[MUSIC PLAYING]

Hello. Hi, everyone. Welcome to the session. This is the scaling the equitable and affordable gas to electric transition session. Please go ahead and scan the QR code now and answer the first question. And if you have any trouble, if there's any delay, please use the Summit Wi-Fi. The codes up there in the corner.

So throughout the session, this team will be asking you questions and you'll have time to respond. You'll have about three minutes to respond, and please do so. We'll return the results at the end of the session, so please be sure to be included there. If you have any trouble with the QR code, there is a URL here, app.sli.do. Please use that. And with that, I will introduce our speaker, Chris Digiovanni.

Awesome. Thank you. Yeah, I've got the mic here so welcome everyone. My name is Chris DiGiovanni. And together with Rachel Kuykendall, we're going to be talking about scaling the gas to electric transition. And so what I'm going to do is start off at a high level and really drill down into the specifics for which we're going to spend this session talking about.

So to provide some context, in June of 2022, PG&E published our climate goals. And so we set some targets for 2030, 2040, and 2050. And so for this session, we're going to focus on the 2040 goal, which is for PG&E to have a net zero energy delivery system by 2040.

So what does that mean for the gas system? So clicking down, this is our scope emissions profile. And as you can see our scope 3 emissions, which is customer use of natural gas, represent the vast majority of the emissions that is under PG&E's umbrella currently. But even if you drill down within the scope 1 and 2 emissions, the vast majority of those are attributable to the gas system. So all in all, roughly 98% of our emissions come from the gas system and customer use of the gas system. So what we're going to spend the rest of this time focusing on is that big green box, which is our scope 3 emissions.

So currently, there are three different ways as of today that we're going about trying to reduce our Scope 3 emissions. So the first is through building electrification. The second is through delivering clean fuels, like RNG and hydrogen to our customers. And then the third is through a carbon management program. So for the remainder of this session, we're going to focus on that first box there, which is household electrification.

So this is illustrative. So think of this as a small distribution network. Think of that box on the far left hand side a distribution feeder main. And that is serving gas to 50, a hundred, 200 customers downstream of that distribution feeder main. These customers are using gas to power their water heaters, their home heaters, cooking, clothes dryers, what have you.

And so our challenge is, as customers start to electrify, how can we scale that to retire that entire distribution network to save costs going forward as we get into a lower throughput world? So to provide some context, we've done some internal pathways analysis that shows to get to our 2040 climate goal, we need to do a minimum 35% electrification of our building stock. That's a minimum of 35%.

Currently, we've got 4.6 million gas customer accounts. So if you take 35% of that, that's about 1.6 million gas accounts that we need to electrify by 2040. So if we look out between 2030 and 2040, what type of electrification activity needs to happen-- and I'm starting at 2030 for two reasons. First, we need a little bit of ramp up time to scale the know-how the knowledge and the technology to do electrification at this scale. And then secondly, right now PG&E has an obligation to serve both electricity and gas to our customers. And it's going to take a few years to go through the legislative process in order to modify that obligation to serve so that theoretically, we're obligated to serve energy or clean energy regardless of the molecule or the therm.

So that's why I'm starting at 2030. So over that 11-year time period, we need to electrify roughly 145,000 accounts each year for those 11 years. And to drill it down further, that's roughly 400 accounts per day. So that's 400 accounts per day, 365 days a year for 11 years. Let's pause to let that really sink in for a moment.

To date, we've electrified roughly 100 accounts. It's taken us five years to do those 100 accounts. So how do we transition and scale electrifying 100 accounts over five years to 400 accounts every day for 11 years? So let that sink in as I pass it over to Rachel.

So this is really why I think Chris and I are so excited to have you all in the room, helping us think through solutions here, because this is a massive, massive scale change. I'm going to start by looking really sort of at the micro level, at the home itself and some of the challenges we face there. And we'll zoom out and talk with you all about potential solutions that we see both at the grid scale as well as the gas system scale.

So in the home or business itself, I think the challenges are not particularly unique to PG&E, but they are maybe a bit tougher in California. We do have, as Chris was mentioning, a large portion of our customers, about 80% that use gas for space and water heating. And that's not consistent across the country. We also have very strong regulatory push towards electrification.

So at the device level and the technical challenge level, I wanted to highlight two things just to seed some thoughts here about what we generally hear from our customers around preference for maybe natural gas. The first is resiliency. So we have gotten much better as a utility about public safety power shutoffs. But our customers are afraid. When we tell them we want to electrify your homes or businesses, they think what if the power goes off? I can't cook, I can't have hot water. So that's really, I think, a technical challenge and sort of a mindset shift for our customers.

The other one that we'll talk about a lot is just, how do you electrify if a home. Maybe has a 60-amp panel, 100-amp panel? That is especially common for, say, our multifamily customers or low-income customers. The customers who are going to be most challenged to do this. So any particular ideas that you all have in that space, we are especially interested in.

Shifting to the second set of problem areas, we have a data challenge, I think, as a utility. So most folks, probably outside of the utility business, think that we know everything about our customers. We are pretty darn blind past that meter. So we don't, for instance, know how big a panel is in a home or business. We don't know what appliances they have. Therefore, we can't really determine, is that person going to need a panel or a service upgrade? Does that person ultimately see savings from electrifying their home or business? And specifically what type of appliances do they have?

So to lead you all off again, we're going to start specifically for this question looking at very small scale, so homes specifically. . We're looking for data and technology solutions to better understand how to fully electrify a home. And then we're especially interested if you have any novel ideas around homes that may face technical constraints, so things like electric panel sizing, or if you have particular ideas or concepts in the AI space. We are also very intrigued about those. So I'll pause, let you all fill that out. And we are very excited.

[MUSIC PLAYING]

And if you all finish early and didn't answer the first question on what customer segment or what segment you represent, that should still be up in the app. So feel free to go back and answer that.

[MUSIC PLAYING]

All right, one minute left to wow us with your brilliant solutions here.

[MUSIC PLAYING]

So moving on, maybe moving on. Oh, OK. So revisiting this graphic again, we wanted to really dive into the topic. We're going to spend most of the time talking about today, which is what we call zonal or targeted electrification. This is where you will get your very, very brief utility rate making 101 in 30 seconds.

So what you're seeing here is as we approach 2030, we're going to have some customers that either fully electrify or partially electrify their homes and businesses. What we predict is maybe that when they do that, based on current policy drivers, we may have a gas system that is still largely the same size as it is today.

What that does for those of you, again, not steeped in utility rate-making, you may have relatively fixed costs of maintaining and operating our gas system. And those costs are spread over customers and therms. So as that system stays the same size, and as we have less customers and therms to spread those costs over, gas rates go up. And this can be a real, real challenge for us.

So why PG&E is so interested in this zonal or targeted electrification thing is really about at the forefront equity. So those of you who are not familiar with this wonk-tastic term here, what we are talking about when we talk about zonal or targeted electrification is, instead of doing these one-off electrification projects for our customers, we're really taking a step back and saying, OK, let's pick geographic areas of our gas system fully electrify. And as we do that, we're going to actually retire the gas system and remove it from our rate base.

And that really is important, because as we then lose sort of therms and customers, we're also sort of shrinking the costs of maintaining our system. In particular, we know that our customers, who are most likely to be on the system longest, are probably going to be our low income customers. They're less likely to be able to afford the upfront costs associated with electrification.

And some consultants are saying that gas rates could be 10, 20 times higher than they are today. And that's just not a sustainable solution for our customers or for us. So obviously, there are a number of ways that we need to address this. But zonal and targeted electrification can be a really good opportunity to both reduce our emissions and promote affordability of our gas system.

To highlight where we are to date, and I will say, I think PG&E is probably actually one of the leaders in this space among our gas utility peers. But again, as Chris said, a hundred projects. That's not a lot if we want to meet our climate goals. So we've done about hundreds of these to date. To give you a flavor of what physically these projects look like, we have an example over here on your left.

And this is a particular project where we had a gas line that was actually running under a freeway would have required shutting down the freeway at night for several months to manage this pipeline replacement for the tune of about $1.2 million. Instead, what we were able to do was electrify those customers at the end of the line and decommission. And that cost us about just under 200k, so that delta then can go right back into gas rates to maintain affordability for our customers.

These particular projects tend to look like this, really long pipe runs to relatively small amounts of customers. And that's because right now, as Chris was mentioning, we do have a utility obligation to serve. So if we have one customer in one of these projects that says, no, that project is sunk. So that's another real challenge that we face as a utility in trying to find these affordable solutions for our customers.

So we're going to take now a look at this sort of larger scale. And in particular, what we'd love to get your ideas on are when we think about scaling from purely the home to these zones or targeted areas, how do we fully electrify a zone, especially if there are technical constraints? And we'll get into some of these on the grid and gas side as we move forward.

And again, we're particularly interested in anything to do with AI or any sort of technical solutions here. So go ahead and answer in your Slido app. And then we'll go ahead and review.

[MUSIC PLAYING]

You have 30 more seconds to put in your answers and solutions here. And if you're all done, you can wow us with some disco dance moves to the music.

We are, yeah. Now, that's the part I'm most excited for is seeing what you all have put in here and letting the AI decide what the best solutions are.

So we talked a little bit about this concept of zonal targeted electrification. And ideally, what we're left with to most cost effectively meet our climate goals at the end of the day is ultimately a gas system that is probably a smaller footprint. And if you had asked me like three years ago, if I would ever think PG&E would say that, I would probably say, no way.

We have come a long way in our thinking here of what climate neutrality like for us as a utility. It doesn't mean the gas system will go away. We obviously will have customers that can't electrify, so things like cement plants or large industrial customers that will need the system long term. Same thing with power generation, that's going to be a segment that we'll need to maintain service to. But it's going to be a smaller system at the end of the day.

And what really, I think, I wanted to focus on for the last part, here is some of the integrated planning challenges of meeting this future. And this is even getting, I think, more challenging, again, as we scale out. But to give you a sense of some of the pain points here, I wanted to focus first on how we plan for electric planning for the future.

And this is something where, to date, we really sort of assume like a fixed load increase across our service territory that's going on every single feeder, same amount, same amount of building electrification, peanut butter across our service territory. And wouldn't it be nice if that's how people actually functioned?

But sadly, people have differences in their perspectives on electrification and how quickly they might be ready to electrify. So ultimately, what we end up with is the reality of how customers act in that we have some customers that are ready to electrify now and are asking for panel and service upgrades, and then some customers that are not ready. And that creates this environment where we're responding really reactively to these applications as they come in, really on a one-off basis.

For folks who are not in the utility world, I often get the question of, well, why don't you just build out the grid now for all this load? And I think the obvious answer there is when we build out the grid, that is a cost that goes to our customers, that is paid for again in the electric rates that you pay. So we can't necessarily do a entire rebuild of expected load because that will cause our electric rates to go up. It will get harder and harder for those customers to electrify. So it's a little bit of a vicious feedback loop. So to some extent, we want to be proactive, but we don't want to be proactive where we don't actually anticipate that load coming online.

The gas side completely different and to some extent, I think a little less advanced than the electric side. So in California, for a while now, we've had integrated resource planning on the electric side. That sort of is aligned with our long term goals. Gas planning is really sort of about meeting reliability and safety concerns as they stand today. So for the gas system, we're not really able to say, OK, well, we're projecting our load is going to go down by 20% in the future. So maybe we avoid this critical safety need now. That's not something that we can really do as a gas utility.

So we're right now really locked into this very short-term planning cycle. That is again a very reactive cycle. And finally, how do these two things meet? Not well is the answer frankly. These kind of planning activities, I think, across utilities tend to be pretty siloed. So we don't necessarily have our gas team talking to our electric team about, maybe we decommission this segment of the pipe, and what impact does that have on our electric system.

So really, we're also very siloed between these two efforts that have their own challenges. And that leads us to the final question. Help us solve this. So do you have any machine learning AI solutions to help us with this integrated planning process, and to help us get more and more proactive in our gas and our electric planning?

[MUSIC PLAYING]

As people are typing, not to mess up our lovely disco music again. After this, we're going to be taking a look at all of the answers that you all provided here today, and segmenting out some of the commonalities between what you all provided, as well as some of the surprising responses. And this is something AI is doing most of that idea generating. So we'll see how good it is. If it can do that, it can definitely help us with our planning process.

[MUSIC PLAYING]

We're going to move on here. So optional question for as I get into this next phase here. So if you can provide the name of your company or organization, that'll be helpful as we tabulate the results. So as the AI is tabulating the results, again, we will go over that in a few minutes here.

We've talked a lot here about our climate goals and some of the technological challenges that we face in doing this electrification at scale. So I want to spend a little bit of time talking about some of the policy and regulatory drivers that is, A, driving and, B, enabling some of this work as well.

So the first one is then Governor Jerry Brown signed an executive order that stated that the state of California needs to in essence, have a net zero energy delivery system by 2045. So I think if you remember from that very first slide, PG&E's goals by 2040, so five years ahead of the state's mandate. And then the next two bullet points are really important here. So the Bay Area Air Quality Management District has passed a regulation that states that by 2027, any water heater or space heater sold or installed in the Bay Area needs to be a 0 NOx appliance. So right now, only electric meets that gas appliances that get more efficient could eventually meet that as well.

And then the second one, the California Air Resources Board, in their state implementation plan, is working through a regulation that they passed in or teed up in their 2022 scoping plan that does something similar but at a statewide level. So what this is going to do is that as early as 2027, if you think about that slide Rachel put up earlier, the 2030 slide where you see some pockets of orange electrification, but you still see pockets of blue gas usage, that's going to start to happen as we get towards the end of this decade.

And we'll start to accelerate as we get into the 2030s. And so that's why it's really, really important that over the next few years, we are able to pilot, demonstrate, and start to scale some of these technologies to enable the zonal electrification, so that we can start retiring some of those gas assets.

And then finally, the CPUC has just relaunched the gas transition OIR. This is going to be a multiyear proceeding that will really lay the regulatory framework for how we start to execute on this from a practical level. So right now, they launched or published a draft scoping memo that stakeholders in the proceeding are responding to on December 16. And we anticipate that at some point in Q1, they will publish the scoping memo, which will kick off a lot of activity from a regulatory standpoint of view around what this long-term gas transition looks like.

So are we ready to start showing responses? I'm going to step over here because I have no idea what's going to show up on this screen. Oh, you need the clicker? All right.

So we've been compiling responses and tried to put up on the screen some of the more surprising ones. I've been looking at them and trying to figure out how to talk about these. I think what I've seen across this question and the next one that's really jumped out to me is a lot of the solutions that are being proposed here, I would characterize as things that are allowing us to have similar levels of visibility related to data and customer assets that we have at the system level.

So we consistently have a challenge as we're planning our systems, taking our information at the system level, and translating it down to really local activity and local projects. And so I think a variety of these technologies enlisting our customers to help us understand what they have behind the meter and using other technologies like air and public information like Zillow, to allow us to get a better sense of what our customers actually have behind the meter. That seems to be the focus of this area.

And arguably, similar on the next question related how to identify areas that are adequate for full electrification, similarly, using data to drive down decision-making at the local level and give us higher probability that we're making the right choices using thermal imaging, for example, to identify where homes are well-insulated and therefore have a higher chance of having good energy savings for our customers.

The second area that pops out with this response that I noticed is these last two in particular are specific customer level information about energy usage to allow us to predict-- to more effectively utilize the assets we have at a higher utilization rate and/or get more out of customers equipment, so that we're not requiring large upgrades to allow us to electrify them.

And then I would argue that the final area kind of revolved around those two topic areas that I mentioned. So I think it's really about generating information around what's behind the customer meter at scale. That's something that's very important for us here. We have millions of customers. We can't be doing this on our own at a premise level. But if we enlist the support of our customers and technology, we may be able to do that more effectively.

And then we could start doing some evaluation at a real customer level to ensure that there's a high probability that customers would be enrolled and see benefits for themselves through this. So I think that's my quick summary that I was able to glean in a couple of moments.

Awesome. So I've got a closing remark here, and then we've actually got some time where we can do a little Q&A real time in live here. So think about earlier, 400 accounts per day, 365 days per year for 11 years. And that just gets us to electrifying 35% of our building stock. So what that means is they're still going to be 65% of our current customers who are going to be utilizing gas in 2040 and beyond.

Now, that'll decline a little some after 2040, but that's still more than half of our customers will still remain on the gas system, even if we are to achieve this 35% electrification by 2040. So to parlay what Patty talked about in the session this morning, and I'm going to upscale the numbers so the math works here.

So if we have $1,000 and it takes $1,000 to maintain our current gas system, and we've got 100 customers on that system right now, $10 per month per customer to maintain that system. If we attain 35% of electrification, we now only have 65 customers. And if we're not able to scale this electrification, those 65 customers are now responsible for that $1,000.

So we need to scale this electrification to bring down the cost to maintain the system. So that customers who continue to use gas aren't burdened with a higher gas bill. So that's really the challenge that we have in front of us here today and as we move forward with this.

So with that we've got about eight or nine minutes. And Rachel and I are happy to entertain any questions that might be in the audience. And a mic will be passed around for those people that are online.

Yeah. Just make sure you're talking into the mic. Otherwise, our virtual friends cannot hear you.

Do you use natural gas for electric generation today?

We do.

So that 98% figure you did at the very beginning, that includes not just residential and business usage, but also utility generated electricity?

Correct.

Thanks.

I'm wondering if you're looking at regional approaches to retiring the gas system. So like urban centers where you could-- I mean, it's almost like you don't want to look at accounts, you want to look at volume, like gas volume, and maybe convert a big boiler that's serving a big high rise or that's going to knock out more than 100 customers out in the country, or maybe even creating district energy systems.

Yeah. Yeah. So I took customer accounts just because we could easily do the math just to really paint the picture of how challenging this is. But you're right, it's really the volume. And so if we can tackle some of the bigger volume users, we'll actually get a bigger bang for our buck. So totally, totally agree with that.

And we do actually have-- we didn't touch on it, but we have a tool, a map, that allows us to target where we maybe have those opportunities to reduce the most GHG per dollar. So that is something we're actively looking at. Now, whether that correlates to where we actually have a big capital investment in the gas system, those two things might not match up, which makes it particularly challenging for us to fund right now. But it is something we're mapping with the intent to pick up those pockets for electrification. Over there.

Thank you for the great presentation. Do you see any opportunity to leverage the existing natural gas pipelines to transfer green hydrogen?

Yeah, that's something that is in our roadmap. And we filed an application with the other utilities in March to do some hydrogen blending demonstration projects to really take a look at how hydrogen blends up to 20% impact our infrastructure. So our proposed project is at a transmission level, and it would be an offline system that would blend various levels of hydrogen. We would take different vintage assets from our gas system to put it into the system, so that we can get an understanding of how those different hydrogen blends would impact those assets.

But yes, we definitely see that it's in our roadmap if we can make it happen to deliver those hydrogen blends safely.

Thank you so much for your talk today. That was very interesting to talk about the transition from greenhouse gas to electric power. And that goes hand in hand with renewable energy as well. So my question is few years ago, California was able to get full capacity using just renewable power. And how come we're not able to scale that or keep that consistent now? Where's the where's the constraint?

I would say one sort of challenge in that is reliability standards. Are we building a system and operating a system where we have 100% or even more reliability for our customers? Because that means we're going to have more, say, natural fire gas generation than solar for that reliability resource. So that's one particular area, I think, that potentially we could lean in more to.

But we're getting there. Our system is pretty clean on the electric side. So I think the last little bit is about thinking through how do we get the remainder of that sort of base load resource that is clean and green for our customers who need electricity at, say, 5:00 PM.

Yeah, one over there.

Hi, Fritz from the California Energy Commission. I really appreciated the talk. There was mention of renewable fuels and hydrogen. And to my understanding, most of that is an economic problem. But there are certainly parts of the PG&E's territory with woody biomass, other types of fuels that could potentially be crafted from that. Is there any creative thinking or solutions how to approach that? Because to get it to volume, I don't think that's really-- there's just not enough woody biomass to get it to volume, but what are maybe some of the approaches you all are having to try to get that production up?

Yeah. So on the woody biomass front, we're in the process of launching a pilot project right now to determine how we can scale that, because we definitely do see that as a pathway for increasing the volume of RNG that will be needed for the cleaner fuels, because there's only so many dairies and landfills in the state. So woody biomass is a huge potential.

Hi. How far could you get with current AMI data, both on the gas and electric side in this process?

Oh. Potentially, we could do a lot with it. I will say right now there are some challenges. For instance, I will say we actually don't store the bulk of our residential AMI data in a way that an average customer can get that data because they're generally not billed based on demand for our residential customers.

So I think there are some technical challenges to empower our customers, potentially, to use that data. We do have that data, and we're able to disaggregate somewhat. It's still, I would say, really challenging for us to exactly pinpoint something like panel size or appliances without physically going into a home or business based on AMI data. But if anyone has solutions, I would be really interested in hearing more.

Hi, [INAUDIBLE] here. I'm wondering if there have been any efforts with integrating like GIS mapping with AI efforts for your integrated planning stuff. That's basically my question.

Yeah. We don't use AI right now, but we do have the tool I was mentioning. The map I was mentioning is a GIS based tool. It overlays probably like a two or three dozen metrics about our gas system. So things like risk, pipe age, customer propensity to electrify to score segments of our pipe system based on whether it's cost effective, whether there's a good GHG driver. So we're getting there.

I will say neither Chris or I are AI experts. So I think we're particularly intrigued on whether there's opportunity to really move that forward from where we are today, which is purely sort of GIS-based. Got about 30 seconds left for burning questions.

Thank you for the presentation. Just looking at the table that you showed about the revenue it would cost to upgrade or replace a gas system, it's like, I think, it was an order of magnitude higher than electrifying. So I'm just curious from the utility perspective, where is the return, the opportunity for return on the electrification piece that's also part of this?

That is a great question. And we could spend like an hour on that. But there is a big policy disincentive because when we do this electrification, we treat it as an expense. Whereas if we replace a gas pipeline, that's a capital cost for us as a utility.

Typically, what that means for us in reality is that electrification maybe needs to be like a quarter of the cost of repairing the gas pipeline once you factor in those differing financial treatments. But I will say, to that point about that particular project, we do think maybe like 10% of our portfolio could be cost-effective today if we could get that 100% customer consent. So the opportunity is definitely out there. I think if we got a differing financial treatment, we could do even more projects. But yeah, I definitely can sidebar on that.

Do we have one other-- oh, yeah.

One more question and we-- we're over time here.

Hi. Thanks so much for the presentation. I was wondering how the industry, utility industry is working with contractors to make sure that things like appliances, electric appliances are available and that contractors have the know-how to install them in an efficient way.

Not well.

Yeah.

I mean, to be perfectly honest, we do-- I'd say we do a lot of training with our energy centers on these particular technologies, but it's a really hard to reach contractors. And in particular, I think sometimes there's the hesitation of contractors to maybe learn these new technologies. My personal perspective taking off, maybe my PG&E hat, is I don't know that the utility is maybe the right person to do that messaging with contractors. I think we can reinforce it. But I don't know that ultimately, like PG&E going and knocking on a contractor door is going to sell them on this.

But I honestly don't think anyone has solved that like, how do we motivate contractors? Unless you have an idea, we're all ears. Awesome.

Awesome. Well, thank you all very much for your time. Really appreciate it. Thank you.