

[Speaker: Kristen Ardani]

Cover Slide:

Welcome everyone to the DG Interconnection Collaborative informational webinar.

Slide 2:

The purpose of today's meeting is to learn about recent innovations in the distributed PV interconnection process, examine how certain challenges related to increase demand for distributed PV can be addressed, revised application processes and procedures, and hear specific examples from electric utilities in mature solar market, SDG&E and PG&E.

Slide 3:

We are fortunate today to have Ken Parks, the Customer Generation Manager for the Distribution Systems at San Diego Gas & Electric (SDG&E). He's been with SDG&E for 36 years. He has vast experience and knowledge in designing electrical systems. His present responsibilities include all interconnections for the Net Energy Metering, Distribution Generators, Feed in Tariffs, and Wholesale Distribution Open Access Tariff and SGIP. Ken focuses on meeting the customer's needs.

We also have Bob Woerner, Senior Director in Electrical Operations of Pacific Gas & Electric. Bob's experience is currently focused on Operations. He's responsible for streamlining processes by engaging employees to pragmatically simplify operations. His main focus is on improving the interconnection process for solar and other Distributive Generation projects. He joined PG&E Corporation in 2006 to manage IT for the holding company.

So with that, I'd like to turn it over to Ken so that he can begin his presentation. Thank you.

[Speaker: Ken Parks]

Slide 4:

Well, thank you very much. SDG&E is very excited today to talk about the new system that we have developed within SDG&E. The long name is Distribution Interconnection Information System, but we call it for short DIIS. It's really a system that was written by us, our software. We wrote the software and it's really focus was to improve our connections with our customers and also to allow them to see within every milestone within our control.

Slide 5:

So today we're going to focus on Net Energy Metering because that's where we have an extreme growth within SDG&E. As you can see, last year in 2013, we authorized – we grew about 108 percent over 2012. So what that means is in 2012, we authorized about 5,200 new customers, but in 2013, we authorized almost 11,000 new customers. The exciting part was our authorization timeline. As you guys understand that the CPC, the California Public Utility Commission, asked the utilities, "How long does it take you to authorize a customer once we have electrical clearance permit released to the utility?" We're really proud of, our average last year was 5 calendar days per 11,000 customers. We're really proud of that.

A lot of that benefit is to our dedicated employees that we have, that the software that we wrote has really sped up our process. We processed well over 13,000 applications. We implemented a brand new process called Fast Track. We'll talk about that a little bit later on. We had almost 1,200 customers go through the Fast Track process. We had also within the software, we wrote a program where we could remotely change meters through the airwaves because we have Smart Meters in our service territory instead of sending employees out. We launched that process in June of last year. We were successful 10,700 times pushing a button in the office and changing a program in the meter to be bidirectional to measure the energy.

Slide 6:

So here's kind of the growth that we talked about and we talked about we grew 108 percent. We talked about 11,000 new customers last year, and that's around about 68 megawatts of energy. Talked about our authorization timeline, but really within SDG&E, we have a huge pressure of budgets today and a down pressure of head count, not to hire more employees, but hopefully doing things a little bit smarter and using technology to speed up the process.

Also, we wanted to reduce the cost to the customers, contractors, and their timeline. If you could look at the chart with me just over to the right, look what we did in 2013, which I mentioned about 11,000 customers. In 2014, we have projected well over 20,000 new customers within that timeline as of today. The interesting thing is we just finished up the first quarter of 2014. So we went back and looked at the first quarter of 2013. Within that timeline,

the first quarter, we already grew within 2014, another 62 percent above 2013, which was our biggest year ever.

Then we looked at the megawatts just to see what the growth was there in that same quarter. We grew about 73 percent. So I don't think our projections are off. I think we may be a little conservative, but we expect a huge growth in 2014.

Slide 7:

So here's just kind of a chart that just demonstrates to you what has happened in the last three years. You can see at the bottom, those are bi month and the axis, vertical axis is authorization amount. You see the purple line; that was 2013. The look we're just demonstrating there was about 62 percent growth on the first 3 months. We haven't added the March in yet. In March, we authorized a little over 1,000 customers, but the trend is we will hit well over 20,000 this year alone.

Slide 8:

So here were some of our challenges that we looked at when we sat down in 2011, and kind of projected what does the future look like within SDG&E's authorization timeline? So we knew that there was going to be strain on internal processes in the team. How can we improve the process without adding to head count? How can we insure our customers and also our employees are not being overstressed in the timeline?

Another growth challenge was the meter shop. In 2012, every customer that we authorized, over 5,200, we had to send a truck and the personnel to change out that electric meter. We were concerned about increasing the timeline. Instead of five calendar days, are we going to be out to 15, 20 calendar days because we were not able to keep up with the work load? We didn't want SPG&E to be the bottleneck. It's easy to point to the utility as the problem, but we wanted to have a solution.

Really, the key thing for us when we wrote the software was there was no off the shelf solution. There wasn't something that we could go purchase. We've been in the business – I've been part of the interconnection process for several years, and so I think we felt like we really knew what the needs of our customers were, and we wanted to reach out to them and build a tool that would help us, but also help them at the same time. So those were kind of some of our challenges.

Slide 9:

So here is kind of just a quick overview. As you can see off on the right hand side, the hub is DIIS. Today, we're focusing on Net Energy Metering, which is under our Electric Rule 21, but also we've implemented DG behind the meter. So all code generation plans, battery storage, anything technology behind a customer meter is also available through DIIS, which is an online application process. We'll talk about that in a few minutes. Also, it's FERC, our WDAT, which is our – we just follow the new GIP process. Advanced Energy Storage, and then also the Electric Metering process.

So we wanted to have one place where all distribution and interconnection would live within the utility where any employee could have access to it. That way they could manage their own business as a planner or maybe a new business or account executive. They could see what their customer is doing to help them out. Really, I think the key thing of this whole slide is the last bullet point. We wanted to empower our contractors to manage their own business through self-serving tools and monitor every milestone within the utility's control.

In the past, the utilities have been really easy to say, "You are the roadblock," or "You are the problem." Well, we wanted to give them the tools. That way they can manage their business a little bit better. So here are some of the facts about the software program that we wrote. We had a capital project that was approved and we launched it in January 2012. We had 12 full time employees dedicated to the project, which means IT folks to write the software. We logged well over 18,000 man hours, people hours. Our budget was \$2.1 million, which was quite a hefty investment on our part, but we had a successful launch on February 19, 2013.

Once we finished the software, we weren't really finished. We've already had 13 other releases to improve it even better than it was in February the 19th.

Slide 10:

So here's some of the facts. We were able to measure three categories or three categories that we looked at. So, remember with me we launched it on February 19, 2013. So this is one year to date. We look back on February 19, 2014, so to process an application without adding to headcount. So today, whatever we have in 2013 or actually 2012 to 2013 and present, we have not added to headcount. So we took that and say, well, what does it take to process an application if we didn't have a new process? Well, we've processed well over 13,000 applications. An

employee today can process an application, probably well over 100 a day and not kill themselves. So it has streamlined the process tremendously. It was a cost saving, avoided savings of over a million dollars.

The Fast Track process was something that was kind of slow being implemented. We wanted to empower the contractors to do a little bit more on our behalf. If they went through the Fast Track process for anything 30KW or less, that gave them the opportunity to get authorized the same day we got the electrical clearance. So, it's picking up momentum as it's grown. We're doing about 20 percent of our projects per month under the Fast Track process today.

Slide 11:

So we saved somewhere around 100,000 meaning that we did not have to send employees out to that home to do our inspection for the utility. The big savings was a remote configuration change out. So 10,700 times, as I mentioned to you, in June of last year was able to change the meter program from the old program called 602 to a 206 to make it bidirectional. It was a cost savings of \$1.1 million. Think about some of the things that we haven't captured. Think about the nuisance we are as a utility pulling people's electric meters out, resetting digital clocks, the traffic up and down the Southern California freeway of trucks, reducing the carbon footprint, and just doing things more efficiently.

I think the key thing out of this whole slide is if you think back with me a couple of slides previously, we spent \$2.1 million as an investment of a software tool, but in one year measuring just three categories, we recouped our cost at \$1.3 million. There are no too many projects that you work on today that you can have a payback within 12 months.

Slide 12:

So what does the future look like? We showed you that within one year we saved about \$2.3 million in avoided costs. This year we're going to double that again because we will exceed 20,000 plus new customers, which exceeds the software that will keep paying back as time goes on, and as we keep on improving the program.

Slide 13:

So here were some of our objectives when we sat down and we designed the system. We wanted to be connected to our customers. It's not just a slogan for us, but we really, we did not want to be the problem or the roadblock, but we wanted to be able to have every contractor and developer look within the utility through a web

portal. Every project that they submit to us, they could track every milestone within the utility's control, which was important to us. So think that if we authorized over 11,000 customers last year, 20,000 this year; this about the phone calls that will come into the office asking, "Hey, what's the status of my project? Where are we at today?" Today, we don't receive those phone calls. They are able to look within their website, our website, and look to see where their projects are located at.

Another objective was to reduce the authorization timeline, and I think we achieved that, one of the big selling points for us. The other thing is we wanted the electrical clearance for the local jurisdiction to release automatically into the DIIS system to kind of bypass some of the roadblocks we have into people filling it out on a piece of paper, coming in to the office, and releasing to the utility. Today, it automatically updates our database. Also, DIIS Remote Meter Configuration. Those were our key points we were working towards.

Slide 14:

So, the next slide, what it's going to show you is that it's our overview, a quick overview of DIIS. Let me log back in real quick, sorry. So, today within DIIS, it's an online application process from 1KW to 1,000KW, which is our program within SDG&E or the State of California. It gives real time status updates and notifications to contractors and developers meaning that automatic e-mails go out and that way they could track their project. So, when a customer submits an application to SDG&E, we process it within 24 hours. E-mails go out automatically to customers, and it states in there, "SDG&E has received your application. Here is your new application ID number. SDG&E is now waiting for the Electrical Clearance Release." Can you go to the next slide for me, slide 19?

Oh, okay. Well, we must have skipped one, so sorry, but anyway there is a – yeah, back one. Today, it automatically updates our GIS system through the DIIS system. So, we talked quite a bit about the Remote Configuration, but also we wrote a program called Reverse Power Flow or some people would call it unauthorized customers generating electricity and sending the energy back to the utility.

That's going to save us a tremendous amount of money to be able to track that of people that – I believe residential customers, they want to do the right thing, but we have contractors within our system today that are now filling out the application. So we're

able to track that on a weekly basis and show the reverse power flow they haven't gone through the interconnection process with the utility. It's a safety concern for the public and also for the utility. So, each week, we run a program to capture the customers that are running a generator and back feeding to the utility bill without authorization.

Within our small service territory, we identify about 150 new customers every week today that are running unauthorized. We are able to manage it through DIIS, so we have automatic robocalls that go out to customers notifying them, "Hey, SPG&E has identified a power flow back to the utility. Please call us to help us. We'll help you through that process." Before the DIIS system, it would take an employee pretty much 40 hours a week just to do that process. But through the new system we developed, it takes an employee less than a day to manage that process.

The Fast Track process, as I mentioned, is a system that if its 30KW or less, residential customers, they can submit the application to us online. They submit the electrical online to us. They also submit a photograph showing the electric meter and the digital and the plaque in front of the meter that says that it's a warning light that says, "Caution, this building is fed by alternate power sources." So we can identify the property by the meter number. Also, they take a photograph of the transformer that's feeding that property with the identification number and submit it to us at the same time.

We will verify that the transformer is correct in the GIS system and that the meter has been changed out remotely, the program. Once we get the electrical clearance, we release it the same day. The thought behind that was typically contractors are cash flow sensitive. Why do you wait on the utility 5 to 7 to 15 days to get the final payment? Typically, people don't get the final payment until they get a signoff by the utility. So, a lot of contractors have just came on board recently, and if they can get their payment the same day that they get the electrical clearance, it makes sense to them.

Slide 15:

So here are some of the capabilities. As I mentioned earlier, this system was built also for the utilities. So every employee within SPG&E can ask for access to the system, the DIIS system, and they have read rights only. We've trained well over 300 phone operators within SPG&E. We have a screen that's called "at a glance." When a customer calls in today and they call our phone

center, the phone center person has the log in to DIIS. They could tell them the date and the time the application was submitted, when did the electrical clearance come in, the size of the system. Any questions that the customer would have about their system, their solar system; it's all on that screen at a glance

The phone personnel does not have to go back and forth and toggle between programs. It's all right there. When a contractor or a home owner is filling out an application online, it takes them about two minutes. They put in their account number and meter number first thing. Automatically, it verifies that the account number and meter number matches exactly. It permits them to go to the next step. So, instead of receiving an application with the wrong meter number or the wrong account number, it notifies them, "Hey, this is not accurate," and it rejects it, and let's them go ahead and resubmit it again.

So it saves us a lot of time. We don't have to physically verify. The system does that automatically. The other neat step is that we are tied directly to the Go Solar website with all the inverters and modules that are approved by the State of California, which is just a drop down window now. We update it on a weekly basis, and they are able to click and point at the inverters and quantity that they are installing within the system. It saves a tremendous amount of time. I know for me the less I type, the better off I am, the less mistakes I make. This has really helped out our contractors and it gives us really a good idea what's out there today in the system.

Slide 16:

What I really want to talk about is the automatic notification. I think the key is don't keep customers in the dark. So, automatically e-mails go out to our customers, tracks every milestone within our utility control. We're working on that, even to improve that process today. Also, the contractors, as I mentioned, they go through our web portal. They log in as a contractor. We give them a log in name, a password. They have administrative rights within that area, so they can add any employee they want to to where they could see their projects within that company or they could take those rights away.

Once again, we're not managing their business for them. They are managing it themselves. The history tracking is really important for our group because of auditing internally. So any time anybody touches the system, we know the date, the time, the employee, or the contractor, whoever goes into the system. We are able to track it. The reverse power flow, all information is stored within DIIS

system. So, as I mentioned, we do robocalls, automatic phone calls to customers on a weekly basis. That's stored within DIIS underneath that account. We know the date, the time the phone call went out, if it was a live pick up, it was a voicemail message, whatever it may be. It's all tracked within DIIS system.

Slide 17:

So what does the future look like for DIIS and how we're improving it? Well, we're also improving the Advanced Search Function today for internal usage so that way we can find customers quicker and faster. We have already written a software program that when a customer submits an application to us, we will look at the KW, KWH and we will estimate what they could produce on an annual basis. It goes into our billing system automatically.

It looks at the last 12 month consumption, and we verify, "Hey, are you over-sizing your system?" What kind of our flag is 120 percent over we were going to ask the customer, "Hey, are you sure that's what you want to do? Are you going to go 150 percent over your consumption last year or are you adding an electrical vehicle? Are you adding a pool? What are you doing?" So, it's to help the customer in the futures what they're installing, that way they don't over-install more than they really need.

One of the things that we're really excited about in GIIS, we're in the process of adding electric permit number on the application. It's not a required field, but if a contractor would go ahead and put in the electric permit number in the application, the city inspector would – if he has a tablet or an iPhone, he can go out to that job site, pull up the address. Maybe it's 123 Park Avenue or pull up the permit number. He can release directly into DIIS into SDG&E, and then we can authorize the customers at the same time. It's really a great next step.

We've just last week have upgraded our software. Now we have events energy storage within DIIS and all other Rule 21 applications, so they could be submitted electronically to us. The Rule 21 application battery storage technology and we're able to monitor it and also they're able to track every milestone within the utilities control.

The last thing that we're moving into is our FERC process, wholesale stuff that are being installed on the distribution system today, since we are going to be upgrading our software to be able to track and monitor that for the customers.

That's kind of a quick, quick overview about DIIS, kind of about the software that we've developed. We're really excited about it. It has been a great success story within SDG&E and also our customers. Typically, general contractors just love the program and the process because they know every milestone within our control. Can I answer any questions for you?

[Speaker: Kristen Ardani]

Slide 18:

Great. Thank you so much, Ken. It looks like we do have a few questions that have come in. Let me see here. Okay, "Do your projects continue –" let me see here, okay. "Do your projects continue significant growth in any NEM installs or do you see it leveling off any time soon?"

[Speaker: Ken Parks]

No, I don't think it's going to level off any time soon. Probably the closest where it's going to level off is July 1, 2017, or if we hit the cap, the Net Energy Metering cap. Today, SDG&E's cap is at 606 megawatts. We are at 41 percent of our cap today. So there's still a lot of growth. So I think we're going to have a landslide of applications coming in the near future.

[Speaker: Kristen Ardani]

Okay, great, and then we do have a few more coming in. "You have a five-day goal for NEM installs. Is that for everything or is it for application through approval?"

[Speaker: Ken Parks]

No, it's for everything. We believe that the five calendar days start when we receive the electrical clearance from the local jurisdiction. The assumption is that the contractor submitted the application prior to electrical clearance coming into the utility. If they do that, our average is five calendar days.

[Speaker: Kristen Ardani]

Okay. "Can you remotely curtail NEMs to manage reverse power flow?"

[Speaker: Ken Parks]

We cannot. All we can tell is that there is reverse power flow into the utility.

[Speaker: Kristen Ardani]

Okay. “Are you able to recover these costs in the SDG&E rate base, and is this approved by the CPUC?”

[Speaker: Ken Parks]

Cost for the software? No. It’s a software that we – for multiple reasons. One is for the utility to manage our business better, right? It was a business need. It was not a – a side benefit is also for the customer and developer, but really it was a business need. How do we do things without hiring more employees, and how do we manage our business better?

[Speaker: Kristen Ardani]

Okay. There’s a lot of questions coming in. We have enough time probably for two more, and then we can save the rest until later. Is that okay?

[Speaker: Kristen Ardani]

– so that we can move forward. Let me see. “Does an application require home owner input or can a contractor complete the entire process?”

[Speaker: Ken Parks]

The contractor can complete the process, the application process. Once it comes into the office, automatically an e-mail goes back to the homeowner. We call it Ts and Cs, Terms and Conditions. The home owner receives an e-mail in their home address. They fill out a couple of questionnaire for us and resubmit it back to us, and that gives us the approval to move forward.

[Speaker: Kristen Ardani]

Okay, great. Another question here. “How do you handle the signatures and the handoffs from the contractor and the customers?”

[Speaker: Ken Parks]

That’s what I just mentioned, the Ts and Cs. In years earlier, it was really tough on us because typically contractors fill that out on behalf of the home owner. So we went through a process through the DIIS system to verify that what the contractor is submitting to us is correct, and that home owner does verify that through an e-mail back to us.

[Speaker: Kristen Ardani]

Okay. I’m going to take one more here. “Are you planning to share this system with other utilities who may be interested, and any plans to sell this system to a third party software company?”

[Speaker: Ken Parks]

Yes to all the above. Yes, we do plan on sharing it with other utilities, maybe the munis and stuff, but we are looking out for future businesses. I mean I don't know what that really means or how successful we are since we are a regulated utility, but we are looking for third party partners.

[Speaker: Kristen Ardani]

Great, fantastic. Thank you, Ken.

[Speaker: Kristen Ardani]

Slide 19:

Okay, great. Well, we have a few additional questions that we can save until the end, but in the interest of time, let's transition over to Bob Woerner's presentation. Bob, I'm going to turn it over to you at this time.

[Speaker: Bob Woerner]

Okay. Welcome everyone. I'm Bob Woerner. I also have with me today Todd Jones, who is one of our best planning engineers who will also be available at the end to help answer any questions you might have that are more technical in nature. Before I get started, I really want to acknowledge the great work we just heard about that Ken and his team is doing at SDG&E. There is no question they are the best at being both fast and efficient. We here at PG&E really appreciate being able to learn from what they have accomplished.

I think he has done a great job and what we just heard of showing why it is so important to automate the NEM process from both the customer and utility point of view. We don't anticipate any volumes tapering off any time soon, so I really think what he has done is wonderful. What I'm going to do before I get into the NEM process is just give you a little bit of contextual information for those of you around the country. You may not really know what it's like here in California.

Slide 20:

So with the next slide, I'm going to talk a little bit about the California drivers, what are the volumes that we're experiencing, and then get into what we're doing to improve these standard NEM processes.

Slide 21:

The next slide is just an overview on PG&E and it's just some statistics on our scope in Northern Central California. We've got 15 million people served, 70,000 square miles, a lot of customer accounts. So you can see what we're dealing with. We're fairly large and that's why we have a lot of volume. Anyway, on the next slide – okay. I just wanted to say a few words.

Slide 22:

We've got an incredibly encouraging regulatory environment, and we have decoupling started 30-some years ago. A physics professor at UC – it was heresy, but he started studying the efficiency of refrigerators, and that has led from that initial work to all of the work that's going on in California. Through the decoupling, the utilities can get behind the energy efficiency. So that's a major shift. Then to that regulatory environment, you add the technology improvements, the really favorable natural conditions, and then basically the readiness with the California culture and you get the explosive growth.

Slide 23:

So, on the next slide it just summarizes all of the government drivers that are behind this. We've got incentives, rates, changed recovery rates, tax credits. It's all driving a lot of the demand.

Slide 24:

This is what the renewable portfolio looks like here at PG&E from the past, present, and future. It goes starting in 2002 to 2030. What we've got on the vertical axis is the percent of total bundled retail sales. So these various lines that you see are the state bills that were passed driving percentage of the renewal was that we're supposed to have. You can see that every time we get close, then they raise the bar. What I've shown here is the talk even now of raising it one more time. In the stacked bar graphs, you see what the components are that PG&E has assembled in order to meet those renewable goals.

The key here is that we expect the – you can see the yellow are there for the great increase in the solar. Then off on the right is what I understand to be Hawaii's renewable goal in the larger future, but I think I heard they might be bringing that closer in. Okay, so that's what we've got there.

Slide 25:

I want to show you how the group I've got here is organized. We're called Electric Generation Interconnection. Under one group, and I'm in the asset management part, the engineering

group of the electric operations, we've got the full scope over the six Orders of Magnitude from the standard NEM up to the wholesale transmission in hundreds of megawatt power plants. In the graph above, you can see which regulatory jurisdiction the various components are under all the way from the standard NEM up to the CAISO Queue and the Export Transmission.

On the table below, you can see the in-service volumes we have, how many active applications we've got going and what we're getting monthly. So in the standard NEM area, you can see that we've got 557 megawatts, 108,000 sites, and we're getting just under 3,000 a month at the moment; but we're projecting around 40,000 for this coming year.

Slide 26:

I just want to give you the perspective here that the generating capacity is applied for by technology type per year. On the right vertical axis is the percent of PG&E peak load, and you can see that the applications submitted are exceeding PG&E's peak load. So we are rapidly getting into the area where all the technology considerations really matter.

Slide 27:

On this slide, this is something about this highly complex interconnection process because what's happened is that the rules were put together thinking about the larger projects and then they tried to make rules for the smaller rooftop stuff. That's why this smaller rooftop is more complicated probably now than it needs to be and we're working to simplify it. But at the larger end here, you can see that there are very extensive compliance requirements, 2,000 requirements across 4 work streams, and 135 milestones for the wholesale distribution.

We've got to retain a lot of documents. This gets quite complex really quickly as you go up from standard NEM. So in this group we're dealing with the whole scope of this.

Slide 28:

Anyway, I just want to show you where the generation volume is happening by county here, and not surprisingly a lot of it is happening in the southern part of our territory in the agricultural area where there's a lot of land and sun. Of course, that's not the way the system was designed, and so we're having to worry about the whole infrastructure, moving all this power around.

Slide 29:

So, now I'll get into on the next slide, get more specifically into the standard NEM. This is very similar graph to what Ken showed you as to what's happening. It's just been a very explosive growth. Here in PG&E, we've got 25 percent of the national rooftop systems. So, as you can see, we're desperately trying to get to where Ken and his team have already got in terms of being efficient.

Slide 30:

I want to show you what we've been struggling with and what we've managed to accomplish. On the vertical axis are the business days that it takes for us to go from a completed application – and that's the same place that Ken was talking about – and a completed application includes the sign off on the inspection certificate from a local jurisdiction. On this vertical axis is the median time.

So, anyway, what you can see back in 2012, we were kind of plodding along here and the volume increased. You can see the average applications per month on a quarterly average in green on the lower end of this. Well, anyway, we first got hit with the increased volume and it overwhelmed our staff and it took us a while to kind of really wake up, frankly, and get going on it.

So we worked on – I came into this thing, and we started doing some initial process simplification. We got rid of some 24/7 meter access requirements, got rid of insurance requirements, really started to get the unnecessary stuff out of there. We managed to work it down, and we got our business days down into the 10 business day timeframe. Then the end of fall of last year, we got hit again by the volume increase. We were thinking that we could handle it, and we couldn't, and we had to add staff quickly. We didn't get it in fast enough.

So we had to add the staff, do the processing adjustments one more time, and then installed a bunch of daily flow metrics. Right now on our median time to get something connected is around four plus/minus one business days. That's from the application being complete to final, and we don't need any pre-notices coming in or anything. That's what we can do.

I should also say in this period of time, we're looking at the unit cost per application. Just the process simplification stuff that we've done without the automation yet, we've saved about

\$3 million in processing costs in 2013. We need to do even better than that in '14, and that's why we're rolling out the system we're going to talk to you about.

Slide 31:

On the next slide, I just want to show you that the first thing we did was said, "We've got to get rid of the paper." So this was just sort of visually gives you a good sense of got rid of the file cabinets. No more paper is going to accumulate. Unfortunately, the paper that was here becomes an official record. We've got to go store it. We just can't throw it away, but we're never going to have any more paper coming in.

Slide 32:

So, on the next slide, I want to show you what we're doing. This is a brute force until we get automation. Every step of the process, we're looking at how many applications come in on a daily basis? How many went out of each step, and what's the residual waiting to be processed? It's only by doing this that we can manage to keep up with what's going on. You can see in the upper right hand corner on this particular day, it was three businesses days on needing time to get from a complete application to a PTO issued. Again, we've got 25 people working on this, and we move them around depending on what happens.

In red indicates the number of applications that are sitting, waiting for somebody in the EGI group here to do something with the application. In blue are other parts of PG&E. We are waiting on them to do something. So, E&P Review stands for the Engineering. They generally get everything in and out the same day. FMS stands for Field Metering Services. They've got to do something. We've also at this point got the Smart Meters out there. So when an application comes in, we alert the Smart Meter Operations Center that it's coming in. They get the programming done so that when the application clears everything, we don't have to send anybody out for an inspection. We flip the switch remotely on the meter and they're good to go.

In the gray boxes down below represents us waiting on the customer to do something, and that's a costly thing for us to be waiting on the customer. We really don't want an application to come into us if it's not complete and perfect. So we're working to kind of deal with that. The kind of thing – if we can go to the next slide, I'll show you what the sum of that looks like.

What we have here is the gray squiggly graph on the top is the number of applications that we're waiting on the customer to do something. Something didn't come in complete. Right now in that particular one, you see the number is 801. The way that breaks out is 40 percent of that is because the building permit wasn't signed off when they sent the paperwork in. Thirty percent is because the equipment information was messed up in some way. The other 24 percent is because the customer information didn't quite match up everything or that the signature was missing on the right document. Four percent is because the rate selection wasn't appropriate. Then a couple of percent due to access when we go to do something and we, in certain instances, couldn't deal with it.

On the line, the red and blue lines below show you the daily backlogs that we're dealing with in total across the whole process. Just last Monday, on the one day alone, we got 250 applications in. So you can see when a pulse comes in like that, it sort of hurts the system, but we watch it every day and move resources accordingly. We have to authorize overtime in order to handle it. The point is, if you don't deal with it every day, your backlogs build, your cycle times go up, and eventually you're gonna start getting to your regulatory limit, so there is no choice but to do it as it comes in.

Slide 33:

On the next slide, I want to show you some data that Solar City was kind enough to give me. You can go to the next slide. So what we have here on the vertical axis is the average time from when Solar City submitted an application to when they are notified that the PTO has been issued to the customer. The various graphs here are for the top utilities that they are dealing with in the country. The blue line is PG&E, and so you see here where we kind of didn't do so well in the latter part of last year, and then you can see that we have driven it down.

Slide 34:

The number here is seven and a half business days. Our data is less than that because we're dealing with the median, and also this illustrates some of the issues that we have. We changed our application a little bit. They didn't check the box on it that indicated that we could send them a copy of the PTO as well as the customers because they didn't find out about the PTO until after the customer told them. That's why that's up in that point, but in the future graphs, we'll show it back down into the five range. Again, this is the average versus the median. Then you can all guess who the top performer is there. I think we heard from them earlier.

Slide 35:

So, now I'll tell you where we're going in the future on the next slide. What we've done is split the forms that are needed here into two pieces. The reason for it is that there are only a few things that we want from the customer for them to sign off on. We want them to sign off on the rate, and we want them to understand what their system size is if it's appropriate and whether they're going to have excess generation; because if they have excess generation, we want them to know that they're not going to get paid at the high marginal rate that's driving the system in the first place, but only at a couple of cents versus the 30-some cents.

So that's all we need from them, and we want them also to authorize the installer submitting all the technical information. So, we have an agreement and authorizations. It's fairly simple and straightforward for the customer and then we have the application with all the technical details for the installer. The reason for splitting it into two pieces, a lot of times early on in the process, the installers were submitting paperwork with hoped for systems. It wasn't the actual thing that occurred, and they didn't know what gonna occur until sometimes they opened the parts and they started to install it. So then you have to either update the application or the information wasn't correct.

So this way we only want the technical information filled out after the system is built, and we want the terms and conditions that Ken talked about post the other things, they can do that initially. So we have the two ways to kind of do it. Right now, half of our applications are coming in with the system already built, and the other half is before they build it.

Slide 36:

On the next slide, we just want to show what we did, just some examples of the forms. I'm not going to spend a lot of time on it, but you can basically see here. You can look at it at your leisure, the kind of way this is laid out.

Slide 37:

On the next slide, I can just tell you what's going on here. On the agreement and authorization, you get the customer contractor, facility location, size information. You get the sign off, as I mentioned, on the rate selection, and it can be submitted alone or at the same time. Then the application has got all the technical details.

Now, why did we do this? We wanted to simplify the process and forms, make it easier for the customer's installers to fill out the forms, and this third one that's most important is facilitate customers signing a properly completed form. Frankly, we were getting a lot of form submitted that customers had signed blank. That doesn't help anybody. So we wanted to get it right.

The next one goes along with it. Really it's important to improve the equipment data quality in our asset registry. The couple of other things that we're doing here until we get the web site up that we're going to, we're enabling machine reading, so we're going to reduce the errors and the processing costs. We just rolled these forms out in a webinar last week to the community here. We're going to further shorten the time needed to issue that PTO letter from where we're currently at. So, just to give you a couple of other examples of how we've kind of tried to streamline things is on the next slide.

Slide 38:

So we used to ask people to submit a separate single line diagram, list all their equipment information on that, and then we'd also ask them to list the equipment information separately on the application. Then we'd check to see if they entered the same thing in both places. That's kind of crazy. We only want a piece of information once so that we don't have to worry about looking for those kind of errors, and we want it to be right. So what we do now is just ask them for their equipment information and check the box if this generic single line diagram matches. So we found that people like that. So that's one example, and then we just ask some other technical information.

Slide 39:

On the next slide, I want to show you where we're really headed here. As I said, we're not at penetration levels like Hawaii is experiencing or Germany for that matter, some of the issues that they are now having, but we know it's coming with these volumes. So what we're trying to do is make it very easy for everyone to understand the complete requirements. This is an example of what you have to think about in order to make sure you thought about whether an AC disconnect is required when pulling the meter is not sufficient to make the system safe for crews to work.

So, this just shows you the kind of thing we're going to be putting out there for everybody to look at and fairly straight forward questions that the technical people can answer to determine

whether or not we need AC disconnect and signage. So that's one example of how we're trying to – rather than say, “Go look in this complicated Green Book and go figure it out,” we're trying to make it really much cleaner to look at that.

Slide 40:

Most of you probably haven't seen this, but this is what's called the Electric Rule 21 Sheet 97, which summarizes the engineering review details. There's a lot of technical screens here that you have to think about. Now, this covers all of the small to the big. So you can imagine that it might be a little bit more complicated than you need for the small systems. So, on the next slide, you can look at – and this is where I have Todd with me because he and I worked together on this. This is mostly his artistry on putting this together. This is how we're trying to simplify the somewhat complicated engineering review that really needs to be done to ensure that the safety, reliability, and the power quality.

Slide 41:

So, many of the screens on the left of the brackets are simply based on the system size and for NEM 30 kilowatts, they pass. Then to the right of the brackets are just a couple of very important questions that have to be answered for that safety, reliability power quality. So we have a single phase generator into a three phase transformer. So, typically you aren't going to have a single phase generator. It's going to be very atypical for residential that you're going to have a three phase transformer. The next one about the inverter connected to less than 208 volts. Ninety-nine percent of the systems are gonna pass that now, but in D is where you've got to worry about whether the aggregate generation is really more than the transformer can handle. So that's where we looked at it.

What we show here is that depending on what happens, we're going to have to get an engineer involved or an associate design engineer with assistance from the engineer to handle it; or we can pass them, but then we're going to have to put in some re-closed blocking or something else on the mode on the line regulator. So that's kind of what we're doing. Now, I want to point out that these questions we can automatically answer now. As soon as we know the meter number and service ID number we're dealing with, we can reach into our asset registry, pull the data out, and we calculate all of this, and present it for review for the engineer. So it's very quick.

Slide 42:

So where I want to say on the next slide is where are we going here? So there's going to be some minor wording changes on the forms. We're just about to add the battery storage options, and then we're going to – this closed rate relinquishment, we have some grandfathered rates that if people go off of it, they can't go back. So we want to make sure that they know what they're doing.

Now, the real things where we're trying to get to and it's a lot quite vapor wear, but it's definitely not at the level of what Ken showed is what are we doing with our portal? So, we're going to have two options; one is that they can enter the data online; or for some of the installers that have high volumes, they've got their back shop systems. They can spit out a file that we're going to let them just upload straight up. They don't have to have their clerical re-typer do anything into the portal. They can just push it into there.

Once we get the meter number and service ID number, all of the information we're going to pull out of the billing system will auto-populate everything. That includes their rates. We'll do their system sizing calculations for them. We'll pull and automate the engineering review. We've got drop down equipment lists, as Ken mentioned, that's going to match the Go Solar website. We're going to do front-end error checking on this thing. There's going to be on-screen help, and we're also hooking up to an electronic signature option so they can just sign it that way right as soon as it comes in.

Slide 43:

On the next slide, I want to just show you the system architecture we've got. Again, this is some of the things that Ken mentioned, but we've got the PG&E website, but right below that is the Middleware, and this is an important design feature because what that means is that all the other systems that we have to hook into this can be changed out. So, for instance, we've got on the left we've got the billing system and the billing extract. If we change the billing system, we don't have to change all of the other connections.

We've got the asset registry. That whole thing for PG&E is being switched over to a GIS system. So when that is accomplished, we'll move the old asset registry out and we'll just make it one connector to that. We've got a work flow database that was home grown at the moment that we're using to do all of this processing and the calculations and to make sure that everybody in the process is informed as to what happens, but we're going to be moving that into SAP.

Shown here in the green lines are those components that have already been built and then the other ones are on their way. We expect to be testing this thing within a month or two, but we all know how IT projects go. Anyway, this is on track and when this goes live, we're going to be, in principle, if you could get that local jurisdiction to enter the okay, the PTO could be issues in seconds. We still have to have humans in there for a while to ensure that everything is working the way it is advertised.

Slide 44:

So the last screen here will give you a sense of – we've gone through the wire frames on all of this, and it's now in coding, but if you go to the next slide that would be good. That's just giving you an example of people can say, "What do they want to do? Do they want to complete the agreement and authorization? They want to do it real time online or they just want to upload the form that they pre-filled? Do they want to add the signature? Then do they want to complete the application?" It should be, in principle, this simple when we get there.

Slide 45: (Questions)

Anyway, that's what I've got to say, and we'll open it up for questions at this point.

[Speaker: Kristen Ardani]

Great. Thank you so much for that informative presentation. We've been monitoring the questions as they've rolled in, and I think we have a few to start the discussion off.

This is for Bob. "Will you use the portal to accept online Remat applications?"

[Speaker: Bob Woerner]

What kind of applications?

[Speaker: Kristen Ardani]

R-E-M-A-T, Remat.

[Speaker: Bob Woerner]

I don't know what that means.

[Speaker: Kristen Ardani]

Well, I will write that person back and say, "Will you clarify?"

[Speaker: Bob Woerner]

Yeah, so why not? So, I'm sorry I don't know that type.

[Speaker: Ken Parks]

Remat is a feed in tariff governed by the CPU and the maximum of three megawatts, but it's a feed in tariff.

[Speaker: Bob Woerner]

No, well, probably not to start with, but just as Ken said, because we've got the whole group here, we're trying to get all of our stuff online. Some of the wholesale stuff we've already got online applications going in and then we begin to process it. We've got it hooked into SAP, so we will eventually get there.

[Speaker: Kristen Ardani]

Great. "Have you considered strongly encouraging them to apply before the system is built? If you have to close a circuit and cannot authorize operation, the customer will be out of money, and then it becomes a customer service issue?"

[Speaker: Bob Woerner]

So, I didn't get to it in the main presentation, but that's why we've split the thing into two pieces. With the just submitting the agreement and authorization, that has the system size. As you could see, most of the issues are whether the system size with respect to the transformer. So there are a couple of things there, but what we're allowing people to do is if they want to, they can submit the agreement and authorization and we can kind of do a pre-check. There is a couple of other technical issues here that I mentioned on the screen E and between E and D that have to be looked at.

It turns out that many of the larger installers are basically telling the customers, "Don't worry about it." If there is some reason that the customer themselves would be liable for an upgrade, the installer will cover it because they just want to get the deal done. The worst thing that I think would happen to the customer is that it could be a delay depending on the necessity to upgrade some of the system before it comes in. So we're allowing them to do a pre-check. We're letting people know that there is a risk, although small and depending on their risk tolerance they can decide whether they need to know in advance or not. So that's the other reason for splitting this into two pieces.

[Speaker: Kristen Ardani]

Okay, great. "When you do anticipate the online portal to be up and running?"

[Speaker: Bob Woerner]

I'm expecting it this fall. Now, I hope nobody from the IT department here is listening because I've asked them to do it much sooner, but we'll have it proved out. I expect to be able to do some preliminary testing and I've re-staffed some installers already to help us with this in the next couple of months.

[Speaker: Kristen Ardani]:

All right. They are coming in. "Will this be available for other states and utilities like N-Star to use for their processes?"

[Speaker: Bob Woerner]

I don't think so. I'll tell you, we've been in contact with various people that want to provide a national solution here, and I think what you have to do is you go back to that system architecture slide. The reason I included that, the big deal here isn't so much the website as the connection to the back end systems. That costs a lot of money to do and the website has helped those too. I would love personally in a few years not to be in the business of maintaining a website based on tariff changes and everything else. I think it's most efficient for the country for there to be some vendors who are selling a national solution. The trick is how to connect each of those solutions into the back end systems.

But if there were a common way to collect the information and that everybody could subscribe to it, I'm sure it would be much better for the installers and everybody. But the effort is going to be to make sure that system can be connected to the back end of the different utilities own architecture.

[Speaker: Kristen Ardani]

Okay. "How long is the implementation timeline?"

[Speaker: Bob Woerner]

How long?

[Speaker: Kristen Ardani]

Uh-huh.

[Speaker: Bob Woerner]

I think it takes well over a year to do something like that. As Ken will probably attest to, you've got to get the funding for it. You've got to get everybody to believe that you need it. I think it's pretty clear in the kind of volumes that we're dealing with here that you have to do it. The sooner you do it, if you're going to have these

kind of volumes, you're better off, but to start planning because it's a year to two to actually get something like this working.

[Speaker: Kristen Ardani]

Okay. "Are applications created and changed by utility or per rules and regulations in their jurisdiction?"

[Speaker: Bob Woerner]

Well, we have to get approval to change the forms. The key thing is what kind of questions we're asking, but what type of font and stuff like that, they don't care about. But if we're trying to delve into personal information, then they get worried about it; but on the other hand because the incentives went away, there was a lot of information that the utilities commission was collecting that kind of went away. So now they are pushing us to put it into our applications. So it's kind of joint on how you design these things. When we designed our new forms, I reached out to the installer community and I got help from a lot of people to comment on how to do this. So lots of people have to weigh in on what these things look like.

[Speaker: Kristen Ardani]

Okay, and "Are you allowed to create your own application in California or do you have to stay close to a commission-approved application?"

[Speaker: Bob Woerner]

Oh no. You have to do what we got. You've got to fill out the application as is if that's what you mean.

[Speaker: Kristen Ardani]

There's a few more coming in.

[Speaker: Bob Woerner]

Didn't you have some earlier ones for Ken as well?

[Speaker: Kristen Ardani]

Yeah. We do have some for Ken as well. Okay, we have for Ken, "How many applications do you estimate would need to be incoming for it to be worthwhile financially to invest in this sort of automated system?" This person is from a small municipal utility, 180 megawatts system.

[Speaker: Ken Parks]

That would be really hard for me to guess what that number would be. I mean you have to weigh the costs as far as employees and

customer satisfaction, right? Is it worth having a full time employee two or three or four or five or six whatever it takes to process versus invest in the software program? Are you concerned about customer service? That's how I'd answer the question. Those are two things I would look at.

[Speaker: Kristen Ardani]

Okay, okay. "What steps do the AHJ complete to automatically notify SPG&E as electrical clearance? Would it be challenging to scale nationally with so many different AHJs?"

[Speaker: Ken Parks]

Well, SPG&E is a little unique. I mean we have 22 local jurisdictions that we deal with. Today they report directly to a group within SPG&E called New Service. All electrical releases come there, but in the future we want to be able to give them the software and the tool to release it from the property by searching on an electric permit number, and it ties directly into our system. As Bob has stated, the expensive part is the immigration, right? Isn't that right in software? It's the immigration to all the back end stuff that we have. It's a big deal because we're tied to our billing system live with this system, the firewalls and everything that has to be put up. So it's quite a task, but for us it's worth it for the process because of the customer service point of view.

[Speaker: Kristen Ardani]

Okay. Is there any other addition questions that folks would like to submit at this time? I guess I would like to ask a question of both of our panelists today, and that is in looking towards the future, you both mentioned how for SPG&E, you're continually iterating on the software. For PG&E, you're getting ready to look at the online platform and then are likely to anticipate changes to it in the future.

Maybe starting with Ken, in thinking about moving forward and the iterative process of improving the software year over year, what do you anticipate to be some of the biggest challenges with that? Is it more on the back end side like on the integration with rising volumes and having to overlap with different AHJ approvals or is it more on simply keeping pace with demand? As far as the software changes explicitly, what are some of the biggest challenges you might anticipate in the future or have already encountered?

[Speaker: Ken Parks]

I think some of the biggest challenges for us is budgets, right? Budgets are really tight. It's hard to hire employees today to do what we need to do manually, but also budgets are tight on the IT side. We're fortunate that we started this process – as Bob said, it's a two-year process. The first year is just planning and processing and laying it out. Then it takes a year of IT software people to write the software once you identify what you want. So, we're fortunate that we're ahead of the curve. I think the challenges in the future for us is having the budgets or the resources to keep up with technology.

One of my criterias when we went to IT is that this software that we wanted to develop, it had to be flexible, meaning because the business needs change sometimes on a monthly basis throughout the state of California. The flexibility is the key. I don't know if that's really process with it comes to IT work, and then IT is extremely expensive. So I think the challenge is just being able to keep up with the changing rules and regulations within the state and then also the new programs that they develop. Are we going to have the resources as far as money-wise to get the IT folks to help support us?

[Speaker: Bob Woerner]

So I can second that, and the thing to realize is that once you've gone away from the manual processing; so we're doing it brute force now, but once you go to that website, you're kind of really stuck because then you have to keep it current with the rule changes and everything. So once you get into that, you're in there. Then you have to have that IT budget. So there's not really an easy way to go back, but the alternative for these kind of volumes is very too costly.

So you go there, but then it will be a continual battle to try and get the budget so that you can actually make the changes in time because the regulators are going to look at more like what Silicon Valley can do in terms of how fast they move and expect us to move that quick. We just don't move that quick because we've got so many legacy systems and a lot of complexity here. So, it's being fast and getting the budget to do it that's going to be the hard part, but I don't think we've got a choice.

Kristen Ardani:

I think it's a really interesting point you make about sort of once you implement this type of system, needing to maintain it, both from a budgetary perspective and technical perspective as well. I think maybe one thing to highlight is that is these two territories

you have experienced these very rapid increases in demand and volume. So, one example of maybe an interim step that could be considered is how that application was split into two, for example, sort of some of the steps that have been taken prior to launching an online platform that different utilities might be able to consider before they actually hit that peak point where financially it makes sense for them to undertake that type of software development. It seems that there are things and steps that can be taken in the interim overlapping the AHJ approvals with the interconnection approvals and streamlining on the ground without a platform. I think those things are also – that you’ve pointed out today, have been also very helpful.

We have another questions from one of our participants today and the question reads, “It seems that the internal review process – ” I believe this is a lot more for Ken, “– that the internal review process goes straight through with less engineering review now that the platform has been established. The guidelines such as that on slide number 45, that is, for projects less than 30 KW.” So, Ken, was this a huge change in accomplishing the decrease in time necessary to process applications? That is, the guidelines on slide number 45, the internal review process, as it relates to the engineering review?

Ken Parks:

It was a huge change for us. I mean we had to sit back and say, “Okay, how are we gonna deal with the process?” If less than 30KW, just residential, and if the modules and the inverters are pre-certified by the state of California, we went to the decision, okay, let’s just go ahead and push it on through. As Bob stated earlier on their application, I really like that the less than 30KW, they have electrical one line system. Does your system look like this? There’s really not much review after that.

If it’s pre-certified by the state, the inverters and the modules, it’s pretty much just pushed through. It was a change, but we feel like it was a very small, small risk of any risk at all to go ahead and push it through that way.

Kristen Ardani:

Great. Okay, I think we have time for one last question and one has come in from the group. This will be for both of you, “Do you have any comments on challenges and opportunities posed by residential systems with significant storage capabilities?” That is, sort of how do you anticipate the rise or potential rise in storage affecting the processes and things that we’ve talked about today?

Ken Parks:

Well, I would say any new technology, and better storage is kind of somewhat new to us on the residential market, it is always a challenge, but we can meet those challenges. Today, as Bob stated, and Hawaii is having issues, we have concerns about penetration at the circuit level or if not at the transformer level. SDG&E is building a program now to monitor overloads of potential transformers. We believe within the next few months, if not within the next year, we will have some issues within the distribution system at the transformer level of overloading the transformers and better storage. It depends on when they discharge to the grid.

If they're discharging at night, that's a little bit different, but our load is gonna change, right? Our load profile, we're going to have maybe more load at night at 1:00 or 2:00 in the morning versus during the day. So, I think there's some different challenges and I think our paradigm is shifting, but I believe that the utilities within the state are ready to meet. Those new changes that are coming along, I'm really excited about it. I think better storage is here to stay, and I think that I'm really excited to see what's going to happen in the near future with battery storage tied with, paired with NEM.

Bob Woerner:

Yeah, I think technically it can be handled. It's just a question of making sure you've got the information so that you know where you have to go. Then we have to figure out how it gets paid for. The other thing is with just adding the batteries, all of the sudden it gets more complex on them. So we have to work on just making sure from a form point of view we can handle it, but as soon as you go there, we've got special facilities, agreements, and invoices and all kinds of stuff going on that complicated just from an administrative point of view.

We've got that and we've got the technical issues and we've got a – I think over the next year, we'll be working to make the batteries just sort of seamless from a residential type. But as you get to the larger systems, that again is another story. The question is under the tariffs and things, is a battery a load or is it a generator? It's actually both, but the tariffs weren't set up to think it that way. So that's a case where technology has gotten ahead of the regulations, and so the regulations have got to catch up.

[Speaker: Kristen Ardani]

Slide 46:

I think that's an excellent point. I wanted to also just provide the group with Bob's contact information, and note that the slides and recording from today's webinar will be posted on our new DGIC web page.

Slide 47:

Just also mark your calendars for our next meeting, which will be focused on minimum daytime load calculation screening. It will be held on April 30th. Like I previously mentioned, we will have Babak Enayati of the Massachusetts Technical Standards Review Group and then also two representatives from HECO to discuss this very important topic. I also just want to thank both Ken and Bob today. The information you provided to the group was very, very valuable, and thank you to everyone who dialed in and for your questions. Looking forward to the next meeting. Thank you!

[End of Audio]