



Rule 21 Working Group Four: Meeting Notes, 4/14/2020

Agenda

Time	Duration	Item
10:00-10:15	15 min	Introductions, agenda, regulatory updates
10:15-11:10	55 min	Issue 18 Anti-Islanding ---CALSSA/SunStreet/SunPower proposal presentation and discussion ---IREC proposal presentation and discussion ---Other proponent proposals and discussion ---Additional study references or analytical work ---Remaining questions for Working Group to answer
11:10-11:15	5 min	Break
11:15-12:10	55 min	Issue 18 (continued)
12:10-1:30	70 min	Lunch
1:30-2:25	55 min	Issue 19 New ZNE Buildings ---Revisions to proposals by CALSSA, GPI, Clean Coalition ---Finalize discussion
2:25-2:30	5 min	Break
2:30-3:45	75 min	Issue F DERMs ---CALSSA proposal presentation and preliminary comments ---DERMs experience from other jurisdictions (SolarEdge and Tesla) ---IOUs activities in relation to DERMs ---Next steps

Action Items

Issue 18	20/4: CALSSA /IREC to update the proposal so it will be ready for all parties to comment before the next full day meeting on 5/5. 4/16: PG&E to write up the proposal as per the comments by all parties 5/4: Formal comment on 4 proposals by all parties for our discussion on 5/5 meeting (Proposals will be shared on 4/21, once updated by CALSSA/IREC//PG&E/BioEnergy)
Issue 19	4/20: CALSSA/Clean Coalition and GPI to submit final proposal to gridworks (GPI (Tam Hunt) to make any proposal revisions to focus on elaborating more, specific to ZNE context) 4/27: Initial version of issue 19 write up by Gridworks will be shared for the first round of comments by all parties.
Issue F	4/17: Comments by all parties on IOU presentations and CALSSA proposal on issue F



Meeting Notes

10:00-10:15	Introductions, agenda, regulatory updates
<p>Eric Martinot (Gridworks) introduced the meeting agenda covering issue 18, 19 and F. Regulatory Updates: None</p>	
10:15-11:10	<p>Issue 18 Anti-Islanding</p> <p>CALSSA (Brad Heavner) presented CALSSA proposal on issue 18.</p> <p>Three major elements: the reactive power matching (trickiest part , it needs to be 1% as per Sandia study, Mike mention that recent research suggest a different number, need to identify what can be done and what’s realistic and CALSSA is open to hear PG&E’s perspective on it), generation to Load Calculation (utilities said too hard to do and need further discussion) and risk of island study if mitigations are determined (general agreement on it).</p> <p>Comments from all parties:</p> <p>PG&E (Mike Jensen): We contacted other utilities and none of them are doing capacity matching.</p> <p>Smart Grid Solutions (Tim McDuffie):: The study shows there were no capacitor on the circuit, there was no chance of matching reactive power , it’s also a reference to the Sandia screens and they do include checking for the reactive power , now if you recognize the fact that it’s a little bit fuzzy between what’s listed in the Sandia screening method and what’s presented as the prescribed method , it doesn’t necessary kick you out, if you can’t match. However, a 2012 Sandia study has presented cases where the possibility of unintentional islanding can be ruled out, “In order for an island to be sustained, both the real and reactive power demand of the load and power system components must be satisfied”. So far, it’s just been a real component and there needs to be a reactive checklist. There is a clear disconnect between what’s listed and what’s written in the step. Need more clarification on it.</p> <p>CALSSA (Brad Heavner): We implemented an updated 1547 that has increased requirements, it might not be so clean, inverters that are type 1 and type 2 may not be strictly type 2.</p> <p>SCE (Roger Salas): Based on a 2012 study, it’s pretty old technology, inverters connected in 2017 can be injecting, absorbing reactive power. System is dynamic and change in topology or change in load will no longer make the studies valid. From the mechanic perspective, these two assumptions are flawed, we rely on static conditions to ensure we forever not going to have this problem, thus for me this is not a right thing to do.</p>



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PG&E (Phuoc Tran): How do we know the exact generation and how that matches the load at any hour. How do we know total generation exactly what it is? I don't think it's valid. If it's all PV, then it's not an issue but if it mixes with a synchronous generator that's when we worry.

CALSSA (Brad): PV generation is a piece of the equation.

Smart Grid Solutions (Tim McDuffie):: Hourly production model is shared every single time based on PVSyst models for PV Systems. PG&E currently collecting hourly generating profiles. After digging through previous applications, it appears that PG&E currently only collects hourly generating profiles on certain types of Rule 21 projects and not in every instance. An example of where it's collected on Primary Service projects is shared with Mike Jensen and Phuoc Tran, but I do not believe it's collected for every application.

PG&E (Phuoc Tran): We don't incorporate that in our model [more details not captured]

CALSSA (Brad Heavner): The idea/proposal is that you update your model to incorporate the data.

PG&E (Mike Jensen): UL1741 and 1347.1 don't specify the type of anti-islanding, but studies show different types of anti-islanding, they don't operate well together. We are assuming that all these inverters are going to trip together in less than 2 sec. we should start talking about the types of anti-islanding out there, we have come to a point with all the grid support put in place , the system might not respond the way we think it does.

IREC (Sky Stanfield): Suggested Tim McDuffie (Smart Grid Solutions) and Mike Jensen(PG&E) to be on the same page.

Sam White: Suggested to discuss the cost responsibility

Brian Lydic presented [IREC Proposal on Issue 18:](#)

The Public Utilities Commission should organize an Islanding Working Group to explore and recommend next steps in the continuance of islanding (or anti-islanding) research and development. Questions to be answered by this working group could include the following:

- At high levels of penetration, are the power quality issues driven by anti-islanding algorithms in need of mitigation?
- What reclosing and system-level unintentional island mitigation solutions exist or are feasible today (e.g. reclose blocking, extending anti-islanding response time, grounding switches)?
 - o What are typical costs associated with those solutions?
 - o Do power quality concerns within an unintentional island need to be addressed if the system-level approach is used?
- What system-level anti-islanding enabling solutions exist or are feasible today (e.g. grounding switches, power line carrier heartbeat, communications)?
 - o What are typical costs associated with those solutions?



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- Do power quality concerns within an unintentional island need to be addressed if the system-level approach is used?
- What system-level intentional island enabling solutions exist or are feasible today (e.g. communications, power line carrier heartbeat)?
 - What are typical costs associated with those solutions?
 - Do power quality concerns within an intentional island need to be addressed if the system-level approach is used?
- What potential solutions that do not yet exist need further evaluation and/or testing?
- What solutions are ripe for pilot projects and/or additional testing to ensure feasibility?
- What coordination and cost allocation issues need to be surmounted in order to deploy the most effective/feasible/least cost solutions?

Comments on IREC Proposal

PG&E (Mike Jensen): I would include not just the distribution side but transmission side as well. Would we be including Sandia labs and others to help us out? And how would that be funded.

IREC (Brian Lydic): We would try to convene a group of relevant experts. We aren't able to resolve who would fund that.

IREC (Sky Stanfield): We don't need to make a proposal about funding at this moment, if we get to the point of pilot projects then need a discussion about it.

Gridworks: our scope is in terms of anti-islanding screens specifically, we will be coming up with proposals consensus and non-consensus around the screens, IREC proposal addresses things beyond screens, is it in this working groups scope and do we need to address it?

IREC (Brian Lydic): the scope focus just on screens is inadequate to account for what needs to happen in the future. The discussion needs to continue beyond screens.

Smart Grid Solutions (Tim McDuffie): This is going to continue to evolve and is a good idea to discuss.

The Bioenergy Association of California (Gregory Stangl and Julia Levin) presented its [Proposal on Issue 18](#):

For us, who put synchronous generators, our biggest challenge is then the rule is pretty clear, the Guidebook says that DTT is not required if an end of line fault (EOL) can be seen and the generator tripped in 120 cycles (2 seconds), then the utility should not be able to deviate from that without prior – and timely – approval by the CPUC. Our projects cant multi million dollars and we are limited to few MW projects, it becomes burdensome , in working with forests , bioenergy have an impact reduce fire danger in the state , you require the older grids are all radio, We use DTT on 4 different substations , the engineers don't enjoy DTT than we do , they have to manage it



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afterwards , if we could be looking at alternative solutions for islanding and technologies for DTT , That would be a high impact thing to do.

First Proposal, CPUC not the individual utilities should be given the guidance on the application and requirements. We are looking for rules in the interconnection handbook should become rules, deviation from certain rules should be an exception not the rule itself. Our three biggest challenges in the industry are one is interconnection 2 interconnection and three interconnections, and really, it's about the cost.

Third proposal, utilities should be required to offer least cost, that best fit solution. We appreciate our partnership with PG&C. We have seen real movements who acknowledge it as a challenge and something the state is requiring to be done. CALSSA proposal that DTT costs 800K, it's more than that, all the telecom equipment are not included. If we could look at the technically challenge we are trying to solve for islanding and start to look for least cost best fit solutions, whether we acknowledge or not utility is compensated based on return on assets, so the more expensive the interconnection, the greater the return, because its larger the asset, we have to look at solutions that are more cost effective. Finally putting in the possibility of interconnection timelines, only because they are competing the deadline in other parts of the utility world, particularly in the PPA world, they are dependent on each other , we are looking at 3 years' timeline , we are not allowed to participate in most programs. Just getting the enforcement of those timelines is the key.

Bioenergy Association of California (Julia Levin): suggest to have a different solution for the rural project compare to the urban projects, particularly the last proposal, that is interconnection timeline, we have projects, everything ready to go and sit for months and years before they are interconnected, there is a lot of money and risk to state. The absolute cost is very high and arbitrary, and the second cost issue is predictability (provided in the table), which is nearly a bigger problem and around a 690-dollar project. We need clear guidelines, developers need to know with an order of magnitude, we need clear guidance on what circumstances require DTT and what applications do not need it.

Comments on BAC Issue 18 Proposal:

IREC (Sky Stanfield): question on if there is a specific timeline associated with DTT?

Bioenergy Association of California (Julia Levin): The process should be happening quickly, another challenge is, if its 18-24 months, after 24 months our PPAs become invalid. The binding timeline is critical.

IREC (Sky Stanfield): Suggest articulating timeline and how the commission enforces it.

Clean Coalition (Sahm white). Major delays tend to occur around utility construction timeline, our focus is to know how to balance that. One of the options to consider would be limited operation prior to additional construction because utilities are a good reason to have to prioritize the construction schedule.



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	<p>Michael: we basically changed our standard interconnection and came up with a better way to do it.</p> <p>PG&E (Mike Jensen) presented a Flow Chart on screening as representing a graphical presentation of its current Issue 18 proposal.</p> <p>Questions on the PG&E flow chart/proposal:</p> <p>Smart Grid Solutions (Tim McDuffie): With regard to item 2 on CALSSA's proposal using more realistic generation to Load ratio matching, that's a necessarily change the chart is presented here, the aggregate generation > 50% minimum load, that's where that ratio would be applied. You look at the minimum loading condition and compare it to the actual aggregate generation during the specific timeframe and need a clarification on the first part. Before we go to DTT under any circumstance, there should be the ROI (risk of islanding) study as an option.</p> <p>SCE (Roger): Are there any technical documents or specifications to guide how the study (ROI) has to be performed?</p> <p>PG&E (Mike): The benchmark the industry accepted were the ones Michael Ropp performed. Take some previous studies and come up with methodology.</p> <p>Clean Coalition (Sahm White): When comparing the load profile to the generation profile, suggest using actual load and actual generation profile.</p> <p>Mike Jensen (PG&E) will tweak the proposal as per the discussion and comments by all parties and share the updated one by 4/16.</p>
1:30-2:25	<p>Issue 19 New ZNE Buildings</p> <p>---Revisions to proposals by CALSSA, GPI, Clean Coalition ---Finalize discussion</p>
	<p>Agenda today: Discussion on CALSSA/GPI/Clean Coalition's Updated proposals and comments by utilities on those proposals and concluding our discussion today.</p> <p>Sahm White presented the Clean Coalition proposal on issue 19.</p> <ol style="list-style-type: none">A standard design and SLD shall be published within 120 days for any category or subcategory of ZNE facilities in which at least 50 applications have been received in the past year, or as otherwise instructed by Energy Division.The template shall be published in one or more formats which provide the ability to enter information digitally (ex: a PDF form or a web interface) and that is capable of being electronically submitted in a machine-readable format.Where applicable, utilities are encouraged to minimize duplication or inconsistency. <p>Comments on Clean Coalition proposal on Issue 19.</p> <p>SCE (Roger Salas) The threshold of 50 applications in a given year would be based on what? Size design and how are you going to evaluate the 50 applications?</p>



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Clean Coalition (Sahm White): The size doesn't change the design, so its size is independent. The question is, whether you are receiving designs which are functionally and structurally are the same? We have previously gone through the basic different designs and the variations, so if within any of these individual categories, if you receive 50 ZNE of them and all similar within these categories, then that would be the threshold and we are open for further refinement. Things can't be standardized, if 50 are all different functionally.

SCE (Roger Salas): Utility interpretation is whether the individual applications have similarity enough to call them equivalent for purposes of single line diagrams for operational purposes?

Clean Coalition (Sahm White): if the engineers are seeing that applications are functionally similar then yes.

SCE (Roger Salas): Need clarity on 50 applications per year. If in 2019 we had 48, in January would we be starting again from 0?

Clean Coalition (Sahm White): We are looking at the rate of receiving applications, if you received 50 in the last 10 years, then it's not enough but if you're seeing them coming in on a regular basis, you would need the templates. Whether a calendar year or rolling over 12 months, but the purpose is when you are getting a relatively large number of similar applications that would benefit from having a template. That would benefit applicants and utility in being able to quickly process, save cost and time spent in review.

SCE (Gary Holdsworth): any discussion with actual developers in working through this? do they have their own standardized approaches?

Clean Coalition (Sahm White): Got feedback from CALSSA representing developer and Tesla.

GPI (Tam Hunt): GPI supports the proposal, the 50 application seems reasonable, but I wonder where the number came from? Would it be the same for smaller and bigger utilities?

Sahm: I recognize, it's not about size of utility, it's the frequency which these are used by developers. If you are a small utility, it doesn't necessarily mean to use a smaller number. We are open to discussion to define a threshold.

Clean Coalition (Sahm White): SCE comments on Clean Coalition have been incorporated.

SCE (Roger): we are putting responsibilities/ additional work on utilities. If that's going to be a requirement.

Clean Coalition (Sahm White): the goal is making it easier and faster to review and require less engineering time. It could require some tracking of applications and It is aimed not to be highly prescriptive. Hopefully you are already tracking how many applications you are getting under each of the listed categories and then check with engineers and figure out if they are similar enough to have a template.



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GPI presented its [proposal on Issue 19](#):

we presented 4 proposals for streamlining and automation of ZNE application and to allow ZNE applications to enjoy the same benefit as NEM < 30KW. Under the notion that we are going to have of standardized ZNE applications for residential and commercial and with the existing tools, it seems there is much reduction in processing time achievable here. We want to ask utilities that how much time reduction is doable giving the existing tools.

Comments on GPI Issue 19 Proposal:

SCE (Roger Salas): Clarity needed if we should apply the same tools using NEM <30KW for ZNE <30KW?

GPI (Tam Hunt): No, apply to whatever size is appropriate that can be defined by utilities. It's not just for projects <30KW. ZNE projects can go up to MWs. What can you do to apply it for larger projects?

SCE (Roger and Gary): System size matters, <30KW and below is possible but cannot generally treat larger scale projects the same way. NEM or Non NEM, under 30KW we potentially could do streamlining. We don't have any automated process for larger interconnection greater than. Larger applications have to go through normal operational processes and timelines. There is not much we can do for larger ones. Here you are proposing to create a whole new system. Larger systems are more complex and require more evaluation.

PG&E (Jim): Looking at the GPI proposal and our process. We provided the table with approval timelines, that is not reflected in your proposal, we are already less than 4 days to release PTO after we receive ASJ. The recommended modification really isn't going to impact. Even over 30KW, our given PTO is less than 4 days.

Gridworks (Eric Martinot): You are proposing a timeframe that is less than current days for ZNE projects regardless of system size.

GPI (Tam Hunt): Yes, as the current process is longer, we are proposing to streamline that process for ZNE by full or partial automation using existing tools to help reduce the timeline.

SCE (Roger Salasr): Same conversation we had already discussed in the previous Working Group. We have to develop appropriate tools to automate screens not just for ZNE but applicable to all interconnections, we will get there but not yet. Require funding, resources and time to do that.

GPI (Tam Hunt): The WG here can jointly recommend funding for these majors for ZNE projects but eventually will apply to other projects.



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Clean Coalition (Sahm White): I see three distinct parts, First, for processes for NEM under 30KW and applying that for ZNE under 30KW. Second one is to see where applicable, which of them can be extended to the process above 30KW, whether it should be reflected in excel tariff timelines or each of them are considering individually.

CALSSA (Brad Heavner) presented its [Proposal on Issue 19](#)

CALSSA has revised the proposal based on the last conversation. First one is using an address rather than the meter or the account number. Since PG&E intend to do what's proposed by Dec 2021 so they are encouraged to apply 2 steps. Meanwhile, do the same process as SDG&E. In proposal 4, parties have issues with extraordinary circumstances, so CALSSA has changed that.

Proposal 2 is about material modification SCE in particular said we have previously worked; we can just go by that and don't need to include anything here.

Proposal #3. Eliminating apartment buildings because in our view, there are two types of templates, <30KW, check a box and effectively not submitting any SLD, therefore, it is super streamlined fast work on the utility side. For multi-family larger systems, it makes sense for utilities to review a drawing but that there is still a place for templates. We believe it will be useful to jointly develop some standard designs just for the purpose of standardizing our work so we understand each other better. It's a different concept of template, not a check box template, standard design for standard type of configuration.

Proposal 1 and proposal 3 – completely consensus and its non-controversial. Proposal # 2 is about the timeline – let's just put a timeline on it. if utilities want to take a position that it's too much work on them -then we go with non-consensus.

Comments by all parties on CALSSA proposal on Issue 19:

SCE (Roger Salas): #2 is not that we disagree, but it's about funding to develop these processes.

CALSSA (Brad Heavner): SCE says it's not worth the cause and CALSSA says it's worth it so the commission will decide.

Clean Coalition (Sahm White) – microgrid proceeding is focused on microgrids and does not deal with requirements that don't apply to microgrids. We are ensuring that we are not duplicating the effort here.

PG&E (Alex Portilla): Rule 21 has appropriate places and parties to discuss interconnection issues, Microgrid proceedings doesn't have appropriate parties to discuss it.

CALSSA (Brad Heavner): it's a collaborative exercise, If we all agree it's useful, let's do it.



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	<p>SCE (Roger Salas): The SLD templates in microgrid proceedings are going to be applicable to these conversations. Let's not duplicate effort. That is very well handled in microgrid proceedings.</p> <p>PG&E (Lee Trevino)– PG&E has no issue with item 1 and 2, about the revision to the date and 2 step process needs further clarification.</p> <p><u>Action Item: Brad Heavner to contact Lee Trevino about the timelines.</u></p>
<p>2:30-3:45</p>	<p>Issue F - DERMs</p> <p>Brad Heavner presented CALSSA proposal on issue F</p> <ol style="list-style-type: none">1. Language for Rule 21: The operational flexibility ICA constraint is severely limiting for many locations even if circuit reconfigurations at that location are rare. This leads to underutilization of existing hosting capacity that has been paid for by ratepayers. When this came up in the ICA working group, utilities mentioned that collaboration flexibility needed to be discussed. When we have communications, then we will have another option. We have the communications built into the DERs and utilities have experimented on their end and this is the time to set rules. If after the normal process of going through the ICA and the operational flexibility holds up, and no constraints for the project in question then the utility has to offer as an option the curtailment. If utilities and customers have to work out a deal, then they should at least explore the options and have a productive conversation. In terms of the curtailment and interconnection agreement, utilities need to have the communication at their end to curtail and currently they are doing experimentally. We need to quantify the expected extent of curtailment.2. Aggregator Agreement: Smart inverter functionality can solve grid integration challenges, but some use cases may require contractual terms. It's still on our side and we need to come up with a draft, the major terms are what's the uptime requirement. That was left open in the previous working groups.3. Demonstration of Capabilities: The current compliance pathway does not test for all possible inverter/gateway combinations. <p>Comments on CALSSA proposal on issue F:</p> <p>SCE (Roger Salas): I think the maximum number of curtailments needs to be changed.</p> <p>CALSSA (Brad Heavner): We can change and let's think of something for quantifying the expected extent of curtailment.</p>



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SDG&E (Greg Smith): This is not a demand response project. We don't want to be in the sense that when we have some sort of our priority defined program limits and you can call this many times or this many curtailments. We just think that's almost impossible to predict as Roger mentioned earlier. And we invested so much in 2013, and we plan on using that as the basis of communication going forward and it is just that the style of interaction would be more dynamic and based on real operational system constraints, rather than being able to predict years into the future how many program calls we would have, this seems problematic for us. And last point is that the need to curtail output in extraordinary conditions whether planned or unplanned outages.

CALSSA (Brad Heavner): Do you consider the cases where there are rational flexibility constraints that produce an upper limit on DER size that are really only applicable for rare occasions?

SDG&E (Greg Smith): I don't want to speak on behalf of our engineering community on the frequency and some sort of capacity and thermal limits that are going to be reached. But I know as we are trying to raise hosting capacity to something much greater than 100% by approving on this project the frequency of the current can increase over time.

CALSSA (Brad Heavner): We are talking about thermal voltage limits and circuit itself and issue 8 came up as well where it was described that the operational flexibility number, there will be cases and projects specific review where engineers would say that the operational flexibility isn't a big deal in that location because we have so many switching options there we can ignore that. And there was a lot of discussion about those scenarios. And we got something in the proposal for the supplemental review for it.

SDG&E (Greg Smith): As more projects go online there will be more generation on all levels, and unless this is all held by storage like more Hawaii situation, our ability, we need to have operational flexibility and Brad talked about communication earlier, certainly communication are capable but not active, they have not been rigorously tested. Over time there is going to be the need of this dynamic system management and decide what is the constraints dispatch order for the circuit, and who gets to decide dispatch, So there is a lot of interaction that we think, over time there the DERM system will need to manage and participate in the energy markets.

SDG&E (Catarino Vargas): We need to discuss how we use ICA with operational flexibility.

PG&E (Rustom Dessai): Agree with Catarino. As Brad mentioned, what do we mean by operational flexibility is important too. There are different ways you can have static seasonal type things where communication isn't necessary and is more real time command to these different systems and controlling real power and apparent power, so all these kinds of things to be looked at in that particular response. We are looking for finalizing some things already to make sure they are working properly before expanding, we touched around the kind of liability potential questions, not only utilities we have to work through the liabilities to the customers



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	<p>as well. We see value in it. We are looking at flexible interconnection and that would be more of a point type rollout than doing it more system level effectively. PG&E is working on DERs for some type of investor deferral. If DRs don't meet the requirement, what if we go over the calls or under them. A lot of learnings but that won't be in operation until next year.</p> <p>SDG&E (Danielle Weizman,): The technology is still under development, as we move forward and think around how a DERMS operational flexibility needs to be identified and utilized in the future. That is still under development and it depends on specific proposals and specific limitations within this proposal.</p> <p>Laurence Abcede presented SDG&E DERMs initiative Brenden Russel presented SCE DERMs roadmap Rustom Dessai presented PG&E DERMs roadmap</p>
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Meeting total Participants: 60+ participants

Abtin Mehershahi, CEC	Jason Bobruk, SolarEdge	Rebecca Davis, Lozeau /Dury LLP
Alex Morris, CESA	Jim Spurgeon, SDG&E	Rustom Dessai, PG&E
Alexandra Leumer	Jin Noh, CESA	Sahm White, Clean Coalition
Aliaga Caro, CPUC	Jose Aliaga Caro, CPUC	Sara Biyabani, GridComm startup
Andy Schwartz, Tesla	Jose Gerbar, Nuvve	Sky Stanfield, IREC
Annie Cwiklinski, Tesla	Julia Levin, Bioenergy Association of California	Sophie Meyer, CPUC
Brenden Russel, SCE	Kathryn Enright, SCE	Steve Sherr, Foundation Windpower
Brad Heavner, CALSSA	Katie Wu, Gridworks	Steven Rymsha, Sunrun
Brian Lydic, IREC	Lee Trevino, PG&E	Tam Hunt, GPI
Brian McCollough, CPUC	Laurence Abcede	Ted Howard, Small Business Utility Advocate
Catarino Vargas, SDG&E	Marc Hutton, Public Advocates Office	Tim McDuffie, Smart Grid Solutions
Danielle Weizman, SDG&E	Mary Brown, SCE	Todd Farhat, SunStreet
Derek Pearson, Artwel-Electric	Matt Gonzales, PG&E	Trenton Jean, Tesla
Eric Martinot, Gridworks	Max Ernst, PG&E	Travis Snyder, Ningbo Ginlong Technologies inc.
Erin McDonough, Tesla	Mike Jensen PG&E	Wilfredo Guevara, SDG&E
Gregory Stangl, Bioenergy Association of California	Mike Turner, SDG&E	Rehana Aziz, Gridworks
Harold Hirsch, PG&E	Phuoc Tran, PG&E	Roger Salas, SCE