and ES, in residential buildings and low-rise offices. These buildings will be used to demonstrate control strategies for end-use loads, PV, and ES, which aid in achieving ZNE, or near ZNE, maintaining grid reliability, and minimizing customer costs. Inverter manufacturers will be engaged to ensure that the inverters deployed have the requisite intelligence to self regulate voltage as well as accept signals for increased control.
Deliverables	Project deliverables include: Report on inverter impact modeling – Specifications for smart single-phase and three-phase inverters – Report on upgraded inverter capabilities and lab testing – Report on ZNE packages for residential and low-rise office space – Construction documents – Measurement and verification report, Technical papers – Final Report
Market Connection/ Audience	The findings of this demonstration project will be disseminated to key stakeholders including architects, building industry professionals, solar industry organizations, building owners/operators and other utilities.

Recommendation	Recommended for funding up to $1,351,907. This project supports several energy goals that are important to California; the CSI and the Big Bold Energy Efficiency Strategies for achieving ZNE.

STATE OF CALIFORNIA EDMUND G. BROWN JR., *Governor*

PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102-3298

I.D. # 11039
February 2, 2012 Draft Resolution E-4470
March 8th Commission Meeting

TO: PARTIES TO DRAFT RESOLUTION E-4470

Enclosed is Draft Resolution E-4470 of the Energy Division announcing CSI RD&D grant recipients. It will be on the agenda at the March 8, 2012 Commission meeting. The Commission may then vote on this Draft Resolution or it may postpone a vote until later.

When the Commission votes on a Draft Resolution, it may adopt all or part of it as written, amend, modify or set it aside and prepare a different Resolution. Only when the Commission acts does the Resolution become binding on the parties.

Parties may submit comments on the Draft Resolution no later than Wednesday, February 22, 2012.

An original and two copies of the comments, with a certificate of service, should be submitted to:

Honesto Gatchalian and Maria Salinas
Energy Division
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102
jnj@cpuc.ca.gov; mas@cpuc.ca.gov

A copy of the comments should be submitted to:

Neal Reardon
nmr@cpuc.ca.gov

and

Melicia Charles

mvc@cpuc.ca.gov

Those submitting comments and reply comments must serve a copy of their comments on 1) the entire service list attached to the Draft Resolution, 2) all Commissioners, and 3) the Director of the Energy Division, the Chief Administrative Law Judge and the General Counsel, on the same date that the comments are submitted to the Energy Division.

Comments may be submitted electronically.

Comments shall be limited to five pages in length plus a subject index listing the recommended changes to the Draft Resolution and an appendix setting forth the proposed findings and ordering paragraphs.

Comments shall focus on factual, legal or technical errors in the proposed Draft Resolution. Comments that merely reargue positions taken in the advice letter or protests will be accorded no weight and are not to be submitted.

Reply comments shall be served on parties and Energy Division no later than Tuesday, February 28, 2012 and may also be submitted electronically.

Late submitted comments or reply comments will not be considered.

/s/ Melicia Charles

Melicia Charles
Program Supervisor
Energy Division

Enclosures:
Certificate of Service
Service List: R.10-05-004

CERTIFICATE OF SERVICE

I certify that I have by mail this day served a true copy of Draft Resolution E-4470 on all parties in these filings or their attorneys as shown on the attached list.

Dated February 2, 2012 at San Francisco, California.

/s/ Neal Reardon

Neal Reardon

NOTICE

Parties should notify the Energy Division, Public Utilities Commission, 505 Van Ness Avenue, Room 4002 San Francisco, CA 94102, of any change of address to insure that they continue to receive documents. You must indicate the Resolution number on the service list on which your name appears.