

## **EPIC POLICY+INNOVATION COORDINATION GROUP**

### **PUBLIC SAFETY POWER SHUTOFFS WORKSTREAM – MEETING #1**

**NOVEMBER 16, 2020 10:00 AM – 11:30 AM**

>> Welcome everybody we are going to get started in one minute. Welcome everybody we are going to get started momentarily. Welcome everybody thanks you for joining us today to discuss an important topic. My name is Andrew Barbeau and I am a consultant for the epic group. I want to thank everyone for joining, let me give you a brief background and introduction. I will start to share my screen. So again, welcome everyone for joining us today. The public utility's commission formed a group through the epic program to gather insight and lessons learned from epic electricity research from projects throughout the state. And to identify new opportunities. The group has been facilitated through four workstreams: Equity, transportation electrification, wildfire mitigation and public safety power shutoffs. This is the first meeting for the public safety power shut offs Workstream. As part of this Workstream we will be discussing how to minimize central and economic disruption from power safety and public shutoffs to the most vulnerable communities. While utilities are submitting wildfire and mitigation plans and are accountable for the organization programs. They are tasked with identifying critical local infrastructure and understanding the impacts of power shutoffs on critical public services and vulnerable populations. Further there are lessons that can be learned from previous grid modernization investments that have been made or could have been made to mitigate and prepare for future growing and more impactful wildfire and public safety high impact threats. This Workstream will conduct meetings between mid-November in mid-December of 2020. We've had several other successful Workstream meetings to date and we are planning to wrap those out by mid-December as well. Today we will be discussing community focused planning solutions. And understanding lessons learned. I want to note that the communities are we talking about today are not necessarily the communities that are most inspect impacted by these events. We do have a significant body of work that can share some experiences and lessons learned around this that can be helpful across the space. I am excited to welcome our speakers here today that we worked with for past few years around the communities. We are going to start with Vipul Gore from grid scape solutions, Tran eight from Huntington Beach advanced energy community blueprint Eric Marna Schwartz and Tran ten and Frank Wasko. At the end we will have a question-and-answer session where you're invited to pose questions. We are going to have the presenters starts as they go through their presentations we will ask them to share insights and what they have learned in their projects. And the questions we are prioritizing here today. Again, these questions are developed around the idea of looking at planning, around energy assurance and resiliency in the community. A lot of them involve bringing together multiple different aspects together. So, the questions we will ask today what are the best ways to identify electric power assets in a community, what electric power data is valuable for community planning and how to be you get it? What considerations are most important for developing advanced energy community plans? How do different outage durations affect different critical needs in community's? Is every community in every blog different when it comes to resiliency energy assurance? Or is there a way to create a standard approach and structure to providing community solutions? The presenters will keep their presentation short. If you have questions, please include them in the Q and a feature on the right-hand side. If you cannot find the Q&A box it will be behind a button on the bottom right-hand corner of the screen. We will try to get in as many

questions as we can. Again, if you are having technical difficulties with audio or video please reach out to Amanda for Nelly. You will also see chats coming through from Amanda and Rebecca they will supply information along the way please pay attention to it. A lesson -- again if you have a question to ask of the panelists there will be a Q&A session after the presentations you can put them in the Q&A box. This meeting is being recorded and will be available online after the meeting. There is also a live transcription of the event you can find that link in the chat function that is being shared by Rebecca and Amanda. Again, I want to thank everybody for joining today I want to kick it off to our first speaker this morning, and that is Vipul Gore. Vipul Gore welcome.

>> Can you hear me? Good morning thanks you very much and I am extremely delighted to be on this panel this morning here. I will be happy to talk about the company. So, we are going to talk about commissioning renewable microgrids in California. And we will try to present a new approach to solving the problems. As well as energy savings. And how these projects are achieved and do what is necessary to these scalable models. Just a quick introduction of grid scape. We are small to medium-size developer and operator of renewable energy microgrids in California. We microgrids are solutions are software grids and they are in software. As well as product centered integrated with EV charging demand response grid services in all types of DER's. And we will try to make this as more product centers as possible. We do that over storage EV charging we provide full energy management. We've been very fortunate over the last 67 years in California regulator Tori commission our research has been. The one that we finish last year. In San Diego and cap Southern California. So, based on this coming year. To make this more complex and can't trade. We have modular scalable software driven microgrids. First in the industry integrated outdoor related expandable box that includes battery energy storage, and venture, controller, interconnection relay critical load panel and other essential implements. Low installation and maintenance costs, cloud -based remote control and management. On-demand comprehensive reporting. Remote management of critical and load panels. On-site and off grid mode. Twenty-four-hour grid resiliency for other loads. So, this is the grid scape critical facility microgrid network. We are dealing with solutions and we have done in ink degraded recharging stations. We are doing a processing plant and we are doing in San Diego area. We expect that by the end of the year we should be operable. Next line. These are the pictures of grid scape microgrid deployments. There are pictures of all of these microgrids small microgrids and other microgrids. Next line. Microgrid design and operations. So, utility registered response services. And you scope Derm's server, service panel and transformer, operating modes grid tied and off grid. It is a difficult solution of this system and the energy is opportunistic pick I don't. That offers the whole site and on the site. We next line. Challenges and opportunities. Challenge financing can't description small critical facility microgrids are very difficult to finance fully with funding. Opportunities contribute incentive programs, establish a value reference. Also create new and ciliary grid services. Another challenge is regulatory, it takes a long time to construct and display. Permit processes, interconnection time, procurement costs, the opportunities would be standardized design and building because. Prioritize and standardize interconnection processes. Promote vertical integration. Next challenges awareness and decision-making, the description will be critical facility operators need a lot of education understand importance of microgrids. The opportunities would be developing market outreach and awareness building programs. Allowing and promoting data driven approach. Also, another challenges cost to deploy, the description would be material costs need to stabilize or decrease

financial viability and bank ability. An opportunity will be promoting product centric approach, custom microgrids are very expensive to build and deploy. Is very important to figure out how we can all bring this together. Really try to figure out our systems. [ Indiscernible by captioner ] we need to work together with the public sector to ensure these things can be accomplished. Thank you.

>> Thank you very much, some antecedent -- interesting things that you've raised. We will probably give you a couple questions in the Q&A session at the end. There are some questions here about the size of the module literally if we really are shooting for non- custom projects. Those of you ready when we get to them. I want to switch over now to Jack, we have a Trent eight here and jump right into your presentation here.

>> Sure, you are changing the slides for me correct?

>> Yes.

>> Thank you I appreciate this opportunity to speak to you about the Oakview Michael Vick -- the Oakview Michael grade in Huntington Beach California. This community is a disadvantaged community in Huntington Beach. We are fortunate to have a great team working on this. That includes the national renewal jewel -- renewable energy Lab. And a really cool building called Altera. So, this community sits right here in Huntington Beach where you see this pair has that is a very interesting location for natural disasters and preparedness for natural disasters. It is an area where tsunamis can hit, and it is in the floodplain, so this is a low collation you need to prepare for emergencies. It also happens to be a disadvantaged community because of its level of income and its exposure to pollution which comps from the adjacent industrial area and the freeway which runs close to it. This disadvantaged community we've been awarded to look at the possibility for introducing a microgrid into this community that has been a proven. RTAS include some things that are related to the questions. We going to capture big data associated with his community like building energy demand addressing security issues with personal data infrastructure if -- and infrastructure disk classification. And what will be included for the microgrid to be installed there. We are also supposed to adapt microgrid design tools which enables us to design microgrids, so we can make that entry easier. We will ask are there ways we can standardize the ways that we can use microgrids. We are also going to develop urban energy scenarios. We can consider the technology combinations for improving urban HQ, reduce GHD and increase grid reliability. We also will apply air-quality techniques and then we will try to propose a master microgrid design in the end. The objective and energy efficient measures that we can apply in this case. Working with faculty we have this emissivity electorate coding. It can be coded onto walls and working materials that can dramatically reduce the air conditioning requirements in this neighborhood. This is a very novel energy-efficient way to apply at other locations.

>> And the urban tool that is one method that is based upon a world leading energy simulation software to open studio with the department of energy. This can simulate entire neighborhoods and communities and then optimizing the energy infrastructure that can be introduced into these communities. We are introducing a lot of new functionality in this software that we have co-funding to develop. It includes adding transformer nodes and transformer ratings capabilities and

even assessing the thermal response of those transformers. To identify critical infrastructure in the communities automatically and a properly sized them so that we can simulate the community well. A lot of focus here on transformers and you will see why in some of the results I will present. So, this is an overview grid modeling model. It is of the existing grid structure that we developed it as a model glue that is a physical model. It has all the transformers lines, and switch gear that is involved in servicing this community. If you can see that there are two main services of green that you can see here in the blue circuits that you see here are the standard circuits. Then there are lower voltage services that are provided to mostly residential sectors and high-voltage's that is provided to the industrial sector. So, we simulated this network and try to see if we could under any circumstances the highest demand, or in lowest demand circumstances that have constraints of transformers or lines being overloaded. Under normal operation we are shown you here we have no critical items. If it appears red amongst the transferors or the wires if it is designed properly. We want to do -- introduce TV. -- PV. Here is an overview of the maximum PV in the industrial sector. We have a lot of rooftop space that is widely available, and we are putting as much solar into this community as we can under the scenario. So, what happens is this was supposed to be an animation here, what happens in this interface is when we add as much solar as we possibly can we have transformer overload that primarily occur on the low conditions. And conditions of PV backflow through this microgrid. So, we can optimize the size and control different PV access and introduce battery storage systems to maximize the microgrid. When we do that changing some of the wires that go into this facility we can't have zero emit energy yet because there is too high a demand, but we can assure that this microgrid can operate through events did not violate any of the constraints -- constraints of the microgrid. This is developing the tools for microgrid simulation, so we can apply this broadly to any microgrid throughout the state. Thank you for your attention.

>> Thank you Jack, we appreciate that we've covered a lot of ground there with a lot of detail in a short amount of time. There is a question that was opposed in the chat about wanting to get access to the presentation if they cannot read them or if they don't have the access to view. You can find them by going online by going to [www.partnership.org](http://www.partnership.org) and go to the public safety page and you can find a link to the presentation down there for this meeting. We will also send the presentation around afterwards. I appreciate that Jack we can have some questions for that. And how accessible this could be for communities going forward as well as some of the questions raised about that. Thank you for the position. I am going to switch over the next presenter is Marna Schwartz. Thanks for joining us today.

>> Thanks for having me today my name is Marna Schwartz. I work at the city of Berkeley in the office of Public Safety. I just want to be clear that I am not an engineer and I appreciate all the technical prowess of the other panelist. And I thank them for that. I will use this space to talk about energy assurance transformation. And the lessons learned. And how these lessons can help us change the energy.

>> -- was the first to establish case financing pick and we were just recently we just passed the natural gas ban. We see the microgrids and backup power as resilient but also as an essential component and becoming a fossil fuel free city. In 2016 the city a book glee was were awarded a \$1.5 million grant Parikh we research the feasibility for connecting building across blocks Parikh when connecting municipal buildings. What made our designs different from others which are

the ones like on military bases we have buildings together in a couple of blocks and it turned out that is very complicated to move power across the street so here are the some of the things that we learn. Number one was utilities are reluctant to share information. Like who is on what distribution ring. To you can't use existing distribution lines city has to pay for new ones. It cut requires a lot of upfront capital. You have to pay the utility for new lines, but the city pays for utility for O and M. And is you can create master meter at point of interconnection don't value grid services and must pay transmission fees. I am happy to answer any of the questions at the end of the presentation. I just want to say the utilities are left to share the infrastructure information which is essential for the community. Micro energy data needs. What energy dater is valuable for the community planning and how do we get it? Current and planned infrastructure, how many and which customers are wanting distribution lines and finally info on building bad in the readiness standard process and interconnection timeline. Create a checklist of steps and rules and provide technical assistance especially for disadvantaged communities. We shared many of these in our case studies and we also share at the microgrid in December. [ Indiscernible by captioner ] we continue to keep doing this work and make sure it has benefits for all. Energy data needs during PSPS events. Staff liaison position appropriately, keep liaisons up to date, and ensure consistency of PG and E outage information. There is still room for improvement and sharing energy data. We have to make sure that the liaison is staffed appropriately, and we have one for the whole county and that is challenging. Making sure the liaisons up to date on the information. And finally, there was some inconsistent things between power outages and emergency management so to ensure consistency of PG&E outage information. In order for us as cities to be on the front line in outages we need them to have more clear and consistent outage information so they can share that with everybody involved. While we appreciate the importance of our customer data. We have many distinct requirements and we need access to certain information to keep the community safe. In addition, we ran into issues the value of small-scale microgrids. The definition between redundancy and resiliency. Ultimately that is one of the goals that can be replicated. Our goal is to build a microgrid that can be replicated in other communities. Ultimately, we decided we hope that the lessons that we learn will benefit all California cities. [ Indiscernible by captioner ] in addition to complement our national gas the city of Berkeley is also looking to pilot to do strategic decommissioning of natural gas lines in strategic communities. Will have similar Lee share the data. Thank you for the invitation to speak in your time today I will leave you on a final note, the best and most equitable solution would be to figure out a way to provide clean energy to the entire grid and bring it to the people who really need it. There are utilities doing just this in the industry. But until we can we need cities to fill those gaps behind the meter solutions to manage outage solutions. I think it is in their best interests to make this effective as possible. Thank you.

>> Thank you very much Marna, we have a lot of questions there about the gaps in infrastructure data. And I think the questions are eagled to jump on. I want to recognize that we do have one question that is coming in the Q&A box. In a couple that have come in the chat function a great director me. Please enter your questions in the Q&A box. As you See you then. and put them in now and I'll try to prioritize them as they come and pick all right we have another presentation here in the last presentation we have Bob O'Hagan and Frank Wasko. Welcome Bob and Frank we appreciate having you here today.

>> Thank you, Andrew good morning I am, Frank Wasko with a clean coalition we are here to help out the staff in the policy makers to gain new insight on the epic research development projects. Our project is the peninsula advanced energy community bridging the gap to resilience. Today we'll talk about a quick intro about the clean coalition then cover the project goals. Will cover the benefits of advanced energy community projects. The components in the benefits of AEC. Project example a 13 Civic Center. And Bob will answer our work stream questions and demonstrating how other projects Inc. California is specifically the Santa Barbara unified school district. The clean coalition has a wealth of experience in micro planning and engineering they have worked with many clients like universities and top companies which help them meet their goals. We do a combination of consulting and grant funded work and where experience working with utilities. This is a groundbreaking initiative streamlining projects and showcasing projects. It shows multiple renewables about energy storage and infant structure at the state and local level. California has policy goals that support the development of clean local energy systems. The scaffolding is in place to build a clean energy future. Are projects look at the key challenges and develop findings and create tools that will accelerate the deployment. We will also share our keynote project that is currently under construction. AEC projects build resilience infrastructure for customers and communities through the effective combination of solar and storage. It can't obviate the need for new power plants and upgrades. These projects designed and must focus on all considerations. These help microgrids be designed and effectively manage events and reduce environmental impacts. Here is the peninsula advanced energy community. Please note the NEC components. It includes energy efficiency renewable energies electric vehicle charging infrastructure and energy storage. The benefits reduce need for new energy transmission and distribution. Promotes grade reliability and real resilience. Financially attractive and replicable and scalable. PV prices have dropped to make them attractive and scalable. Here is the Atherton Civic Center SLD. Its enclosed batteries also natural gas heaters data using a high-efficiency pump. It will have heating and cooling in the plant. Here you see additional AEC leaders in the region. A couple of highlights include Facebook, as a result of their commitment they are committed to reducing their greenhouse gas emissions by 75% and powering their global operation to one 100% global energy by the end of 2020. Also, Kaiser Permanente the nation's largest nonprofit health system has become the first healthcare system to achieve carbon neutral status. These are both great or complements. Nell Bob will cover the rest. Bob?

>> I am looking to answer some your questions. The best ways to identify the energy assets in the communities. One of the key ways to find that is using the ICA map available at the IOUs. All the companies have these available and you can go on there and get some of the answers to the questions you were asking. We will work with PG and EE to model this. To model the entire grid from the substation level. Most of the systems work at the feeder only and they don't see the solutions to these things. We also do solar siding surveys to look for existing PV and the potential for vampiric every place you see a flat roof or park line is a potential site. But we have a big problem with the split incentive for building owned by one party and occupied by another. That is one of the major things we have to figure out. I'm going to bypass these next pictures quickly. So, the energy data, obviously you need to aggregate data into model these things. There is a new source online coming out of UCLA called the energy analyst. And I am just starting to explore this. A first of its kind interactive website built with the largest set of publicly available dis- aggregated energy data in the nation. For individual consumers annual 50-minute load profiles are best stated to have for any modeling planning and is readily available from

individual customers if they give permission to use API. Is the next best load source being utility monthly bills also from direct request. Utility bills are useful for fighting information, but they don't tell you much. For developing an advance plan, you have to figure out what your goals are caught energy use and reduction bill saving during normal operations. What is the resilience? What are the funding resources? Are assets for normal operations or for backup? Although we are seeing improvements opportunities there. You have to figure out what assets are for normal operation or for backup. And how will these sites be repurposed during an extended outage. So again, that will be your municipal resources in your schools. And so, the outage duration spirit obviously with life-sustaining is choose always are Panama are paramount. The following answers assume that the individual life-sustaining needs are handled separately. Hospitals already have their own requirements under OS HPD and are therefore not good candidates for community energy planning. The outages that go on two hours you have to think about how to safely get people out of buildings and you have to clear their buildings without having shoplifting going on. And we are starting to repurpose resources and we have to keep all the civic functions goings, the water pressure, wastewater treatment provisions. In terms of Jimmy's start looking at cookie-cutter approaches. We are not there yet businesses and functions tend to have similar load profiles. Schools are going to be heavier during the day and those types of things. We learned each city has similar needs but great differences in magnitude of funding resources for building resilience infrastructure. IT standard approach we found his sizing PV plus storage resources to be cost-effective on their own for bill savings and then examining. So, the Santa Barbara unified school district we work with them on 18 sites in the selected 14 for solar and some of them are going to have solar power microgrids. Here is a quick example of the concept of load sharing. What you probably can't see very well is sort of in the middle of the yellow blocks those are the tier one lows they selected. These are the more simple important areas which other refrigerators and freezers in the cafeteria. The next one just above it is the lights for the gym our definition of tier one is load you want to keep on 24 hours a day seven days a week. Tier two lows are optional loads that you don't keep on as long as tier one. We are ready for Q and A.

>> Thank you Bob and welcome back everybody. But hopefully we now have a panel and let's pretend like we are on a stage at your favorite workshop or public event. We going to start jumping into questions here. If you are an attendee which there are many of you please use the Q&A feature we've had some questions command that are very good and we are going to get those on the way through. And we have a question come into the chat. And we will try to get through piece-by-piece here. If you are one of the other panelists or other folks on the panel, please just come on video and you compose your question verbally. I want to go to this question that I raised at the beginning to kick this off. Obviously, the projects we have selected are very interesting and have a lot of meaning pick where we want to gather here is his experience from projects have tackled some of these core questions by communities were becoming highly important. We've had a question come in, that your high fire risk areas loss of power means lots of traffic lights, lots of radio signals, loss of cell and Internet. I think some of the things you were mentioning Bob. The things like my cougars are great ideas for Atherton City Hall in the Santa Barbara schools but in places like Napa or Paradise or Malibu it seemed like a social mandatory life-saving tool. What gives you. Would anybody like to jump at that first

>> We are working with several facilities in Napa it is pretty important for them to have power. For them we actually work with maintain energy and we have been talking with several people there about microgrids. You are right sometimes so the idea is that you have completely [ Indiscernible by captioner ] the microgrids are completely isolated and then you have a backup generator which can become a second generator which is a backup of the backup. Primary power is solar and battery and then late at night you use different powers. That is how we help propose this pair has there are challenges in addition when the solar generation drops [ Indiscernible by captioner ] we are recharging on the microgrid, so we can actually get power from. Passenger cars are not really use for that, but it is possible. But I'm hoping that hopefully before the next fire season we can actually commercialize those systems.

>> Can I add onto this we've been doing work from this and Santa Barbara County and Ventura County we just secured an agreement after doing a study. They are going to suits proceed with microgrids and for city sites. And they are very intrigued by the whole concept of cost effective during normal operation and kicking off the microgrid without just turning on generators as backup Eric in these cases they are going to have hybrid solutions and the differences allow your places, your sites are fire stations that have diesel generators in place. Which is a good place to start. They are moving forward searching for grants and if not, we will get PPA funding from those sites. -- for those sites. And those are high fire zones and plus we get the mudslides after the fires.

>> So, you're talking about this being ready in advance for the next fire. That's pretty short turnaround. For communities that may be haven't started applying what it is maybe they have a major fighter this year end a gun think about this next year. The first step here is obviously where are they going to start? What are they going to start with? Developing a plan and how they start looking at the facility needs in understanding the capabilities of their community. I guess the question is for the newest communities where should I start? What is the first most important thing that should be evaluated?

>> There would always say that safety is 1st and foremost. So what other things are going to save lives pick for us we looked at our community microgrid and we focused on in the downtown and what we considered our current critical facilities which are public safety buildings, nonnormal call centers and jails as well as our police and fire. I think that is often true for a lot of cities.

>> I will just add the fire stations and police stations and the community centers need to be operated on. And then you start the next data on those sites what type of microgrid they want and what are their goals. Is it energy savings I'm talking with several customers a day for example there really small sites and they are thinking about resilience -- resiliency not energy savings pick cost of them becomes important. [ Indiscernible by captioner ] I just can't apply the solutions. Next year for projects so that's what we [ Indiscernible by captioner ] is there critical life-saving communities I think those are prime spots but smaller and smaller sites like fire stations it seems to be hard and we do something about it.

>> Jack, I want to go to your next at the point of getting data. Will continue on this journey getting the data and you are one of the few who were able to get data. Weatherby transformer



loading or locations and we also have some ideas of other things. How do you get data? And what are some options?

>> So, we also do after a long period of engagement we work directly with the utilities to confirm that we have found. They work also with us to give us information if you work with them long enough they are happy to provide that information to us. You have to sign some nondisclosure stuff specifically and they say you are required to do that for security reasons. So sometimes that is required. Let me also suggest I want to comment about a couple of the other things. I think it is really critical for the California Public utilities to institute a microgrid tariff. To do so almost immediately that accounts for the value of resilience. We've heard many of us talk about it. So, this is an opportunity for them to say hey we are going to give you a value for resilience in these fire threat zones and here is. We are going to add this to your bill every building. Because you built a resilient microgrid. This hasn't been done yet, but we really just need to do that that will help with this financing challenge that has been raised. The second point I want to make related to this is the duration of outage in the degree to which zero net energy can be acquired with batteries and solar alone, is something that we should be thinking about. You can get a lot of the resiliency we need but we have long-duration outages on thing about hydrogen and fuel cell technology. We have to start thinking about that in our microgrid technology. This is an important next step small duration outage can be handled great by solar and battery backup Eric but we have to think about fuel cell technology I know and going a little bit off topic from the data, but the data is not easy to get from the utilities, but we do have some of the data either by talking to utilities or doing the inspection yourself.

>> I think that is helpful, I want to keep going on this journey here, part of what you're talking about community needs. I think the issue was brought up on several occasions, once you start looking at two to three-hour outages in 12 hours to 36 hours you start to get at different points on the system.

>> We are putting in new diesel generators and I think this is a bad direction to go and pick we have alternatives that will work both stationary fuel cell systems that work and can transfer over to a dedicated load, and backup options that are available. Where there are zero omission alternatives. This is really important.

>> So, going down this thread you have the data, you been able to work with utilities and to get infrastructure of what's out there and you understand what is out there. So, we have to put all that into a plan. I think that you work with orb and ops Jack, that is a tool that is out there that is a tool that has a learning curve. That is a specialized field that folks will not have to partake in this journey. What data points does it bring in? How does it, how do these types of tools dress questions like the duration of outages? How do you take an account of building K -- electrification into account? What tools are out there, are there any twos that make this easy?

>> There are definitely other tools out there I like to suggest these tools are the most extensive in regard to the capabilities. Including physics and infrastructure strengths and the ability to accurately simulate not only a building, but all of the loads with that building and these are things that we can do to electrify. We have all the options available to us. And sometimes communities don't need that at the table. And then there are clear tools that are out there in

available. But I know several of them. Those might be at the higher level before you have to do a design build you might want to use these higher-level analysis tools for figuring out whether community can use the microgrid of and help with the engineering. I think ours is the next level on the table. If you are just thinking about it I don't know, once you design one and once you figure out your storage assets this tool is going to be one of the best. It will be serviced and provide a publicly model for this going forward.

>> Let me pose that question over to you other tools on the grid scape that help during the planning stages?

>> [ Indiscernible by captioner ] the connection challenges based on drawings and I think that's where the companies have created externalized plan search. Again, if you have a standardize plan [ Indiscernible by captioner ] there are many design tools, so I have a whole team that is working on all of this.

>> I want to follow up on something. You're working on projects in multiple places, the benefit of standardized plans is that a gap? Is that something I can help with acceleration. Or other obstacles?

>> Yes, several speakers and you just also mentioned the real problem with permitting. It is extremely slow and that's why hang-ups are financing is the longer the permitting takes to get your interconnection application. More likely you have your committed financing just get up and walk away pick or owned and operated. That is a key problem we have had to create our own analytical tools to model the loads to what can be supported. In order to do the proper sizing. Existing tariffs are because the results tend to be behind the meter installations. They penalize heavily when you get beyond that zero-tech support in. To make community microgrids, we have to encourage exports. So, Jack's point about we need a microgrid tariff is right on. Also, where we have had properties where we could interconnect we have to run a private line pick which is expensive in order to connect during an outage. Right now, the utility would not let you use their own distribution grid during an outage. That connects even physically adjacent next-door resources. The terrace is not there. We are also on the technical advisory team for the microgrid. Is taking a different approach there PGE is running the microgrid and it has both behind the meter and in front of the meter access. During an outage PPE will still be the supplier of record for the energy and will still be billing those people. So perhaps there is an incentive plan we can use for the utilities where they are not losing revenue during the outage if they still are bandaging the microgrids to keep people up and running.

>> I have an example which is very understanding that situation pick in the [ Indiscernible by captioner ] we have solar power on the microgrid because we cannot put that in order to keep that microgrid balance [ Indiscernible by captioner ]

>> If we make it this. There are areas in the Northeast that are already have addressed this issue and they share power amongst the facilities. This can easily be done technically you just need to have the whale and the enforcement of the PNC to make utilities do this.

>> I think these aftermarket tariffs around adopting. And I know the discussion is. I was going to go with the financing question pick

>> I just wanted to say we have direct experiences with trying to use the existing distribution line to connect buildings on the same block. There were additional things that were not included in the microgrid like the inability to use the same distribution because it would have to be separated from greater microgrid pick in the ability to turn off or on customers. And so, the cost ability in distribution is really and it has to be owned and operated by a utility you would have to deeded back to the utility to pay taxes on the deed and then pay and L and M charge that actually exceeds the cost ability. So that's where I think some of the innovations about ongoing financing pick .

>> Following up on the financing question I know there is a lot of discussion in the idea of sharing lines and restrictions there, utilities there was a lot there that will impact the next three months. But I think it is important topic of conversation. I want to go pick I want to go through the customer journey from identifying the need and identifying the data and feel that missing piece around financing pick there were some comments made that it can't be done. There is value for resiliency. So being able to prove it negatively is very hard. So, another recommendation here is to value resiliency and high fire safety districts. Is it more customer education?

>> [ Indiscernible by captioner ] anything less than that is a challenge, so you have to if your bill is less if it is a firehouse the bill is low. Now you have to come up with group options with different sites all fixed together and then have a standardize designs of the whole cost comes down. So that is something that education is required for committees to do that pick I can call some cities and asked them to do one or two fire stations with the microgrids can you get financed, it is really hard so when they collect sites together. Let's say you don't have those sites then what are the cost of the plans. Then you can get some more. [ Indiscernible by captioner ]

>> Just to add on the resiliency side in the bill savings that Bob talked about. The Santa Barbara project does solar microgrids are going to provide about \$8 million in bill savings over the. Along with that there will be some form of resilience on a daily basis either minutes or hours because of the solar in storage. Particularly the stores. So, customers are gardening more used to seeing this built and. Some would say basically they are getting free resilience which tends to go a long way with talks about finalizing these projects. So that has been a new kind of a new push. To see that value that it is bringing to our resilience. And basically, it is prepared

>> I am full you more Santa Barbara. The number of sites the it is much larger and much bigger projects. There is a county that I've been working on that has only five or six fire stations. When there is a large number of sites in schools and communities I think that is the challenge that we have pick

>> I want to also mention one thing and emphasize that the importance of energy efficiency measures cannot be overstated. We should definitely make sure to apply these because these can often be very short turnaround investment actions Eric within the community within certain sites that is very important I emphasize it this is really good. So, the fact that you can deploy additional assets like fuel cells, and they also mention Kaiser Permanente. Kaiser Permanente

has fuel cells and they are mitigating the emissions with their backup systems. They still have to have diesel, but they have eliminated some of those omissions because they are using fuel cells that can operate during a long period of time during outages. At the same time, they are saving money to the comparison to the utility rates. These are examples of multi- faceted microgrids that had solar storage and fuel cells that should also be enabled by these kinds of tariffs and things that we are talking about.

>> I want to wrap it up because we are actually at time. I think is great that we on identified some of these obstacles and was key and we can initiate more conversation. Within this workspace we are focused on gaining insight and learning more information. About these projects in the field I think, I've been following my grades were a number of years microgrids and practice some of the greatest learning in energy policy. Looking at this through community journey and trial resolve the obstacles and we all identify those options. These are opportunities for us to think about further how we are working on a community resilience. So, I want to thank again the speakers. We have one more meeting in the war extreme as well as the forum in February. I will be sharing information after this call and the next meeting we have two dates on the calendar at least one of those and possibly a second. You as an attendee if you have a comment or a question you like to pose to us and you did not get a chance to please send them to me at Andrew they will pop that into the chat. And you can reach out and post them to me and they will be circulated to the panelist. And the report will eventually be putting together. I want to thank all the pain it is today thank you to the members of the CPUC that joined us here and all the companies and the researchers that were involved. I am happy with our turnout today. Please join us again next time. We have a next meeting coming up on Thursday and then another meeting a week after Thanksgiving wildfire litigation and equity you can find that it epic partnership.org. So, thank you again. Thank you everyone for joining us today we hope to talk to you again soon.