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BEFORE THE  
CALIFORNIA ENERGY COMMISSION

In the Matter of: )  
)  
*Electric Program Investment* ) Docket No. 20-EPIC-01  
*Charge (EPIC 4) 2021-2025* )  
*Investment Plan* )  
\_\_\_\_\_ )

COMMISSIONER EN BANC MEETING

REMOTE VIA WebEx

FRIDAY, OCTOBER 08, 2021

1:30 P.M.

Reported by:  
Peter Petty

APPEARANCES

**CEC**

Commissioners Present:

David Hochschild, Chair  
Siva Gunda, Vice Chair  
J. Andrew McAllister

Staff Present:

Laurie ten Hope, Deputy Director, Energy Research &  
Development Division (ERDD)  
Virginia Lew  
Mike Petouhoff  
Jonah Steinbuck  
Erik Stokes  
Misa Werner, EPIC 4 Project Manager  
Harrison Reynolds

**California Public Utilities Commission (CPUC)**

Commissioners Present:

Marybel Batjer, President  
Martha Guzman Aceves  
Clifford Rechtschaffen  
Genevieve Shiroma  
Darcie Houck

Staff Present:

Fredric Beck, Senior Regulatory Analyst, Energy Division

Public Comment:

Julia Levin, Bioenergy Association of California  
Bruce Nordman  
David Meyers, Polaris Energy Services  
Amanda DeMarco  
Sara Fitzsimon Nelson, California Hydrogen Business Council  
Bill Capp  
John Kennedy, RCRC  
Anna Sciaruto, Bay Area Council

APPEARANCES CONTINUED

Public Comment:

Graham Noyes  
David Wilkinson  
Adrian Covert, Bay Area Council  
Lillie French

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P R O C E E D I N G S

1 OCTOBER 08, 2021 1:30 p.m.

2 MR. BECK: Good afternoon. I'm Fred Beck with  
3 the Energy Division of the California Public Utilities  
4 Commission and I'm the lead analyst for the Electric  
5 Program Investment Charge or EPIC program. I'd like to  
6 welcome all the Commissioners from the California Energy  
7 Commission and the California Public Utilities Commission  
8 and thank them, in advance, for their time in discussing  
9 the EPIC 4 Investment Plan. I'd also like to welcome all  
10 of the public participants and thank them for their  
11 interest and involvement in the EPIC Program.

12 This event, as was just said, is being recorded.  
13 A transcript of this meeting and all meeting and EPIC 4  
14 materials will be available on the CEC's EPIC website.

15 I'd like to give a brief review of today's  
16 agenda. We'll start with introductory remarks from Chair  
17 Hochschild and CEC and CPUC Commissioners. Then we'll hear  
18 a snapshot of EPIC's past decade. Next, we'll hear an  
19 overview of the CEC's Proposed EPIC 4 Investment Plan.  
20 Chair Hochschild will then lead a roundtable discussion  
21 among all Commissioners on EPIC 4 priorities, balancing  
22 investments among those priorities, and identifying any  
23 potential gaps in the investment portfolio. We'll conclude  
24 with a public comment period and note that written comments

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1 may be submitted to the CEC through October 15<sup>th</sup>. Now I'd  
2 like to turn it over to Chair Hochschild.

3 CHAIR HOCHSCHILD: Well thank you, Fred, and  
4 thanks to all the staff for setting this up and welcome  
5 friends, to all the stakeholders for joining us, and to my  
6 colleagues at the PUC. Actually, before we get into the  
7 event today, I wanted to take a point of privilege and  
8 pause and recognize Laurie ten Hope, who is retiring after  
9 36 years of public service, outstanding public service at  
10 the Energy Commission, the last nine of which were spent  
11 leading this incredible work in clean energy research and  
12 development, the EPIC Program. She has served in a number  
13 of other roles, including advisor to a number of  
14 Commissioners about her portfolio, and this current role  
15 includes efficiency of renewable generation, transmission,  
16 distribution, transportation, industry, agriculture, water,  
17 gas pipeline safety, fossil gas replacement strategies, and  
18 so much else. And earlier this year, she was given a  
19 prestigious Energy Commission Lifetime Achievement Award.  
20 You know, most of all, what I want to say to you, Laurie,  
21 is you embody what public service is all about. The heart  
22 that you bring every day, the way you hire, the way you  
23 mentor younger staff, the diligence, the professionalism,  
24 the grace, and the excellence that you bring to your work  
25 every day is an inspiration to me, to my colleagues, to

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1 staff, and to stakeholders. And it is not an accident that  
2 the majority of US clean [indiscernible] venture capital  
3 comes into California and that's is because of work, like I  
4 said, you've been doing and, you know, the seeds of the  
5 Clean Energy Future we're building, you know, are being  
6 planted in large part from this program. It's one of the  
7 greatest collaborations between the PUC and the Energy  
8 Commission, and I'm so proud of your work, of your legacy,  
9 and particularly the way you've paved the way for the next  
10 generation.

11           So I just wanted to pause and invite any other  
12 Commissioners wishing to make a comment to begin. And  
13 maybe we can start with the PUC Commissioner Guzman, who's  
14 lead on this, and go to President Batjer.

15           COMMISSIONER GUZMAN ACEVES: Thank you very much,  
16 Chair Hochschild. I just want to also thank Laurie for her  
17 tremendous commitment. I was able to work with Laurie,  
18 obviously in this role, for the last nearly five years and  
19 have seen that professionalism and inclusivity that you  
20 talked about. She, Laurie, you're just one huge, huge core  
21 to all of this mission that we share jointly. I also  
22 wanted to share that her organizational skills and her  
23 ability to kind of forecast those things that are coming  
24 ahead really helped us through a very difficult time when  
25 the EPIC Program shifted from the Public Goods Charge to



1 what we have today. And it was a very challenging time to  
2 really prove to everybody, the public, the Legislature, the  
3 need to have a continued program, and she led that. She  
4 led that by having readiness and relevant information. And  
5 I've just seen her through very difficult moments, really  
6 step up. And now we have such a robust and sustainable  
7 program that it's due, in very large part, to her  
8 leadership and her ability to lead a great team.

9           So thank you very much, Laurie. I know you leave  
10 the program with a lot of strength and it's in its pillars  
11 here, but I know you very much deserve a good, well-earned  
12 retirement. Thank you so much for your service.

13           DEPUTY DIRECTOR TEN HOPE: Thank you.

14           CHAIR HOCHSCHILD: President Batjer, do you want  
15 to say a few things?

16           PRESIDENT BATJER: Yes, of course I do. When  
17 there's someone that has devoted a professional life to  
18 public service, one of the most noble things that I think  
19 anyone can do, I of course have to give you my heartfelt  
20 thanks and for all of the hard work over the years, the  
21 innovative thinking that such a program like EPIC needs and  
22 must have and you have all of that and more. So I just  
23 echo what my friends, David and Martha have said, and thank  
24 you, really from the bottom of all of our hearts, for your  
25 devotion, your passion, and most importantly, your service.

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1 So thank you, Laurie.

2 DEPUTY DIRECTOR TEN HOPE: Thank you.

3 CHAIR HOCHSCHILD: Thank you. Any other  
4 Commissioners wishing to make a comment? Yeah,  
5 Commissioner Houck.

6 COMMISSIONER HOUCK: I just want to say I don't  
7 know if Laurie remembers, but you know, 20 years ago as a  
8 young attorney working at the Energy Commission, I -- it  
9 was when we first met, and you were extremely amazing and  
10 back when this was the PIER Program and just our most  
11 recent work together just really re-emphasized what a  
12 strength you are to the Commission and all of the hard work  
13 and echo all of the comments that Chair Hochschild and  
14 Commissioner Guzman have said, and as President Batjer  
15 said, it was just a real honor and pleasure to be able to  
16 work with you while I was at the Commission. And I agree,  
17 it's a well-earned retirement, but it will be a real loss  
18 too to the state, so thank you for all of your work.

19 DEPUTY DIRECTOR TEN HOPE: Thank you.

20 CHAIR HOCHSCHILD: And for the record, I  
21 contemplated civil disobedience to present -- to prevent  
22 this retirement, but my better angels prevailed. Other  
23 Commissioners wish -- yeah, Commissioner Gunda, please.

24 VICE CHAIR GUNDA: Chair Hochschild, I think  
25 Commissioner Rechtschaffen raised his hand, so I will give

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1 him the chance first and then go after him. It'll be  
2 easier. Go ahead, Commissioner.

3 COMMISSIONER RECHTSCHAFFEN: Okay. Thank you. I  
4 didn't mean to edge you out, Commissioner Gunda. I want to  
5 echo everyone's thanks and support. I've had the pleasure  
6 of working with Laurie for over 10 years when I was in the  
7 Governor's office, as well as here at the PUC. And you  
8 have created the crown jewel research and development  
9 program in the country if not the world, and you deserve a  
10 lot of credit for that. I have learned a great deal from  
11 you, and you have been extremely responsive to all  
12 questions and requests. And I so much appreciate how EPIC  
13 is always totally in sync with where we need to be as a  
14 state and not only in sync, but one or two or three steps  
15 beyond where our policies are by laying the groundwork for  
16 where we need to go. You really embody professionalism,  
17 Laurie, and it's been a pleasure to work with you and I  
18 wish you the best.

19 CHAIR HOCHSCHILD: Thank you, Commissioner.

20 DEPUTY DIRECTOR TEN HOPE: Thank you.

21 CHAIR HOCHSCHILD: Commissioner McAllister. Oh  
22 sorry, Commissioner Gunda.

23 COMMISSIONER MCALLISTER: Commissioner Gunda  
24 first.

25 CHAIR HOCHSCHILD: Yeah, sorry. Yeah. Go ahead.

1                   VICE CHAIR GUNDA: Yeah. Sorry. No, I mean, I  
2 had a chance to briefly speak with Laurie. I mean, I just  
3 want to add a couple of things. I mean, Laurie and I had a  
4 chance to work as colleagues, as kind of, you know, fellow  
5 deputy directors and you know, all of us at the deputy  
6 directors level looked to her for leadership and  
7 mentorship. And I appreciated Laurie's, you know,  
8 generosity and ability to help and make good judgment calls  
9 in a management style. I learned a lot from her on the  
10 management side. There was a word that Chair Hochschild  
11 used, legacy. And I think, you know, I have not known  
12 Laurie more than like, you know five, six years and, but  
13 now, just the volume of her work and the number of people  
14 that come in support of recognizing her work over the years  
15 and professionalism and service, you know, I'm just honored  
16 to call her a colleague and a friend, and I wish her all  
17 the very best and will miss her in the building and being  
18 able to work every day. Laurie, congratulations and thank  
19 you so much for, you know, the love and passion and  
20 everything that you brought to the table to help California  
21 move forward.

22                   CHAIR HOCHSCHILD: All right, let's let this love  
23 fest continue. Commissioner McAllister.

24 COMMISSIONER MCALLISTER: Yeah, I can't not say anything.  
25 I just have to amplify what everybody said so far, and I

1 really consider you a friend, Laurie. I remember before I,  
2 when I was out there working in the nonprofit world and  
3 doing energy projects well before I came to the Energy  
4 Commission, I just, you were sort of a mythic figure for  
5 me. You know, I'm sort of reaching back to when I -- when  
6 I was, you know, more of a newbie in California, at least  
7 in the energy field here. And just working with you over  
8 the last decade has been a total pleasure. I just, the  
9 process, I think about how we'll -- how we can improve our  
10 processes, and you just have put together a process for  
11 sort of vacuuming up the best ideas and having  
12 anticipation, that's really remarkable and it's -- it  
13 works. I think just because you set  
14 up -- you set up a, just an inclusivity that is free of ego  
15 and is kind of really focused on the good of the state and  
16 the public interests. And I just so much appreciate that  
17 and your ability to do that and still maintain a position  
18 on the avant-garde of the technology issues is really  
19 remarkable. And I think it's a big loss for the state,  
20 obviously, but I certainly don't begrudge you that. You  
21 deserve a shift -- a shift of gears and a nice retirement,  
22 so I really want to support you as well on that. So thank  
23 you very much. It's been a pleasure working with you.

24 CHAIR HOCHSCHILD: Thank you so much,  
25 Commissioners. Unless there are other --

12

1 DEPUTY DIRECTOR TEN HOPE: Well.

2 CHAIR HOCHSCHILD: Sorry someone else trying to  
3 make it a comment. If not, Laurie, would you like to  
4 respond?

5 DEPUTY DIRECTOR TEN HOPE: It was me. It's an  
6 honor. I'm just kind of blown away. I wasn't anticipating  
7 this. I have so much respect for each one of you and for  
8 you to, you know, share those thoughts means so much to me,  
9 and I hope to be able to stay in touch with each one of  
10 you. I -- it's really been an honor to be a part of this  
11 program. I, as Commissioner Guzman Aceves said, I mean I  
12 really took the helm of this program at a very challenging  
13 time, and we really didn't know what was ahead. And I  
14 think the program wouldn't be what it is without the  
15 connection to Commissioners and leadership. And that's  
16 something I just really want to talk about a little bit in  
17 this snapshot. But first, you know, just thank you very  
18 much. That was just super kind. I do want to just shout  
19 out to my staff. I might be a little bit like a conductor,  
20 but I wouldn't do anything if, you know, it didn't have  
21 people who are playing instruments and making beautiful  
22 music, and the stakeholders. So you know, the Energy  
23 Commission tries to establish a vision for what's possible,  
24 what we think we can do. But if researchers and  
25 entrepreneurs didn't come to the table with their ideas we,

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1 you know, we wouldn't have anything to shout about at this  
2 point.

3 I do want to just say to people listening, I  
4 appreciate the love fest. It's very, you know, it warms my  
5 heart. But I also, this is a time where we're kind of  
6 transitioning from a look back of nine years of the  
7 program, to a look forward, to a future of 10 more years of  
8 research investment. And it's a time to kind of see what  
9 did we build, what do we like, and what are some of the  
10 suggestions for how we might pivot. Are we focused on the  
11 right areas now? So I'm -- I will try to be quick since we  
12 have a really -- a really tight agenda and we want to get  
13 to the Commissioner dialogue and the stakeholder input.  
14 But if we could transition to the to the next slide.

15 I just want to see if we can --

16 CHAIR HOCHSCHILD: Sorry. I think Commissioner  
17 Houck was trying to say something. Go ahead.

18 DEPUTY DIRECTOR TEN HOPE: Oh, I'm sorry.

19 COMMISSIONER HOUCK: I apologize. I do just have  
20 a brief comment I wanted to just note for the record before  
21 the -- we get into the discussion that I was the previous  
22 chief general counsel for the Energy Commission and there  
23 was a brief overlap between the opening of this phase of  
24 the proceeding and my appointment to the CPUC. I don't  
25 believe that impacts my ability to participate in this en

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1 banc as a CPUC Commissioner and look forward to  
2 participating in the remainder of the proceeding. And just  
3 wanted to note that for the record and let any parties that  
4 may have a concern about that know they can reach out to my  
5 office or follow our Rules of Practice and Procedure with  
6 any concerns. And so I just wanted to note that for the  
7 record and then just thank Staff for all of their work in  
8 putting this together.

9 CHAIR HOCHSCHILD: Thank you, Commissioner. Back  
10 to you, Laurie.

11 DEPUTY DIRECTOR TEN HOPE: I might have cut you  
12 off, Chair. Were there any other opening remarks regarding  
13 the workshop [indiscernible] --

14 CHAIR HOCHSCHILD: Well, I could go on for  
15 another hour about you, but in the interest of the agenda,  
16 I thought we should just jump right in. I guess one other  
17 thing I would want to say just on behalf of all of us, a  
18 warm welcome to Jonah Steinbuck, who is your successor.  
19 Incredible resume and experience. DOE, White House,  
20 Stanford Ph.D., and just has been a terrific team member.  
21 And Jonah, we're excited to have you come on board and try  
22 and fill those big shoes Laurie left for you, and looking  
23 forward to all your work in the years to come. But with  
24 that, let's go back to your presentation, Laurie.

25 DEPUTY DIRECTOR TEN HOPE: Okay. So I just want



1 to provide a few highlights of the past nine years. I  
2 think as people are all well aware, ten years ago the PUC  
3 established the framework for the EPIC Program and  
4 intentionally rooted the program in certain principles.  
5 There were several of them, but particularly ratepayer  
6 benefit and policy relevance. The Energy Commission took  
7 that framework and took our experience with a PIER Program  
8 and other research programs, and you know we took a look to  
9 kind of think about what we wanted to build on from the  
10 PIER Program, but also some areas where we wanted to  
11 intentionally make some revisions and build some new  
12 programs.

13           So a couple of those sort of intentional  
14 revisions, first was Fostering and Accelerating  
15 Entrepreneurship in the Energy Space. And I'll talk about  
16 that a little bit more in one of the future slides. We  
17 also really tried to be intentional in articulating and  
18 requiring a realistic path to market from our recipients.  
19 And we based the work on competitive merit, and we really  
20 worked hard to increase stakeholder engagement, both at the  
21 front end of the program in the design and after the  
22 program to share research results. And that also included  
23 an increased engagement with under-resourced communities  
24 and their representative organizations. So let's just take  
25 a quick look at a snapshot of some of the numbers that kind

1 of highlight some of the EPIC results over the last nine  
2 years. Excuse me. If we could go to the next slide.

3           So this basically, you know, highlights where  
4 we've been and what our investments are. We've invested  
5 close to \$900 million in 30 -- 385 projects. This second  
6 number is a number that we've really tried to track  
7 carefully because it demonstrates the private investment  
8 that comes after EPIC funding. So we're aware of about 3.5  
9 billion in follow on private investment. That's about four  
10 times the investment goes to researchers who have  
11 participated in the EPIC program versus those that don't.  
12 So it gives some -- it gives some credibility to the  
13 researchers and their technology development. We -- were  
14 very proud of a number of projects, demonstration projects  
15 that are in under-resourced communities. That stands right  
16 now at 68% and I'll talk a little bit more about that. And  
17 then the bottom number, 730 organizations are part of the  
18 EPIC network. It's like, well why is that important?

19           Part of the way that's important is in the way  
20 we've been scoping the research is we really do want to  
21 think about the path to market. If you're working on a  
22 better building technology, are you involving builders, are  
23 you involving manufacturers? Most of our projects have  
24 multiple stakeholders engaged, and that helps facilitate  
25 that path to market. The right-hand side shows some of the

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1 benefits that we've captured through our benefit  
2 methodology, and I think, you know, what's important here  
3 is to really be intentional upfront about what you want to  
4 achieve on the back end. Not all of our projects are going  
5 to be home runs. Some of the technology doesn't pan out,  
6 but the portfolio should you know, the portfolio itself  
7 needs to be a home run. And it's critical to have a  
8 methodology that will measure this in terms of jobs, energy  
9 savings, bill savings, health benefits, etcetera. So next  
10 slide, please.

11 I wanted to share this slide, I'm not going to go  
12 through and read each one of them, but this really captures  
13 what our investments have been over the nine years in these  
14 six categories. I think what's important in sharing this  
15 slide is, is this where you want to look back five years  
16 from now, in terms of where our investments are in the EPIC  
17 4 portfolio that we'll be discussing shortly? Next slide,  
18 please.

19 So I wanted to just take a minute to talk about  
20 investing equitably in our technology demonstration. We do  
21 have legislative requirements to achieve a certain amount  
22 of projects in disadvantaged communities defined by their  
23 environmental score and also low income. But we've far  
24 exceeded our legislative requirements. I think this is a  
25 goal that the PUC and the Energy Commission strongly

1 embrace, and what we've focused on in the last few years  
2 is, you know let's just not sit on our laurels and think  
3 it's really great a lot of these projects are in these  
4 communities, but are we ensuring that we're bringing  
5 tangible benefits to the community and is there meaningful  
6 engagement of community members? We've built that into the  
7 structure of the program, but today and any time, we really  
8 want to hear what more we can do to accelerate an equitable  
9 transition for everybody in California. Next slide,  
10 please.

11           So I mentioned at the beginning that one of the  
12 additions that we intentionally built into the program was  
13 really trying to conceptualize and build an entrepreneur  
14 ecosystem. The PIER Program had really strong engagement  
15 from the universities in the lab, and that's continued in  
16 EPIC. They're kind of the mainstays of California research  
17 and we're, you know we're grateful for those contributions.  
18 We also, though, wanted to have more infrastructure that  
19 supported startups. And so these are some of the elements  
20 of the Start-Up Program. CalSEED is a grant program that  
21 really helps the clean energy startups who have a concept  
22 to really take their -- be able to develop their prototype.  
23 We funded regional innovation clusters around the state so  
24 that the clusters know more about their geography. The  
25 startups have that connection to the market within that

1 area. There's a lot of mentorship that can happen through  
2 those clusters. These programs are supported by a testbed  
3 program where entrepreneurs can go to any of 60 test labs  
4 in California and get a credible test, you know, test and  
5 validation of their technology that that helps them fine-  
6 tune their technology and helps with, you know, bringing  
7 their technology closer to market and getting investors.

8           This kind of ecosystem, I mean it's not -- it's  
9 not this program alone, but this and all of the rich  
10 resources in California have led to California being the  
11 destination for cleantech. Over 50% of the cleantech in  
12 the United States comes to California. So I just really  
13 wanted to highlight why we think this is really important  
14 to get some of these ideas coming from the bottom up. We  
15 do a lot of solicitations where we scope the performance,  
16 the expectations. We award large grants. We're, you know,  
17 it's very policy connected, all the right things you'd want  
18 to do in a research program, but we can't envision  
19 everything that could -- that someone could be imagining  
20 and give them the space to create their technologies. The  
21 next slide, please.

22           So as I mentioned, we have almost 400 projects,  
23 and you know, so this is not going to do justice to those  
24 projects at all. But I just wanted to just give a little  
25 flavor of what the portfolio of projects looks like or

1 could look like going forward. If we start in the upper  
2 left-hand corner, ChargePoint is helping accelerate EV  
3 adoption through the EPIC program. They developed a cloud-  
4 based vehicle charging algorithm that responds to grid  
5 signals. They were able to successfully demonstrate that,  
6 save customers money, lower the overall cost of ownership,  
7 and now incorporate that into their products.

8           The next one is on solar, we have a lot of solar  
9 projects, I just picked this one. It's kind of a simple,  
10 but you know, an interesting idea that's gotten market  
11 traction to use air-driven components for their tracking  
12 system versus mechanical systems. It eliminates a lot of  
13 the maintenance. It saves money. They've reduced their  
14 cost of energy by about 20%. It's now commercially  
15 available, and they've been successful in raising investor  
16 funds and have about 26 projects that are in active  
17 development. And they started with us as really a lab  
18 concept.

19           Microgrids. Everybody is familiar with  
20 microgrids. We have funded microgrids for the last decade,  
21 kind of starting from, not a proof of concept, but  
22 demonstrating that microgrids work, that they could  
23 successfully isolate from the grid and seamlessly integrate  
24 back in, you know, be a good citizen of the grid. So we've  
25 encouraged the technology development and demonstration,

21

1 more recently focusing on moving microgrids to incorporate  
2 100% or pushing towards 100% renewables, moving away from,  
3 you know, from their fossil generation source and still  
4 meet the reliability needs that are usually driving  
5 customers to microgrids. This is the Miramar Air Station.  
6 They can supply all of their critical facilities. And last  
7 summer during the heat storm, we called on -- we called on  
8 them to drop load and they were able to drop three  
9 megawatts of load each time they were asked and provided a  
10 small contribution to riding through the heat storm.

11 Another area that's not really so technology-  
12 oriented is some of the tools that can help us with  
13 wildfire resilience, and we have funded spatial informatics  
14 to really bring fire behavior knowledge to, you know, to  
15 the next generation. You know, we're all aware that fire  
16 behavior is changing in California. It presents a huge  
17 risk to people, the environment, and our energy  
18 infrastructure. And they've built a tool that brings in  
19 the latest in tree mortality, extreme weather, and fire  
20 behavior to help identify areas at greater risk of future  
21 fires and help inform some of our grid resilience efforts.

22 In the lower-left, I wanted to profile this  
23 company called Porifera, and I think this is kind of a cool  
24 technology because it's hard in the industrial sector to  
25 find technologies that apply across multiple facilities.

1 There -- the processes are often so customized, but a lot  
2 of, especially food processing, concentrates liquid, and  
3 that concentration of liquid often -- usually is through  
4 evaporation, takes a lot of -- takes a lot of heat. They  
5 instead have come up with a different technology of special  
6 membranes and forward osmosis to pull that liquid out and  
7 also be able to recycle that liquid. So it's -- they're  
8 also commercialized and broadening the applications in  
9 their technology.

10 Batteries and storage. Just a couple of  
11 highlights. We know we need storage. We need about 18,  
12 you know 18, sorry, an eightfold increase in storage in  
13 California. And so we're really looking from component  
14 innovation that QBerg is doing, increasing the density of  
15 components within batteries, to companies like Eos that are  
16 demonstrating large-scale non-lithium storage in grid  
17 applications. And finally, I'm getting my time checks, and  
18 I'll -- I'm one minute away from closing here.

19 Finally, I just want to call out some of the  
20 efforts around residential electrification. This is an  
21 example of a technology, a heat pump by gradient,  
22 previously known as Tro, if some of you were familiar with  
23 them. So they really have a unique heat exchanger and  
24 compressor. But what's really exciting about this is not  
25 just the energy savings, but how modular this is. This is

23



1 something that a homeowner can put in themselves or a  
2 renter. You can take it with you. It really helps achieve  
3 some energy efficiency at the rental applications, which is  
4 such a hard sector to impact. So this is, you know this  
5 side was really just a dip into the project of portfolios  
6 just to stimulate some thinking about what some of the  
7 innovation that's been realized through the program. But a  
8 good program's not static, so what we're going to hear from  
9 next is where the Energy Commission, after lots of  
10 consultation of workshops all summer long, has put forward  
11 a suggested portfolio of research projects. And the  
12 purpose of the rest of the workshop is to hear those and  
13 then get your reactions on whether we're missing something  
14 and where the emphasis should be placed.

15           So next up, I'd like to introduce Jonah  
16 Steinbuck, and he will walk us through the CEC's proposed  
17 initiative. Jonah.

18           MR. STEINBUCK: Thank you, Laurie. Good  
19 afternoon, everyone. I'm Jonah Steinbuck, currently the  
20 manager for the Energy Generation and Research Office. And  
21 as the Chair mentioned, will soon be transitioning to the  
22 R&D Deputy Director role. And I'd just like to add my  
23 thanks to Laurie for her long and hugely impactful public  
24 service at the CEC and at a personal level for her  
25 wonderful mentorship and guidance during my time at the

24

1 CEC. It's been a huge honor to work with Laurie, and it's  
2 an honor to also continue this important work with all of  
3 the R&D Division, RCC, and CPUC leadership, CPUC, and other  
4 state agency colleagues and stakeholder partners, as we  
5 Laurie mentioned as well.

6 I'll be kicking off our overview of the Proposed  
7 EPIC 4 Investment Year. It includes six overarching  
8 strategic initiatives spanning R&D for renewables for grid  
9 reliability, distributed energy resources, efficiency and  
10 electrification, support for entrepreneurs, and equity and  
11 environment. And will be overviewing each of these, but to  
12 conserve time will just highlight a small subset of the  
13 specific R&D topics under each one of these strategic  
14 initiatives, but you will see the full list as we go  
15 through the various initiatives. Next slide, please.

16 So this is, I'm sorry, this is the slide that I  
17 was just speaking to. So apologies that I didn't suggest  
18 moving forward. So please to the next slide. Okay, thank  
19 you.

20 So this first strategic initiative focuses on  
21 renewable generation technologies. That will be important  
22 to achieving a 100% renewable and zero-carbon electricity  
23 system by 2045. So the SB 100 Joint Agency Analysis showed  
24 that grid capacity will potentially triple by 2045. So the  
25 buildout's very substantial, and we'll need a portfolio of

25

1 technologies to meet that capacity and ensure reliability.  
2 So Proposed EPIC 4 research would invest in technologies to  
3 help meet that buildout, driving cost reductions and  
4 supporting improvements in technology performance and  
5 durability. And I'll just briefly touch on these first two  
6 topics on offshore wind and pairing geothermal with lithium  
7 production. So next slide, please.

8           The purpose of this first research topic is to  
9 advance offshore wind as a key resource for SB 100  
10 buildout. Earlier this year, California, and our federal  
11 partners, announced an agreement that opens the West Coast  
12 to offshore wind development for the first time. And our  
13 Proposed EPIC 4 R&D would support the implementation of  
14 this agreement and would focus on floating technologies,  
15 given the water depths off our coast. We're proposing a  
16 number of different R&D focus areas here, optimizing  
17 component designs for cost, efficiency, durability. So  
18 things like longer and more efficient blades, tall towers  
19 for accessing higher wind speeds, support structures to  
20 handle the water depths and waves, developing processes for  
21 installation, operations and maintenance of the floating  
22 offshore wind components, grid integration, innovations,  
23 and port infrastructure readiness strategies and  
24 environmental impact assessment and minimization. And the  
25 goals here are really to lower the levelized cost, reduce

26

1 the technical and financial risk, inform environmental  
2 planning, and support reliability by complementing solar  
3 and diversifying the supply mixed with offshore wind. Next  
4 slide, please.

5           Here's another example. This is the topic  
6 focused on advancing geothermal energy and the opportunity  
7 for lithium recovery from geothermal brine near the Salton  
8 Sea. So advancements in geothermal could support its role  
9 as a firm resource to complement other intermittent  
10 renewables. And for lithium, there's a very significant  
11 opportunity to develop a relatively environmentally benign,  
12 and in-state source, of lithium that can support battery  
13 manufacturing for transportation electrification and grid  
14 storage. And R&D opportunities here that we're proposing  
15 include improving the drilling technologies, well  
16 targeting, advancing the ability for geothermal plants to  
17 operate more flexibly, addressing corrosion and scaling,  
18 etcetera. And these innovations would help lower the cost  
19 and risk for geothermal deployments and improve operational  
20 performance.

21           Second, on lithium, trying to advance more cost-  
22 competitive recovery methods for lithium from geothermal  
23 brine. So investments here would include developing  
24 sorbents for collecting the lithium from the brine,  
25 improving methods for brine pretreatment in the recovery

1 process, and capturing other valuable brine constituents  
2 like zinc and manganese. So the overarching goal on  
3 lithium is to drive down the cost and really enable scaled-  
4 up production. Next slide.

5 And I'm going to pass it to Mike Petouhoff.

6 MR. PETOUHOFF: Thank you, Jonah. This next  
7 initiative, which is to create a more nimble grid to  
8 maintain reliability as California transitions to 100%  
9 clean energy, is really a response to the initiatives that  
10 Jonah's suggested. Assuming that they're successful, we'll  
11 have a 3x gross -- growth, and generation will have a great  
12 increase in intermittent wind and solar, and we'll  
13 electrify transportation and buildings. Given that, we'll  
14 need to have a grid that can respond in firm in shape that  
15 intermittent energy that comes from the forces of nature.  
16 Given that, we're going to need to deal with the when, the  
17 where, and the how much of the power flow.

18 The wind is really going to be coming from  
19 storage, short duration, long duration, and zero-carbon  
20 dispatchable. The where may be directed by power flow  
21 control or changes in the impedance. So if one line is  
22 congested, we can -- we can move the power to a less  
23 congested line. And also, the how much may be impacted by  
24 smart conductor technology but will help us to create more  
25 capacity on the same lines and optimizing really all of

1 these together. We'll also need to be looking at power  
2 quality as the grid goes to a more inverter-centric type of  
3 operation and maintaining cybersecurity as we have more  
4 modulation and more points of access. Next slide, please.

5 So to cover this, it's really nine initiatives  
6 that address this. And we're going to focus on short- and  
7 long-duration energy storage, as well as power quality and  
8 cybersecurity. Next slide, please.

9 So for the -- for the short duration storage,  
10 we're going to be dealing with both improving lithium-ion  
11 as well as developing alternate battery technology, such as  
12 cobalt and zinc. For long-duration energy storage, we're  
13 going to be looking at flow batteries, flywheels,  
14 compressed air, liquid air, molten sulfur, molten salt, and  
15 even green methane and green hydrogen that may be used for  
16 storage. These are examples of all the different types of  
17 technologies we may look at. We're also going to be  
18 looking at energy storage use cases. So looking at how  
19 energy storage can be deployed more effectively to support  
20 grid reliability.

21 In this, our overall goals are to meet the  
22 projections for the 8x storage increase with the least cost  
23 and optimal performance. For short-duration storage,  
24 that's going to include improving the depth of discharge,  
25 degradation over time, and the safety issues involved with

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1 thermal runaway as well as supply-chain diversity. What we  
2 mean by that is, we're going to invest in lithium-ion,  
3 we're also going to invest in alternatives. While some  
4 initiatives, as Jonah described, will be dealing with  
5 lithium recovery, and other initiatives you'll hear about  
6 later talk about lithium recycling. We're also going to  
7 look at supply chain diversity. So lithium will be, we  
8 expect, will be a player, a major player for many years.  
9 We're looking at diversifying the supply chain at the same  
10 time. For long-duration storage, we're looking at  
11 minimizing cost and environmental impact over pumped hydro.  
12 Next slide, please.

13           One issue we really want to look carefully at as  
14 we move to a more inverter-centric grid is that of power  
15 quality. As most people know, power comes to the -- is  
16 produced by batteries in solar systems as DC and comes to  
17 the grid through an inverter. So we have a new set of  
18 issues that come up. One is rotational inertia, which is  
19 really what keeps the grid in sync now as our gas fleet has  
20 rotating generators. They all generate on the same sine  
21 wave because they naturally keep each other in sync. As we  
22 lose that rotational inertia, but we're used to having grid  
23 following inverters, we'll need to have new kinds of  
24 technologies that can actually be grid forming inverters.  
25 Power factor is also an important factor to maintain the

1 energy efficiency of the grid and that will be dealt with  
2 or managed differently when we have an inverter-dominated  
3 grid.

4           Harmonics or perturbations in the sine wave also  
5 affect power quality and these all need to be dealt with.  
6 But what we want to do is have demonstrations by things  
7 such as grid forming inverters, harmonics filters, and new  
8 power factor correction technologies to keep power quality  
9 high in this inverter-centric grid. We may also provide  
10 recommendations on new standards and regulations, and we  
11 may find that we actually need to keep some percentage of  
12 our rotating -- of our rotating generation fleet repowered  
13 in different forms to maintain rotational inertia. So  
14 we'll be investigating each of those issues and doing  
15 demonstrations. Last slide, please.

16           The next issue is furthering cybersecurity with  
17 much higher levels of modulation and more access points.  
18 So we'll be -- need to be nimble to avoid these cyber  
19 opportunities and be able to adopt cybersecurity protocols  
20 for CEC projects, while at the same time we try to develop  
21 new protocols learning from past experiences and working  
22 with the IOU's and others. We also want to have a  
23 cybersecurity testing and performance verification  
24 consultant.

25           Overall, we're going to be moving to a grid with



1 not just -- but not just one-way power flow, but power flow  
2 in two directions and data flow in two directions and all  
3 these issues will be taken into account. And I'll turn it  
4 back over to Jonah for the next initiative.

5 MR. STEINBUCK: Yeah, thanks, Mike. If you could  
6 just progress to the next slide. Thank you.

7 So this strategic initiative covers a wide range  
8 of technology innovations related to distributed energy  
9 resources and seeks to maximize the benefits that they can  
10 deliver for both customers and the grid. So DER benefits  
11 come in many forms; load flexibility, peak demand  
12 reductions, reducing and deferring grid upgrades,  
13 supporting climate resilience and reliability and the  
14 proposed R&D will help enhance the cost and performance  
15 attributes, the DERs and support their integration with the  
16 grid and maximize their value. So you can see some of the  
17 areas here. There are improving forecasts, behind-the-  
18 meter solar storage, load flexibility, developing renewable  
19 backup power systems, capturing opportunities from load  
20 flexibility, etcetera. And we'll just touch a little bit  
21 more on the highlighted ones. Next slide, please.

22 So this topic focuses on enabling and  
23 demonstrating the benefits of using EVs as distributed  
24 energy resources. So we expect in the range of 8 million  
25 EVs in California by 2030, and those can be important

1 assets for providing power to the grid or to a site. So  
2 technology advancements proposed here include developing  
3 grid-interactive inverters and bidirectional charging  
4 equipment that can support power flow from EVs to the grid  
5 or a site when the vehicles aren't in use, or where  
6 the -- when the charging need is more flexible. Another  
7 advancement opportunity is in developing software for  
8 integrating EV charging with site or building management  
9 systems. And additionally demonstrating high accuracy,  
10 low-cost submeters for EV chargers. So this could  
11 facilitate tailored rates for EVs as appropriate and help  
12 avoid costly separate service requirements.

13           So the overall goals here; lowering the cost of  
14 the site, enabling operator benefits, delivering ratepayer  
15 savings from more efficient use of the existing electricity  
16 infrastructure. Next slide, please.

17           One more example from this group focuses on  
18 demonstrating and scaling up lithium-ion battery reuse and  
19 recycling technologies. So there's a wave of batteries  
20 coming that need end-of-life solutions. We expect, again,  
21 8 million EVs on the road by 2030, plus tons of gigawatts  
22 of stationary storage for SB 100 implementation. So the  
23 proposed research here would support end-of-life solutions,  
24 investing in improving battery design for re-use and  
25 recycling, testing new batteries that utilized

1 recycle -- that utilize recycled materials, and developing  
2 methods for battery collection, storage, and  
3 testing -- sorting and testing, I'm sorry. But the goals  
4 here are to spur investment at battery end-of-life, lower  
5 the cost of new battery storage products by utilizing  
6 recycled content, and reducing lifecycle environmental  
7 impacts. And I'll pass to my colleague Virginia for one  
8 more example in this -- in this initiative.

9 MS. LEW: Hi. Thank you, Jonah. So this -- can  
10 we go to the next slide, please. So this topic is going to  
11 focus on creating the Industrial Load Flexibility Hub. So  
12 the industrial AG and water sector, also known as IAW, has  
13 the potential for two and a half gigawatts of annual load  
14 flexibility. But studies show that up to \$600 million  
15 could be saved annually by shifting load in this sector to  
16 avoid curtailment of renewable generation. But the value  
17 proposition for load flexibility in this sector is not well  
18 defined, and there are few viable control strategies and  
19 technology solutions currently available to owners and  
20 operators. So this topic was -- will establish the  
21 California IAW Load Flexible Research and Development Hub,  
22 primarily to conduct research to increase the use and  
23 market adoption of advanced, interoperable, and flexible  
24 demand management technologies and strategies as electric  
25 grid resources, will also facilitate the integration of

1 distributed energy resources, and develop advanced load  
2 flexible technologies, tools, and models to increase  
3 efficiency and grid resiliency. Let's go to the next  
4 section here.

5           So this next section is going to focus on  
6 advancements to improve the value proposition of energy  
7 efficiency and electrification technologies in both the  
8 industrial and building sector. California's industrial  
9 sector accounts for about 20% of the state's greenhouse gas  
10 emissions, and a large portion of that is due to the  
11 high -- the need for high-temperature process heating. So  
12 the research topics in this section focus on decarbonizing  
13 industrial high-temperature process heating and separation  
14 processes. We also have a topic that focuses on the cement  
15 industry, which produces over 8 million metric tons of CO2  
16 annually. On the building sector, it accounts for about  
17 25% of the state's greenhouse gas emissions, and to meet  
18 the state's decarbonization goals, replacement of fossil  
19 fuel appliances with high-efficiency electric systems will  
20 be needed. And so research topics in this area focus on  
21 reducing barriers to decarbonization, such as advancing  
22 building end-use electrification, increasing energy  
23 efficiency of existing buildings and end-uses, and enabling  
24 electric load flexibility. Let's go to the next slide,  
25 please.

1           This slide highlights one of our industrial  
2 research topics, which focuses on low-carbon high-  
3 temperature industrial heating. This topic has three  
4 strategies. One is to develop and test and demonstrate  
5 standalone or hybrid electrification technologies. Because  
6 electricity is four times more expensive than natural gas,  
7 improvements to the economic aspects of electrification  
8 will be a focus of this research. The next area is to  
9 develop and demonstrate zero-carbon heat sources, such as  
10 waste heat recovery and  
11 high-temperature heat pumps that can upgrade  
12 low-temperature waste heat to the required temperatures. A  
13 third area is fuel switching to zero carbon fuels, such as  
14 green hydrogen. For some industrial applications that  
15 require very high temperatures, direct electrification may  
16 not be economically viable. Research here could focus on  
17 addressing some of the challenges, such as economics,  
18 safety, structural integrity of equipment to enable use of  
19 zero-carbon fuels. Let's go to the next slide.

20           So this slide deals on the building side with  
21 high-efficiency, low global warming potential heat pumps.  
22 So heat pumps will continue to use high global warming  
23 potential refrigerants, and these refrigerants are more  
24 potent greenhouse gases and can be hundreds to thousands of  
25 times more damaging than carbon dioxide. Recent analysis

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1 indicates that use of these high global warming potential  
2 refrigerants can reduce the amount of greenhouse gas  
3 benefits from heat pumps by up to a third if the  
4 refrigerants are not managed correctly. This research  
5 topic focuses on design, testing and demonstrating  
6 high-efficiency 120-volt and 240-volt heat pump water  
7 heaters and HVAC heat pumps that use low global warming  
8 potential refrigerants, and also to focus on reducing  
9 refrigerant leakage during the equipment's life and also at  
10 the end-of-life. These units must be comparable or better  
11 than existing electric heat pumps with respect to  
12 efficiency, life, maintenance, and capital costs. The 120-  
13 volt heat pump water heaters and HVAC heat pumps are aimed  
14 to avoid electric panel upgrade costs and so the  
15 residential portion in this project is targeted for  
16 installations in under-resourced communities. So that  
17 concludes my section. So let's go to the next slide, and  
18 I'd like to introduce Erik Stokes.

19 MR. STOKES: Thanks, Virginia. So I'll be  
20 talking about our funding topics under the strategic  
21 initiative that aims to continue to support successful  
22 clean energy entrepreneurship across California. The  
23 infographic here shows our ecosystem programs that we've  
24 developed over the prior three investment plans. And as  
25 Laurie mentioned in her opening slides, these set of

1 programs to support over 200 companies that have gone over  
2 to raise over \$1.9 billion in private sector investment.  
3 And these programs really kind of set -- lay the foundation  
4 for a lot of our initiatives around EPIC 4. Next slide,  
5 please.

6           So we have really kind of three main objectives  
7 under this Initiative EPIC 4. One of those is we want to  
8 continue to support startup companies through the early  
9 stages of the innovation pipeline so that we're constantly  
10 refilling the pipeline with exciting new ideas and  
11 technologies. And so a lot of our funding topics that are  
12 in this initiative will continue to support the programs I  
13 mentioned in the prior slide. Second, we want to broaden  
14 and expand the number of entrepreneurs that are coming into  
15 the innovation pipeline. And so we have one initiative,  
16 which I'll talk about in the next slide, really aimed at  
17 this objective. And third, we want to support these  
18 startup companies in the later stages of the pipeline as  
19 they push towards full commercialization. And so we have  
20 one initiative really trying to help them secure the type  
21 of investment they need to scale their technologies and  
22 businesses. We also have another initiative that's really  
23 aimed at overcoming industry acceptance barriers for new  
24 technologies, particularly around battery technologies.  
25 California has really developed quite the ecosystem of

1 battery technology startup companies, but they still face a  
2 number of barriers in really trying to get industry  
3 acceptance from OEMs. Next slide, please. I think we  
4 skipped a slide. Thank you.

5           So as I mentioned in our previous slide, you  
6 know, one of our objectives is to broaden and expand clean  
7 energy entrepreneurship in the state. The challenge is  
8 there were a lot of entry barriers into clean energy  
9 entrepreneurship, especially when we're talking about kind  
10 of the hard tech -- hard technologies. One of the pathways  
11 into entrepreneurship is to license intellectual property  
12 from a research institution such as a national laboratory  
13 or a University of California system. The problem is we  
14 have almost an oversupply of intellectual property. We  
15 mentioned this in the report, but [indiscernible] alone has  
16 over seven hundred technologies that are on their way to  
17 being commercialized, and they're just sitting in the lab.  
18 On the flip side is we think we have really just an  
19 untapped entrepreneurial talent pool that, if we can kind  
20 of bring into this space, could really help commercialize a  
21 lot of this IP that we've -- that are just ready to help  
22 support California's Clean Energy Policy goals. So under  
23 this topic, we would establish a new kind of incubator-type  
24 program. In this New Incubator program would aim to  
25 recruit entrepreneurial talent, particularly from diverse



1 and under-resourced backgrounds, and really match them with  
2 the intellectual property that's being developed at these  
3 research institutions. You know, a big focus of this  
4 effort will be helping these potential entrepreneurs with  
5 the kind of technical and commercial due diligence around  
6 the various IP that they'll be exposed to through this  
7 incubator program and really assisting them in negotiating  
8 a licensing agreement, as well as guiding them through the  
9 initial stages of setting up their clean energy venture.

10 Next slide, please.

11 The other funding topic we wanted to highlight is really  
12 aimed at helping startup companies secure the investment  
13 they need to scale their businesses and technologies. You  
14 know, as we've pulled these companies through the earlier  
15 stages of the pipeline, we're seeing funding gaps in the  
16 later stages. And this is the stage where these companies  
17 transition, you know, their investment needs from kind of  
18 in an order of, you know, tens of millions to hundreds of  
19 millions of dollars. And the problem is there's a gap  
20 right now in these later-stage investments that can provide  
21 this stage of capital. The other challenge is because this  
22 later-stage investment isn't there, it's really deterred a  
23 lot more early-stage investors, such as GCs, from entering  
24 kind of this clean energy innovation space.

25 One group that could really fill this gap is

1 institutional investors, such as pension funds and  
2 insurance companies -- but for the most part, they've  
3 remained untapped, and there's a number of reasons for  
4 this. Most of those reasons are structural. The other  
5 reason is a lot of times these early-stage technology  
6 companies just don't quite yet meet the risk-return  
7 objectives of institutional investors. So under this  
8 funding topic, we would establish this first of a kind,  
9 Clean Energy Innovation Financing Center. And the cluster  
10 would be responsible for, among other things, conducting  
11 the necessary due diligence on EPIC's support of  
12 technologies and companies and really presenting a  
13 portfolio of investments, bankable clean energy deals, to  
14 both early and later-stage investors. And from that  
15 portfolio, this new cluster would [indiscernible] wind up  
16 the various investments from the various sources so that we  
17 have a smoother financing runway for a lot of these  
18 companies as they begin to scale. One of the other  
19 responsibilities of this new cluster would be to kind of  
20 secure and aggregate financing from early-stage investors  
21 that can be used along with CEC funds to be deployed as  
22 what we call catalytic capital, such as first lost capital,  
23 to really kind of crowd into the later-stage investment and  
24 make, you know, some of these investments are a little too  
25 risky for institutional investors, less risky and basically

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1 will wind up with their investment objectives. And with  
2 that, I'll turn it over to Jonah to cover the last  
3 strategic initiative.

4 MR. STEINBUCK: Thanks, Erik. And I know we're  
5 short on time. I want to leave time for a discussion and  
6 public comments, so maybe I'll just do kind of a higher-  
7 level overview of this initiative and then if it's helpful  
8 to go into more detail, I can do that.

9 So this strategic initiative contains R&D  
10 concepts supporting public health and equity, climate  
11 resilience, and environmental sustainability as we move  
12 towards our decarbonization goals. So just to give a  
13 couple of quick examples, you know, we know that climate-  
14 related stressors such as extreme heat, disproportionately  
15 impact under-resourced communities. Another example, kind  
16 of in this space, is that climate change significantly  
17 impacts the ability to -- it impacts our supply and demand  
18 and distribution of electricity. And so there's a whole  
19 range of issues here, but EPIC 4 research, under this  
20 initiative, would support a more detailed understanding of  
21 these types of issues and inform technological solutions.

22 And if you want to just flip to the next slide  
23 quickly, just to very briefly here, you know, looking at  
24 air quality and health issues associated with particular  
25 strategies for meeting our goals, and specific

1 demonstrations like electrification of a community,  
2 developing the tools and metrics for incorporating health  
3 and equity into our energy policies. If you can go to the  
4 next slide, please.

5 This one's focused on integrating climate  
6 resilience into electricity system planning. So evaluating  
7 how it impacts, like drought and wildfire, and other  
8 environmental impacts from climate change affect our  
9 electricity system, quantifying the benefits of deploying  
10 technologies to ensure grid reliability and community  
11 resilience to address those. And sorry to move quickly  
12 there, but I just wanted to leave as much time for  
13 discussion here, so I'll pass it back to the Chair for the  
14 discussion.

15 CHAIR HOCHSCHILD: Thank you. Thank you so much,  
16 Jonah, and to all the team for that really comprehensive  
17 presentation. So let's turn now to the Commissioner  
18 discussion, and let's start with our colleagues at the PUC.  
19 Any feedback, just in terms of from what you've heard,  
20 where do you feel like the greatest emphasis should be  
21 placed? Let's maybe start with that. I welcome comments.  
22 I don't know if, Commissioner Guzman Aceves, if you'd like  
23 to start.

24 COMMISSIONER GUZMAN ACEVES: Thank you, Chair  
25 Hochschild, and thank you, everyone, for the presentation.

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1 I think one of the more -- something that I just want to  
2 acknowledge, there's been an evolution in EPIC Program is  
3 being more intentional about -- connecting some of the  
4 innovators and researchers with communities and community  
5 needs. And I think I see that reflected in some of the  
6 priorities here, most notably in some of the  
7 electrification research and the need to have, you know,  
8 lower voltage appliances to be able to make those  
9 transitions possible. And so I just wanted to maybe hear a  
10 little bit about what the next iteration of those efforts  
11 is to really build in this component of matching where  
12 communities and where households in communities are,  
13 particularly the most disadvantaged that need more, maybe  
14 more specific types of both appliances, but also  
15 infrastructure. I know with the San Joaquin Valley pilot,  
16 the issue of distribution lines needing new drops has been  
17 a real issue. So it's something that may be another  
18 research gap. So just, but the question's really around  
19 where some of the strategies that your team is thinking  
20 about in terms of making further connections to identifying  
21 those needs.

22 CHAIR HOCHSCHILD: That's a great question.  
23 Would -- who would like to respond to that just before we  
24 move on? I don't know, Laurie or Jonah.

25 MR. STEINBUCK: I can -- I can respond quickly.

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1 COMMISSIONER GUZMAN ACEVES: Thank you.

2 DEPUTY DIRECTOR TEN HOPE: Go ahead, Jonah.

3 MR. STEINBUCK: Yeah, one of the initiatives  
4 that -- yeah, one of the initiatives that I just kind of  
5 skimmed over quickly is really trying to develop, you know,  
6 these tools and metrics and the data support to understand  
7 some of these health and equity issues. And so I think  
8 getting a better handle on that. Where are there needs for  
9 greater clean energy access or greater involvement in clean  
10 energy technology workforce? Or where is the air pollution  
11 burden greatest? I think some of our research can help  
12 inform that and help target investments. And you know, I  
13 think Laurie highlighted just the amount of investment that  
14 we're making in disadvantage in low-income communities.  
15 Around 70% of our demonstration funds go towards  
16 disadvantaged and low-income communities. And I think just  
17 continuing to have that focus, making sure that our clean  
18 energy strategies are inclusive is another priority going  
19 forward. And I'll [indiscernible] --

20 CHAIR HOCHSCHILD: Laurie, did you want to -- did  
21 you want to add to that at all, Laurie?

22 DEPUTY DIRECTOR TEN HOPE: I had one addition,  
23 and then I thought Virginia might want to jump in. So just  
24 on the strategic level, on the efficiency opportunities  
25 specifically. We're really building up our platforms and

1 getting out and talking to communities and researchers  
2 about how to use the place's platform, where communities  
3 can indicate what they -- what their strongest needs are in  
4 the community. Are they most concerned about resilience  
5 and are looking at storage for critical facilities, or  
6 electrification, or efficiency for rental, or whatever the,  
7 you know whatever the issues are, so that we can have a  
8 much more effective linkage between research projects and  
9 then finding the community members that really want to be a  
10 demonstration project for those. But I think your question  
11 might have been specific around electrification for  
12 households and for that, I'd -- would actually turn to  
13 Virginia.

14 COMMISSIONER GUZMAN ACEVES: Yeah. No. I think,  
15 actually Laurie, your answer was what I was looking for.  
16 It's more, not so -- I was getting --

17 DEPUTY DIRECTORY TEN HOPE: Okay.

18 COMMISSIONER GUZMAN ACEVES: -- really, but more  
19 about how you're building that those connections that have  
20 been a real problem in the past, and I know you guys have  
21 proposed different strategies to get at that, including  
22 kind of this centralized database idea at one point. I'm  
23 not sure where that's at.

24 CHAIR HOCHSCHILD: Virginia, did you --

25 DEPUTY DIRECTOR TEN HOPE: Yeah, I'd also -- can

1 I just add one thing quickly?

2 CHAIR HOCHSCHILD: Oh, yeah.

3 DEPUTY DIRECTOR TEN HOPE: We -- for both the  
4 interim plan and this plan, we've had meetings with the  
5 DACAG Working Group, the EPIC Working Group, and we're on  
6 the agenda for next Friday. So we have, you know, we've  
7 been able to go through presentations like this and target  
8 the initiatives that we think would have the highest  
9 interest and benefits and then get feedback of, yeah, we're  
10 on the right track or some of the projects that, you know,  
11 are not a top priority or are a concern. So we're using  
12 those, you know, that as well. So that's been -- that's  
13 been really helpful to have that engagement.

14 CHAIR HOCHSCHILD: Virginia, did you have  
15 anything?

16 MS. LEW: Commissioner, so I just might want to  
17 add --

18 CHAIR HOCHSCHILD: Yeah, please, go ahead.

19 MS. LEW: Yes, I just want to add quickly that on  
20 many of these topics that we have, there is a  
21 under-resourced community element. And what we've been  
22 requiring on any of our solicitations is that they identify  
23 community-based organizations as part of their team members  
24 so that we incorporate, you know, feedback from the  
25 community where these technologies are going to possibly be

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1 installed. And in some cases, if our target is  
2 specifically under-resourced communities, we bring those  
3 organizations early into the conversation so we identify  
4 community needs, areas you know that they are concerned  
5 about so that we can address them upfront before we, you  
6 know, start developing our solicitations.

7 CHAIR HOCHSCHILD: Yeah. Great. Thank you. I  
8 can't see all the Commissions, but I'm just going to, sort  
9 of Socratic method, just call Commissioner Shiroma, did you  
10 have any priorities you wanted to highlight?

11 COMMISSIONER SHIROMA: Thank you. Yes. Well,  
12 first of all --

13 CHAIR HOCHSCHILD: Commissioner, you just  
14 accidentally muted yourself.

15 COMMISSIONER SHIROMA: I certainly did.

16 CHAIR HOCHSCHILD: Yeah.

17 COMMISSIONER SHIROMA: Tremendous work. Really  
18 impressive and a really comprehensive list of activities.  
19 I think in the vein of Commissioner Guzman Aceves'  
20 comments, in terms of the going forward governance of this  
21 effort, that there is a -- that there is a, you know,  
22 upfront link to the CPUC's Environmental Social Justice  
23 Plan. And the goals of that plan, so that it becomes part  
24 of the DNA of the effort, that everything, all of these  
25 essential and tremendous projects are viewed through the

1 lens of those goals of the ESJ. And then beyond that, you  
2 know, is there anything that you've left out? Whew. I  
3 don't think so. But to drill down for a moment is that,  
4 you know, these heat storms that have become more  
5 prevalent, more normal and what is the physical impact on,  
6 you know, our infrastructure? Last year there  
7 were -- there were power plants that in the -- in the sheer  
8 intensity of the heat, couldn't operate. And that's very,  
9 you know, a very disturbing thing. So you know, I don't  
10 know if it's in addition to or maybe it's embedded in some  
11 of these projects, but that came to my mind. And I'll stop  
12 there. So of the two [indiscernible] ESJ, heat storm  
13 impact on our valuable infrastructure, small and large.

14 CHAIR HOCHSCHILD: Thank you, Commissioner.  
15 Commissioner Rechtschaffen, any feedback on priorities  
16 here?

17 COMMISSIONER RECHTSCHAFFEN: Yeah. I know you  
18 were always jealous of us attorneys and you wanted to  
19 engage in the Socratic method. That's why you're -- that's  
20 why you're torturing us like this.

21 CHAIR HOCHSCHILD: I could never get into law  
22 school. This is as close as I get.

23 COMMISSIONER RECHTSCHAFFEN: I have a question  
24 and then I have two or three quick comments. One is, to  
25 what extent do we factor in investments by other entities

1 in what our priorities are? And I'm just thinking now with  
2 a very robust federal budget, Department of Energy, some of  
3 the things that we're focusing on, like offshore wind,  
4 which is very important, may be funded by our sister  
5 agencies. So I know in the past we've had -- used money  
6 from matching grants with federal agencies. I just want to  
7 ask that. That's one question, and then -- well let me ask  
8 that and then I have a -- I just want to -- I'll give you  
9 quick comments and quick feedback.

10 CHAIR HOCHSCHILD: Okay, who would like to  
11 respond to the Commissioner's question?

12 DEPUTY DIRECTOR TEN HOPE: Well, I think that's  
13 something that we always try to track. I mean, when we put  
14 the Investment Plan together in the first place, it's to  
15 try to be cognizant of where we have value-added, but we  
16 update that as we go along. So when we, you know, when  
17 we're scoping a solicitation, we take another deeper dive  
18 in terms of, you know, where are the investments? And then  
19 are we trying to, you know, not duplicate this effort, or  
20 is some of that effort only going to go to a demonstration  
21 project with some leverage funds in California? So you  
22 know, it's an ongoing -- it's an ongoing challenge and just  
23 something that we try to build into the DNA of how we run  
24 the program.

25 CHAIR HOCHSCHILD: Okay. And you had another

1 point, Commissioner.

2 COMMISSIONER RECHTSCHAFFEN: Yes, I -- yes,  
3 I -- these are -- this is my, the feedback I wanted to  
4 provide. And it's generally all positive, but I just have  
5 a couple of specifics. I'm very -- I'm very focused and  
6 I'm happy that you're looking at EV integration and vehicle  
7 grid integration, and I know there are some specific  
8 projects called out. They're part of prioritization that  
9 includes a lot of other priorities. So I don't know how  
10 much is going into which bucket, but I want to make the  
11 point that I, to me, the EV integration and especially  
12 bidirectional vehicle grid integration are very important  
13 priorities. So I support that and encourage more funding  
14 in that direction.

15 Second, there's a priority for looking at how to  
16 deal with used batteries, which is something we've been  
17 trying to get a handle on for a number of years. My  
18 comment is that, and I think this may be implicit if not  
19 explicit in what you're already doing and in Laurie's  
20 outline, that you're trying to make things more  
21 commercially ready and have a focus on entrepreneurship.  
22 But I'd like to see some of the funding go not just to the  
23 technical aspects of this, but to the financing and  
24 implementation aspects about how to create a program that's  
25 workable and implementable because that's what's really

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1 bedeviled us. And then --

2 CHAIR HOCHSCHILD: Great point.

3 COMMISSIONER RECHTSCHAFFEN: And then third, that  
4 Mike listed but didn't really talk about, the green  
5 hydrogen roadmap. I think that's a very important priority  
6 and something I've heard earlier presentations from the  
7 Energy Commission about this. I think there's a lot to be  
8 done and a very worthwhile priority.

9 CHAIR HOCHSCHILD: Thank you. That's all great  
10 feedback. Let's go to President Batjer next.

11 PRESIDENT BATJER: Great. Thank you very much,  
12 Mr. Chairman. I -- Cliff sort of stole my -- a couple of  
13 the thoughts that I wanted to put forth and I know we're  
14 short on time. So you know that I've been sort of a Johnny  
15 one-note on the need for more technology for lithium-ion  
16 battery reuse and recycling, Chair Hochschild. So thrilled  
17 to know that that's in one of your strategic initiatives  
18 under the increased value proposition, etcetera. So  
19 really, really important. I'm also, and in the investment  
20 portion of that which Cliff also just mentioned is  
21 extremely important, and I'm so glad you all are working on  
22 that and investing in it. The other thing that is of  
23 concern, and yes, it is one of your initiatives, is  
24 wildfire mitigation innovations and funding some of those  
25 ideas. The cost of wildfire mitigation is of such concern

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1 to me. It's explosion -- it has exploded, and right now  
2 it's totally on the backs of the ratepayers. And that's  
3 just unsustainable. So many innovations, R&D efforts, or  
4 even more importantly, financing schemes, very hard because  
5 you're not investing in a thing, except maybe there might  
6 be some mitigations, but also a very interesting and  
7 important topic for all of us going on in the future. So  
8 thank you for asking.

9 CHAIR HOCHSCHILD: Great.

10 PRESIDENT BATJER: And I'll take my hand down.

11 CHAIR HOCHSCHILD: Great points. Well received.

12 Commissioner Houck, any feedback or priorities you wanted  
13 to highlight?

14 COMMISSIONER HOUCK: I just want to thank you for  
15 the very comprehensive presentation, and I don't have any  
16 comments at this time.

17 CHAIR HOCHSCHILD: Okay. Vice Chair Gunda,  
18 anything you wanted to add?

19 VICE CHAIR GUNDA: Yeah. Thank you, Chair. I  
20 think most of the priorities were already kind of noted by  
21 the other Commissioners. Again, I want to thank the EPIC  
22 team and the CPUC and CEC teams for kind of like thinking  
23 through this comprehensive list. I think, you know from  
24 just kind of the SB 100 planning and the reliability, I  
25 think you know, it's kind of on the top of my mind in terms

1 of storage technologies. I think, you know, kind of having  
2 diversification in the way we think about storage would be  
3 really, really helpful. Chair, you noted that early on  
4 today. I think that's a focus. And also, given kind of  
5 the climate uncertainty, it is really important to unlock  
6 the potential on the demand side. So you know the -- you  
7 know I did see some initiatives on the virtual power  
8 plants, the microgrids, and the whole DER spectrum, really  
9 would like to encourage us to think through, you know,  
10 specific projects that are scalable rapidly as we think  
11 through, you know, the next 10 years. And also kind of  
12 putting in a plug for, I think Commissioner Rechtschaffen  
13 mentioned the vehicle to grid integration, I think is  
14 extremely important in the future and its role in the  
15 future grid. So just wanted to thank the EPIC team, and  
16 those are the things I would note.

17 CHAIR HOCHSCHILD: Thank you. Commissioner  
18 McAllister, any feedback you'd like to give?

19 COMMISSIONER MCALLISTER: You know, I wanted to  
20 just acknowledge Commissioner Shiroma being on the dais  
21 since I'm, you know, overseeing this Division with you.  
22 I'm more familiar with the initiatives themselves. I do  
23 have a couple of points I'd like to make, but Commissioner  
24 Shiroma will -- I'd rather give you the mic for right now.

25 COMMISSIONER SHIROMA: Okay. Let me add a few

1 more things. Thank you, Andrew. You know, autonomous  
2 vehicles are poised to become a very -- a big sector of our  
3 transportation network, and so we need to figure out how do  
4 we tap into the vehicle-to-grid effort that Commissioner  
5 Rechtschaffen has talked about. And there, you know, are  
6 efforts underway amongst quite a few sister agencies on  
7 looking at the whole effort; jobs, innovation and  
8 electrification, and so forth. So you know, let's keep an  
9 eye on how that folds into, you know the transportation of  
10 the future. And then also, you know and just in terms of  
11 energy efficiencies, I think you've got quite a few topic  
12 areas there that, and the presentation spoke to the  
13 opportunities and pitfalls of how HVAC and heat pumps, you  
14 know, are rolled out. But in all of that, I'm really, you  
15 know I'm thinking through how the monies that we are  
16 allotted for energy efficiency and also for our Energy  
17 Savings Assistance Program, the ESAP Program, and our  
18 financing, and why are -- how all these things can  
19 jumpstart knowledge that arises, you know, out of the EPIC  
20 projects. Now let me stop there and see if Commissioner  
21 McAllister wants to add in anything else that I may have  
22 forgotten to mention.

23 COMMISSIONER MCALLISTER: No. You did a great  
24 job. Thank you very much. And I also have a great  
25 interest, as you know, in the building's energy efficiency

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1 and increasingly kind of making sure that load flexibility  
2 is another component of all of these new electrification  
3 technologies, electric technologies that we're going to be  
4 seeing increasingly on the grid, certainly on the  
5 transportation side. But the mass shift towards heat pumps  
6 and lots of batteries at all scales, including behind the  
7 meter, and even our appliances day in and day out as we  
8 develop the Flexible Demand Appliance Standards at the  
9 Commission, we are going to see hundreds of millions of  
10 devices that have a grid connection of one sort or another,  
11 and I think that opens up huge frontiers for R&D going  
12 forward.

13           And I just wanted to acknowledge that staff at,  
14 the EPIC staff, EPIC team is very aware of that, and I  
15 think, you know, the structure of the program, if I can  
16 just sort of riff a little bit on that, is really, I think  
17 well-tailored. It's balanced such that we have these very  
18 focused, or these very short of overarching and clear,  
19 well-defined strategic initiatives. Within those -- within  
20 those, though, and even between them, there's some  
21 flexibility in terms of emphasis. And so as we know, you  
22 know this arena is just expanding and moving incredibly  
23 quickly and changing quickly. And so each solicitation is  
24 another opportunity really to really identify that cutting  
25 edge and really go there and keep pushing, pushing the

1 envelope.

2           So I think, you know, on the demand side stuff,  
3 and aggregated virtual power plants, and all the different  
4 technologies that involves, is a great area that we'll see  
5 so much innovation in over the -- over the next cycle. And  
6 I think it was Cliff and President Batjer who brought up  
7 the program model kind of aspect of this or the, not just  
8 the technology but the approaches. And I just want to  
9 second that. You know the -- I know that the EPIC team is  
10 focused on producing ratepayer benefit, right, which  
11 is -- which is the point of this program.

12           And the -- and historically, you know, the  
13 program's been focused more on sort of tangible  
14 technologies. And I think making sure that there are  
15 pathways to get those technologies used and scaled, and  
16 that innovation is also in the program models, some of the  
17 data issues, and some of the automation that enables these  
18 technologies is increasingly going to be a focus of  
19 research as well. So I just wanted to give -- commend the  
20 staff. Commend Laurie and the team, and Jonah on a nice  
21 presentation and really appreciate the sort of incisiveness  
22 of the way they go about putting together these strategic  
23 emphases.

24           CHAIR HOCHSCHILD: So I had one sort of  
25 substantive comment to make that really builds off

1 Commissioner Rechtschaffen's point on EVs. We are only  
2 8,500 electric vehicles away from hitting one million  
3 electric vehicles sold in California, which is an  
4 incredible milestone. 34 companies manufacturing these  
5 vehicles now in California. It was our top export. We're  
6 adding 650 electric vehicles a day in the state. So  
7 incredible success and growth and opportunity. What I see  
8 coming is a shift in the OEMs towards bidirectional power  
9 capability. I think what Ford is doing with the F-150  
10 Lightning; 300-mile range, a bidirectional vehicle coming  
11 out in Q2 of next year, I think that is the future, and I  
12 think even for existing EVs, there will be software  
13 upgrades to make that possible. And we need to kind of be  
14 throwing the ball to where the receiver is going, not to  
15 where the receiver is, to use that analogy. And I do think  
16 planning for that, thinking how to make use of that because  
17 it's an enormous capability.

18 I think maybe Drew, if you're on, do you -- what  
19 was the stat you gave me, if we took all of the EVs that  
20 are on the road today and like dispatched them all at once?  
21 It was like five gigs of power. Am I remembering that  
22 right? I'm not sure if Drew is still on, but something on  
23 that order. So it's an incredible capability and I'd love  
24 to see us be able to make use of that, particularly for  
25 these critical peaks. So that was my one substantive

1 comment.

2 I do want to get to public comment, but I want to  
3 first just make sure we have an opportunity for any of  
4 these other remaining questions. So let me just read off  
5 these next three questions and anyone really wishing to  
6 comment on any of these, please speak up.

7 Are there any gaps in the proposed research that  
8 you heard today? Do you have suggested changes to certain  
9 strategic initiatives? And what are your suggestions to  
10 promote equity? Would love to hear if anyone has any  
11 responses to any of those, then we'll go to public comment.

12 Yeah. Go ahead, Commissioner Guzman Aceves.

13 COMMISSIONER GUZMAN ACEVES: Thank you. I also  
14 kind of feel a little bit of privilege here because I get  
15 to spend so much time with the team on my thoughts, but you  
16 know, one question I was thinking about is, is there any  
17 integration with the PIER Gas Program? I know there are  
18 some really innovative things happening there, particularly  
19 looking at those pilot areas, geographical areas, for a  
20 phaseout, and if there is overlap with some of the  
21 initiatives here. And of course, that kind of goes to the  
22 equity question based on some of the geographical focus of  
23 those gas phaseouts. I don't know if I'm using the right  
24 term there to describe the pilots, but I think you know  
25 which ones I'm referring to.

1           CHAIR HOCHSCHILD: Great. Laurie, would you like  
2 to respond to that?

3           DEPUTY DIRECTOR TEN HOPE: Sure. We don't  
4 combine the money in a common solicitation because we have  
5 different legislative requirements and CPUC requirements  
6 for the PIER Program and EPIC, but we really try to think  
7 consciously about the complement of one program to the  
8 other. So you were talking about natural gas phase-out.  
9 So you know, the natural gas program has evolved over time,  
10 in terms of, you know, where that focus has been and we  
11 focus now on some -- the niches where we think  
12 electrification might be the hardest, like industrial, or  
13 maybe medium and heavy-duty transportation on the -- on the  
14 electric side, you know. Well, I guess I'm not sure if I'm  
15 answering your question, but for example, in industrial, we  
16 would really think about electrification, where it makes  
17 sense in the EPIC Program, maybe some alternative gaseous  
18 fuels, hydrogen and others for industrial applications  
19 where maybe electrification isn't the right answer and try  
20 to have a portfolio between the two that speaks to the  
21 overall needs of that sector.

22           CHAIR HOCHSCHILD: Great, super helpful. Any  
23 other Commissioners wish to comment on any of these  
24 questions before we turn to public comment. Okay. Hearing  
25 none, I think let's now turn to public comment. Thank you.

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1 Thank you, everybody, for that.

2 MS. WERNER: Laurie, if I could have the next  
3 slide, please. For public comment, we're going to have  
4 folks use the Raise Hand feature at the bottom of Zoom that  
5 looks like a high five symbol, and if you're on the phone,  
6 please dial \*9 to raise your hand and we'll call on you.  
7 We'll have a one-minute timer and there's a link on where  
8 to file written comments that are due October 15th. So  
9 we'll go to the queue.

10 MR. REYNOLDS: This is Harrison Reynolds with the  
11 CEC. So I will first be calling on Julia Levin. Julia,  
12 your line is now open, you may need to unmute. If you  
13 could say your name, spell your name, and your affiliation.

14 MS. LEVIN: Good afternoon. Julia Levin,  
15 J-U-L-I-A, L-E-V-I-N with the Bioenergy Association of  
16 California. I want to add my thanks and my praise to  
17 Laurie ten Hope. I've worked with her over many years,  
18 both inside the Brown administration and as an outside  
19 stakeholder, and she deserves all of the praise, thanks,  
20 accolades and a really, really great retirement party. So  
21 thank you, Laurie.

22 I also really want to support the new initiatives  
23 that are focused on firm renewables, dispatchable power,  
24 and long-duration storage. I think it is really clear now,  
25 and from the PUC's recent decision in the IRP proceeding,

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1 we're going to need a lot more firm renewables for  
2 reliability.

3           There was also a recent study in energy and  
4 climate change that was funded in part by Environmental  
5 Defense Fund. They found that increasing firm renewables  
6 will reduce overall system costs substantially, as much as  
7 65% as we get to 100% renewable and zero-carbon power. So  
8 they're huge reliability, as well as cost benefits of  
9 increasing firm renewables.

10           Having said that, we really urge the Energy  
11 Commission and the PUC not to restrict these initiatives to  
12 green electrolytic hydrogen or zero carbon hydrogen. By  
13 far, the most urgent thing that we can do to address  
14 climate change is to reduce short-lived climate pollutants,  
15 meaning methane and black carbon. In fact, that's the --

16           MR. REYNOLDS: Julie, your time has ended. If  
17 you could please wrap up your comment.

18           MS. LEVIN: Sure. And the last thing I would say  
19 is please add an initiative to implement AB 322, which the  
20 governor just signed two weeks ago, and it requires the  
21 Commission to consider allocating EPIC funding to advance  
22 technology biomass. Thank you.

23           MR. REYNOLDS: Thank you. We will next be moving  
24 to Bruce Nordman. Your line [indiscernible] unmute.  
25 Reminder, if you could please say, spell your name, and

1 your affiliation. Bruce, your line is open. Bruce.

2 MR. NORDMAN: Yeah. Sorry, I didn't raise my  
3 hand. I'm not sure what happened.

4 MR. REYNOLDS: Okay. Did you not --. perfect.  
5 We'll move on to the next person. Nicholas Connell, your  
6 line is now open. Nicholas, you may need to unmute on your  
7 end. Moving onto the next person.

8 David Meyers.

9 MR. MEYERS: Yes. Thank you for this session and  
10 thank you for the opportunity to comment. My name is David  
11 Meyers, D-A-V-I-D, M-E-Y-E-R-S. I'm the CEO of Polaris  
12 Energy Services and we are a past and current EPIC grantee.

13 Overall, I think what was discussed here is, you  
14 know, the choir nods in agreement. The focus on marketing  
15 program innovation alongside technology is key, and exactly  
16 what we've seen as a need to focus on spreading across many  
17 sectors and disadvantaged areas are exactly the things that  
18 we see as needed in the market.

19 The only thing I would add is that some of the  
20 difficult problems that have a lot of value in solving may  
21 be physically and metaphorically out of the public eye.  
22 For example, the chairman mentioned the medium- and  
23 heavy-duty vehicles, and five gigawatts of vehicle load  
24 that could be on the grid or providing grid services. As  
25 one example, if we electrify agricultural equipment,



1 tractors and so on, that's another five to six gigawatts  
2 that no one is yet talking about very much. So I just ask  
3 that the people making the decisions also look where  
4 there's not yet been a lot of focus because there's  
5 opportunity there. Thank you.

6 MR. REYNOLDS: I will next be moving to Amanda  
7 DeMarco. Your line is now open, and you can unmute  
8 yourself.

9 MS. DEMARCO: Good afternoon. My name is Amanda  
10 DeMarco with Conservation Strategy Group. A-M-A-N-D-A,  
11 D-E-M-A-R-C-O. Thank you to the Commissioners, and the  
12 California Energy Commission, and the Public Utilities  
13 Commission for the opportunity to comment today.

14 I'd like to draw your attention to a comment  
15 letter that we submitted to the Energy Commission on behalf  
16 of a number of leading researchers, which emphasize the  
17 importance of allocating some EPIC clean energy investment  
18 funds to support the development of engineered carbon  
19 dioxide removal technologies, including bioenergy with  
20 carbon capture and storage and direct air capture.

21 Research has shown that California will need to perform a  
22 significant level of carbon dioxide removal in order to  
23 meet its ambitious climate goals. These strategies can  
24 produce valuable products like green hydrogen and also  
25 create high paying manufacturing jobs, as well as provide a

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1 needed outlet for the 56 million tons per year of  
2 anticipated agricultural, forestry and other biomass waste  
3 sources that are currently open-burned, landfilled, or left  
4 to decompose in fields which create severe climate and air  
5 quality impacts.

6 Thank you for the opportunity to comment today.  
7 Please refer to our comment letter that we submitted to the  
8 docket log in relation to the proposed draft initiatives.  
9 Thanks.

10 MR. REYNOLDS: Thank you, Amanda. Sara Nelson,  
11 you can now unmute.

12 MS. FITZSIMONS NELSON: Hi. Yes. Sara Fitzsimon  
13 Nelson, S-A-R-A, F-I-T-Z-S-I-M-O-N, N-E-L-S-O-N. Sarah  
14 Fitzsimon Nelson, on behalf of California Hydrogen Business  
15 Council. I would like to take our comments and just line  
16 them up with Julia Levin, who had just previously commented  
17 from the Bioenergy Association.

18 We too, are very happy to see hydrogen included  
19 in this EPIC plan. Unfortunately, only one type of  
20 hydrogen was included. So it's a good first step, but when  
21 talking about the inclusion of firm renewables, and  
22 dispatchable power, and long-duration energy storage, we  
23 really think it's important to include all types of  
24 hydrogen technologies that contribute to decarbonization.  
25 So we also submitted the comments on the EPIC programs, in

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1 particular the EPIC 4 Draft Initiatives. We had written  
2 some very detailed comments about these issues, so please  
3 refer to those. We do plan on commenting on the 15th as  
4 well, but we'd like to support Julia Levin's comments about  
5 the inclusion of all hydrogen technologies and in  
6 particular, organic waste.

7           So thank you for your time today, and I hope you  
8 have a great afternoon.

9           MR. REYNOLDS: Thank you, Sara. Bill Capp.

10           MR. CAPP: Yes, thank you. Appreciate the  
11 opportunity to make public comments. My name is Bill Capp,  
12 C-A-P-P, and I'm with Store Works Power, which is a thermal  
13 energy storage company.

14           There have been multiple concepts for using  
15 thermal energy storage to convert legacy fossil plants that  
16 have a steam turbine, converting those into an electricity  
17 through electricity storage system. This approach  
18 preserves the inertia available from that equipment, which  
19 is helpful in terms of reliability, but it also preserves  
20 jobs in the tax base. So you get rid of the fossil  
21 components, and you add a thermal energy storage system and  
22 a source of heat, and you're able to bring in the  
23 electricity and put electricity back onto the grid. The  
24 question is, is that kind of a concept for that conversion  
25 potential of interest to the EPIC Program?

1           And I also put my comments into the Q&A window.

2           MR. REYNOLDS: Thank you, Bill. John Kennedy.

3 John, you may need to unmute on your end.

4           MR. KENNEDY: There we go, let's try that. Good

5 afternoon, John Kennedy with the Rural County

6 Representatives of California. J-O-H-N, K-E-N-N-E-D-Y.

7 Just a couple comments today.

8           First, I'm encouraged by focusing on lithium

9 production and lithium-ion battery recycling. There's a

10 significant need for this and you know, it could really

11 benefit local governments and economic development in

12 Southern California. I really want to highlight, we've

13 really got to improve energy resilience in rural areas.

14 So to the extent we can focus funding on that to ensure

15 that people keep the power on. That would be wonderful.

16           Appreciate Commissioner Batjer's comments on

17 wildfire mitigation. That should be a high priority for

18 EPIC funding and aligning my comments with Julie Levin on

19 bioenergy AB 322. We urge consideration of biomass as a

20 wildfire risk reduction tool to address the phase-out of

21 open-burning, of AG waste, and also as a way to help local

22 governments in the state achieve new organic waste

23 recycling and procurement targets.

24           Thank you very much and apologize for the dog

25 barking in the background.

1 MR. REYNOLDS: Thank you, John. For anyone on  
2 the phone, you may press \*9 to raise your hand if you wish  
3 to make a public comment. I see Anna.

4 MS. SCIARUTO: Good afternoon, my name is Anna  
5 Sciaruto, S-C-I-A-R-U-T-O, and I'm calling on behalf of the  
6 Bay Area Council. Thank you for the opportunity to comment  
7 today.

8 The EPIC grants have been critical in moving many  
9 bioenergy projects toward implementation. These projects  
10 provide firm renewable power, which is desperately needed  
11 in California for reliability purposes, especially in rural  
12 communities that are most at risk for PSPS events. For  
13 these reasons, the Bay Area Council would like to express  
14 our support for the reallocation of EPIC funding,  
15 specifically for forest biomass projects as a wildfire  
16 mitigation tool. Thank you.

17 MR. REYNOLDS: Thank you, Anna. If there was  
18 anyone else that would like to make a public comment,  
19 please use the Raise Your Hand feature. Graham, you may  
20 unmute yourself.

21 MR. NOYES: Graham Noyes, N-O-Y-E-S. I'm the  
22 executive director of the Low Carbon Fuels Coalition, but  
23 also speaking today as a citizen of California who lives in  
24 the Sierras.

25 And I want to start by acknowledging that EPIC is

1 obviously driven by some very long-term plans that have  
2 been carefully developed. However, my key point is that  
3 the program needs to recognize that California is in a  
4 wildfire crisis, and it needs to shift its focus  
5 accordingly. Last year, we had approximately 112 million  
6 metric tons of greenhouse gases reduced -- released in  
7 wildfires. These wildfires are often caused by electric  
8 power. When they arrive, there's chaos here. Power shut  
9 down, medical devices stop working, cell phones are no  
10 longer functional.

11 Commissioner Batjer's point was well taken  
12 regarding ratepayer strain. We also need to start  
13 utilizing biomass at scale. We need quick deployment. We  
14 need resilient power. We need microgrids. We need  
15 long-term deployment at scale with carbon capture and  
16 sequestration in terms of baseload power, and sustainable  
17 aviation fuel. And I'd like to support Julia Levin's  
18 comments as well. Thank you.

19 MR. REYNOLDS: Thank you, Graham. Thalia Kruger.  
20 Thalia, you may need to unmute on your end.

21 We will move to David Wilkinson. David.

22 MR. WILKINSON: Good afternoon, David Wilkinson,  
23 W-I-L-K-I-N-S-O-N. I am a private economist based in YOLO  
24 County. I'd like to support Julia Levin's comments. I'm  
25 here to advocate for rural communities on the financing

1 side, putting bioenergy and hydrogen from organic waste in  
2 the EPIC Program. The EPIC grants you've made in recent  
3 years for the BioMAT 3 megawatt renewable energy projects  
4 in rural areas are working. We'll be closing a project in  
5 Shasta County soon that'll average \$4 for every EPIC grant  
6 and begin to protect these rural communities from fire,  
7 create jobs, and baseline power. So thank you for your  
8 previous support, and I would appreciate it if you would  
9 continue EPIC grants for these purposes. Good afternoon.

10 MR. REYNOLDS: Thank you, David. Anyone else  
11 wanting to make a public comment, please use the Raise Your  
12 Hand feature. Adrian.

13 MR. COVERT: Greetings. my name is Adrian  
14 Covert, with the Bay Area Council representing the largest  
15 employers in the San Francisco Bay Area. Just wanted to  
16 say that the explosion of wildfires in the last several  
17 years is creating extraordinary, measurable negative health  
18 and economic impacts, not just for the Bay Area and  
19 Northern California, but increasingly large parts of the  
20 Western and Midwestern United States. And so to help  
21 reduce our risk of wildfire, we need to use every tool at  
22 our disposal, which is why we're urging the CEC to include  
23 bioenergy and hydrogen from organic waste in the EPIC  
24 Program. Thank you.

25 MR. REYNOLDS: Anyone else wanting to make a

1 public comment, please use the Raise Your Hand feature.  
2 For people on the phone, you may dial \*9 to raise your  
3 hand.

4 Chair, at this time, I don't see any more. Oh,  
5 we do have another hand. Lillie French, you may unmute  
6 yourself.

7 MS. FRENCH: Hi. Thanks for the opportunity to  
8 comment. Just wanted to say that -- oh, my name is Lillie  
9 French, L-I-L-L-I-E, F-R-E-N-C-H, and I Roadmap Biofuels,  
10 and I wanted to emphasize that we are using waste-woody  
11 biomass to reduce these risks of wildfire and therefore  
12 reduce greenhouse gas emissions and air pollutants. As it  
13 was said before, there are millions of acres of California  
14 burning up every year and we need to -- we need to do  
15 everything we can to utilize this biomass effectively and  
16 critically. And we can do this by producing net-zero SAF  
17 to decarbonize these hard to mitigate sectors. Thank you.

18 MR. REYNOLDS: Thank you, Lillie. Anyone else  
19 want to make a public comment? Okay. Chair, at this time  
20 I do not see any more raised hands. I will turn it back to  
21 you.

22 CHAIR HOCHSCHILD: Okay. With that, let me thank  
23 all of my friends and colleagues at the Public Utilities  
24 Commission and the hundreds of staff at the Energy  
25 Commission under Laurie ten Hope's leadership, working



1 every day to execute this program with diligence and  
2 excellence, all the stakeholders for your comments and  
3 inputs. And let me just see if Commissioner Guzman Aceves  
4 would like to offer any closing comments.

5           COMMISSIONER GUZMAN ACEVES: Yes. Thank you very  
6 much. I just wanted to acknowledge that this is the first  
7 opportunity we've had to have this type of en banc  
8 together, and I'm not sure why it took us this long, but  
9 I'm very happy to see this level of integration. And I  
10 look forward to us continuing to build on this work. So  
11 thank you also to all of the staff, both Commissions, to  
12 make this possible.

13           CHAIR HOCHSCHILD: Thank you, Commissioner. And  
14 with that, we're adjourned.

15           (Whereupon the En Banc Meeting was adjourned at 3:11  
16 p.m.)


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I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a certified electronic court reporter and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF, I have hereunto set my hand this 21st day of November, 2021.

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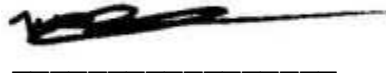
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