

Will Closing Diablo Canyon Increase Carbon Pollution?

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Greg Dalton: From the Commonwealth Club of California this is Climate One, changing the conversation about energy, economy and environment. I'm Greg Dalton. The era of atomic energy in California is coming to an end. Pacific Gas & Electric recently announced plans to close the last remaining nuclear power plant in the state. The Diablo Canyon power plant near San Luis Obispo has operated since the early 1970s and will be closing the next seven or eight years. In a surprise move, PG&E joined with several longtime adversaries – environmentalists, and anti-nuclear groups – to craft a plan to replace Diablo Canyon's electricity with renewable solar and wind power. Over the next hour, we will discuss what this milestone means for California's fight against climate disruption. What closing Diablo Canyon will reduce or increase carbon pollution. What does it mean for the state's clean energy push?

Joining our live audience we're pleased to have four guests with varying views on nuclear power in the age of climate disruption. David Baker is a reporter for the San Francisco Chronicle where he covers PG&E and other energy companies. John Geesman is former executive director of the California Energy Commission. He's a legal advisor to the Alliance for Nuclear Responsibility, an anti-atomic group that supports PG&E's plan to close Diablo Canyon. Dian Grueneich is a former Commissioner of the California Public Utilities Commission who is now with the Precourt Institute for Energy at Stanford. Michael Shellenberger is President of Environmental Progress, a pro-nuclear advocacy group. Please welcome them to Climate One.

[Applause]

Welcome all of you. Before we begin, I want to say that we invited PG&E to be part of this conversation and we had some back and forth. We will hear directly from a PG&E executive and of course during the audience in question portion we welcome anyone to do that, to join us then. But David Baker, let's begin with you. Set the context in terms of powering the California economy. How big a deal is this, shutting down Diablo Canyon, which is 20% of PG&E's power?

David Baker: It's quite a big deal. Not just in terms of PG&E, but in the entire state. The state had up until a couple years ago two nuclear power plants running. And then in 2012, one of them closed down because it had a little bit of radioactive steam that leaked out of a particular part. And it

turned out that the plant had just spent a whole lot of money on new equipment that was badly designed or just not working properly. And rather than go through the whole process of trying to keep it open relicensing and all that, its owners decided to close it down. So that left us with just one plant, Diablo Canyon. And to give you a sense of how big the plant is in terms of its importance to the state; last year it was 9% more than 9% of all the electricity that was generated within California's borders so all of that coming out this one plant.

So it was a bit of a bombshell the spring when PG&E announced that rather than going for extending the licenses and keeping it open another 20 years up until 2045, they were going to agree to close it down when its final license expires in 2025. And they say that they can do this and replace as much power from the plant that as they need to replace with energy efficiency, solar, wind and some energy storage. Still need to find out exactly how they plan to do that. But they have not quite a decade to do it. So it's a huge change if it happens.

Greg Dalton: We'll get into that in the next hour. Earlier today I spoke with Bill Manheim, who is legal counsel for energy supply of PG&E. He talked about why they're closing Diablo Canyon. Let's hear from Bill Mannheim.

[Audio Playback]

Bill Manheim: *The underpinning of PG&E's decision not to relicense Diablo Canyon is really in California's existing green energy policies which are really visionary. But they are seeking to double energy efficiency by 2030, and increase renewable power to 50% by that time. That displaces the need for much of Diablo Canyon's energy. It's a business decision that was driven by the reality that we no longer need by 2030 the output of Diablo Canyon and that from a policy perspective and from an economic perspective, it was better to replace the portion that is needed for our customers with energy efficiency and renewables.*

Greg Dalton: That's Bill Manheim from PG&E. Michael Shellenberger, he said they don't need the power; they're going to replace it, what's your response?

Michael Shellenberger: Well I mean last week we were in New York State, where they have really been a pioneering. They've just set a new example for how to deal with climate change. New York has a huge amount of its power came from nuclear, it became the first state to recognize nuclear for its climate benefits. So New York is a climate leader. California tries to take credit as a climate leader but in fact our emissions have declined slower than the national average. If this proposal goes forward - and I don't agree with the way you framed it, you suggested that it is going to close. It is a proposal to close it. Emissions will go up the equivalent of adding 1.3 million cars to the road. It will be replaced by natural gas. There's literally nothing in the proposal that requires that Diablo be replaced by any amount of clean power. In fact, on both of the key elements it just says, will do a bunch of energy efficiency.

Now I think the people in California didn't sign up for that. I think we signed up for clean power, for clean energy that doesn't destroy our beautiful desert landscapes. We didn't sign up for big natural gas leakages. But that's exactly what this proposal would lead to. So I think it's really a testament to how far lost the environmental movement is that so many of these groups have signed off on this deal that would increase methane leaks, increase carbon pollution. Make the state incredibly vulnerably dependent on natural gas, including power from out-of-state. When San Onofre closed, as

David Baker was describing, we we're 45% natural gas in California. After it closed, we're 61% natural gas.

If they succeed with this proposal to close Diablo Canyon, we will become 70% dependent on natural gas. That is a fuel that is just notorious for having huge price spikes. So what we're looking at is a big increase in carbon emissions, big increases in electricity prices and really I have to say just the corruption of a basic positive vision that California has had as an environmental and climate leader.

Greg Dalton: John Geesman, you're a part of this group, of this deal with PG&E. Your response to the charge that it will result in more natural gas and will hurt rather than help California's climate plan?

John Geesman: I think that's wrong and I think that Mike is one of the best propagandists in the business. Last week in New York he was successful in extorting \$7 billion, \$7.6 billion to be precise, on behalf of the incumbent nuclear plant owners. That's \$7.6 billion that could have been going to new technologies. That could have been going to energy alternatives that have a tendency to reduce in price as the volume expands of purchases. And as a consequence of that, New York has taken a path that is antithetical to what California has tried to do over the course of the last 40 years.

Greg Dalton: How about the idea that there's no guarantee in the proposal that it will be renewable power that it could be natural gas. Does the proposal say what Diablo Canyon electricity has to be replaced with?

John Geesman: It most certainly does. And I don't think Mike has closely read it if he actually feels that way. There are very clear tranches of new supply that the proposal specifies. Now, I will acknowledge those tranches only address about one third of the Diablo Canyon output. But the key story here is, and you heard Bill Mannheim said it. PG&E is very uncertain as to what their load will be in 2025, 2026. And I think that's something that all of us ought to ponder pretty carefully. PG&E cannot predict right now what the presence of community choice aggregators will be in its market and what the presence of rooftop solar will be and they've tried to thwart both. So acknowledging the uncertainty stemming from both of those sources from a business standpoint, I don't think PG&E had much choice.

Greg Dalton: Dian Grueneich, let's get you in here. You've been on the Public Utilities Commission. One of the interesting things here is that the state is predicting declining electricity use. There's a shrinking market here and it seems to be that there is some scramble of what's going on and how to supply that shrinking market, is that right?

Dian Grueneich: Let me just say that I find the situation and heaven forbid about 40 years involved in energy in California, about the most interesting one we've ever tackled or been faced with. And part of what's so interesting is that everywhere else that we've dealt with nuclear it's been a very sudden closing. What David said, you know, you discover that unfortunately a whole bunch of parts for a nuclear power plant aren't working. And literally everybody scrambled what are we going to do. And that did result in an agreement. 50% of the replacement power would come from natural gas. That needless to say, had a lot of people upset. But in this situation we actually have seven years to plan. And that to me is what's so extraordinary. The same thing with New York, the economics of the market there, the plant operators no longer were making money. And shareholders do not just donate; let's keep a nuclear power plant in operation. So it's a very different situation. And with all of our policies what we're striving for is a dramatic change in how we're all going to get electricity.

Our number one priority in California is energy efficiency. And when I was a commissioner, I had the

honor being lead on efficiency. We doubled how much we would all invest in energy efficiency. Last year our legislature passed a new law that said we're going to double past that. And so yes, our loads are declining. You know, when you turn on the lights in the building instead of the old incandescent lights that use a lot of energy, not only do we have CFLs but we have the LEDs that people are buying. And so it does mean that overall, we use less energy and that's bringing up this fascinating situation a very large power plant like Diablo Canyon that's running just fine economic. You just may not need that in the future these very large-scale plants. Especially when you have people saying let's put PV on our homes or let's have them in our communities. And so it's a situation we've never really been faced with before. And I'll just stand by saying my prior agency, the California Public Utilities Commission. It's going to be the place where I guess PG&E and I don't know John, if your group and the others - there's going to be a big application for permission to carry out this proposal that will be filed. And there is going to be lots of question asked. I mean I have a lot of questions and a lot of public hearings to sort of sort out, is this really going to make sense or not.

Greg Dalton: David Baker, what this tells us about what PG&E and others think about the future of California, that's going to power California's economy. The future of energy system, we've had some really big plants, billion-dollar plants and now we have a distributed system much like computers went from mainframes to PCs and now phones. We're going to have energy created closer to where it's used. What does this tell us about the future?

David Baker: That's a pretty good way of putting it actually. It does tell us a couple things about what, where PG&E and also the people who manage the state's electricity grid think things are going to be 10, 15 years down the road. And it's not necessarily that the amount of electricity we'll use overall will shrink, but it's not going to grow very much. I was visiting two weeks ago this organization based in Folsom, the California Independent System Operator, the people who actually run the grid. And they are projecting that you look out 10 years from now and it's basically going to be about the same electricity demand in the state that we have right now, but with a much higher percentage of solar, bit higher percentage of wind. And a lot of fast ramping natural gas plants that can move up and down as the rest of the system needs it.

A big plant like Diablo which was designed to go up to full power and just stay there day and night is kind of a tough fit for all of that. And PG&E clearly is seeing the same thing because you got to remember PG&E's CEO is a big believer in nuclear power. He used to lead the nuclear power industry's main lobbying group in the United States. He is a big believer in this technology. And this is a big asset for this company, you know, they own this thing at a time when California forced them and the other utilities to sell most of their power plants years ago. They would not want to give this up if they thought there was a good economic case to be made for keeping it open. But keeping it open isn't free; it's I think the operating costs at one point it's over like 600 million a year or something like that. So if you can't run at full tilt, it's not going to pencil out.

Greg Dalton: Michael Shellenberger, your response to these big nuclear plants don't fit into the future we're going into.

Michael Shellenberger: I mean it's funny, right because it's like, I thought we cared about climate change, right? So if you're going to take 9% of our power away, why are you going to take it away from clean energy source? Why not go from 61% to 51% natural gas? Why remove 20% of full one fifth of our zero carbon power?

The only reason to do this because you think there's something really scary or dangerous about

nuclear power. But the medical journals, the British medical journal Lancet, finds that nuclear is the safest way to generate reliable power. There's been a fear mongering campaign against this plant, including by John's organization for almost 40 years; that's what underlying it. And you know, with all due respect David, you make it sound like the market is sort of operating without, you know, or on its own. The market is constructed by policies. So what PG&E very clearly said is that if you're trying to get, if we have to get to 50% renewables it's very hard to do that if nuclear is not counted as renewables. They went to the legislature and said, we'd like to be able to count nuclear renewables and they were denied. They were lobbied against by all the so-called environmental groups, the antinuclear groups that wanted to keep nuclear out of that definition of renewables.

So here we are in a situation where California imports one third of our power from out-of-state. You know, we have 61% of our power from natural gas. Why is it that we would be taking off line this amazing source of zero carbon power; 24/7 it produces power. Solar when the sun goes down and everybody comes home to work you've got to ramp up your natural gas. Why did we have a leak at Aliso Canyon? We had to stuff all this natural gas into the side of a mountain to deal with the fact that when the sun goes down and power demand goes up, you have to flood huge amounts of gas fired electricity into the system.

So if you care about climate change this proposal is ridiculous. It's disastrous. If you don't care about climate change and you think that nuclear power plants pose some unique danger, which the science does not support at all, then maybe you don't care. But I would suggest that even if you don't, even if you're just concerned about the explosions you get from natural gas pipelines like the one that killed eight people and blew up what, 38 homes in San Bruno. They're in the middle of a criminal trial on it. Guys break into, you know, apartment buildings all the time trying to steal natural gas, somebody lights a cigarette the building goes up in flames.

So why is it that we are putting more of our people at risk by going from nuclear to natural gas? If you take those Lancet numbers that I just cited or you cite the number that James Hansen the climate scientist finds, closing down Diablo, replacing it with natural gas will increase premature deaths in the state from 800 to 2,100 deaths. So this is a proposal that will increase our reliance on one of our most dangerous ways of making power. It'll increase methane leakage, which put the equivalent of a half million cars on the road from Aliso Canyon. There is no excuse to do this, other than an underlying paranoia about our largest source of zero carbon power.

Greg Dalton: We're talking about climate change and nuclear power at Climate One. I'm Greg Dalton. My guests are David Baker from the San Francisco Chronicle. You just heard Michael Shellenberger from Environmental Progress. We also have Dian Grueneich from Stanford and John Geesman former director of the California Energy Commission.

Michael Shellenberger just mentioned James Hansen, noted former NASA chief climate scientist. One of the, probably world's preeminent climate scientists. He has some views about nuclear power. Let's hear what he had to say last year when he was recording these comments for the film Pandora's Promise.

[Audio Playback]

James Hansen: *The only hope that we have of phasing down emissions and getting to the middle of*

the century with a much lower level of fossil fuel emissions, which is what we will have to do if we want young people to have a future. Then we're going to have to find alternatives and at this time nuclear seems to be the best candidate.

Greg Dalton: That's climate scientist James Hansen. So John Geesman, there's an increasing number of people coming over who used to be opposed to nuclear saying climate is such a big moral responsibility, the energy needs are so vast, nuclear has to be part of the solution. What do you say to that?

John Geesman: I get that. But I would distinguish between new nuclear plants, new nuclear technologies and existing incumbent aging plants heading into the end-of-life, their hospice period.

And I think that Mike, if in fact he were truly concerned about climate change and truly familiar with California, would recognize that 50% of our greenhouse gas emissions in California are attributable to the development in refining and use of petroleum, and focus attention there. And one of the potential solutions there is electrification of our transportation system; that clearly wasn't enough from PG&E standpoint to justify keeping Diablo open. And let me tell you why. If you take the revenue requirement that in our public utilities commission regulation establishes how much money Diablo takes to run every year, it works out to about 5.6 cents per kilowatt hour. Check out what the wholesale price of power in California is right now, it's 3.0. Tony Earley, Geisha Williams, both very sophisticated business executives. And they can look forward and say, you know, I don't know that it makes sense to try and put any more money in this leaky bucket any longer.

Michael Shellenberger: It's not accurate by the way; those numbers are wrong. What it cost to run and David report on this very well. The cost to run Diablo Canyon for PG&E is \$.45 a kilowatt hour. What you and I pay is \$.18 a kilowatt hour. What PG&E says that they pay for imports from out-of-state is something closer to \$.10 to \$.12 a kilowatt hour. So those are the facts of it. The economics of an existing nuclear plant, which by the way could run 80 years, that nuclear plant that's what the NRC would be considering Diablo to run for. It's run 30 years so I guess you can call a 30-year-old at the end of his life, but I think that's a little unfair to the 30-year-old. Nuclear power on average I say is 35 years old. Those plants can go to 80 years, some people think they can go to a 100, you're just replacing parts.

So you got to ask, why and frankly, the desire I mean - let's get rid of petroleum let's move to electric cars, let's move to hydrogen fuel cell cars. Why would we be shutting down a major source of zero carbon power that can produce the power we need for zero emissions vehicles or produced the hydrogen we need for those vehicles? It's just - ask John what he really thinks of nuclear power, he'll tell you he thinks it's a unique threat.

Greg Dalton: David Baker, what does this say about the economics of industry of nuclear industry; is this is going to spread to other states. We've seen a lot of the nuclear plants in the United States have had their licenses extended. A few has closed, is this a harbinger of something that could happen nationwide?

David Baker: The Nuclear Regulatory Commission, which is the one that the government agency that rules on the licenses. They extend for 20 years at a time. And they have yet to deny an extension request for any nuclear plant that has finished the process of requesting one. That said, we have seen a bunch of plants basically killed by the same thing that's killing coal plants, namely cheap natural gas. It is hard for them to compete in the long run against that. And if we're talking about electricity prices, you know, Tony Earley will tell you that while they pay pretty heavily for a large-scale solar 10 years ago in California. Now they're seeing prices in the five cent per kilowatt hour range from new utility size solar projects. And that's actually, it's been confirmed by a pretty good

study out of Lawrence Berkeley National Lab last year. So the economics here are a bit different from what they are elsewhere. But they're still pretty challenging for nuclear overall around the country; at least this kind of nuclear plant.

Greg Dalton: We're going to go to our lightning round at Climate One. We're talking about nuclear energy and climate change. These are a series of yes or no questions for our guests. Starting with John Geesman, yes or no, the nuclear energy industry in America is dying a slow death?

John Geesman: Yes.

Greg Dalton: Dian Grueneich, more people, yes or no.

Dian Grueneich: Oh, I don't get the same question.

Greg Dalton: No, it's different.

[Laughter]

Dian Grueneich, more people have died working in coal mines than working in nuclear power plants?

Dian Grueneich: Yes. Is there a right or wrong to this?

Greg Dalton: Michael Shellenberger, coal-fired electricity damages public health far more than nuclear power?

Michael Shellenberger: Oh it's easy. Yes, of course.

Greg Dalton: David Baker, the nuclear power industry has a poor record of controlling costs?

David Baker: Yes.

Greg Dalton: Michael Shellenberger, nuclear energy provides a shrinking percentage of global energy supply?

Michael Shellenberger: Unfortunately, that is true.

Greg Dalton: Dian Grueneich, the plan to close Diablo Canyon is not a done deal and could come unhinged?

Dian Grueneich: Yes.

Greg Dalton: Also for Dian Grueneich. You get a two for here, nuclear energy is renewable energy.

Dian Grueneich: Depends. Defined by policy makers in this world.

Greg Dalton: In this case in California no, okay. John Geesman, the only U.S. states building new nuclear power plants today are ones where the utility companies have regulators on a leash, which means they can pass huge cost on the customers?

John Geesman: They also have their hands in your pocket for advance construction funding. That will be yes.

Greg Dalton: There's some plants under construction in Georgia where the ratepayers are already

paying for the plants that are not operating yet. Dian Grueneich, nuclear power plants will continue to be built in Asia and the Middle East?

Dian Grueneich: Yes.

Greg Dalton: John Geesman, the United States should continue research into new forms of nuclear power?

John Geesman: Yes.

Greg Dalton: Michael Shellenberger, nuclear waste is the best kind of waste?

Michael Shellenberger: Yes.

[Laughter]

In terms of electricity production.

Greg Dalton: That means you're willing to carry it out to the curb in your slippers and robe on Sunday morning?

Michael Shellenberger: Every morning I do that in fact, yeah, whenever I have the chance.

Greg Dalton: David Baker, some liberals oppose nuclear power blindly and ideologically unencumbered by facts?

David Baker: You gave that to me the last time we're here.

[Laughter]

Greg Dalton: We recycle questions occasionally.

David Baker: I can agree on the first part not on the second. First clause yes, second clause no.

Greg Dalton: John Geesman, that is similar to conservatives who deny climate science blindly and ideologically unencumbered by facts?

John Geesman: Yes.

Greg Dalton: Michael Shellenberger, movies such as the China Syndrome, starring Jack Lemmon and Jane Fonda and Silkwood, starring Cher and Meryl Streep, did more to shape public perception about nuclear power than most environmental groups?

Michael Shellenberger: Yeah, I don't think so.

Greg Dalton: David Baker, last question. Small modular nuclear reactors are like hydrogen. They are the fuel of the future and they always will be?

David Baker: Sure seems that way.

Greg Dalton: Alright, that ends our lightning round. How do you think they did? I think they did pretty well.

[Applause]

Greg Dalton: Let's talk about the waste, Michael Shellenberger, nuclear waste this country doesn't have a good solution. Yucca Mountain was a political decision to put in a place where there's already a nuclear industry. How are we going to solve the waste problem?

Michael Shellenberger: I mean let's talk about it. I mean, look the waste – first of all people don't know what it is. So what gets called waste is the spent fuel. At least the high -level stuff that everyone worries about. But it's the spent fuel. Most of the energy is still in it because our reactors are not yet where they will be in 100 years or whatever when they can burn all of the energy up. The waste just sits there it's in solid form. You ask people what they worry about, they kind of go, oh my gosh and where it will be transported and then it'll fall off the truck and then green liquid will spill into the river. So first of all, it's not green and it's not liquid, it's solid. It's sitting right there on site and it's fine.

If you take all of the waste that nuclear power the United States has produced since we began producing power from nuclear, it would all fit on a football field, about 50 or 60 feet high. So there's hardly any of it. As an environmentalist like I worry about so many other kinds of ways like all the plastic islands of waste in the ocean or, you know, the chemical waste or the carbon dioxide waste that we call pollution and we put up into the air. No form of making power better internalizes its waste than nuclear. So there's tiny amounts of it, it's easy to handle and manage. It's just become a kind of bogeyman for people.

I do want to say one other thing too because David said cheap gas. I don't think that's accurate. Solar and wind have boomed during the period of cheap gas in the United States. So if it were just cheap gas, we wouldn't have seen solar and wind booming. Nuclear has been discriminated against in federal subsidies. The U.S. government finds that solar gets a 140 times more subsidies than nuclear. Wind gets 17 times more in subsidies than nuclear. Nuclear is excluded from every state renewable portfolio standards. So I don't think it's accurate to say it's just cheap gas. It's a policy of discrimination and those policies are based on a set of fear mongering by institutions that really started in this state and has spread over the last 40 years.

Greg Dalton: Dian Grueneich, back on waste. Is the waste no big problem it's fine where it is?

Dian Grueneich: Absolutely not. It's a very, very significant concern. And it's actually not just the United States. And this is a thing to really think about. The question that you would ask me, is nuclear going to be continued to be built basically outside of the United States. Yes, this is where Asia, this is where India, this is where some of the other areas of the world that politically are very worrisome are getting their power from.

And we have not solved the waste problem in 40 years. And it is, Michael was right it's a political problem. If we got past that then we could start to focus on can we have the science work. We'd like to see that that happened. But for waste, it's really what's happening outside of the United States where you don't have anywhere near the protections or concerns. And this is where collectively we've all got to figure out what we're going to do about this.

Greg Dalton: David Baker, that raises the question of terrorism. There was one of the suspects in the Paris terror attacks, who was thought to be kind of casing a nuclear facility in Europe. Let's talk about terrorism, that's something of real concern whether it's here in the United States or abroad.

David Baker: It would be pretty tough for terrorists to attack Diablo. Diablo is very heavily armed, it is. Do not go there by accident.

[Laughter]

You, I mean it sits on a private road, you have to travel I think something four or five miles on private road before you can even see the plant. But once you get to the plant you don't get onto the real grounds or get anywhere near the machinery until you've gone through multiple layers of security. And there are a lot of guys with guns who look extremely serious about using them who are constantly patrolling the ground. To get into the reactor machinery itself, I don't know how he would ever do that. To get to the spent fuel that's stored outside of the main buildings, again I'm not sure how do you do that. There's been some concern about people trying to crash planes into it but you would probably need jetliner to actually physically impact it; a small plane would smash up to bet against one of those casks.

John Geesman: And who would think that terrorists could get a jetliner?

David Baker: I know, it's a radical idea. So yeah, now PG&E will have an answer for that too. They think that essentially that it's protected by the hillsides that are right nearby. The hillsides would catch the plane before they would actually reach the canyon.

Michael Shellenberger: I mean, it's just get to a level of ridiculousness like what do you think is going to happen. I mean it's like people, I think it's promoted I used to believe it by the way when I was an anti-nuclear activist. That if there's like a meltdown or accident that it's like a bomb going off, I mean, when you look at like the U.S. government scenarios what happens is a dirty bomb that's what it would effectively be.

Basically all the deaths are from panic. People trampling each other, driving fast whatever, it can be hospital radioactive ways that creates a dirty bomb like that. And I think it's a powerful metaphor for the whole issue here which is that it's our fear that kills. And I think the fear mongering we have got to hold it to account. We don't allow people to fear monger around vaccines. We don't allow people to fear monger in ways that put us at risk. The fear mongering on nuclear is putting us at risk. If we go and shut down this plant, more people will die from air pollution and accidents than if you keep it running. And that has to be held accountable here. You can't get away with saying nonsense about this technology and not be responsible for the accidents and the damages that you're causing.

Greg Dalton: Michael Shellenberger is a pro-nuclear advocate. We're talking about the closing of Diablo Canyon here at Climate One. I'm Greg Dalton. Other guests are David Baker from the San Francisco Chronicle. Dian Grueneich from Stanford and John Geesman from an anti-nuclear group.

Fukushima was mentioned, Dian Grueneich, have United States and California applied the lessons of Fukushima? Diablo Canyon is up high, tsunami can't get there but more generally, have we learned the lessons of Fukushima?

Dian Grueneich: I want to echo what David said because I have visited Diablo Canyon. And it is very, very well protected I think. There is some issues about it was built before we understood climate change. And as ocean levels rise, we either going to have to have even more protection against the ocean right there. But I think in general, there's a great effort made to be protecting the plant.

What I will say is more of what John had mentioned, which is when you go inside the facility, you are stepping back in time. Again, I want to say I think that it is - everybody, my impression was, was trying absolutely their professional best to run a top-notch facility. But it was built, John, 50 years

ago?

John Geesman: Designed 50 years ago.

Dian Grueneich: And they still have, you know, we're not talking digital, you know, some of it is still mechanical. And what's happened is over those 50 years as different devices have worn out, they've been replaced. And so it's not a brand-new shiny, you know, state-of-the-art facility. It is one that has had to have, you know, various parts of it replaced and replaced and replaced. And I got the impression when I toured it in, this was when I was a commissioner, that again the commitment there was phenomenal. But they are dealing with an older facility and that's I think more of sort of a concern of how are we going to keep our top-notch performance records at the state we all want them to be.

Greg Dalton: The other concern is cost. David Baker, how much is this going to cost and who's going to pay?

David Baker: We're going to pay. The estimated cost right now is 3.8 billion to decommission the plant. That may go higher; they've increased the estimate a couple of times over the last few years. We have already, all of us in this room, been paying into that fund though probably most people don't realize it. As soon as a nuclear plant starts up the people who are and the customers, the utility ratepayers, start paying bit by bit into a decommissioning fund. And to date we've put 2.6 billion well, by the end of last year we put 2.6 billion into that.

Now there is a bit of a shortfall between now and 2025. PG&E wants to raise rates by roughly the bill is I think roughly \$.50 per month over the next few years to sort of close the gap of what they think it's going to cost. But the total right now, yeah, it's 3.8.

Greg Dalton: We did a poll on Twitter that asked people whether they think closing Diablo Canyon, what its cost will be monetarily and carbon. We had about 100 responses, 43% said that closing Diablo Canyon will save money and reduce carbon. 37% said it would have a neutral effect, and 20% said it would cost money and increase carbon. So most people think that it will be a good economic move and a good move for the climate, Michael Shellenberger, are people misguided?

Michael Shellenberger: Totally. I mean, just think about it. Like here you're taking off line 20% of our clean power. And then they kind of go, well no we're going to make it up. But first of all the proposal doesn't make it up at all. Just go read it, I mean it just says, we'll do 2,000 gigawatt hours from efficiency and then 2,000 gigawatt hours from efficiency or maybe renewables. Well, efficiency is not a power source; that doesn't replace clean power. You know, I agree what David said, projections of electricity will be flat. So that doesn't mean, that means electricity is not projected to go down. Every major analysts who looks at this whether it's the industry guys at PIRA or KQED did a great story on this, David's going to - nobody, I mean there's just nobody independent do things that you can take off line 20% of our clean power and have it just instantly replaced in seven years by solar. That took us what, 20 years to get that much solar as we are at today.

And meanwhile, like what do you do at night? I mean we still have got to provide power for hospitals and schools at night, for homes at night. So it's really foolish. I mean, look at San Onofre, right. When San Onofre shut down the amount of emissions went up to equivalent of over 2 million cars on the road. We spent, I mean, now it's in legal case, but the proposal is to spend \$6.6 billion taking down a nuclear plant that could have run for 30 to 50 years more instead of just spending another 800 million on replacing the steam generators. I mean, who will talk about these plants in this kind

of odd way I don't really, I mean disrespectfully like we don't talk about dams this way. We don't go, well that damn is getting really old, you know, I mean it's really, now you replace parts, you replace turbines. I mean things get replaced, these are long-lasting. Frankly, these are things that should be considered public goods. If you care about climate, you care about pollution, why would we be spending billions of dollars to put ourselves in greater jeopardy in terms of more pollution, more accidents, higher electricity prices. I mean, does anybody even remember why we had an electricity crisis in 2001? Our governor had to leave office and get replaced by a Hollywood movie star because we were too dependent on natural gas being imported from out-of-state. Now we're intending to go from 61% to 71% gas?

It's a kind of madness, I mean I don't know how else to describe it. I mean when, you know, when people decide to stop vaccinating their kids, we don't kinda go make it state policy that everybody should not vaccinate your kid. You say no, you know what if you want your kids to go to public school they got to get vaccinated. This is a public good; this is clearly where the science says we need to be going. I mean we've done now eight letters to President Obama every major antinuclear group. Governor Brown with James Hansen, Stewart Brand just a who's who of the most prestigious climate and conservation scientists in the world just pleading to just keep these nuclear plants open. And instead these very powerful lobbies and we're talking about groups like the Sierra Club and NRDC that have budgets over \$100 million a year. They take money from fossil fuel and other energy companies that have a direct interest in replacing Diablo Canyon. I've documented it on our website Environmental Progress, lots of accusations get made. Our group by the way is completely independent of any energy interest. But the group trying to shut down Diablo Canyon have serious conflicts of interest, taking money from solar, natural gas and have investments in those companies that will stand to benefit from replacing Diablo Canyon.

Greg Dalton: So we kind of expect environmentalists to be involved in clean energy. You claim your group is independent, though Rachel Pritzker primary funder of The Breakthrough Institute and Pandora's Promise is on the advisory committee of the nuclear innovation alliance which is with members from Bechtel, Babcock and Wilcox, Exelon, TerraPower. She's very closely aligned with nuclear energy interests.

Michael Shellenberger: No, that's not what that shows. It shows that she's on a board. I mean, I'm on the MIT, The Future of Nuclear Advisory Board, there's going to be nuclear companies on that advisory board. That's not a conflict of interest. I mean look, the conflict of interest is when you have money coming into your organization or you're invested in energy companies that stand to benefit. That's just, frankly that is just guilt by association what you just did right there. That's not a conflict of interest.

Greg Dalton: We're talking about clean energy and Diablo at Climate One.

[Applause]

Tony Earley the president and chairman and CEO of Pacific Gas & Electric was here recently and he talked about a couple of things. He talked about his predecessor and also the CPUC. So let's hear from Tony Earley during the lightning round.

[Audio Playback]

Greg Dalton: *You are still working to repair the damage to the company's reputation caused by Peter Darby's tenure as CEO?*

Tony Earley: Yes.

[Laughter]

California Public Utilities Commission under former president Mike Peevey got a little too cozy with utilities that regulated?

Tony Earley: Boy, that's a, can I take the fifth on that one?

[Laughter]

I mean there were issues on both sides that really needed to be fixed.

Greg Dalton: Dian Grueneich, you were formally on the PUC. And the former chairman Mike Peevey the Orange County register reports, that Kamala Harris the state attorney general is pursuing criminal charges against him for cozy relations with another utility, Edison International, which he used to head. And there's been, so you as a former Commissioner doesn't, you know, how good a job has the PUC been doing and can we really trust them to police this deal?

Dian Grueneich: You didn't ask the question I was worried about so, thank you.

John Geesman: What question was that? We'll get to that.

Greg Dalton: Yeah, what question was that?

Dian Grueneich: I think that there can be trust in the PUC's review of Diablo Canyon. Again, just to remind folks this is a proposal that's been developed to, you know, shut down Diablo Canyon to recover costs and then to have a plan going forward, which, contrary to my panelists up here does not include natural gas power plants. I have read it and that much is what they've said is that it will be carbon free resources. All those issues are going to be reviewed in a public forum. I really encourage people who care about this issue to either participate before the PUC, if you are a consumer there are consumer watchdog groups, there's going to be Michael, I'm sure. But the PUC in my experience does best when there is really the public eye, keeping track of what's going on. And this is, you know, one of the most important decisions that California has faced, David I'm sure you're going to do a great job of reporting on it.

David Baker: I will report it.

Dian Grueneich: But it requires the public to say you care about this and we want to understand what decisions are made. What facts are behind those decisions that you're making. And when the commission and the commissioners understand that the public is keeping an eye on them, that's when I think they function the best.

Greg Dalton: So David Baker, what do you think, can we Californians have confidence that the PUC is going to do a good job overseeing this deal? We had another Commissioner Mike Florio who is a consumer rate advocate who played, end up playing footsie with the industry?

[Laughter]

So it's damaged institution in some ways.

David Baker: It is but it is a public process, you know, people can go on and read what exactly what you're talking about. You can read these proposals. You can go to these meetings. You can see exactly what's being said about it. And yeah, it's like a lot of government bodies, it functions best when people are staring at it and talking to it. I think the thing that's interesting here though is it's not just this issue with Diablo; it's not just a question of trust in the PUC. I think it's fundamentally a question of trust in PG&E itself. Now for decades, the people who wanted that plant closed were the ones who distrusted PG&E. They didn't believe the seismic studies around there. They didn't believe the claims that the technology is as safe as PG&E thinks it is. Here, Michael and the people who agree with him don't believe PG&E's statement that they can replace this without increasing greenhouse gas emissions. Now, the company does a lot of modeling, it's part of their business. And they're staking a big asset on the idea that they can do this without increasing those emissions.

Some people either don't believe that they're being honest about that or don't believe that they're accurate. But if you're talking about a damaged institution, I think that's sort of it, the crux of this; people are so used to distrusting PG&E.

Greg Dalton: The other part of this was the Peter Darbee era when he was running PG&E and now Tony Earley. Under the Peter Darbee era, PG&E try to stop renewable energy, spent \$50 million trying to change the state constitution, alienated a lot of their supporters. Is it different now, I sense a difference. Is it difference now that there seem to be more onboard, recognizing community power is happening and really going more forcefully toward renewables?

David Baker: I would say in a lot of ways, yes. And this announcement was kind of astonishing to me in some ways because of that. Now you've mentioned the community choice programs, things like Marin Clean Energy and Clean PowerSF. These are programs where cities or counties get together and buy electricity on behalf of their citizens. PG&E really tried to strangle that one on the grave and tried to prevent the Marin agency from even forming; at one point even threatening to blockade power deliveries to it. They lost that fight and now when PG&E was announcing that they were going to close down Diablo. One of the main reasons they were talking about was that they expected that model to spread really far across California as it has. It may not necessarily be the future that they would've wanted for themselves 10 years ago, but I think they realized this is the policy of the state; this is where things are going. And I'd say they're far more on board with it now than they were 10 years back.

Greg Dalton: Are they more on board than the oil companies which is constantly litigating against the state?

David Baker: Yes.

Dian Grueneich: Greg, may I just say something that I think that we should not fall into taking a position one way or another on this because we either trust or don't trust PG&E. I mean, I don't know what's really in their minds. They, yes they care about their customers who are increasingly wanting to have solar and community choice and hopefully energy efficiency. But they also have shareholders and they're looking at this type of an issue very, very, you know, coldly in a sense.

But as a state, you know, hopefully we are all committed to climate change and reducing our greenhouse gas emissions. I mean, for me that's the overriding factor. And so what we have here is Michael and his group in very, you know, honest situation saying, hey, I just don't trust PG&E. They can talk all they want about energy efficiency and renewables but boy, I think the first chance they get, they're going to build natural gas plants and that's going to shoot our emissions up high. You probably have John, I'm assuming, saying, wait a minute they can, you know, that's where technologies going, we're going to get a lot of renewables. We've had great drops in prices.

But none of us should have our future just based upon a hope that all this is going to work out. You know, we need to when I come back to the Public Utilities Commission; probably at some point the legislatures gone away, and another folks, you know, demand that there is insurance of understanding this deal and all the costs and all the risks, and then if it does proceed transparency and understanding, step-by-step what is going to be happening as far as replacement power. And I hope demanding that it's carbon emission free because that's what our state needs.

[CLIMATE ONE MINUTE]

Announcer: And now, here's a Climate One Minute.

The Natural Resources Defense Council, along with other environmental groups, has come out in support of closing Diablo Canyon. Yet some of its funds are invested in renewable energy companies that could profit from the plan. Is that a conflict of interest, as our guest Michael Shellenberger contends? Greg Dalton spoke later with Ralph Cavanagh, co-director of the NRDC's energy program, and asked him to respond.

Ralph Cavanagh: *NRDC accepts no money from energy companies, any energy companies. Some of NRDC's financial reserves are invested with mutual funds that make decisions independently of us. None of those decisions had any bearing whatever on our participation in these negotiations. NRDC's clean energy leadership dates back 40 years and it is ridiculous to suggest that there is something corrupt about replacing an aging nuclear power plant with less costly energy efficiency and renewable energy.*

Announcer: During their conversation Dalton also asked Cavanagh about the recent jury verdict against PG&E regarding the 2010 fatal explosion in San Bruno.

Greg Dalton: *PG&E was recently convicted of six federal felony charges for obstructing justice. So what can you say to Californians who say, well can we trust PG&E to follow through on this deal. They were just convicted of federal crimes.*

Ralph Cavanagh: *PG&E's reputation can only be helped by its energy efficiency and renewable energy leadership in the joint proposal. What it comes down to now is following through. NRDC is committed to doing that. I think that's the best response PG&E can make and we certainly look forward to helping.*

Announcer: That's Ralph Cavanagh of the Natural Resources Defense Council. He spoke recently

with Greg Dalton about PG&E's proposal to close Diablo Canyon. Now, back to our live program from The Commonwealth Club.

[END CLIMATE ONE MINUTE]

Greg Dalton: Let's go to our audience questions. Welcome to Climate One.

Male Participant: Thank you. Let's consider that we take the joint proposal at face value. And the proposal says, we will be at 55% CO2 free emissions by 2031, and perhaps through 2041. Today we're at 56% CO2 free emissions. Why should I be happy about being stagnant for up to the quarter-century? Thank you.

David Baker: You shouldn't be happy.

Greg Dalton: David Baker.

David Baker: It's two different measures of greenhouse gas free emissions. When PG&E is talking about that, they're talking about sources of power that fall underneath the state's renewable portfolio standard, which excludes nuclear and excludes big hydro. If you included those two in there we would, yes we'd be way over. We'd be way over the figure that the state touts right now. Right now PG&E says that there are about 30% for the stuff that the state counts and they're trying to get to 55 for 2031.

John Geesman: And you need to add about 8% for large hydro to each of those numbers.

Michael Shellenberger: Yeah, but just to be clear. What I think the gentleman question was pointing out is that PG&E is saying that they're going to reduce the amount of zero carbon power that they provide under this deal.

John Geesman: No, you didn't do the arithmetic, Mike. Fifty-five plus eight equal 63.

Greg Dalton: Hold on. We can't hear you, so. John Geesman, quickly.

John Geesman: Fifty-five which is the 2030 target of RPS eligible power plus eight, which is the current amount of large hydro in California, is 63. Now if I focus on PG&E that large hydro is about double that. So it would be 55 plus 16. You need to do the arithmetic, Mike -

Michael Shellenberger: Oh, you need to actually read the proposal. It doesn't promise to replace any of Diablo Canyon with clean power. None of it.

Greg Dalton: Let's go to our next audience question. Welcome to Climate One.

Female Participant: Hi. In the U.S. there is some, from my understanding there are some nuclear power plants that are still running despite the fact that the safety regulations are outdated. So how can we ensure that if there are nuclear power plants that our government and that our safety regulations stay up-to-date.

Michael Shellenberger: That is what the Nuclear Regulatory Commission does. It does update them. I mean you're talking about what is considered one of the best regulatory agencies in the

world. I mean it is staffed by independent regulators that are overseen by an inspector general. This is, it is not, does not report to the president, does not report to congress, it's, it's bipartisan. I mean this is the thing about the Nuclear Regulatory Commission. It is the gold standard of regulation around the world. So what you're arguing it's just not the case.

Greg Dalton: John Geesman.

John Geesman: Very few people unaffiliated with the nuclear industry feel positively toward the NRC. Virtually everyone else that has had any dealings whatsoever with the NRC consider them as Barack Obama said in 2008, a captive agency.

Greg Dalton: Let's go to our next question at Climate One.

Male Participant: This is something that really comes up in Germany. I don't know, I think tying this to California is the priority in California's policies more renewables or greenhouse gas abatement?

Greg Dalton: Dian Grueneich.

Dian Grueneich: That's a great question, it's both. We continue to believe that the path forward for reducing our carbon emissions is to really increase how much renewables we have as well as energy efficiency. We still have on the books a law that does not allow us to build new nuclear power plants until we have an approved method for disposing of the highly radioactive waste. So if we were to bring on anymore nuclear power plant, we would actually have to have a change in the law.

Greg Dalton: Next question. Welcome to Climate One.

Male Participant: Hi, Bill Manheim from PG&E. And I understand there's a lot of skepticism about how we're going to do this. I just wanted to say that in two days, August 11th we'll be filing our application with the Public Utilities Commission. We have 10 scintillating chapters of analysis that will explain our plan and how we're going to do it and Dian you'll be happy to hear it will be 100% public, not a single confidential document within the filing. We are committed to a public process we've had public, four public workshops and another for participants in the PUC process. And we've been engaging with people who've raised concerns.

So we, you know, we fully encourage everyone to participate in this process. We're going to do our best to explain how it's going to happen. But in a nutshell, California's policies today are already displacing Diablo Canyon. And by 2030 half the need for energy will be displaced. So the focus in the joint proposal is how we're going to replace that second half. And we make very real commitments in the joint proposal and as your CNR filing. First, the energy efficiency in unparalleled magnitude before the plant even closes. Then another tranche of renewables are energy efficiency and then a voluntary 55%. We project as you'll see in our filing that by 2030 the resource base for our customers will be 80% to 95% ghg free. So it's not just about holding steady. We think under this plan we'll be reducing ghg emissions.

Greg Dalton: Thanks a lot Bill.

Michael Shellenberger: A couple of points about that. Well, the first is just that these are all its public relations proposals is we're going to try there's no commitment to it. The second is that the proposal actually says we're going to have this democratic process, but all the parties to our proposal must defend the proposal as written. It literally says it like a few sentences later it goes

we're all committed to defending this proposal exactly as it's written. So the public participation part, I'm sorry it's hard to see that it's very sincere when all the parties to it, have agreed that they're not going to budge from any element of what's in it.

Dian Grueneich: But Michael I really must say this that public participation means the public. It does not mean just the people who signed this agreement. So the process will be everybody, yourself, anybody else who opposes this, people who have questions to come in. And I reiterate again, it's going to work if the public shows up and says I have these objections, or I have these concerns.

Michael Shellenberger: But the point is that the people that are defending the proposal have already agreed that they won't make any changes to it.

Greg Dalton: We got that, okay. Last question.

Male Participant: Thank you. It's worth noting the nuclear power can actually load follow, while wind and solar can't. So if it's a purely economic argument requiring Diablo Canyon to stay on 100% that's the only way that they can make it economically viable, what if this could be accomplished with diversions of energy to non-grid applications; would that provide reasoning for not closing Diablo, such as production of hydrogen or electrical cars?

Michael Shellenberger: Or desalination, right? Of course, I mean if you really cared about climate, you would not be shutting down 1/5 of your clean power. If there's too much solar coming on to the grid, which was happening this year we had, the grid operators had to stop all the solar coming in from the farms when we didn't need it. You would be setting up our cells to go and get hydrogen cars, electric cars, that's not what this does; it takes away a full fifth of our zero carbon-based load.

Greg Dalton: Welcome to Climate One. We're talking about nuclear power and Diablo Canyon.

Male Participant: A lot of people are asking whether or not they're going to be able to replace all of its power with renewables. But I think that's missing the point. Even if they could do that that's not acceptable, you know, how is it acceptable to spend all that time, money and effort like 15 years or so and all this money just to replace one non-fossil source with another. In other words, just to tread water on climate change. These are not the actions of a society or a state that really cares about global warming. And apparently it's very clear that the agenda is renewables period and maximizing those.

Greg Dalton: Okay, we have to wrap it. John Geesman.

John Geesman: Let me say something as an energy planner. I've done that twice in my life. Once as an executive director of the energy commission in the 70s and later as a member of the energy commission when Arnold Schwarzenegger was governor. And it's really important from the state standpoint to recognize how hard it is to build infrastructure. And a key takeaway from confronting that toughness is find where the path of least resistance lies. Figure out what the public wants and give them some of that. Now all these community choice aggregation, organizations formed, not a single one has organized around the principle of we want more nuclear power in our supply system. Mike, why don't you organize?

Michael Shellenberger: I would love to, that's what we're doing. I mean look, you guys has spent 40 years fear mongering on completely baseless grounds. So I think it's understandable that people think nuclear power is something that it's not. This is the first time there's been a civil society movement for this technology, its early days, organization is seven months old. So, you know, come

and let's talk in 40 years and let's see how we do. I think that in the long-term the society bends towards truth and science and away from hysterical fear mongering.

Greg Dalton: We have to end it there. We've been talking about Diablo Canyon, the future of nuclear power and climate change in California with David Baker, reporter for the San Francisco Chronicle, Michael Shellenberger, the pro-nuclear advocate, Dian Grueneich an energy expert at Stanford and John Geesman an anti-nuclear activist. I'm Greg Dalton. I'd like to thank our audience in here, in the room at the Commonwealth Club, on air and online. Thank you all for joining us for this conversation.

[Applause]