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BEFORE THE
CALIFORNIA ENERGY COMMISSION

In the matter of,)
) Docket No. 17-IEPR-10
)
2017 Integrated Energy Policy)
Report (2017 IEPR))

**JOINT AGENCY WORKSHOP ON DEVELOPMENT
AND USE OF RENEWABLE GAS, BIOMETHANE, AND BIOGAS
TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS**

CALIFORNIA ENERGY COMMISSION
FIRST FLOOR, ART ROSENFELD HEARING ROOM
1516 NINTH STREET
SACRAMENTO, CALIFORNIA

TUESDAY, JUNE 27, 2017

9:35 A.M.

Reported By:
Peter Petty

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Matthewson Epuna, Commissioner

Dorris Chow, Commissioner

California Air Resources Board

Richard Corey, Executive Officer

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Geetika Joshi

Governor's Office

Saul Gomez, Deputy Secretary for Energy

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Scott Beckner, CalRecycle

Amy Myers Jaffe, UC Davis

Philip Sheehy, ICF International

Steven Malnight, Pacific Gas and Electric Company (PG&E)

George Minter, Southern California Gas Company (SoCalGas)

Mike Silva, CR&R Waste Haulers

Lyle Schlyer, Calgren Renewable Energy

Gog Heinrich, City of San Mateo

Neil Black, California Bioenergy LLC, (Via WebEx)

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Bruno Miller, Fulcrum BioEnergy, Inc.

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Ben Vitali, Equilibrium Capital Water and Waste

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P R O C E E D I N G S

1
2 JUNE 27, 2017

9:35 A.M.

3 MS. RAITT: I'll go ahead and get started. So,
4 welcome to today's 2017 IEPR Joint Agency Workshop on
5 Renewable Gas. I'm Heather Raitt, the Program Manager
6 for the IEPR.

7 For the housekeeping items, our restroom's out
8 the doors, behind the hearing room. There's a snack bar
9 on the second.

10 And if there's an emergency and we need to
11 evacuate the building, please follow staff across the
12 street, diagonal to the building, to the Roosevelt Park.

13 Also, please know that workshop today is being
14 broadcast over WebEx. And so, we will have an audio
15 recording that will be posted on our website in about a
16 week, as well as a written transcript that will be
17 posted in about a month.

18 We do have a very full agenda today. So,
19 please, I'd like to remind our speakers to stay within
20 your allotted times. And we will actually have a little
21 sign to let you know when you've got a two-minute
22 warning, when time is up.

23 At the end of the day there will be an
24 opportunity for public comments. We will request that
25 you go ahead and fill out a blue card, and you can give

1 it to me. The blue cards are at the entrance to the
2 hearing room. And we will limit comments to three
3 minutes per speaker.

4 Also, for those on WebEx, we have an opportunity
5 for comments at the end of the day. We won't have an
6 opportunity for a Q&A, but we will have an opportunity
7 for comments. And you can just raise your hand to let
8 our WebEx Coordinator know that you'd like to make
9 comments at the end of the day.

10 Written comments are welcome and they are due on
11 July 11th. And the notice gives you all the information
12 for submitting written comments.

13 And with that, I'll turn it over to the Chair.

14 CHAIR WEISENMILLER: Yeah, Heather, one
15 question. We have a lot of people standing, so is it
16 possible could we find either more chairs or an overflow
17 room?

18 MS. RAITT: We're working on setting up some
19 overflow in the hearing room across the way, in Hearing
20 Room B. So, I'll let you know when we have that ready.

21 And also, I should mention we're making some
22 more hardcopies for folks for the handouts, because we
23 did run out, but we'll have some more available.

24 CHAIR WEISENMILLER: That's good. I wanted to
25 thank everyone for coming today. We have a pretty

1 packaged agenda. We have a pretty packed dais. So,
2 anyway, we're going to -- just a few of us will kick off
3 with comments and then we just really want to get into
4 the meat of the matter.

5 I'm going to say a few words, just briefly
6 framing things. Obviously, the short lived climate
7 pollutants are a big issue for us going forward. It's a
8 big responsibility for the Air Board in that area. In
9 fact, we've got a pretty good background in the hearing
10 notice for the SB 1383, and what it does generally. It
11 goes into a pretty simplified description of it. But
12 the basic message is we're trying to deal with short
13 lived climate pollutants.

14 And part of that bill drafted the Energy
15 Commission to have a workshop on this topic. And as
16 part of that, we were going to set up the workshop in
17 consultation with the ARB and PUC. And so, I have
18 representatives of both those agencies here today.
19 Certainly, the Governor's Office is also here. And this
20 is a huge issue for Karen Ross and her folks.

21 So, again, it's a pretty packed dais and a lot
22 of great speakers coming up.

23 I would note that this is sort of building off
24 of an earlier workshop we had on sort of the hydrogen
25 questions. And that was a May 12th workshop looking the

1 particular -- we had a panel dealing with what to do
2 with excess electricity. Instead of curtailing the
3 solar, what are the best uses?

4 And obviously, one of the things we looked at
5 was hydrogen, so we had a couple of speakers go through
6 that. Although, frankly, it was disappointing and it
7 really did not get into cost effectiveness there. And
8 so, certainly hoping we can get more on the record on
9 that.

10 I think, in trying to keep things simple, the
11 reality is I believe that looking at these issues, you
12 know, gas has come into people's minds a lot from San
13 Bruno and Aliso. And so, as we look at transitioning
14 some of the fuel types I think we have to convince
15 people that we've got the leakage under control on the
16 pipeline system, and we have to convince people that
17 it's safe. Even if, you know, we've sort of moved Aliso
18 from natural gas to renewable gas, I'm not sure the
19 Porter Ranch people are going to be that happy.

20 So, I think we have to really have that as part
21 of the thinking about things is how do we deal with
22 public perception?

23 Certainly, the other thing which the Legislature
24 certainly calls out for us to look at here is sort of
25 cost effectiveness and how to address some of those

1 questions.

2 So again, I think moving forward it's really
3 important to deal with these questions. I think,
4 certainly, that public perception issue is important. I
5 think, certainly, trying to deal with the cost
6 effectiveness issue is important.

7 I think, as my colleagues in the PUC know, we're
8 sort of at record levels of disconnect at this stage.
9 So we have to be, obviously, very prudent of where we
10 put our money.

11 Let me ask, Cliff, do you want to say a few
12 words?

13 MR. RECHTSCHAFFEN: Sure. I was hoping people
14 would think I was Richard Corey and I would get more
15 cachet, but I guess they --

16 (Laughter)

17 MR. RECHTSCHAFFEN: We were bused here. It's
18 almost a cliché, but I think it bears repeating that
19 what we're doing here is path breaking and leading the
20 country, and our efforts are more important than ever
21 given Federal retrenchment on climate and, in particular
22 on dealing with methane.

23 Renewable gas is one important part of our
24 strategy to meet our short-lived climate pollutant
25 goals. It's very important. We have very ambitious

1 goals. We have a lot to do and we have to do it very,
2 very quickly. So, I look forward to an excellent
3 discussion.

4 We have folks from the PUC, Doris and Matthew,
5 who are going to talk about the various roles that we
6 play in the 1383 implementation, and you'll hear from
7 them later. So, I look forward to the discussion today.

8 MR. COREY: Yeah, thanks Chair Weisenmiller. A
9 few points and one is that SB 1383 built on 605, SB 605,
10 both from Senator Lara, which recognized, as we all do,
11 the important role that short-life climate pollutants
12 play in terms of its contribution to climate change.

13 And SB 1383 requires a 40 percent reduction in
14 methane, as well as some other short-life climate
15 pollutants, by 2030 relative to the 2013 emissions. It
16 also recognizes those reductions present, in themselves,
17 a great opportunity to utilize a resource that's
18 substantially vented to the atmosphere.

19 But in doing do it recognized there are barriers
20 in terms of how we can effectively move together and
21 that we're only going to get there through collaboration
22 amongst our energy agency partners, CDFA and you all.
23 But it's an opportunity we need to seize in presenting
24 both reductions and economic opportunity, as well as a
25 model for others to follow. So, we're really excited

1 about this, but much work in front of us. So, thank
2 you.

3 CHAIR WEISENMILLER: I was actually going to go
4 to the Governor's Office first, but accidentally turned
5 to Cliff. But anyway, go ahead.

6 MR. GOMEZ: No, no, it should go to the
7 Commissioners. I mean, really, I think the three of you
8 so far have really covered the range of issues. You
9 know, in my discussions with agencies, as they've come
10 in over the last few months, with respect to
11 implementation of 1383, you know, they always kind of
12 catch onto this issue that Richard has talked about.
13 There's an opportunity here that as we achieve our
14 goals, there's an opportunity to use these resources.

15 And so, you know, I think it's insightful that
16 the bill actually included this to be part of the IEPR
17 and to talk this through.

18 And the bill actually provides opportunities in
19 the future to see how we pivot or adjust as time goes
20 on. And so, I'm looking forward to the discussion.
21 Thanks.

22 MS. LESTER MOFFITT: Good morning. Thank you
23 for having us here. So, Agriculture represents about 8
24 percent of our State's greenhouse gas emissions, of
25 which over half is from methane and from the dairy and

1 the livestock sector.

2 And so there's a lot of opportunity here, as we
3 have these conversations, as we hear from folks in the
4 room for agriculture to continue to lead with innovation
5 in making great strides, and reducing methane emission
6 reductions from our dairy and livestock sectors.

7 I think there's also a lot of opportunities to
8 continue to strengthen those ties. Not just with the
9 waste and the energy sector, but also water quality, air
10 quality as well.

11 And so, I think I'm looking forward to having
12 some conversations really looking at the integral, in
13 the whole system as we do this.

14 One thing I'd like to say is we did kick off,
15 through the SB 1383 process, the Air Resources Board has
16 been leading the charge with some working groups, and we
17 had our first working group yesterday. There's three
18 workgroups that are led by industry. And I think that's
19 a very important part of that is that industry is at the
20 table. And so, the first workgroup was yesterday.
21 There's another one, a separate working group meeting, I
22 believe, next week.

23 And so, there's really great work already
24 happening. We kicked it off a month ago and the
25 workgroups are already hard at working getting and

1 identifying the barriers, and looking for very
2 collaborative solutions.

3 So, thank you, guys, for all the workgroup work
4 and then I look forward to the conversation today.

5 CHAIR WEISENMILLER: Yeah, so the Imbrecht Room,
6 which is right across the atrium, is now open for those
7 who want to be more comfortable listening to what we're
8 talking about. So, that's the first announcement.

9 I was going to ask if we could have, submitted
10 for the record, sort of the schedule for the various
11 working groups? If you could just submit, in the docket
12 here, the schedule for the working groups that would
13 probably -- because we know there's people interested in
14 that topic.

15 Let's go to the first panel, which is going to
16 set more context of what the various State policies are.
17 Some of them complementary, some of them are more
18 challenging.

19 John, you want to lead the group?

20 MR. KATO: Sure thing. And thank you, thank
21 you, Chair. I'm John Kato, the Deputy Director of the
22 Fuels and Transportation Division, over at the Energy
23 Commission. I am the Moderator for Panel One, which is
24 the Overview of California Policies, Programs and
25 Regulations to SB 1383 Responsibilities.

1 Each panelist will present their respective
2 agency perspectives in regards to SB 1383. So, we have
3 a loading order of first CEC, then ARB, then PUC,
4 CalRecycle, and CDFA.

5 As a reminder, Panelists, please let Heather,
6 behind the podium, know when to advance the slides. Be
7 kind of aware of the time frame and time limit.

8 And members on the dais, we would like to have
9 all the questions held until everyone gives their
10 presentation. However, with that said, if there's a
11 pressing question, nothing precludes you from asking the
12 questions at that time. So, again, it's your
13 prerogative. We just want to keep things flowing as
14 quickly as possible.

15 Okay. So with that, Tim, please begin with your
16 presentation.

17 MR. OLSON: Hi, I'm Tim Olson with the
18 California Energy Commission. Let's go to the next
19 slide.

20 So, the Energy Commission has a couple of
21 different responsibilities under SB 1383. One is
22 seeking your recommendations today. And out in the
23 lobby there's a report entitled, "Staff Framing
24 Document, Challenges, Considerations, Questions for
25 Stakeholders to Address." This is the document that has

1 several different questions and issues raised that we're
2 looking for your feedback on that, and comments into the
3 recommendation in the form of recommendations.

4 The other point is that the Energy Commission,
5 the other responsibility under SB 1383 is we need to
6 prepare a cost effectiveness analysis of all of these
7 different options, electricity, and transportation, and
8 for each submarket that we're looking at. Dairy farm
9 manure methane, wastewater treatment, landfills, organic
10 diversion from landfills, and maybe even into the woody
11 biomass where there's a waste residue.

12 You will not see in that framing document any
13 conclusions about cost effectiveness. We're using this
14 process to gather more cost data. That information will
15 be developed over time.

16 This information, from this workshop, will flow
17 into a renewable gas chapter of the Integrated Energy
18 Policy Report.

19 The other thing is, as John Kato mentioned
20 there's lots of interaction and workgroups between the
21 agencies and you'll hear more about that today.

22 The next slide, please. So, the Energy
23 Commission also has another kind of role. We deploy
24 money in both commercial development and also research
25 and development. We have examples on this slide,

1 reflecting about 15, 18 years of history from this
2 agency. Some of those, we have projects that we've co-
3 funded, both electricity generation and transportation
4 fuels.

5 Some of the emerging technologies are candidates
6 in those. You're going to hear about some of those
7 today.

8 We are co-partners with private firms on almost
9 every single project, and partners with our sister
10 agencies on a couple of them.

11 We have examples of four pipeline injection
12 projects in California. In our short history in this
13 area, the Energy Commission has been involved in three
14 of those. They're all meant to be looking at
15 transportation outcomes. You're going to hear from one
16 of those companies today.

17 And we also have examples of success and
18 progress on not only anaerobic digestion, but other
19 technologies, pyrolysis, gasification, and some of the
20 other conversion technologies.

21 The next slide, please. This gives you an
22 indication of the Energy Commission projects. What we
23 did here is show you where the projects are. And the
24 point of this is, this is true of every agency, too,
25 where projects are funded, they happen to be located

1 with the areas of disadvantaged communities. So,
2 there's a connection there.

3 Let's go to the next slide. The next slide,
4 please. This slide gives you an indication of the
5 Energy Commission ARFVTP funding. Since 2009, about \$50
6 million deployed in biogas, renewable gas projects, all
7 transportation.

8 We also have deployed money, about \$20 million
9 in infrastructure, mostly natural gas fueling stations.

10 And then, we have this other category, vehicle
11 buy-down. Several tens of millions on the vehicle buy-
12 downs, covering differential cost of the non-petroleum
13 fuels compared to diesel vehicles, and vehicle
14 demonstrations. Of note is the Cummins-Westport, low
15 NOx, 8.9 liter engine, co-funded with South Coast Air
16 Quality Management District, Southern California Gas
17 Company and, of course, that corporation.

18 So, that's kind of a quick sum up of the Energy
19 Commission activity.

20 MR. KATO: Thank you. Next, we'll have Floyd,
21 from the Air Resources Board.

22 MR. VEGARA: Good morning. Next slide, please.
23 So, I'll go quickly over these, provide some
24 foundational comments based on the short-lived climate
25 pollutant strategy that our Board recently adopted, and

1 how that fits within the SB 1383 requirements, both for
2 us and, you know, how the other agencies' activities are
3 affected by that.

4 I'll also talk briefly about some of the
5 existing programs we have at the Air Board that are
6 either affected by SB 1383 or further the objections in
7 that statute.

8 And then, we're trying to head off a couple
9 other questions that were posed to us in terms of
10 tracking methane reduction progress, so we'll talk a
11 little bit about that.

12 The next slide, please. So, as mentioned
13 earlier, short-lived climate pollutants, or SLCPs,
14 include methane and other pollutants, black carbon and
15 hydroflora carbons. These are powerful climate forcers
16 that have lifetimes of days to a few decades, and have
17 global warming potentials that are tens to thousands of
18 times greater than carbon dioxide.

19 So, as I mentioned earlier, in March our Board
20 approved the SLCP strategy, which identifies a number of
21 measures to meet specific reduction targets that are
22 specified in the SB 1383, including a 40 percent
23 reduction in methane from 2013 levels, by 2030.

24 As Richard mentioned earlier, Senator Lara
25 authored two bills recognizing the importance of SLCPs,

1 and directing State agencies to work together,
2 collaboratively, to reduce these emissions as quickly
3 and as deeply as possible.

4 Let's see, I won't go into the history of that.
5 But the reductions of SLCP emissions, from these
6 measures identified in the strategy, will help meet the
7 State's 2030 GHG reduction target.

8 The next slide, please. So, this slide shows
9 the relative contributions of the various methane
10 sources in California. As you can see here, nearly half
11 the emissions come from the dairy and livestock
12 operations, specifically from manure management and from
13 enteric fermentation emissions. So, those are the parts
14 of the dairy sector that we're focused on with our dairy
15 workgroup that Jenny, from CDFA, mentioned earlier.

16 The next slide, please. Okay, so real briefly,
17 going over the 1383 requirements. So, ARB and other
18 agencies will undertake a number of efforts this year to
19 address existing hurdles to developing methane projects
20 in the waste sectors, required by the bill.

21 First of all, we're working with CalRecycle to
22 develop regulations on organics diversion to achieve
23 substantial reductions by 2025 and 2030.

24 We're also working with the Energy Commission,
25 which is why we're here, very closely with the Energy

1 Commission in developing renewable energy and
2 infrastructure policies through the Commission's IEPR
3 process.

4 We are working, my staff, on the low carbon fuel
5 standard, and Cap and Trade folks, we're working on a
6 pilot financial mechanism which is called for under
7 1383. And this is intended to strengthen the
8 environmental credits, but not just low carbon fuel
9 standard, but also looking at other environmental
10 credits that are relevant to the dairy and livestock
11 sector. And we believe that's a very important step in
12 making sure that the strongest market signals can help
13 get financing and make these projects real.

14 We're also providing -- SB 1383 also calls for
15 providing guidance on regulatory impacts on credit
16 revenues. And this is basically providing guidance on
17 how long these credits are intended to last. And again,
18 that is intended to strengthen the signal there.

19 So, we're also working with the Public Utilities
20 Commission, in coordination with CDFA, in developing
21 guidelines that gas corporations will use to select at
22 least five dairy biomethane pilot projects to
23 demonstrate the feasibility of pipeline injection.

24 We're also looking at developing a similar pilot
25 project under our Sustainable Freight Action Plan. A

1 work plan for that project will be released later this
2 summer. These projects should help develop least cost
3 pipeline injection strategies that will be transferrable
4 to future projects.

5 And then, finally, Chairman Weisenmiller
6 mentioned earlier the need for building confidence in
7 making sure that the pipeline emissions are reduced and
8 eliminated whenever possible. To that end our Board is
9 working closely, worked closely with the Public
10 Utilities Commission staff, as part of their 1371
11 rulemaking, recent rulemaking.

12 And also, our Board adopted the Oil and Gas GHG
13 Reduction measure back in March of this year, and that
14 is designed to reduce, substantially, GHGs and achieve
15 other co-benefits from the oil and gas production
16 sector.

17 The next slide, please. So, let's move
18 specifically to the dairy and livestock sector
19 requirements under 1383. The bill requires ARB and CDFA
20 to report by July 1st, 2020 on the progress the dairy
21 and livestock sector has made to meet the methane
22 emission reduction goals for this sector.

23 The statute also requires ARB, in partnership
24 with Food and Ag, to develop a regulation to reduce
25 manure methane emissions no earlier -- from this sector,

1 no earlier than January 1st, 2024. So, the information
2 that we're collecting and the recommendations are being
3 developed by the working group that Jenny mentioned
4 earlier will help support that future rulemaking
5 development.

6 And the approach we're taking here is working
7 closely with the industry and other stakeholders to
8 develop recommendations and approaches that, you know,
9 in an ideal world, if everything works out well, we
10 won't even need to develop regulations. We want to make
11 these collaborative, voluntary measures to get the
12 deepest possible reductions and get these projects off
13 the ground. And if we're successful there, that should
14 reduce or possibly eliminate the need for regulations.
15 And that's at least our hope.

16 So, we're required to release a progress report
17 before a regulation is developed. So, a progress report
18 must discuss the impact that a regulation may have on
19 leakage, as well as a number of other considerations
20 called out in the bill, and those are listed here.

21 The next slide, please. So, as mentioned
22 earlier, the 1383 addressed a number of things and
23 provided a number of directives, one of which is to
24 develop a working group, or consult with a wide range of
25 stakeholders involving the dairy sector, and

1 environmental groups, and project developers, and things
2 like that.

3 So, what we did is we developed a manure
4 management strategy, or we are in consultation with CDFA
5 and stakeholders that will focus on as many voluntary
6 methane emission reductions projects as possible before
7 any regulatory action is taken. And this will be
8 accomplished through a combination of actions, such as
9 establishing incentives, filling research gaps,
10 collaboration to overcome barriers, the development of
11 policies to encourage renewable gas production.

12 And to this end we are working with CDFA and our
13 sister agencies. We formed a dairy and livestock
14 workgroup, as mentioned earlier. And that is an
15 important step in developing recommendations that are
16 going to inform our efforts and those of our sister
17 agencies as we move forward.

18 The next slide, please. So, just a little
19 bit -- no, the previous slide. Yeah. So, a little bit
20 more there. So, the working group that we've put
21 together, as mentioned, is comprised of an oversight
22 group, which is the heads of the sister agencies that
23 are involved, and then the three technical subgroups,
24 one of which is focused on fostering markets for
25 digester projects, dairy digester projects. The second

1 subgroup is for fostering markets for non-digester
2 projects. And then, the third subgroup is intended to
3 address research needs including, but not limited to,
4 enteric fermentation.

5 And so, we've worked with the various subgroups
6 and the co-chairs for those subgroups and put together a
7 wide range of stakeholders.

8 So, I covered most of that here, the next slide.
9 I won't go too much into these other programs, but
10 suffice it to say that we have a number of programs
11 right now on livestock offsets. Mobile source strategy,
12 you know, has an element in there for a strategy for
13 displacing diesel with biomethane to get us to near zero
14 technologies.

15 The next slide, please. The low carbon fuel
16 standard is a very strong market signal for producing
17 very low carbon fuels, including biomethane.

18 As mentioned earlier, the Sustainable Freight
19 Action Plan also has relevant provisions that affect
20 this.

21 And then, of course, we're working with -- the
22 next slide, please. We're working with our sister
23 agency, at Food and Ag, to develop, to work on their
24 Dairy Digester and Alternative Manure Management
25 Program.

1 So, I think I will skip the last couple of
2 slides just for time, plus we may go over that in
3 questions. So, thank you.

4 MS. CHOW: Good morning, my name is Dorris Chow,
5 with the California Public Utilities Commission, in the
6 Energy Division, Natural Gas Section.

7 Today I'm going to tag team with Matt Epuna.
8 I'm going to be talking about biomethane gas activities
9 at the CPUC, and the BioMAT Program, while Matt will be
10 talking about the pipeline safety.

11 The next slide, please. So, before any
12 biomethane gas gets injected into the pipeline it has to
13 meet what we call a gas quality standard. In accordance
14 to AB 1900, the CPUC opened a rulemaking to establish a
15 biomethane inject standard for human and pipeline
16 safety. And this was approved in 2014.

17 And the standard is to be reviewed every five
18 years, or if new information arises, such as the
19 biomethane studies conducted by the CCST.

20 They are tasked to review certain elements of
21 the CPUC Biomethane Injection Standards, such as the
22 heating values, the siloxanes, and the dilutions, and
23 the blending standards.

24 So, once a contract is finalized, CCST has nine
25 months to conduct the studies. And once the study is

1 finalized, the CPUC has within six months to open a
2 rulemaking or a proceeding to reexamine its biomethane
3 injection standards.

4 The next slide, please. The CPUC currently have
5 \$40 million Biomethane Interconnection Incentive
6 Program. Successful biomethane projects will be
7 eligible for interconnection rebates of \$3 million per
8 project or \$5 million for dairy digesters. The program
9 will end by 2021, or earlier, if funding is exhausted.

10 As soon as the incentive program funding runs
11 out, or sunset in 2021, the CPUC will open a proceeding
12 to address how we would promote biomethane industries in
13 California. So far, currently in this program we have
14 one project, called the CR&R, in Paris, California.
15 They are expected to interconnect to the SoCalGas system
16 this summer and they qualify for the \$3 million rebate.

17 The next slide, please. So, Senate Bill 1383
18 requires the CPUC, in consultations with Air Resource
19 Board and the California Food and Ag to direct the gas
20 corporations to implement at least five dairy biomethane
21 projects to be injected into the common pipeline system.

22 The gas corporations may recover, in rates, the
23 reasonable costs of the pipeline infrastructure.

24 The next slide, please. So, to implement SB
25 1383, the CPUC opened a rulemaking just last week and we

1 propose four implementation framework. And I would like
2 to let you know that the CPUC have worked with Air
3 Resource Board, the California Food and Ag, and the CEC
4 to get all inputs and comments. And we reach out to all
5 the stakeholders to get some information on this.

6 So, based on all the inputs and comments, we
7 propose four implementation plans. The first one is the
8 definition of infrastructures. We propose that defining
9 the infrastructure as a gathering line, the point of
10 receipt and the pipeline extensions. And those costs
11 will be recorded into the utilities' memorandum accounts
12 and it will be eligible for cost recovery from the
13 utilities' customers.

14 All other costs associated, such as the
15 digesters and the cleanup facility are the
16 responsibility of the biomethane producer. Again, this
17 is just a proposal.

18 In terms of how the five pilot projects will be
19 selected, we propose a scoring criteria based on, number
20 one, business model, number two financial plan, and
21 number three greenhouse gas reductions, environmental
22 benefits, disadvantaged communities, and project
23 readiness.

24 So, we propose that we issue a solicitation
25 process. And based on the five highest score on these

1 selection criteria, we'll pick the five pilot projects.

2 So, the five pilot projects are responsible to

3 provide us various data, including costs to construct,

4 maintain, and operate the biomethane dairy projects.

5 And so, these data will provide valuable information

6 about the economic feasibility of the biomethane

7 productions.

8 So, please note this is just a proposal. The

9 CPUC will be holding two public workshops on July 10th

10 in Fresno. One will be around lunchtime and the other

11 one will be in the afternoon.

12 So, in the public workshop we'll be providing

13 more detailed information about this framework and we

14 will seek public comments. Written comments are due

15 August 4th.

16 The next slide, please? So, the BioMAT is a

17 feed-in tariff program for bioenergy generators, the

18 size of 3 megawatts or less. It offers a fixed price

19 contracts with utilities based on the kinds of

20 feedstock.

21 As you can see from the chart here, the biogas

22 from wastewater, fruit processor, and organic wastewater

23 diversions offer \$127.72 per megawatt hour. We

24 currently have a total of 5.5 megawatts from category

25 one, the municipal solid waste.

1 So, to be eligible for this program, the project
2 must be located in the utility's service territory and
3 have completed an interconnection impact study.

4 So now, I'll turn it over to Matt on the next
5 slide.

6 MR. EPUNA: Thank you, Dorris. My name is
7 Matthewson Epuna. I'm with CPUC, in the Gas Safety and
8 Reliability Branch.

9 The Commission does have a broad authority to
10 regulate all Investor Owned Utilities in California,
11 meaning all Investor Owned Utilities that have
12 intrastate gas pipeline, and also natural gas storage
13 facilities within California.

14 I do have to add a caveat on the natural gas
15 storage fields. The Commission does share jurisdiction
16 with Department of Oil and Gas and Geothermal Resources.
17 In that sense, the Commission has everything above
18 ground, meaning from the wellhead to the other scrub-in,
19 injection and transmission pipeline within the field,
20 while DOGGR has the other, from the wellhead down to
21 deep formation.

22 Anyway, one of the authorities that the
23 Commission has is the California Public Utilities Code
24 Section 701. It says that the Commission may supervise
25 and regulate every Public Utility in the State, and do

1 all things whether specifically designated in this part
2 or in the addition thereto.

3 So, given that, there are also other -- in
4 addition to this, the Commission does have certification
5 and agreement -- I'm sorry, next slide, please. So, I
6 said in addition to the Public Utilities Code, the
7 Commission does have certification and agreement with
8 the Federal Pipeline and Hazardous Material Safety
9 Administration, simply called PHMSA.

10 Through that certification and agreement the
11 Commission is required to enforce the Federal Natural
12 Gas Pipeline Safety Regulations. And these regulations
13 are just minimum, minimum standards. So, each state
14 within the union that does have this certification
15 agreement, it's also allowed to implement more stringent
16 requirements than that minimum Federal standard.

17 The next slide, please. In the interest of
18 time, I'm just going to quickly go through this.

19 So, the Commission then, with these authorities,
20 established General Order 112(f), which prescribes the
21 design of pipeline facilities, construction,
22 maintenance, and operation of all transmission gathering
23 lines and distribution facilities within the State.

24 In addition to that, the Commission also has
25 another general order called 58(a), which prescribes the

1 Gas Quality Standard that every utility must meet. And
2 these are particularly important, especially in entrant
3 points. Whenever there is an entrance to the
4 transmission infrastructure, there needs to be several
5 things done to verify that that gas entering into the
6 transmission system met certain gas quality standard, or
7 what we call pipeline quality gas.

8 The next slide. The question arose whether this
9 whole effort pertaining to SB 1383 is really worth it if
10 all the gas will leak out. So, to illustrate that
11 point, I'm trying to show that the natural gas pipeline
12 facilities do not leak as much gas as many may think.

13 I believe, according to the study or analysis
14 conducted by ARB, the pipeline portion of this was about
15 7.5 percent of the total greenhouse leakage in
16 California. So, in that sense, the pipeline facilities
17 only contributed about .75 percent of the greenhouse in
18 California, in 2015.

19 I've run out of time. I will discuss the next
20 slides in case anyone else has questions.

21 MR. BRADY: Hi, my name's Hank Brady. I'm with
22 CalRecycle. This is my colleague, Scott Beckner. We
23 are going to discuss the intersections of the waste and
24 the energy sectors, short-lived climate pollutant
25 strategy, the IEPR and SB 1383.

1 Scott's going to discuss some of the more
2 technical aspects, existing data, and tracking for
3 biomethane from the waste sector, and I'll give an
4 overview of SB 1383's organic waste reduction targets,
5 background on the waste sector and CalRecycle's
6 regulatory process in connections between the IEPR RNG
7 sections and the waste sector.

8 The next slide, please. SB 1383 codified the
9 most dramatic solid waste reduction targets in 30 years.
10 It requires a 50 percent reduction in disposal of
11 organics by 2020 and a 75 percent reduction by 2025,
12 with both of those targets tied to 2014 baseline, which
13 I'll discuss in a moment.

14 And also, less pertinent to the energy sector,
15 but critical to the overall methane reduction, is that
16 the legislation also directs CalRecycle to include
17 requirements to achieve a 20 percent improvement in
18 edible food recovery by 2025. And all of these goals
19 are essential to the SLCP's 40 percent methane reduction
20 target, of which the waste sector is expected to
21 contribute a 4 million metric ton reduction.

22 The next slide, please. And this slide just
23 simply notes that the legislation directs CalRecycle to
24 adopt regulations in consultation with the California
25 Air Resources Board, which is a process that we have

1 already begun.

2 The next slide, please. So, what do we mean
3 when we talk about organics? These are some basic
4 examples of organic material that's in the waste stream.
5 This is green waste, food waste, wood and paper,
6 biosolids, and manure.

7 You can go to the next slide, please. This
8 shows the percent of disposal that was organic waste in
9 2014. Roughly two-thirds, or around 20 million of the
10 31 million tons of disposal in 2014 were organic waste,
11 with food waste making the largest portion at 5 to 6
12 million tons. And paper also significant at 4 to 5
13 million tons, or 17 percent. This is the 2014 number.

14 If you go to the next slide, this is a look at
15 the previous five years that we have data for. Between
16 2014 and 2015 -- or, sorry, beginning in 2012,
17 disposal's been on an increase from year to year.
18 Disposal in 2014 was 31 million tons, as I mentioned,
19 and 2015 it increased to 33 and a half million tons,
20 which is the latest year that we have data available
21 for.

22 We've seen there's a strong correlation between
23 economic growth and disposal, indicating there's a
24 potential to increase in the future years, absent
25 regulations.

1 The next slide, please. This chart demonstrates
2 some of the significance of the 2014 baseline. As I
3 previously mentioned, in 2014, 20 million tons of
4 organics were disposed. The legislation requires a 75
5 percent reduction from that 2014 baseline of 20 million
6 tons, which essentially equates to a reduction to no
7 more than 5 million tons of organic waste disposal on
8 and after 2015, the 5 million being 25 percent of what
9 was disposed in 2014. And that number remains flat, so
10 as generation and population grow, the target becomes
11 more and more difficult to achieve as the years go on.

12 The next slide, please. These slides quickly
13 outline our timeline for regulatory development, as well
14 as key milestones in the legislation related to the
15 waste sector.

16 In 2017, CalRecycle, in consultation with ARB,
17 has been holding a series of informal workshops to vet
18 regulatory concepts. We had our third series of
19 workshops actually just yesterday. And we're looking to
20 develop draft regulatory language in the fall, and begin
21 formal rulemaking in 2018, with regulations to be
22 completed towards the end of '18 or early '19.

23 The first milestone is in 2020 and that's a 50
24 percent reduction, and it also requires that CalRecycle
25 and ARB complete an analysis of progress towards that

1 goal.

2 The legislation has the regulations taking
3 effect in 2022, which is two years after the first
4 milestone and three years prior to the 2025 target of 75
5 percent. And I'll go into the reason for our timeline
6 in just a moment.

7 So, go to the next slide, please. This slide
8 demonstrates a little bit of the main reason for our
9 timeline is that there's a lack of infrastructure for
10 recycling organic material, and the infrastructure is
11 expensive. Composting and anaerobic digestion range
12 from 8 to 15, and 30 to 15 million for facilities, and
13 our estimate is that there's a need for about 30 to 100
14 new facilities to recycle the material by 2025, and that
15 would range in the \$2 to \$3 billion.

16 That's part of why we're implementing our
17 regulatory process this year is to send a market signal
18 and indicate early what the regulatory expectations will
19 be to our stakeholders.

20 Skip the next slide and skip to the next slide,
21 please. Thank you. So, I'm going to close with a
22 couple of points which tie our initiatives back to the
23 IEPR.

24 SB 1383 requires and directs the IEPR to include
25 recommendations relative to priority end uses of RNG and

1 consider the waste diversion goals, including the SLCP
2 strategy and other goals. And State agencies, such as
3 CalRecycle, are to adopt policies relative to those
4 recommendations.

5 As it relates to the waste sector, recycling of
6 organic waste through anaerobic digestion could generate
7 between 20 to 30 billion standard cubic feet of
8 renewable natural gas or 17 to 18 million diesel gallon
9 equivalents.

10 We believe the IEPR and our regulations present
11 an opportunity for collaboration to work on expanding
12 anaerobic digesting infrastructure.

13 In our experience, in terms of increasing
14 recycling of materials and purchase of recycled products
15 requires a balance of ensuring feedstock security on the
16 recycling side and market demand on the purchasing side.
17 And this feedstock security surrounds developing
18 collection and processing standards that ensure clean
19 feedstock for anaerobic digestion or other organics
20 recycling.

21 And market demand can be achieved through
22 mechanisms such as carbon pricing, which is partially
23 addressed through Cap and Trade incentives, such as low
24 carbon fuel standard, and grants and purchasing
25 standards, which can take on a variety of forms and

1 depend on the product.

2 So, we appreciate the opportunity to consult and
3 look forward to continuing to work with the Energy
4 Commission, and all the other boards and departments
5 here today.

6 I'm going to transition to Scott on the next
7 slides.

8 MR. BECKNER: Thank you. So, shifting gears a
9 bit, I'm going to go over these slides pretty quickly.
10 These next three slides are three questions that I was
11 asked to touch on, from the CEC.

12 Briefly, CalRecycle gathers information from
13 everywhere we can. But of most importance to me, and to
14 my team, are our direct relationship with the CEC and
15 the ARB. In particular, the AB 118 and EPIC Program
16 staff we have a really great working relationship with.
17 And ARB's GGRG and low carbon fuel standard staff.

18 In addition to that, one of the best ways for us
19 to learn what we need to know to further our goals,
20 under 1383, is direct, candid communication with
21 facilities that are actually producing the biogas and
22 diverting materials. We learn so many great things,
23 including barriers, and issues they're having with
24 interconnect, or with feedstock contracts, et cetera.

25 So, possibly the most important way we utilize

1 what we learn through these conversations is to inform
2 our policy and our regulation development. And then,
3 helping guide all our work with other agencies in
4 addressing the barriers we come across.

5 The waste sector and biogas, in particular, has
6 some pretty significant barriers, and some public
7 perception. But as others have noted, there's huge
8 benefits that can be achieved for reducing methane from
9 landfills.

10 The third question we were asked to cover is
11 what data gaps and information gaps we have. If I could
12 boil it down to the most important info we need, it
13 would be in-depth case studies for facilities that are
14 in the process or have been through the interconnect and
15 power purchase agreement process.

16 And then, on to the major barriers slide, I'm
17 sorry I lost you there. Keep going. Great. So,
18 finally, this is kind of where the rubber meets the road
19 for us. Through outreach and the data gathering efforts
20 I've described, we're aware of a number of hurdles and
21 barriers to expanding waste sector biogas
22 infrastructure.

23 These include the fact that successful projects
24 will need long term, consistent feedstock agreements.
25 And SB 1383 related efforts should go a long way to

1 helping in this area.

2 Within the energy interconnect category,
3 including electricity and RNG, we've heard concerns from
4 project proponents about the cost and time required to
5 interconnect. In general, I think we need to ensure
6 consistency and transparency within these interconnect
7 and power purchase agreement processes, as well as we
8 need sufficient financial support for interconnect
9 costs. Such as the Biomethane Interconnection Incentive
10 Program that Dorris covered.

11 We also need to ensure that we are requiring
12 appropriate biomethane testing that's based on the
13 relative risk of each biogas source. And the CCST study
14 that's stemming from SB 40, hopefully will go a long way
15 to helping have appropriate testing requirements for
16 these.

17 And then, within the SB 1122 programs, we're
18 closely watching the impact of SB 840 for the category
19 three projects. SB 840 changed the way that the queue
20 works for them. And we're kind of waiting to see if
21 that might be a model to accelerate bringing category
22 one and two projects to fruition.

23 Finally, regarding the end use markets for
24 energy products, such as electricity, and CNG, and
25 biomethane, we consistently hear that there are

1 insufficient revenues for renewable energy products.
2 And we also hear from stakeholders that it's difficult
3 to secure long term end users for these products. And
4 that's because of a variety of reasons, historically low
5 fossil energy prices, uncertainty of the low carbon fuel
6 standard and RFS incentives, and lack of fleets to
7 actually utilize the RNG.

8 So, these projects aren't cheap. And ARB's
9 Short-Life Climate Pollutant Plan estimates that 100,000
10 tons per year, digester costs around \$50 million, give
11 or take. Consequently, long term contracts for
12 feedstock and product off-take agreements are vital to
13 finance the capital investments needed. Because a lot
14 of the other financial supports these get aren't
15 thinkable, they can't finance on them.

16 So, in summary, 1383 requires CalRecycle to
17 consider the IEPR recommendations and then, as
18 appropriate adopt policies and incentives to
19 significantly increase reduction end use of biomethane
20 as it relates to waste diversion goals.

21 We appreciate the opportunity to participate in
22 this work group and look forward to considering the
23 recommendations included in the IEPR. Thanks.

24 CHAIR WEISENMILLER: Thanks. Next.

25 MS. JOSHI: Good morning. My name is Geetika

1 Joshi and I'm with CDFA's Office of Environmental
2 Farming and Innovation.

3 So, really here we've already heard from Deputy
4 Secretary Moffitt about that 8 percent of California's
5 greenhouse gas emissions come from agriculture and
6 methane forms a significant chunk of those emissions.

7 And in the light of that background, this is a
8 really important opportunity, especially for dairy and
9 livestock sector that have a target applied to them
10 through SB 1383 to reduce their methane emissions to 40
11 percent of 2013 levels, by 2030. That it is really
12 important for our role, in coordination of the Air
13 Resources Board, Public Utilities Commission, as well as
14 Energy Commission towards meeting these targets.

15 And while everyone on the panel has really
16 covered the important timelines and key dates associated
17 with a lot of different efforts going on, especially
18 with the Dairy Methane Workgroup that's being led by Air
19 Resources Board, in collaboration with CDFA, so I will
20 focus really on CDFA specific activities for this piece
21 of the talk.

22 So, can we go to the next slide, please? So,
23 CDFA currently has two incentive programs that are
24 targeted towards incentivizing development of dairy
25 digesters, as well as non-digester technologies, to

1 reduce methane emissions from dairy and livestock
2 operations.

3 So, the first program, the Dairy Digester
4 Research and Development Program, has been around since
5 2014. And the Alternative Manure Management Program is
6 being developed as we speak currently, as funds were
7 appropriated to develop this program in 2016.

8 In addition to that, there have also been
9 efforts to support research on various methane reduction
10 strategies and research projects related to that, at
11 CDFA. I will touch upon them a little bit, too,
12 shortly.

13 CDFA has also been organizing International
14 Climate Smart Agriculture webinars in relationship with
15 Netherlands, Israel, and other countries. And some of
16 our webinars have focused on opportunities for new
17 technologies for dairies and potentials to explore
18 renewable energy production and methane reduction at
19 dairies through those efforts, as well, to really
20 understand what's going on in the world and could we
21 learn from them while we're trying to meet these targets
22 here in California, as well.

23 And finally, we would also highlight the
24 California Healthy Soils Initiative. This is an effort
25 that's being led at CDFA, in coordination with a variety

1 of State agencies, CalRecycle, the Water Boards, Air
2 Resources Board, et cetera. And one of the aspects
3 being covered within the Healthy Soils Initiative, and
4 through CDFA's Healthy Soils Program is incentivizing
5 compost application on California range lands and crop
6 lands. And to that effort, there's also been
7 development of eligible compost application rates for
8 the Incentive Program.

9 And this development of compost and
10 incentivizing compost, too, kind of ties in, in many
11 ways to also reduction of compost, which in turn relates
12 to management of manure at dairy and livestock
13 operations, too. So, that's another angle that we're
14 looking at over at CDFA.

15 So with that, could we go to the next slide,
16 please? So, just covering a little bit more in detail
17 about the Dairy Digester Research and Development
18 Program. The objective of this program is
19 implementation of digesters that will result in long
20 term methane emission reductions on dairies and minimize
21 or mitigate adverse environmental impacts associated
22 with these projects.

23 So, this program started in 2014. And in 2015
24 six digester projects were awarded funding through these
25 dollars that are from the Greenhouse Gas Reduction Fund.

1 So, \$11.1 million total were awarded to projects.

2 On the table, on your right, is a list of all of
3 those projects, if you'd like to look at the details.
4 At the time, all the projects that were funded through
5 this program were looking at converting methane into
6 renewable electricity.

7 And about \$19 million in matching funds were
8 provided by the industry as a match to these projects,
9 when awarded.

10 So, in this current round of funding, in 2017,
11 the application process is still open for this program,
12 closing tomorrow, June 28th. CDFA will award between
13 \$29 and \$36 million to digester projects through this
14 round.

15 And as I mentioned, there's a requirement of
16 minimum 50 percent cost share and we saw much greater
17 than 50 percent cost share coming in from industry funds
18 for this program.

19 Some of the projects that we've seen in the past
20 were also co-funded through the Energy Commission's EPIC
21 Program, so that's another partnership that we would
22 like to highlight and we appreciate in this program.

23 One of the requirements, as part of the Dairy
24 Digester Program, especially starting 2016 onwards, is
25 that there is a requirement for projects to conduct

1 community outreach and evaluate the environmental
2 impacts of these projects.

3 There is community outreach assistance also
4 provided through an effort that's funded through the
5 Strategic Growth Council, again using GGRF dollars
6 towards that process, as well.

7 So, the next slide, and we'll take a few moments
8 to talk about our other dairy methane related program,
9 the Alternative Manure Management Program. So,
10 alternative being here the key word and it really
11 implies non-digester technologies. So, the objective of
12 this program is to incentivize the adoption of non-
13 digester manure management practices that will reduce
14 greenhouse gas emissions for California's dairy and
15 livestock operations.

16 And this is a new program. It's going to start
17 this year, currently under development. \$9 to \$16
18 million will be available in funding to projects through
19 this program. And we're anticipating requests for
20 applications being released later in the summer, this
21 year.

22 The proposed award amount per project would be
23 \$1 million. Also for this program with a cost share
24 being strongly encouraged as well. And these projects
25 will also not only be looking at greenhouse gas

1 emissions, but will also be evaluating environmental
2 protection, air and water quality protection through
3 their implementation.

4 There are a variety of different manure
5 management practices that are not anaerobic digestion
6 that can reduce methane. And they are currently being
7 evaluated, as well as we're working closely with
8 colleagues at the Air Resources Board to develop
9 quantification methodologies so that we can have an
10 estimate of greenhouse gas reductions through
11 implementation of those technologies.

12 So, a list of those practices that are currently
13 under evaluation is on the right, in that table. Some
14 examples are essentially covering -- the idea of
15 switching from a wet type manure management system,
16 where manure under anaerobic conditions makes methane,
17 to going to drier systems. And that could be achieved
18 by either switching to scrape systems, or solid
19 separation, followed by drying of the material, or
20 composting of the material, and so on. So, several of
21 these practices are being evaluated through that
22 program.

23 The next slide, please. So, that's the final
24 slide and this is just quickly covering the research
25 projects that have been funded by CDFA recently. Also,

1 to support manure management and methane reduction on
2 dairies, or side pieces that are important to achieving
3 these methane reduction goals.

4 So, the Dairy Digester Research and Development
5 Program, in 2015-16, also had funded a research project,
6 along with the six dairy digester products. The title
7 of the project funded is "Converting Manure to Reduce
8 Greenhouse Gas Emissions Minimizing Environmental
9 Impacts and Enhancing the Economic Feasibility of Dairy
10 Operations."

11 And the focus of this project is to look at a
12 method of manure conversion and evaluate it using
13 various criteria, such as greenhouse gas emissions. And
14 this project is being led by Professor Will Horwath, at
15 UC Davis.

16 In addition, the CDFA's Dairy Marketing Branch
17 also funds research projects. And in the recent past
18 two projects for Dr. Ruihong Zhang, at UC Davis, have
19 been funded as well to really evaluate the production of
20 co-products from digested material, digestate, and also
21 looking at effects of solid separation on manure methane
22 emissions which is, again, important and ties into the
23 Alternative Manure Management Program, as well.

24 So, that is the end of my slides, but in
25 conclusion I would say we're working closely with our

1 colleagues at the Air Resources Board in coordinating on
2 the Dairy Methane Workgroup process required with 1383,
3 and really appreciate the opportunity to participate in
4 this process, in today's meeting as well. Thank you.

5 CHAIR WEISENMILLER: Thank you. I wanted to
6 thank everyone for providing some context. I do need to
7 encourage, yeah, in terms of as we go through the
8 different panels, when people hand up the "end slide"
9 that means end. That doesn't mean ignore them or
10 otherwise we'll never get today done.

11 The other thing, just in terms of context, again
12 we went through this on the Barriers Report. Basically,
13 if you have issues, say, with CalRecycle, please deal
14 with them in their proceeding. I'm trying to stay more
15 at the 40,000 foot level, as opposed to getting into the
16 nuts and bolts of the various programs, at the various
17 agencies, in the IEPR context. And again, we're trying
18 to see how the pieces fit together, but the precise
19 details I'm sure will be -- should be addressed in the
20 appropriate proceedings, as opposed to this forum.

21 We're sort of running a little late, but I
22 wanted to see if anyone has any questions or comments.
23 Sure?

24 MR. GONZALEZ: Dorris, in your slide you
25 mentioned, you know, after the CCST contract is executed

1 and the timeline for that, but do you have an
2 approximate date on when that contract would be
3 executed?

4 MS. CHOW: Well, currently it's in our Contract
5 Office Department, so it's out of Energy Division's
6 hands. So, I don't know when that will be out.

7 MR. GONZALEZ: Okay. So, like within weeks
8 potentially. We'll check in on that.

9 And then, I just want to understand how
10 important that study plays because you have other
11 proceedings going on, or potential proceedings. And so,
12 does that feed into the five pilot projects? Does it
13 feed into other proceedings where that study, you know,
14 given its timeline and the associated rulemaking, does
15 that then play into other projects or proceedings that
16 you outlined in the presentation?

17 MR. CHOW: Right. So, it depends on when the
18 study comes out and when the CPUC opens a proceeding
19 that reexamines the Biomethane Injection Standards.
20 Once the Commission issues that decision, depending on
21 the effective date and wherever our other proceedings
22 are going on that would apply during that time. So,
23 it's hard to say.

24 MR. GONZALEZ: It will lead into other
25 proceedings?

1 MS. CHOW: Yes.

2 MR. GONZALEZ: Okay.

3 MS. CHOW: But in terms of the five dairy pilot
4 projects, in this rulemaking we're just soliciting five
5 dairy pilot projects to be interconnected. Depending
6 when that's further along the line of the five selected
7 projects, the constructions and everything, we'll see by
8 then. I can't give you a timeline on that.

9 MR. GONZALEZ: No, no, but that's enough. Thank
10 you.

11 CHAIR WEISENMILLER: Great. Again, thanks for
12 your contribution. Encourage everyone to provide
13 written comments on this.

14 Let's go on to the next one, thanks.

15 MS. RAITT: So, our next panel's on the
16 Potential to Develop Methane Biogas and Renewable Gas to
17 Produce Electricity and Transportation Fuels in
18 California.

19 MR. OLSON: And we have two speakers for this
20 panel. I'm going to be a moderator. I'm Tim Olson.
21 And Amy Jaffe will be the first speaker, and if Phil
22 Sheehy could come up to the table, we'd appreciate it.

23 So, let's start with Amy. This panel is to
24 address some of the growth potential in all these
25 different sectors. And Amy, if you could sit at the

1 table, the slides will be turned for you back here.

2 MS. JAFFE: Okay.

3 MS. RAITT: Just as a reminder, we do have extra
4 seating in the Imbrecht Hearing Room, which is across
5 the atrium, and you'll be able to hear all the
6 presentations and hear the slides from there.

7 MS. JAFFE: Well, Chairman Weisenmiller, thank
8 you for the invitation. And to all of you, our audience
9 and guests, it's a pleasure to be here to talk about
10 this subject. I do think it's an important subject. It
11 is one of the resources that the State has that could be
12 very commercial in providing lower carbon fuels into the
13 transportation sector. So, I'm going to talk about that
14 a little bit this morning.

15 So, the next slide. Just again to redefine
16 which resources we looked at, we do have data on woody
17 biomass and we have not done an economic analysis on
18 what potential that has to move into the transportation
19 sector, but that's work that we could perform if there
20 was an interest.

21 The next slide. I think the first thing that
22 it's important for me to discuss with you this morning,
23 before showing you the basic data, is this difference
24 that people have difficulty with, between what is the
25 resource in total? What is the resource that if you

1 would take a cost number seems to be commercially
2 viable? And what is the resource that is actually
3 commercially viable when you start thinking about the
4 economies of scale of transporting the resource to
5 market, and cleaning it, and all the different
6 requirements that you have.

7 And I find that when people talk about this
8 subject they use all three of those categories
9 interchangeably. And they're not interchangeable.

10 And I take this opportunity to speak beyond
11 renewable gas because it's a particularly important
12 distinction in renewable gas, but to speak about it in
13 general, about California's goals for renewable energy
14 in general, and even for national, U.S. goals.

15 Because there have been a lot of publications in
16 the science community that take the physical resource,
17 look at the cost for producing that physical resource in
18 the place where it's located, and completely disregard
19 the competitive situation for other fuels that are
20 available in those same markets, or contiguous markets,
21 the cost of transportation, and the competitive cost of
22 handling and transportation.

23 And when you look at the question that we have
24 before ourselves today, which is how much resource is
25 available? What kind of either incentive, or market

1 price, or carbon credit, or subsidy the State needs to
2 provide to make that resource commercial?

3 There tends to be this disconnect where I might
4 give you a presentation about what it would take to make
5 an actual investor want to do this resources. And there
6 will be someone here who's representing a group that
7 either likes that resource, or collects up all the
8 producers of that resource, and they will say that my
9 resource estimates are too low, or that the amount that
10 I'm saying could be commercial is too low.

11 And that is because they're not actually talking
12 about the same definitional thing. We're not talking
13 about how much physical manure there is, or how much
14 physical landfill gas there is. We're talking about, of
15 the physical product that exists how much would a
16 reasonable investor come and clean up that resource, and
17 bring it to market for a particular purpose?

18 For our purposes, when we do our modeling, we
19 use a 12 percent commercial rate of return as a
20 consideration because, typically, that's what the energy
21 industry is looking for.

22 To give you an idea, in the old days the oil and
23 gas industry used to be able to get a 17 percent rate of
24 return. And that is the kind of rate of return they
25 look for when they invest in refining, or other kinds of

1 fuel investment.

2 But we felt the 12 percent was sort of a
3 reasonable business profile. Obviously, there's some
4 businesses that think they're going to get 12 percent,
5 and they wind up getting 6 percent or 7 percent.

6 Some scholars, when they do work, McKenzie, for
7 example, did a big study on renewable energy and carbon
8 abatement, and they used the public discount rate of 3
9 percent. I don't think it's realistic to think that a
10 business is going to invest for a 3 percent return.

11 So, the State might invest for a 3 percent
12 return, but a business is not going to invest for a 3
13 percent return. And I just wanted to make that
14 distinction when I, you know, provide these data of what
15 are the numbers that we projected could be achievable in
16 a market, where we had twice as many natural gas
17 vehicles on the road as we currently do. Which is also
18 an iffy, you know, will we, won't we get there?

19 So, the State has a very large renewable gas
20 potential. Probably when we talk about this 90.6 Bcf
21 per year, that's probably understating it a little bit
22 because we really are just looking at the resource that
23 we believe could be theoretically commercial.

24 When we work to understand which locations had
25 sufficient volume readily available, that could be

1 cleaned up at a cost that would be supported by the LCFS
2 credits, or renewable fuel credits, federal renewable
3 fuel credits what we found was that without the
4 renewable fuel credits, so assuming -- you know, not
5 assuming in the Federal program, about 14 Bcf would be
6 able to be achieved into the market by 2020.

7 And that was based on \$120 per metric ton of CO2
8 LCFS credit.

9 If you add in the RINs, maybe it could be four
10 times higher, if the RIN credit program were to remain
11 and be consistent with the kind of levels we've seen,
12 historically.

13 We also found that if the State were to come up
14 with some way of encouraging or regulating that tipping
15 fees in key locations would be increased by 20 percent,
16 either through tax or having a floor price for tipping
17 fees, that that would also incentivize higher volumes of
18 municipal solid waste coming into the system.

19 Since you're already moving in that direction on
20 waste policy in general, and given the fact that there's
21 so much landfill gas in and around L.A., and other
22 basins, that would not be affected. I mean, in other
23 words, it's such a large resource that you'd be able to
24 use it for five or ten years without -- even if the MSW
25 wasn't be replenished into that site, I don't see the

1 two things as being related.

2 Again, people say, well, if you're going to do
3 all of this to incentivize the MSW into digesters, it
4 means that you won't have enough landfill gas. But, you
5 know, that landfill's been sitting there an awfully long
6 time, and there's a very big resource that will be there
7 for at least some period of time without replenishment.

8 And, you know, as other presenters have already
9 talked about, California has this very high pipeline
10 interconnection charges, much higher than other states,
11 and I'll show a slide on that if there's an interest.
12 And our operating standards for the gas are very, very
13 strict.

14 And so, what you're basically having is the
15 State has incentivized renewable gas into the system,
16 but has very, very high standards for domestic, local
17 California gas. And so, you're basically subsidizing
18 through our carbon credits, and elsewhere, other kinds
19 of programs, the RINs, Texas gas, Texas renewable
20 biofuels, biomethane gas to come to the State of
21 California. Right, because these other restrictions
22 make it that the California-based renewable gas can't
23 compete with the same product injected into the pipeline
24 in Texas.

25 So, final most basic principle is that the cost

1 of production for this resource is directly correlated
2 with the size of the resource and its proximity to
3 market. Right? So, I know there's a lot of interest in
4 promoting the dairy industry to provide renewable gas,
5 but if you're talking about small farms that are very
6 far apart, and you're needing to collect that gas on a
7 very small scale, that's going to be somewhat
8 prohibitive in terms of the cost of doing that.

9 And there's some resource in the State that's
10 large enough to overcome that, but a lot of the smaller
11 production sites are going to be very challenging,
12 economically, to find a commercial way to bring that to
13 bear into this market.

14 The next slide. So, just a few data slides, I'm
15 going to go through these very quickly and then I think
16 our time would be better served for questions.

17 So, we are using more natural gas in vehicles in
18 the State. There is, there had been some momentum that
19 came to even bring natural gas into the heavy trucking
20 industry because of air pollution and other kinds of
21 considerations there's a push for natural gas around the
22 ports, and other kinds of air quality districts. So,
23 there is momentum, as you can see from this chart.

24 The next slide. Part of that momentum came from
25 the gap between oil prices and natural gas prices. Of

1 course, when oil prices were very high and natural gas
2 prices were relatively low, because we have so much
3 domestic natural gas, the market didn't really need a
4 push at all, or just a small push to get people to
5 convert.

6 Now, because the oil prices are lower, the gap
7 is narrower. We used the futures curve -- you know,
8 this work is a year old, so probably the gap is narrower
9 now.

10 But I do mention the gap to you because just
11 because diesel prices are low doesn't necessarily mean
12 that the gap between natural gas and oil prices won't be
13 encouraging switching because there's so much natural
14 gas in the United States. We're going to have a lot of
15 gas in the Permian Basin of Texas. There's a play
16 called the Niobrara Play, which is in the Western U.S.,
17 like Colorado type region. And then, of course, Western
18 Canada has all this natural gas with no home.

19 So, really, fundamentally, the question is, in
20 terms of the pricing for natural gas, in California
21 maybe there's going to be an inclination to move away
22 from natural gas as a feedstock in general, and as a
23 feedstock for electricity. That could wind up cratering
24 the price of natural gas even more which, you know,
25 makes the gap between natural gas and oil wider.

1 And so, all these things are very dynamically
2 related and I mention it because, again, somebody's
3 likely to say, well, you know, their study doesn't make
4 any difference anymore because the gap between natural
5 gas prices and oil is shrinking. And that's true.

6 But futuristically, you might have such a low
7 natural gas price that the gap might still be, you know,
8 somewhat commercial.

9 The next slide. So, we looked at -- the first
10 step is, of course, to look at where would be commercial
11 places in the State to have natural gas refueling for
12 liquefied natural gas, or compressed natural gas? Both
13 of those technologies are relatively commercial in the
14 State of California.

15 California has a really interesting advantage in
16 putting gaseous fuels into its trucking industry. In a
17 lot of other locations in the United States there might
18 be a lot of gaseous renewable gas, and a lot of gaseous
19 fossil gas, but they've millions of highways that go in
20 different directions. And the cost of putting in
21 stations for trucking is very expensive because you have
22 to have a certain amount of stations to make the network
23 viable.

24 In California, we're almost like a train track.
25 So much of the volume of our freight industry goes up

1 and down I-5 that the number of stations you need to
2 have a commercial, gaseous fueling network in California
3 is very small. And already, you know, you've seen big
4 players come in here and put in stations. And many of
5 you probably saw the announcement, a few months ago,
6 that British Petroleum, even, was investing in renewable
7 gas nationally. And I'm sure that they have an eye to
8 participate in the California market.

9 The next slide. The thing that makes renewable
10 gas attractive is that if you're already having a
11 network of natural gas in vehicles, and you could
12 substitute a good measure of that, which our research
13 shows you could do with renewable gas, you know, once
14 the gaseous material hits the pipeline it's methane.
15 And, of course, methane is a high pollutant. But
16 because you're offsetting, sort of on a lifecycle
17 analysis, you're offsetting emissions that might have
18 happened. So, landfill, that methane is leaking into
19 the atmosphere and so, therefore, it's higher. And when
20 you take it and use it in a form, and burn it or use it,
21 then at least you're getting -- you're substituting
22 other emissions and you're preventing just the full
23 leakage of the methane.

24 So, that's sort of the advantage of putting
25 renewable gas into the system. It's basically the

1 emissions that you're saving from what would have
2 happened to that renewable gas, had you not intervened.
3 Is that clear? That's kind of a confusing concept, but
4 that's the concept. So, you're avoiding the initial in-
5 state emissions and you're replacing it with some level
6 of emissions, but a reduced emissions because through
7 use.

8 The next slide. So, you know, just so you know
9 for your reference, we have some resource-in-place
10 estimates. My colleague, Steve Kafka's here. If
11 anybody has a question on the actual size of the
12 resource, he's probably better placed to speak about
13 that, than I am.

14 The next slide. We took that resource and we
15 tried to create supply curves to understand how much of
16 that resource can be made available at different prices
17 in the market.

18 And you can see, for most of this supply, with
19 the exception of landfill gas, it's quite expensive to
20 bring a high volume of this material into the
21 marketplace.

22 The next slide. So, we did specific
23 calculations, in 2015 dollars, assuming 120 low carbon
24 fuel standard price, average price, how much gas could
25 be provided into transportation, into trucks based on

1 some kind of a credit that would be needed to make it
2 competitive to fossil natural gas. And you can see the
3 relative difference. And you can see the dairy needs a
4 \$26 incentive, on average, to move it into the
5 marketplace. Whereas, with landfill gas the incentive
6 is pretty limited and would certainly be covered by the
7 different kinds of -- you know, the Cap and Trade
8 credits, and the RIN credits, and LCFS credits, and so
9 forth, if it's pretty commercial.

10 Okay, the next slide. This map sort of gives
11 you an idea of the location of the resource that was
12 commercial under that chart I just showed. So,
13 obviously, there's a concentration in Southern
14 California.

15 And what I would say to you is what makes --
16 again, going back to my original remarks, the larger the
17 resource and the closer it is to the marketplace where
18 it's being used, the more commercial it is. I mean
19 that's just a given. And so, that's why this large
20 landfill resource that's down in Southern California is
21 the most attractive resource to produce first.

22 The next slide. And then, you can see that
23 California tipping fees are low compared to other
24 places, relatively low compared to other states. And
25 so, again, we looked at intervention in that market,

1 either whether that would be commercial intervention or
2 whether it would be regulatory intervention.

3 You can see that in our view a 20 percent
4 increase, like say you put a 20 percent -- you took all
5 the tipping fees from around the State and said that
6 you're making a floor 20 percent higher than the current
7 tipping fees. That would provide an increase in MSW
8 from 1.75 Bcf a year, to a 12.4. So, it's pretty
9 substantial.

10 Intervention could be done by being a little bit
11 more proactive into the waste business in California.

12 The next slide. I think that might be my last
13 slide. And then, this is just we did some sensitivity
14 analysis for the amount of renewable gas in general,
15 that would be commercial to come into the market per
16 different levels of the low carbon fuel standard.

17 Okay. Oh, I have one more slide. Oh, this is
18 just a data slide, in case there were some questions
19 about where the raw resource is located geospatially.

20 MR. OLSON: Okay, thank you, Amy.

21 And now, Philip Sheehy from ICF International.

22 MR. SHEEHY: Chairman Weisenmiller and everybody
23 up there, thanks for having me today. Tim thanks for
24 organizing the workshop. Oh, that's the end. We skipped
25 my time. Thank you, Amy, for taking -- no, I'm just

1 kidding. All right. Is this the PDF or the Power Point
2 version, just to make sure we're on the same page? Oh,
3 thank you.

4 All right, my name's Phil Sheehy. So, I've got
5 my colleague's name up there, too, Jeff Rosenfeld. He
6 does a lot of work with me on the renewable natural gas
7 space. He also offers me an escape goat. In the event
8 of any mistakes I make, I will blame Jeff. He's in the
9 audience today.

10 So, the next slide, please. We'll just get
11 right in to some of the questions that we were asked.
12 I'm not going to read those. But basically we're trying
13 to figure out how much biogas can be developed in
14 California and at what cost, is kind of what we're
15 getting at here, with a mention of the submarkets. That
16 Amy's already talked about some of those.

17 So, the next slide. A brief introduction to ICF
18 to give you an idea of my perspective on this because I
19 think Amy made some very good points at the outset of
20 her presentation. That I think, you know, I think that
21 the perspective that people are bringing to this is
22 dependent on who they're representing, or what advocacy
23 group or, you know, what their view is as it relates to
24 whether that be carbon reductions in a post-2020 world,
25 or what type of economic development they're seeking.

1 You know, everybody's got an angle and I think that's an
2 important thing to recognize, especially when you're
3 talking about a resource assessment as it relates to
4 biogas potential. So, I think I just wanted to echo
5 that and put our cards on the table, at least, to make
6 sure folks understand what's coloring our comments.

7 So, ICF works in these four main areas. We've
8 done work with about 25 to 30 clients in the renewable
9 natural gas space over the last 24 to 36 months.

10 So, we tend to work with investors, fuel
11 suppliers, utilities, and one of the biggest areas that
12 we operate in is in the lifecycle analysis area. So,
13 people that are selling fuel into California, selling
14 renewable natural gas into California, we do the fuel
15 pathway certification for them.

16 So, they've already made the decision to invest,
17 they've already got gas and they want to bring it to
18 California. So, you know, we're dealing with folks who
19 have already made that investment.

20 We also work with investors who are trying to
21 understand the interplay between the Federal Renewable
22 Fuel Standard and the Low Carbon Fuel Standard in
23 California. So, people who are trying to figure this
24 out, figure out what their value proposition is. But
25 again, they probably are close to making that

1 investment.

2 We're not working with you know, aggregates of
3 dairy farmers or folks who are, you know, trying to get
4 some of these projects off the ground. We're dealing
5 with people who have capital and are already pretty
6 smart in these markets, and we're just adding some value
7 at the margin, I would argue.

8 So, we do a lot of work in -- and most of that,
9 just to be clear, is in the LCFS space. So, my comments
10 are also colored by getting -- you know, the previous
11 slide, the question included renewable gas for a variety
12 of end uses, but I'm somewhat biased, to some extent
13 based on our work experience in the transportation
14 space. So, just again putting that out there so people
15 know where my comments are coming from.

16 The next slide. So, we did a resource
17 assessment. Again, I think that at this point, I think
18 to operate in California you have to have an RNG
19 resource assessment. It's like obligatory for
20 everybody. So, not to talk too much about
21 electrification, but you've got to have like an EV
22 forecast. If you're a consultant, that's like a box you
23 have to check. And you have to do three of them. I
24 don't know why, but anyway.

25 So, I've got a range here. It's a big difficult

1 to read. So, you know, basically we come down in a
2 similar region as what Amy had. One of the differences,
3 I would argue, is -- or not argue, but note is, so the
4 left most part of that table there, UC Davis, I should
5 re-label that. That's actually a collaboration between
6 the California Biomass Collaborative and Davis. So, I
7 believe that work informed what Amy's team did, but I
8 don't think it's -- there are differences. And that
9 falls more towards like that technical potential she was
10 talking about, rather than economic potential.

11 So, that's not to throw shade at, or whatever
12 the appropriate term is on that study. Again, just like
13 putting it out there. And this echoes, again, Amy's
14 point that there's a variety of forecasts or resource
15 assessments out there that capture the range of
16 potential futures as it relates to renewable gas.

17 We fall in this range of -- you know, we cover
18 ourselves a little bit. We had a factor of 205 to 210
19 Bcf per year.

20 Again, another one of the main differences
21 between what I'm talking about and what Amy mentioned is
22 that their study, the ITS study didn't -- not that it
23 didn't include, it focused on anaerobic digestion of
24 manure, then also landfill gas, MSW and wastewater
25 treatment gas. Our table also includes forest residue

1 and AG residue, so that would be through a more -- that
2 would be through like thermal gasification.

3 But just to be clear, you know, again we agree
4 with the findings of ITS, the near-term potential is on
5 AD technology. So, about 65 percent of our resource
6 potential sits in that anaerobic digestion bucket. So,
7 just to clarify there.

8 So, the next slide, please. Okay, so here's the
9 cost curve that we've got. It's a little faint. I need
10 to darken that up the next time we give this
11 presentation. So, we did the full 2010 Bcf that we want
12 to do here. This is Bcf annually. Dollar per MMBTU in
13 the vertical axis.

14 You know, again, the prices are pretty similar.
15 You know, you can get this stuff online from \$8 to \$90
16 in MMBTU. This is the free market world. This is why
17 there is low participation of renewable gas providers in
18 the market. It's expensive. Not that surprising.

19 Can you click through, now? So, just to give
20 folks some context -- oh, wow, you're going too fast.
21 So, yeah, that's fine, just there.

22 So, again, I just called that out there. So on
23 the horizontal, you know, we're looking at, again, we
24 developed our potential around 200 Bcf. California used
25 about 15 Bcf of natural gas in 2016. It's probably

1 closer to 16 Bcf, but 15's easier to remember for me.

2 So, I think it's important. I was somewhat
3 surprised I think I beat folks to this. This slide, you
4 might see various versions of it, but the stacking of
5 environmental commodities, why this is even coming in
6 play. You're getting, you know, four to five bucks in
7 MMBTU from the Low Carbon Fuel Standard. And again,
8 that's for landfill gas. The 35 grams per megajoule,
9 that's for landfill gas, largely from out of state.

10 So, you're getting like, you know, five bucks an
11 MMBTU there. But then the RINs, from the Federal
12 program, again you can stack these because you're
13 selling two different types of commodities. The RIN is
14 like a renewable fuel volume and the LCFS is actually
15 the GHG attribute so that you don't have to choose.

16 You know, you get upwards of the non-dotted
17 line, the straight pink line, which is, you know, 35
18 bucks an MMBTU, 35 to 40 bucks an MMBTU.

19 So, the question is, so click through one more
20 time, you know, why isn't all that gas below it coming
21 online? Right, that would be the simple economics. But
22 the fact is that there's so much variability in the LCSF
23 and RIN, and so much uncertainty nobody finances against
24 those, just to be clear. Like we face that challenge
25 all the time. We do investor reports and forecasting

1 for folks and, you know, we might do a forecast that
2 shows that LCFS will run up to 200 bucks a ton.
3 Investors don't -- they don't look at their internal
4 spreadsheets, never say \$200 per ton. Just so people
5 are clear about the value. And RIN's very rarely a --
6 like they're applying very steep discounts to these on
7 the ongoing value with this commodity.

8 So, the next slide, please. Yeah, so just step-
9 wise, yeah, you get -- so, our work -- yeah, keep going.
10 Yeah, stop there, please.

11 So, this is just illustrative. But, basically,
12 you know, walking up the curve, step-wise, landfill gas
13 to wastewater treatment, and then MSW, or source
14 separator organics, dairy manure or animal manure, and
15 then thermal gasification. That's the supply curve.

16 So our clientele effectively reflects, in my
17 opinion, this supply curve. The folks that are coming
18 online -- the next, please. That's the mix of our
19 clientele. It's the resource by the number of clients,
20 by the number of facilities they represent.

21 So, we've got 9 to 10 clients who bring in
22 landfill gas, but they're representing more than 20
23 facilities, right, so you're on the short part of that
24 supply curve.

25 We're starting to talk to folks about wastewater

1 treatment, also about MSW. We actually just got the
2 first animal manure -- or the lowest carbon fuel in
3 California, the carbon intensity was just posted last
4 week. That's not a fuel from California, just as a side
5 note. But again, we're walking up that curve. But
6 again, this is all out of state, right.

7 So, we anticipate that absent some sort of
8 intervention or absent some sort of very defined
9 policies that somehow, you know, modify the approach
10 that you're going to see -- you know, the question posed
11 was what's the development in these submarkets? This is
12 what the development's going to look like, this supply
13 curve. Absent some different valuation or absent some
14 intervention that tilts the value in a way that values
15 the component of that fuel in a way that you would like.
16 Whether that be the environmental commodity, the
17 economic development opportunity, but whatever it is you
18 need to figure out how to value the attribute associated
19 with that fuel if you want to switch this supply curve.

20 So, the next slide. So, yeah, so this is -- I
21 basically copied Amy's slide, except I put it in million
22 diesel gallons equivalents, instead of Bcf. So, now, I
23 can do unit conversions, basically. I like this one
24 because it shows you percent RNG in the market. We're
25 up to 60 percent, now.

1 The next slide, please. So, why is it like
2 this? You know, so this is not out of the goodness of
3 investors' heart. And this is not because of the LCFS.
4 That's the other thing, just again, so everybody's on
5 the same page I think it's important that we not focus
6 exclusively on California and operate in a vacuum here.

7 In 2013, EPA says that biogas is RIN eligible.
8 So, in 2015 they say, hey, you generate D-3 RIN, and
9 those are really valuable especially when gasoline
10 prices are low. At 250 a RIN right now, it gives you 25
11 to 30 bucks an MMBTU.

12 So, basically, you've got a bit of a gold rush
13 getting into, you know, renewable natural gas into
14 California.

15 So, hit the next. So, L.A. Metro executed a
16 contract recently to deliver, you know, 35 to 40 million
17 gallons equivalence of natural gas into their 2,200
18 buses. Assuming, for the natural gas folks in the room,
19 if you assume constant natural gas use, don't quote me
20 on that. But just again, for the sake of simplicity, if
21 you assume constant natural gas use in transportation,
22 that puts you at 88 percent of the California market is
23 renewable natural gas in the transportation sector.
24 We're running out of places to put the renewable natural
25 gas, basically.

1 The last 12 percent is, you know, mom and pop
2 shop gas stations, and stuff like that. So, those will
3 get picked off, but it's diminishing returns in terms of
4 pushing this fuel in the market.

5 So, all of the sudden we're going to live in a
6 world in which you're pushing landfill gas out. You're
7 not pushing fossil gas out of the transportation
8 anymore. You're going to be pushing landfill gas out
9 with dairy gas, or wastewater treatment gas. So, you're
10 going to be fighting over grams per megajoule,
11 basically, rather than facility.

12 So, the next slide, please. So, key factors for
13 us. I think this is not a groundbreaking point, but I
14 just think it's worth mentioning. You know, the market
15 will not expand absent some policy intervention that
16 values the environmental benefits.

17 We're seeing that in, again, the RINs and LCFS,
18 but we're running out of head room in those markets.

19 So, this is somewhat self-serving. So, just to
20 be forthcoming, we're doing some work on a renewable gas
21 standard. But you basically need a complementary policy
22 that is going to enable and support success that has
23 already happened in the RIN and LCFS market. You know,
24 these kind of one-off incentives that interconnect, and
25 things like that, aren't going to move this -- they're

1 not going to move this market, I think, just to be
2 frank.

3 The amount of capital there, you know, just to
4 get a project going the capital will arrive, but you
5 need to somehow value the ongoing commodity that's
6 produced. The one-off cost at the beginning, people
7 will figure out how to -- in my opinion, they'll figure
8 out how to buy those down. They're nice. Don't get me
9 wrong, they're nice and they'll get some of the first
10 projects off the ground.

11 But until you have some sort of supply and price
12 certainty over a period longer than a quarter, you know,
13 you won't get there.

14 So, in the renewable gas standard kind of
15 there's a lot of benefits there. I'm not necessarily
16 advocating for it, but it brings a different
17 counterparty to the table. Right now you have a gas
18 station, or a fuel supplier, and then a biogas provider
19 and they're kind of haggling over things. Like all of
20 the sudden, if one of those counterparties is a utility,
21 you're having a different conversation. Right, so you
22 have a different -- the credit worthiness of a utility
23 is different.

24 So, more folks will probably come to the table
25 if they know that the procurement agency is a utility

1 that has to do it and that it's tied to some mandate.

2 So, absent that, and I'd be happy to talk about
3 that more, but absent that some sort of price floor in
4 the LCFS program. So, you know, there was a workshop on
5 this financial mechanism that's in play around SB 1383.
6 It's interesting, you know, these contracts are
7 different, these put options, these things are very
8 interesting, I think. And they've had success in some
9 markets. I don't want to discourage that conversation.

10 But nearly every one of our clients, when asked,
11 you know, about the LCFS program, the fact that there's
12 no floor is a challenging aspect. So, that basically
13 becomes a zero. The LCFS program, you know, sometimes
14 has a zero like in terms of what value it will deliver
15 in the future, so you have riskier assets -- or, excuse
16 me, investors will to take more risk are the only ones
17 bringing capital to that.

18 So, supply is not the issue. I once had a
19 biogas supplier say, if you give me 8 to 12 bucks an
20 MMBTU, I'll give you as much renewable natural gas as
21 you want. That wasn't just in California, but that was
22 a direct quote, you know.

23 And then on the issue of interconnect, again
24 another -- like when we're talking to folks on the
25 investor side they say, you know, they kind of feel like

1 it's the first out of the gate, the first mouse gets the
2 trap and the second mouse gets the cheese. So, once
3 people figure that out, I think people are waiting for
4 the cheese.

5 So, again, I don't want to downplay that issue,
6 but for us it just seems like something more, like I
7 said here kind of flippantly, but an obligatory mention,
8 like interconnect is expensive, right. But I'm not
9 convinced that that is "the" barrier. I think it's
10 something that folks need to work on but I don't think
11 that that's necessarily -- or, we don't see that that is
12 something that folks wouldn't overcome.

13 So, I mentioned here, you know, there needs to
14 be -- like again, absent an RGS, if you don't have some
15 other market to dump this fuel into, you know, you need
16 -- you've got to put it somewhere. So, you know, I
17 think this idea of, again, diesel and natural gas
18 spread, and stuff like that. You know, despite
19 consistently low natural gas prices for 12 to 18 months,
20 coming out of the great recession, there was no capital
21 on the other side to buy those trucks.

22 You know, the commercial entities, the fleets
23 that could have bought those natural gas trucks weren't
24 buying trucks.

25 So, and in 2013, 2014, 2015 the amount of diesel

1 trucks that were sold precludes drastic advancements in
2 natural gas use absent -- again, absent some policy
3 intervention there. Which again, incentivizing trucks
4 to get more natural gas demand there.

5 And I think it's important to recognize that
6 there's this conflict now, in California, between
7 renewable natural gas and electrification. Like that's
8 there, right? I think that it's important that folks
9 recognize that. It's that it's a concern that, whether
10 it's a bait and switch that, hey, we were promised
11 renewable natural gas and the supply isn't there.

12 Or, you know, maybe we shoot ourselves in the
13 foot on the way to 2030. It's like, well, I don't --
14 I'm just telling you the arguments. Those are not my
15 arguments just to be clear. But that argument is in
16 place right now. I think that's an important context
17 for folks to understand.

18 So, again, from our perspective these one-off
19 incentives at the point of investment aren't really
20 going to move the market. It's more of like how are you
21 going to value that commodity over the lifecycle of the
22 project? You know, in a RIN and LCSF type of way.

23 We think that, and not necessarily that an RGS
24 is an answer, but it's one of the solutions that, again,
25 it provides some certainty to that market that is

1 entirely absent right now.

2 I think that's my last slide, I hope. So, I'll
3 adjourn there.

4 MR. OLSON: Thank you very much. So, we've got
5 about five minutes to be back on schedule.

6 CHAIR WEISENMILLER: Great, that's good. I'll
7 start out and then hand it off. In terms of our
8 direction to look at cost effectiveness or how to
9 enhance cost effectiveness, obviously something that's
10 15 dollars or million, compared to 3 is not cost
11 effective. So, we're trying to figure out how to get it
12 there is part of the question.

13 Although it was encouraging, as I understood
14 Amy's presentation, again the transportation sector with
15 LCFS, with RIN, you know, there are various things. You
16 know, it's close to cost effective at this stage. And
17 so, it seems like in terms of as you go through various
18 submarkets that that part of it is certainly attractive
19 at this point.

20 And also trying to understand, again, in terms
21 of comments from folks, you know, again, what
22 technologies, what markets are cost effective or can be
23 cost effective relatively easily, as opposed to ones
24 where it's just a real stretch.

25 And those, again on the real stretch question,

1 it's like how do you increase the cost effectiveness
2 seems to be the challenge.

3 And obviously, sometimes, you know, I remember
4 doing solar water heating stuff back in the last '70s
5 and we had a goal of one and a half million solar water
6 heaters in the State. And we didn't get there. And I
7 mean, it just wasn't cost effective was the bottom line.
8 You know, but we tried.

9 So, again, how do we move the needle on the cost
10 effectiveness, realizing again we're sort of high level?
11 At some point people get to go to the PUC and fight
12 exactly on how many -- you know, how big a dairy farm,
13 how close to an interconnection is the precise break
14 point.

15 But again, I think what we can do to help
16 clarify is this big picture, which of these resources
17 are more cost effective. Which of the locations or
18 technologies is the most effective and how can we move
19 the needle, generally, on cost effectiveness?

20 MS. JAFFE: Can I make a comment on that?

21 CHAIR WEISENMILLER: Yeah.

22 MS. JAFFE: If you go into our 200-page study
23 which, you know, it's hard to summarize briefly, there
24 is -- so, I mean, that was the advantage of how we did
25 is because we really looked at geo-location, using GIS

1 technology. And, I mean, I didn't do this work. It's
2 Nathan Parker, and I'm sure he would be happy to present
3 at some later time. But it really required clustering
4 the dairies together and having joint investment of
5 different locations in one facility.

6 And that would probably take, you know, a
7 certain kind of organizational intervention and
8 leadership to get the economic clusters together when
9 you're talking about dairy.

10 When you're talking about the whole market,
11 really the barrier to the market, I agree, is getting
12 the trucks. Right? So, how do you get either smaller
13 truck owners or the large truck owners to switch to the
14 technology on the trucks?

15 And, you know, part of the problem is
16 regulatory. So, I have to know that these incentives
17 are going to be in place. I'm not buying a truck for
18 one year, so I need to know that the Low Carbon Fuel
19 Standard's going to be in place. I need to know that
20 the RIN credits are going to be available. And I need
21 to know the price of natural gas I can lock in, in the
22 futures market.

23 But, you know, in the end that's part of the
24 difficulty. And I think that in our working and
25 testing, you know, where to put the incentive, I guess

1 we've kind of felt over time -- I mean, we've looked at
2 different kinds of things. Could you tax the price of
3 diesel fuel higher and incentivize it that way? I mean,
4 there's different ways to skin the cat. But the bottom
5 line is the most direct intervention is giving people
6 some kind of assistance on the payout on the initial
7 investment in the trucks. Because that's really the
8 barrier, because the size of the market has to do how
9 many trucks there are.

10 If there were twice as many natural gas trucks,
11 versus diesel trucks, then you wouldn't have too much
12 resource.

13 MR. RECHTSCHAFFEN: Can I ask you, Professor
14 Jaffe, as a follow up, do you agree that incentives
15 alone, or feel that incentives alone are not enough and
16 we need some kind of price stability as the natural
17 mechanism to guarantee the contracts to get more market
18 certainty?

19 MS. JAFFE: Yeah, the price is not enough. The
20 fact that there are players in the market that refuse to
21 sell Low Carbon Fuel Standard Credits two years from
22 now, or three years for now, where there's uncertainty
23 about the five-year picture holds the market back.

24 COMMISSIONER HOCHSCHILD: Can I ask you a
25 question? So, first of all thank you for the

1 presentation and for being here, very illuminating. So,
2 just on the cleaning of the gas that's necessary for
3 effectively using biogas and renewable gas in our gas
4 electric fleet, how much cleaning is necessary and what
5 are the challenges around that? To what degree can you
6 just feed it directly into the power plants?

7 MS. JAFFE: So, what I would tell you is there
8 are contaminants that are in the gas, that are
9 considered dangerous. And the standard by which people
10 would feel comfortable that you can just inject it into
11 the pipeline and it's okay, you know, different
12 locations and different companies might have different
13 perceptions about that level of contamination.

14 And then, in addition to that, you have players
15 that game the system. Right? So, I have a pipeline and
16 maybe the level of contaminants that I'm accepting into
17 that pipeline from other locations is higher than the
18 California standard, but I'm objecting to the California
19 lower its standard because I want to keep the California
20 business out of my pipeline. It's a competitive reason.

21 COMMISSIONER HOCHSCHILD: And in terms of the
22 cleaning, itself, are we just talking about a filter or
23 is it something more involved than like a --

24 MS. JAFFE: No, no, no, you're talking about
25 expensive technologies.

1 COMMISSIONER HOCHSCHILD: Yeah.

2 MS. JAFFE: And I think, you know, I think
3 there's someone here -- is someone here from UC Irvine?

4 CHAIR WEISENMILLER: Actually, Glendale's going
5 to talk later this afternoon about their experience.

6 MS. JAFFE: Yeah, they'll talk about the
7 specific technologies, probably, in great detail. But
8 they're expensive. It's expensive technology.

9 COMMISSIONER HOCHSCHILD: Thank you.

10 MS. MOFFITT: I have a question. You mentioned
11 that that clustering, especially for the dairies, is an
12 option that looks like it's economically feasible. You
13 talked about, also --

14 MS. JAFFE: Or, more economically feasible than
15 not doing it.

16 MS. MOFFITT: More economically feasible. Yes,
17 I see the pricing here. Dairy has quite a high support
18 requirement. And I have a question about that one. I
19 also have a question about, in the study that you did,
20 did you look at those clustering and what is the
21 opportunity there? And then, also, I'd like to know how
22 the dairies are so high, the \$26 support needed,
23 relative to the other ones?

24 MS. JAFFE: So, in economics we have a concept
25 called economies of scale. Right? And that's a

1 principle that you find in oil refining and marketing,
2 it's a principle you find in electricity generation.
3 Right? And the idea is I'm building a plant and the
4 cost per unit goes down the larger the plant.

5 MS. MOFFITT: Right.

6 MS. JAFFE: And then, also, the cost of
7 transportation. If I'm having to build a pipeline or
8 some kind of network for, you know, two gallons, that's
9 much more expensive than building something for a
10 million gallons. Right?

11 So, the problem with the dairy gas is you have a
12 lot of small farms in California, so the resource is --
13 the amount of capital you would have to invest to
14 process this very small amount of gas at a particular
15 location is so high, compared to the amount you can sell
16 and get a return. Right?

17 So that's why clustering can help. Because if
18 the economies of scale would dictate that you need to
19 have a plant of a certain size, the way to have a plant
20 of a certain size is to have five or ten dairies all
21 putting their product into one plant, so the plant can
22 be large enough.

23 MS. MOFFITT: Yeah, and I'm familiar with the
24 dairy clusters and the ideas that are out there. And we
25 funded, in our last round, two projects that, hopefully,

1 you know, at some point plan on being part of a cluster
2 down in Kern. So, I'm familiar with that concept.

3 What I'm wonder is are those concepts integrated
4 into the study that you guys did?

5 MS. JAFFE: Yes, it is. We put the actual -- we
6 determined what the most economic clusters were and
7 those clustering is in that \$26 number. I'm sorry, I
8 misunderstood your question.

9 MS. MOFFITT: Got it, thank you.

10 MS. JAFFE: Okay, so that is the number with the
11 cluster.

12 MS. MOFFITT: Okay, thank you.

13 CHAIR WEISENMILLER: Thanks that was quite
14 helpful.

15 MS. RAITT: Yeah, our next panel is on Utility
16 Strategies to Reduce Short-Lived Climate Pollutants.
17 And Kevin Barker is the Moderator.

18 MR. BARKER: Thanks, Heather. Thank you, Chair.
19 We'll jump right in, since we're staying pretty close to
20 being on schedule, but we're just a few minutes behind.
21 And I'd like to leave enough time for Q&A for our dais.

22 But we have the privilege of having two Vice
23 Presidents from the largest gas utilities, here in
24 California. We're really pleased to have them.

25 One thing I'd like to do, that's a little bit

1 different from this workshop, so we do have sort of
2 visionary leaders at the utilities here, is to kind of
3 get an overview of where do you see a gas utility going
4 in the future. I think this, as the Chair's pointed
5 out, is gas utility 2.0.

6 So, it would be nice to get that, you know, kind
7 of high level overview before diving into the questions
8 that you guys have prepared for.

9 The other thing, too, you know, one thing that
10 would be worthwhile to touch on, we did have two
11 infrastructure incidents at San Bruno and Aliso Canyon.
12 And it would be nice to know kind of what those lessons
13 learned have been since then to sort of ensure the
14 reliability, integrity of the infrastructure system.

15 As the Chair pointed out, you know, folks in
16 Aliso, if we do move even to renewable gas there may be
17 some questions still down there on the storage there.

18 The other thing, too, is how big of a worry are
19 contaminants using the current infrastructure. And so,
20 building of those things, lastly, it would also be nice
21 to get your take. We do have a gas research program
22 here. I know you guys are doing, interested in yours,
23 too. And kind of that overlay, too, of what -- that
24 maybe even gets to what are the next steps in some of
25 that.

1 And then as you heard on, I think the Chair's
2 opening remarks, but then also most recently, what are
3 some of the things that we do get to, you know, cost
4 effectiveness going forward?

5 And so with that, we'll jump right in with
6 Steve, Senior Vice President at PG&E.

7 MR. MALNIGHT: Thank you. Thanks Kevin.

8 I have some prepared remarks that I think will
9 address some of those questions but, obviously, would
10 love to get into the discussion phase and get into the
11 conversation.

12 So, you know, if I can just start off, PG&E's
13 been a very strong supporter of the State's carbon goals
14 and GHG reduction goals. And that includes taking a
15 number of steps to reduce the greenhouse emissions
16 associated with our natural gas system.

17 We've also actively worked to explore and
18 advanced opportunities related to renewable natural gas,
19 or low carbon gas. And we're doing this while
20 maintaining a laser focus on safety, which is our first
21 priority in everything we do in the gas system.

22 I think it's important to note California's
23 natural gas system, today, plays a vital role in helping
24 the State achieve our short term and near term
25 greenhouse gas targets. But I also just want to

1 emphasize that it's our belief that the natural gas
2 system plays an equally critical role in achieving the
3 State's longer term climate goals.

4 And we're going to get there as we take the
5 steps needed to de-carbonize the gas stream through
6 renewable and natural gas alternatives. And that's
7 really what I want to talk about I think, today, is how
8 the system plays an important role.

9 You know, just to highlight, I think -- a couple
10 of things I want to emphasize. With the right focus and
11 the right policies we can leverage the California's
12 natural gas infrastructure to drive reductions in the
13 transportation sector today. We can move forward with
14 strategies to reduce methane leaks across the system.
15 And we can reduce the overall carbon content of the gas
16 moving through the pipeline by advancing the use of
17 renewable and low carbon gas alternatives.

18 So, I'm going to give you some background on the
19 topics that I think I heard. I'm going to talk about
20 what we're doing to ensure safety and reliability of the
21 gas system, the steps we're taking to reduce emissions,
22 associated with operating that system, our efforts to
23 develop biomethane alternatives and the policies and
24 actions that we think would facilitate this transition
25 to a de-carbonized future.

1 So, I'd like to begin with safety. As I
2 mentioned already, safety is our top priority in the gas
3 system. You mentioned the San Bruno incident. I will
4 tell you that since that tragedy occurred in 2010, there
5 have been a huge number of learnings and changes in how
6 we operate the gas system.

7 In recent years we've undertaken sweeping
8 efforts to test and replace pipelines, to modernize our
9 control systems, to improve our operation and
10 maintenance processes and procedures, and reduce the
11 overall leak rate on the system.

12 We've pioneered new and innovative technologies
13 to detect and reduce leaks, such as the Piccaro vehicle-
14 mounted leak detection technology. We've added sensors
15 and automated shutoff valves throughout the network.
16 And we've pressure tested more than 800 miles of pipe to
17 confirm the integrity of the system.

18 In addition to making the system safer and
19 improving reliability, many of these actions have the
20 dual benefit of reducing methane emissions. For
21 example, the Piccaro technology I mentioned is a
22 thousand times more sensitive than traditional detection
23 equipment, and has helped us detect much smaller leaks
24 on the system.

25 We're also piloting a super-emitter survey that

1 uses the same technology to identify the largest
2 emitters on the system to prioritize leak repair. Our
3 equipment to those timely leak repairs helped us reduce
4 our grade two and grade two plus leak backlog by 99
5 percent from 2010 to 2015, which in turn helps to reduce
6 the fugitive emissions from the system.

7 Another example. As of 2014, we've completed
8 the replacement of all known cast iron pipe on our
9 system with stronger, more efficient and seismically
10 resilient pipelines. We've also implemented measures to
11 reduce blown downs on the gas system and make sure we're
12 not emitting that gas to the atmosphere.

13 We've partnered with Lawrence Berkeley National
14 Labs to pilot equipment that continually monitors
15 emissions at our McDonald Island Storage Facility, which
16 is located within an environmental justice community.

17 The data allows us to identify and accelerate
18 repairs which, again, minimizes our emissions.

19 And finally, we worked with the US EPA, and
20 other progressive gas utilities, including SoCalGas, to
21 develop the Methane Challenge Program. The focus is on
22 establishing meaningful best practices for methane
23 reduction that pipeline operators can adopt.

24 All these actions are making the gas system
25 physical infrastructure stronger, safer, and more

1 resilient, while at the same time keeping the gas in the
2 pipes and reducing emissions from the system.

3 So, as we continue to invest in that system,
4 we're looking beyond simply how to reduce the impacts of
5 emissions, we're looking at ways to use this asset to
6 significantly advance the State's progress towards its
7 carbon goals.

8 One of the most significant and immediate
9 opportunities to do this is in the transportation
10 sector. Apparently, I said something wrong.

11 (Laughter)

12 MR. MALNIGHT: Numerous efforts are underway to
13 electrify the goods movement, but electrification of
14 medium and heavy duty, as we all know is challenging.
15 And there's tremendous opportunity today to use natural
16 gas to fuel this segment of the transportation sector.

17 Recent studies have shown that switching medium
18 and heavy duty vehicles from diesel to natural gas
19 results in significant air quality improvements,
20 reducing NOx and particulate matter levels by 90
21 percent, and reducing CO2 emissions by 15 percent.

22 These impacts help all of our communities to
23 breath cleaner air, particularly our disadvantaged
24 communities and environmental justice communities which
25 are located, typically, near transportation hubs or

1 transportation corridors.

2 I know the CEC is working on this and I really
3 do commend all of us for the continued work on moving
4 forward with that effort.

5 At the same time, I think while using the gas
6 system today for the transportation sector offers huge
7 advantages, we can only leverage that and multiply it if
8 we focus on de-carbonizing gas and moving that gas to
9 the transportation sector.

10 We support the development of a robust,
11 renewable natural gas markets in California to make that
12 happen.

13 A variety of sources are available. We've
14 talked about many of them today and I don't need to go
15 through that again. But to develop and advance these
16 sources, it's critical that we put in place the right
17 policies and create opportunities to learn from real
18 world experience. We're actively participating in
19 regulatory efforts and other initiatives in the State to
20 do just that.

21 For example, we signed our first dairy biogas
22 pipeline injection contract back in 2007, with Vintage
23 Dairy and Microgy. The experience -- while that
24 project's no longer delivering to the system, I think
25 that experience taught us a lot about the constituents

1 that we found in dairy biogas, the cost to clean the
2 gas, interconnection issues and other lessons. And
3 we're now applying those lessons to how we're going to
4 move forward with 1383.

5 We also have 13 projects on the system which use
6 biogas to generate electricity and connect to the
7 electricity system which is another accomplishment that
8 we should continue to move forward on.

9 So, these projects, these pilots give us
10 valuable information and insight into the barriers, as
11 well as other challenges that we need to overcome to get
12 there. For example, they may provide the opportunity to
13 evaluate the cost effectiveness of different
14 transportation options for the pipeline system.

15 So, we've talked a lot about interconnection.
16 And the interconnection costs can be significant,
17 particularly if you're not located near the pipeline and
18 have a significant distance to cover. We're looking at
19 trucking biomethane as one way to address those kinds of
20 issues, where we can aggregate methane from the numerous
21 projects where they are located, and transport them to
22 injection points, to dedicated injection points on the
23 system.

24 That would eliminate the need for long and very
25 costly pipelines to drive that interconnection. If

1 that's cost effective, I think that opens up more
2 opportunities for us where it would work.

3 Another opportunity we see for RNG is woody
4 biomass. With the SoCalGas, Northwest Natural, and
5 SMUD, we've committed to fund an engineering analysis of
6 the viability and costs of developing and RNG production
7 facility, utilizing an existing woody biomass power
8 plant site.

9 This type of RNG could be utilized in either low
10 NOx, heavy duty trucking, or power generation to have
11 clean, renewable power generation as well.

12 Ultimately, as I've indicated, you know, policy
13 is going to play a crucial role in moving these efforts
14 forward. For example, PG&E is supportive of a well-
15 designed, renewable natural gas or low carbon gas
16 standard to jump start the market. How that standard's
17 developed, what qualifies, the cost recovery mechanisms,
18 these are all critical issues that have to be address.

19 But this kind of a policy gives assurance to the
20 marketplace of the value that we, as a State, are going
21 to place on renewable natural gas, which can attract the
22 capital needed to make it a reality.

23 Also, the interrelationship between an RNG
24 standard and the Low Carbon Fuel Standard will have a
25 significant impact on the economics of renewable natural

1 gas and overall use of the pipeline system.

2 We're a strong supporter of the LCFS program.

3 It's vitally important for many sectors of achieving our
4 carbon goals. It's a critical program that incentivizes
5 low carbon fuel produces.

6 Developing an array of incentives for the RNG
7 industry is particularly important. In the livestock
8 manure management projects it will be essential to
9 reducing costs, increasing long term viability, and
10 allowing these projects to capture the GHG reduction
11 benefit they're creating. We're going to continue to
12 work with stakeholders in developing this framework.

13 Finally, you mentioned gas quality. And I want
14 to address that now which, really, in my view is ending
15 with safety, the same place that I started. You know,
16 the quality of the gas that goes into the pipeline is
17 often a contentious issue, but it's critical that we
18 recognize that this is, at its heart, a safety issue.

19 As we begin to discuss the framework needed to
20 build these projects, it's important that we lay the
21 foundation of this work on safety by ensuring that we
22 have appropriate gas standards in place.

23 Having them is foundational to developing a
24 robust low carbon or renewable gas standard, and
25 industry in the State.

1 Traditionally, feedstock and other sources that
2 can produce renewable natural gas must be processed and
3 conditioned, as we talked about, to meet renewable
4 natural gas quality specifications. And this is not a
5 trivial exercise. As was said, it often involves
6 significant investments.

7 But it's vital to ensure that the composition of
8 the gas that we input into the system is interchangeable
9 with the natural gas that's already in the system. And
10 that ensures that constituents of concern are below the
11 established limits.

12 Not meeting those standards may create build up
13 on equipment that could be damaging and risk safety, and
14 it could damage or cause malfunction in end use
15 appliances in homes and businesses. Maintaining that
16 consistent gas quality protects the end use equipment
17 and it manages the risks associated with those
18 constituents becoming or introduced to breathable air.

19 Thus, testing is important and we're working
20 closely throughout regulatory proceedings, at the CPUC,
21 on gas quality issues.

22 We're also sharing data with the California
23 Council on Science and Technology, as it studies and
24 makes recommendations to the PUC on any updates to the
25 existing gas quality standards.

1 In the end, any change should not compromise
2 safety and reliability, and should also try to minimize
3 cost impacts to both of those injecting onto the system
4 and those who depend on the system every day.

5 So, these essential elements, the robust
6 infrastructure, thoughtful supporting policies, and the
7 tools to ensure consistent gas quality we believe are
8 the keys to promoting the long term de-carbonization of
9 the gas system. Increasing the development of low
10 carbon fuels and fully utilizing the State's natural gas
11 infrastructure to meet our carbon goals.

12 We're excited about the opportunities ahead and
13 the role that we can play in achieving both the short
14 and long term goals.

15 But I want to just acknowledge, when I've gone
16 out and talked to various stakeholders across the
17 segment, I continue to hear some who suggest that
18 natural gas, even with renewable gas, is just a bridge
19 fuel that the State eventually will have to move past or
20 abandon as we head to 2050.

21 However, I think this misses the incredibly
22 important role the natural gas system can serve in
23 making use of the methane that would otherwise be
24 admitted to the air. Unless these gases are combusted,
25 the 20-year global warming potential of methane will

1 drive emissions 72 times higher than CO2.

2 But by injecting that methane into the natural
3 gas system, it can be dedicated to the uses that
4 electricity can't serve or can't easily serve, such as
5 industrial process heat, central station heating, and
6 medium and heavy duty transportation.

7 I think it's time for us to really deal with
8 that fact and acknowledge and plan for the natural gas
9 system that we need to achieve our 2050 goals. That
10 kind of certainty and policy support is what's going to
11 be required for people to make the long term investments
12 that we need them to make to capture these benefits, the
13 co-benefits that we can derive from RNG for both
14 avoiding the emission of methane, and serving vital
15 energy needs at a lower carbon impact.

16 So, we think the integrated approach is key, and
17 we have to focus on system safety, and then we can go
18 capture the co-benefits that are available to the
19 system. And we also need to focus on capturing those
20 immediate benefits today, both to improve air quality
21 and reduce GHG emissions in the transportation sector.

22 So, with that, those were my prepared remarks.
23 I'm going to turn it over, I think, to George, who will
24 continue and then I'll look forward to questions.

25 MR. MINTER: Steve, thank you very much. Great

1 overview. I'll drive a little further. I was asked to
2 address gas utility 2.0. I'll suggest that it might
3 actually be 3.0.

4 Why are we here? You know, you hear that, well,
5 geez, gas is a fossil fuel. We've got to get off fossil
6 fuels, we've got to electrify and have renewable energy.
7 And we've got to start realizing that renewable energy
8 isn't just renewable electricity, but it is renewable
9 gas.

10 And I'm heartened by the comments that have been
11 provided to this point, and looking at the agenda what
12 we're going to hear later this afternoon.

13 What I can tell you about the future of the gas
14 industry is informed by the past. You know, before
15 there was electricity there was gas. We lit our
16 streets; we lit our houses with gas before the Civil
17 War. There was no electricity. We hadn't invented the
18 light bulb. Edison wasn't around, yet.

19 And we manufactured gas. We didn't have a
20 natural gas industry. Gas utility 1.0 was manufactured
21 gas plants, producing manufactured gas from coal and
22 kerosene, and building pipes to the city streets to the
23 street lights. The gaslight district.

24 When I first moved to Berkeley to go to school,
25 our house as a pre-1906 Craftsman. And in the attic

1 there were copper gas jets that had been retired from
2 use. That's how we lit our homes and our cities. And
3 the gas utility business started in Baltimore, and New
4 York, and Philadelphia, and Boston, and San Francisco,
5 and in Los Angeles, manufacturing gas. We've been
6 around for 150 years. We started manufacturing gas
7 right after the Civil War.

8 Electricity was developed and harnessed through
9 power plants, developed by Edison. The light bulb was
10 developed by Edison. And gas moved away from lighting
11 and provided for heat.

12 But another revolution occurred in the
13 transportation sector and we figured out how to build
14 automobiles, and gasoline and diesel powered transport.

15 And this fuel to revolution in energy
16 development, which spanned the oil industry that we know
17 today. And associated with oil production there was
18 lots of methane or natural gas that was really
19 problematic in oil recovery. And we had to watch very
20 carefully what we did with that natural gas and vent it
21 to the atmosphere so that it wouldn't explode, so that
22 it wouldn't create a catastrophic fire and we could
23 produce our oil for our transportation purposes.

24 And people figured out, you know what that's the
25 same gas that they're using in those cities that they're

1 manufacturing, but it's free right now. It's natural
2 gas. It's a waste product. If we could get that to the
3 cities, we have a great business. And that was the
4 birth of the natural gas industry.

5 So, that's the gas utility industry 2.0. So, we
6 went from being a manufactured gas industry to a natural
7 gas industry.

8 And the gas industry 3.0 is that we're going to
9 manage that gas distribution system and move from
10 natural gas to renewable gas.

11 What is renewable gas? It's simply contemporary
12 methane. Fossil methane is what we rely on today,
13 natural gas. But increasingly we're talking about
14 capturing that contemporary methane that's a climate
15 change problem and putting it into the pipelines.

16 Our thinking is that we need to address gas
17 supply today the way we addressed electric supply 30
18 years ago. Thirty years ago we said you know what, we
19 need to develop renewable sources of electricity, and we
20 developed solar and wind. And we went through a 30-year
21 process to get where we are today, which is trying to
22 achieve the 33 percent renewable by 2020 electric
23 generation.

24 We need to think about gas supply in the same
25 way. We need to think about how we develop our

1 renewable gas supply resources over the same kind of a
2 timeframe, and then begin to displace our fossil gas
3 with our renewable gas, de-carbonize the pipeline, take
4 the fossil out of the fuel, if you will.

5 But what does this mean? It means continued use
6 of the pipeline system, so the pipeline system has to be
7 enhanced. We've got to be able to ensure
8 deliverability. We've got to be able to ensure that
9 it's safe.

10 You've heard PG&E programs. Our programs are
11 similar. We have a Distribution Integrity Management
12 Program on distribution pipes. The same for our high
13 pressure transmission lines. The same for our storage
14 facilities. We have a PSEP program, or Pipeline Safety
15 Enhancement Program. We spent over a billion dollars
16 testing and replacing large transmission pipe. We, too,
17 have tested hundreds of miles of pipe. We've replaced
18 over 100 miles of pipe. We've replaced over 100
19 pressure monitor valves with automatic shutoff valves.
20 That when the pressure reduces in the line, indicating a
21 potential leak, boom, that automatic shutoff valve is
22 activated.

23 We're using innovative capture technology when
24 we're doing these pipeline replacements to capture that
25 gas that's in the pipeline segment that we're replacing.

1 And then we store it and use it later, so that it
2 doesn't go into the atmosphere.

3 And, of course, this means we've got to address
4 leaks. And we've been doing that for a long, long time.
5 We were actually an original signer of the Natural Gas
6 Star Program which started in the 90s, with Federal EPA.
7 I think Mary Nichols was the Assistant Administrator at
8 the time. And we actually signed an accord with her,
9 with EPA to voluntarily reduce methane emissions that
10 are coming from the natural gas system.

11 So, we've been focused on this for a very long
12 time. We did collaborate with EDF, in their study with
13 Washington State University on the distribution pipeline
14 system. And that was part of a broader study EDF did on
15 the entire industry.

16 The concern is if the industry is leaking at
17 more than 1 percent of its total through put, that
18 leakage and the effect of methane as a refractive gas,
19 that is a GHG, and more powerful than a CO2 emission,
20 that that would offset the climate benefit of using
21 natural gas to displace dirtier fuels, like coal and
22 generation, or diesel in transportation.

23 The results of the study suggest that we're well
24 below the 1 percent. And the results on the
25 distribution system are well below .1 and .2. They

1 range between a .1 percent and .2 percent. So, this is
2 a very, very tight system.

3 SoCalGas actually volunteered its system to be
4 in the study and our rate of leakage was 0.12 percent of
5 through put within the system.

6 The average reported to EPA, of pipeline
7 distribution systems as late as 2012 was .5. So, we're
8 almost five times lower than the average.

9 The system is tight and it's tight for some of
10 the reasons described by PG&E. We long ago got rid of
11 our cast iron, and that's the biggest challenge in the
12 distribution sector right now.

13 We've developed new ways, using Piccaro and
14 other technologies to detect leaks, to fix leaks. We've
15 worked with the PUC and the other utilities, and the
16 utility workers to really take a hard look at the way we
17 go out and find leaks, and then schedule the replacement
18 -- excuse me, the repair or the remediation of that
19 leak.

20 We've committed, in the 1371 process at the PUC,
21 to adopting a whole number of best practices that will
22 start driving leaks down. We've committed to eliminate
23 our backlog. Backlogs develop over time, as you target
24 your resources to go after the gross leakers, or the
25 super emitters. And sometimes the very slow emitters

1 fall off the table and we've got to not let them fall
2 off the table. And so, we're going to get rid of our
3 backlog and then maintain a rolling year net zero
4 backlog.

5 And we've got to learn from these incidents,
6 like Aliso. You know, Aliso was a methane leak. No
7 explosion, no fire, no damage to property. But it was a
8 significant methane leak and it taught us about new ways
9 of managing injection and storage wells, new ways of
10 managing storage fields.

11 We've installed a variety of infrastructure in
12 safety enhancements. We've worked with the PUC and
13 DOGGR on those enhancements. We've got on-site pressure
14 monitoring. We've got video monitoring. We have visual
15 inspection schedules. We have perimeter monitoring.
16 All of these are methane detection methodologies.

17 All of our wells that are operational wells are
18 newly enhanced with inner tubing that essentially kind
19 of double hulls the injection and withdrawal of gas. It
20 does reduce the volume that you can both inject and
21 withdrawal and that's a challenge. But it's a very,
22 very significant safety improvement.

23 We will be operating a safe distribution and
24 storage pipeline system for the next 100 years.

25 And that brings us to RNG. RNG is key to the

1 future. It helps us solve air quality and climate
2 change challenges. But I think it's important to pause
3 and understand, you know, it's not just about climate
4 change.

5 And actually, from Southern California and for
6 SoCalGas it really, first, is about air quality. We're
7 going to need to displace dirtier fuels with cleaner
8 fuels. We're going to really need to focus on diesel in
9 transportation, and displacing that with gas.

10 We've done a very good job eliminating coal from
11 generation and utilizing gas. We need to deploy more
12 and more ultra-low or non-combustion gas technology,
13 like fuel cells, and micro turbines.

14 We're going to rely on quick-to-ramp peaking
15 technology to help us bring more solar and wind to the
16 electric system.

17 But ultimately we're going to need RNG to
18 displace our geologic gas to help us reduce GHGs and
19 achieve our climate goals.

20 Southern California is the home of the only two
21 extreme non-attainment regions in the United States. We
22 have "the" worst air quality in the nation. That's the
23 San Joaquin Valley and the L.A. area. And those two
24 areas comprise 80 percent of our service territory.
25 That's our focus.

1 And the Clean Air Act requires us, in the next
2 20 years, to reduce our polluting emissions by 60
3 percent. And that's a more immediate challenge than our
4 climate change challenge in terms of time frame.

5 Now, it turns out that in the inventory of
6 emissions, 80 percent of the emissions are coming from
7 the transportation sector. And the single largest
8 source in that sector, in heavy duty transportation is
9 trucks and buses.

10 The CEC, the AQMD, SoCalGas, working with other
11 private industry interests has developed this game-
12 changing engine technology, the near-zero, super low NOx
13 engine. It's been certified by ARB. It's now, the
14 engine size is appropriate for transit bus, and waste
15 haulers, and street sweepers, and that's actually now in
16 production, and now actually being bought by agencies,
17 and companies for those uses.

18 And that drives emissions down from those uses
19 by 90 percent. It's called near-zero because the
20 emissions associated with the tailpipe is similar to the
21 emissions associated to the power plant smoke stack, if
22 you were generating the electricity to run that truck or
23 bus as an electric vehicle.

24 It's interesting, now, that the Air Quality
25 Management Plans for the South Coast and the San Joaquin

1 Valley both really rely on deploying near-zero
2 technology in transportation to get the emission
3 reductions they need to meet the Federal Clean Air
4 requirements.

5 It's also interesting that the mobile source
6 strategy has a similar reliance.

7 And that the State Implementation Plan, which
8 just adopted the two local plans, now commits the State
9 to the deployment of this near-zero technology in
10 transportation to drive the emissions down that we need
11 to drive down to meet the requirements of Federal law.
12 So, that's all the air quality regime.

13 We've got to deploy natural gas, displace diesel
14 in the low NOx engine to get where we need to go for air
15 quality. And then, when that natural gas becomes
16 displaced with renewable gas, we start driving down our
17 GHG emissions. It's a twofer. It's where we need to
18 go.

19 It's interesting that the ARB Scoping Plan,
20 which lays out how we get to 2030 and, ultimately, to
21 2050 actually relies significantly on the Short-Lived
22 Climate Pollutant Plan to get the emission reductions
23 that we need.

24 Methane, as we've heard, is a major short-lived
25 climate pollutant. We've also heard that most of the

1 methane does not come from the oil or gas sector. Less
2 than 7 percent is coming out of the energy pipeline
3 sector. Over 80 percent are all of those contemporary
4 sources in landfills, and wastewater treatment, and
5 dairies, and AG operations, and ranching, and woodland
6 waste. That's where our focus is and that's what you've
7 been hearing today.

8 I think it's important to note that the short-
9 lived climate pollutant, which now commits us to a 40
10 percent reduction in all of those sources of biomethane
11 to atmosphere, also represents about 30 percent of all
12 of the reductions in the Scoping Plan.

13 So, if we don't do what we're talking about
14 doing, we can't meet the requirements for 2030 or we
15 can't meet the requirements for 2050.

16 So, this is not a, wow, wouldn't it be neat to
17 do this. This is we must figure this out and we must do
18 it.

19 It's interesting that today transportation is
20 actually driving the RNG market. And I think you've
21 heard that 60 percent of the CNG transportation market,
22 now, is renewable gas.

23 We've done a lot of analysis with the E3 firm
24 that suggests that, actually, the highest and best use
25 from a GHG reduction perspective is all of the end uses

1 that we're commonly familiar with, with natural gas.
2 And that's water heating, and cooking, and space
3 heating, and commercial and industrial thermal
4 applications.

5 So, ultimately, we need to move renewable gas to
6 satisfy those thermal applications, which are very hard
7 to electrify. That's an electrification challenge. And
8 the way to solve it is with renewable gas.

9 So, we look at it from the short term we've got
10 to develop RNG to move into transportation and over the
11 long term we have to move it into the end uses. That's
12 where we need to go.

13 What is our vision? I think our vision is
14 consistent with sort of what I laid out. That is that
15 we need to develop this market and everybody needs to
16 play their role. We're a gas utility. We do pipes. We
17 do interconnection, so that's what we do. It's obvious
18 that the gas utility ought to be investing in the
19 pipeline interconnects with the new gas producers of the
20 future, the renewable gas producers. I think that's the
21 discussion that we're having today.

22 The gas pipeline system, the interconnects, but
23 also the conditioning equipment and the gathering lines.
24 These are all functions that we're currently engaged in,
25 and we're doing the conditioning for all the gas that

1 goes in or out of storage, or comes from interstate
2 pipelines into our system. Because we're concerned
3 about the constituents. We're concerned about heat
4 value and constituent value. And that's why there's the
5 requirements, and pretty tough requirements in
6 California to make sure that all gas meets the
7 constituent and the Btu requirements.

8 So, I would suggest that we ought to clearly see
9 the utility role as the pipeline and the interconnect.
10 But could well and might often be, and particularly in
11 the cases of dairy, small producers, the conditioning
12 function. And I'll get to that in a minute.

13 The second piece, which was mentioned by Steve,
14 is a procurement requirement. We really do need to
15 establish a procurement requirement, just as we did in
16 the electric side of the house.

17 I mean, let's be clear, folks, we need to look
18 at electric supply and what we did. We build the
19 transmission lines to the renewable producers. We had a
20 renewable electric standard, an RPS. We need to do the
21 same. We need to build the gas pipelines to the
22 producers of renewable gas and we need some sort of
23 procurement requirement.

24 It does stabilize the financial investment. It
25 does, over time, drive prices down. It does encourage

1 technology development. And that's what we need to get
2 the volumes to grow so we can start, now, deploying into
3 the residential and commercial markets greater and
4 greater volumes of natural gas.

5 As I said, the 60 percent of natural gas that's
6 now in the transportation marketplace, we expect in the
7 short term to grow to probably 80 percent with the
8 continuation of the Low Carbon Fuel Standard.

9 We also are very supportive, obviously, of the
10 LCFS. It's been really, really important for the
11 renewable gas development business and will be critical
12 in time.

13 But as we look to larger and larger volumes, we
14 need to start setting a standard and a purchase
15 requirement.

16 We were asked to make a note -- I'm sorry, I
17 thought I had 20 minutes here -- to mention
18 disadvantaged communities. And I'll just say that in
19 the Southern California area, the disproportionate
20 impact is greatest from the transportation sector.

21 Disadvantaged communities are in the port area
22 and along the freeway corridors. So, reducing the
23 particulate matter and the air pollutants, as well as
24 overall reducing GHGs is a direct benefit and most
25 benefits, the most directly, the disadvantaged

1 communities that are affected by transportation and
2 port-related activity. So, that kind of an approach we
3 think is very critical.

4 Now, there's been some effort and discussion
5 about, well, we don't really want to site refueling
6 stations or those kinds of facilities in those
7 communities. However, when you move from diesel to
8 natural gas and renewable gas, those refueling stations,
9 actually the pipes are already in the ground and you're
10 delivering the fuel through a pipeline network. So,
11 that eliminates the trucks delivering the fuel and it
12 eliminates the emissions associated with the trucks.
13 So, it turns out that actually creates a net benefit and
14 not a negative environmental impact.

15 So, you've heard a lot about the supply. And I
16 think in general the presentation by Amy suggested that
17 we have, you know, 90, maybe even more, maybe upwards to
18 100 Bcf. And if you think about what that is, that's
19 about 5 percent of our through put in California. Or,
20 for us, it's 10 percent of our throughout put in
21 SoCalGas. So, we look at that as achievable.

22 So, when we're thinking about a renewable
23 portfolio, or a procurement requirement, I think we
24 ought to look at what the supply is.

25 But if you look at the numbers put up there by

1 ICF, there's large numbers from national organizations
2 that have very, more broadly expansive supply scenarios.
3 And if you look at the national supply scenario, there's
4 enough volume of RNG to replace all of the gas we use.
5 In fact, probably 5 to 8 times of our usage is available
6 on the national marketplace.

7 And I'll just that today, in the natural gas
8 business for SoCal, 90 percent of the gas that we
9 deliver to customers comes in from out of state.

10 So, while we appreciate the necessity of the
11 State capturing biomethane and developing a biomethane
12 business, let's not discount the opportunity of
13 renewable gas from all over the nation.

14 How do we get to 2030? I think it's simple.
15 Utilities invest in the pipeline and other facilities
16 that are necessary to produce RNG. Those investments
17 are socially beneficial, the public benefit. The costs
18 are recovered from all ratepayers, with a mechanism
19 that's a non-bypassable mechanism.

20 I think, too, we've got to have a utility
21 procurement requirement. And we can argue what it is or
22 how it would be implemented, but at the end of the day,
23 again, costs recovered from all ratepayers.

24 We have to accelerate the market for heavy duty
25 trucking and move the near-zero natural gas combustion

1 engine into the marketplace. Particularly in Southern
2 California and the San Joaquin Valley. And that means
3 we're going to need incentives to help people purchase
4 that engine, so that we can maximize deployment of that
5 engine, so that we can get the reductions we need. And
6 we need to continue to move RNG into the transportation
7 marketplace.

8 But, ultimately, we need to grow the RNG market
9 so we deliver it generally through the pipeline, and it
10 accrues to the benefit of all the small users, the core
11 customers, and they can drive their GHG emissions down.

12 Remember, the E3 study tells us that the greater
13 benefit from a GHG reduction perspective is for the
14 thermal applications. So, that's where we've got to
15 drive our renewable gas to have the best and,
16 ultimately, the most cost effective approach to reducing
17 the GHGs in the residential gas sector. It's more
18 effective than electrification, far less costly, and
19 ensures customer choice as we go out into the future.

20 I want to thank all of you for putting this
21 together, all of the agencies, as well as all of the
22 participants. I'll note that a few of the folks coming
23 up will be talking about different aspects. One aspect
24 that we'll start hearing about is power to gas.

25 And what was missing in the supply discussion

1 was renewable hydrogen. And what was mentioned by the
2 Chair --

3 CHAIR WEISENMILLER: That was the earlier
4 workshop. I heard from your company directly on that.

5 MR. MINTER: Yes, you did. Yes, you did.

6 CHAIR WEISENMILLER: So, you don't need to
7 repeat, now. I think you're out of time.

8 MR. MINTER: Just simply that that's part of the
9 continuum is that we focus on our biomethane resources
10 and we develop power to gas so that becomes our future
11 opportunity for renewable gas.

12 Thank you very much.

13 CHAIR WEISENMILLER: Thanks. It would be useful
14 if you could submit to the record the E3 studies you
15 referred to. And certainly, Steve, if you have any
16 similar studies on the future of natural gas, or natural
17 gas utility 3.0?

18 MR. MALNIGHT: I'd be happy to do that.

19 MR. MINTER: Yeah, I committed to staff that we
20 would submit the E3 Low Carbon Pathway Study, the GNA
21 Game Changer Study, which also looks at the GHG benefits
22 of the engine. The ICF Renewable Gas Study they did for
23 us. The Navigant Net Zero Study.

24 We also did a jobs and economic development
25 study related to renewable gas development, and we'll be

1 submitting that as well.

2 And I think I'll probably submit the National
3 Academy of Science Study that was just released last
4 week, that look at the WWS, the wind, water and solar
5 approach --

6 CHAIR WEISENMILLER: Okay.

7 MR. MINTER: -- versus a more diversified
8 approach, that really focused on bioenergy and biogas.

9 CHAIR WEISENMILLER: Sure. No, that would be
10 good.

11 The other thing is Amy pointed out that,
12 obviously, a lot of times people -- it's sort of
13 confusing on whether you're talking potential, economic,
14 you know, what definition. So, certainly, to the extent
15 you've got information for us on cost effectiveness of
16 the various supplies and submarkets that would, again,
17 be great for what we're looking at.

18 I guess, George, I don't know how far you can go
19 on this one, but I'll at least try. So, obviously,
20 SoCalGas is committed to mitigate the impacts of the
21 Aliso Canyon leak. And so, you're out looking for
22 methane to take care of.

23 How much of this is going to -- what's the scale
24 of the scope of what you're trying to do, and how does
25 that fit into on what we're trying to do here on

1 renewable natural gas?

2 MR. MINTER: Well, it's too bad Richard's not
3 here because he's been involved in those discussions.
4 I'm not a party to those discussions. They're very
5 confidential. They center around offsetting the volumes
6 released. And there's some dispute on the volumes,
7 whether it's 90 or 104. So, if you just use rule of
8 thumb, 100,000 metric tons, we're talking about taking
9 out of the atmosphere 100,000 metric tons of methane.

10 And we are talking to a variety of producers.
11 We've actually signed some contracts and some
12 confidentiality agreements with others.

13 Our intent is to develop a profile of projects -
14 - excuse me, a portfolio of projects that will get us to
15 the 100,000 metric tons reduction threshold, or whatever
16 is agreed upon by the agencies is the threshold that we
17 need to reduce.

18 So, I think that's where we're at. I've been
19 encouraging our team and I know that Richard's been
20 encouraging his team to try to get to this sooner,
21 rather than later. It would good to be able to announce
22 at least where we are and what the status is on the
23 progress. And I'll leave it to the parties to come to
24 that determination. But there is a lot of work being
25 done on that front.

1 CHAIR WEISENMILLER: Well, when you reach a
2 settlement, it would be great to have it filed in this
3 docket.

4 MR. MINTER: That would be great.

5 CHAIR WEISENMILLER: Yeah.

6 MR. MINTER: Okay.

7 CHAIR WEISENMILLER: Yeah, so we can consider
8 it.

9 I guess the first question, generally for both
10 of you, is historically you've been very active with
11 gathering systems in California, for California gas
12 production. Is there any analogs or interest here?

13 MR. MALNIGHT: Are you talking about for the
14 gathering systems for the dairy projects and things like
15 that?

16 CHAIR WEISENMILLER: Exactly.

17 MR. MALNIGHT: Yeah, I mean, you know, I think
18 we come at this from the perspective that these are
19 going to be vitally important pilots to determine what
20 the marketplace is really going to require.

21 I think coming in we feel like the PUC's hit the
22 investment framework about right in terms of where the
23 utilities should be and where the developers should be.

24 Our issue, and this is, I think, a slight
25 difference between us, but PG&E's issue is the

1 recognition that the conditioning of the gathering
2 facilities are often highly integrated into the
3 operations of the dairies, and other facilities. They
4 may have a desire to own those facilities because
5 they're so integrated with their ongoing activities.

6 If the market needs a different solution, we're
7 clearly willing to look at that. But we think that
8 right now the PUC has it about right going in on the
9 break out of where the investment should be.

10 CHAIR WEISENMILLER: George?

11 MR. MINTER: I think we have a similar
12 viewpoint. Our discussions with the PUC staff was
13 really, you know, look, we do pipelines, we do the
14 interconnection, and the measurement and monitoring, we
15 do conditioning and we do gathering lines.

16 So, depending on what the situation is, the
17 utility role, you know, could be variable. We insist
18 that the pipeline and the interconnect is a utility
19 function. We're willing to do the gathering system and
20 the conditioning.

21 In some cases, dairies may not want to be the
22 producer. They're in the dairy business. And so,
23 they'll do the anaerobic digester. We'll do the gas
24 gathering, we'll do the conditioning, and we'll do the
25 interconnect and the pipeline.

1 In other cases, people who may be cluster
2 dairies would want to be the energy producer and they'll
3 do the gathering lines and they'll do the conditioning.

4 Our thinking is that these five dairy pilots
5 ought to look at different models and try out different
6 models. And each pilot could potentially be different
7 to see what works best.

8 At the end of the day, we need to move the
9 market. And transportation incentives, like the LCFS
10 and the RINs credit is moving the market to
11 transportation uses, but it's not really helping
12 development here in California.

13 So, what's going to help development? I think
14 you'll hear from one project, CR&R, talk about how
15 costly the utility pipeline was and why should he be
16 burdened with the cost? Isn't that a utility function?
17 Isn't it serving a social good and shouldn't the
18 ratepayers, shouldn't that be an investment of the
19 utility? We'd agree with that.

20 Can we do gathering lines? Yes. Do we have to
21 do that? No. So, that's I think we're open minded and
22 I think the pilots should be structured so that we're
23 able to look at different models.

24 CHAIR WEISENMILLER: Okay. From time to time, I
25 think you, George, have come into my office with various

1 conditioning proposals you've had with the PUC. What's
2 the current status?

3 MR. MINTER: Well, the current status is we have
4 a tariff to provide those conditioning services. And
5 we've been in discussion with various interested parties
6 and have not yet negotiated an agreement.

7 CR&R actually has incorporated the conditioning
8 as part of their project.

9 Existing landfills that have a methane issue are
10 much more interested in that service because they don't
11 want to make a bigger investment in conditioning. We'll
12 offer that service. But again, it's all about prices.
13 And we heard that the cost of conditioning is very high
14 priced. We also heard the ICF representative say, you
15 know, one off incentives to address this problem isn't
16 enough. We need a systemic approach.

17 CHAIR WEISENMILLER: Well, at this point
18 pending, there's an application before the PUC on, you
19 know, charging infrastructure for heavy duty vehicles.
20 And I can't get into that question, per se.

21 But is there any thought of a fueling option
22 before the PUC on providing gas for heavy duty vehicles?

23 MR. MINTER: There's decades of thought on that.

24 CHAIR WEISENMILLER: I realize that. What's now
25 pending?

1 MR. MINTER: Under PUC rules, gas utilities are
2 not allowed to be in that business. And so, you know,
3 we kind of have a problem with the idea of electric
4 utilities being in the refueling business, particularly
5 in the market where we think natural gas makes the most
6 sense.

7 When you look at air quality, you know, 90
8 percent of the problem in the San Joaquin Valley, 80
9 percent of the problem in South Coast is transportation.
10 And the largest sector is trucks, heavy duty
11 transportation trucks and buses. And by the way, also
12 off-road, port-related marine and railroad, all of which
13 could go from diesel to natural gas.

14 When you look at GHGs, 40 percent is
15 transportation and about 70 percent of that is light
16 duty vehicles. So, it seems to me that electric
17 deployment on the light duty for GHG reduction is
18 optimal, and natural gas deployment in the heavy duty
19 side is optimal for an air quality perspective.

20 CHAIR WEISENMILLER: Let's ask Steve, his
21 perspective.

22 MR. MALNIGHT: Well, yes, as a combined fuel
23 utility, we tend to believe that both fuels are going to
24 have a vital role to play in achieving our greenhouse
25 gas goals for transportation in light duty, all the way

1 to heavy duty.

2 As George said, you know, there's different
3 regulatory constructs right now on the gas side, as they
4 are on the electric side. But both are going to be
5 vitally important.

6 And as I mentioned in my remarks, I mean we
7 clearly see with low-NOx engines, and renewable natural
8 gas combined, a huge opportunity to make a big impact,
9 particularly to those local communities that, frankly,
10 suffer under the effects of emissions from heavy duty
11 transportation today.

12 CHAIR WEISENMILLER: Yeah, let me ask one last
13 question of Steve and then I'll pass it on.

14 Have you thought about, with a renewable natural
15 gas standard, who buys the gas? Which of your
16 customers?

17 MR. MALNIGHT: Yeah, I mean, you know, I think
18 you highlight one of the complex issues that needs to be
19 really resolved as we think through this.

20 I do think it's important, you know, as George
21 said, we have to recognize gas is recognized throughout
22 the State and in many different industries, from the
23 home all the way up to businesses.

24 And our objective really should be to recognize
25 the value of renewable natural gas for its carbon

1 benefits across the spectrum of uses. We think core
2 customers should participate in that as well. But we
3 need to really think about the cost allocation regimes
4 and, you know, the constructs that we use to ensure
5 fairness and equity across all customers.

6 But we really think renewable natural gas is a
7 benefit to all customers and we need to find ways to
8 drive it across all segments.

9 MR. MINTER: So, let me just comment because
10 we've done a lot of thinking and are moving forward in
11 some areas. You know, when you think about a renewable
12 gas procurement requirement, you've got to think about
13 the non-core and the core market in the gas marketplace.
14 You know, most of the gas we're delivering we don't buy,
15 it's customer-owned gas.

16 And so, you've got to think through how do you
17 address that? And so, we've talked, really, about a
18 core portfolio because at least we're in charge of that,
19 and so we look at it in that way.

20 We have a lot of transportation customers at our
21 existing stations. We have refueling stations that are
22 for our fleet, that are open to other fleets, and public
23 fleets and agency fleets. And we're actually looking at
24 how do we move green gas or the RNG, and make that
25 available to the public users of those stations.

1 We're also, now, looking at a core green tariff.
2 You know, how do we provide the opportunity for core
3 customers, if they want to, to purchase renewable gas?
4 So, we're looking at exploring that with the PUC in the
5 months, and through next year.

6 COMMISSIONER HOCHSCHILD: Can I ask a quick
7 question on that? Yeah, thank you.

8 Well, first of all, Steve and Professor Minter,
9 thank you for your lecture on the history of natural gas
10 in America. You have a future on YouTube, yeah.

11 MR. MINTER: 3.0.

12 COMMISSIONER HOCHSCHILD: Just a question about
13 the leakage. George, you mentioned, you know, the
14 system has gotten tighter. There is leakage, you know,
15 we have 2 million wellheads in the United States.
16 There's leakage at the wellheads, there's leakage in the
17 transmission system, the distribution system, and at the
18 end use. I mean, all of us have gas water heaters. You
19 lose 1 percent of the gas up the flue because it doesn't
20 combust with 100 percent efficiency.

21 The number you were talking about was referring
22 to what? And when you say the system, you're talking
23 about the distribution and transmission system? So,
24 what is included in that?

25 MR. MINTER: So, the study by EDF was actually

1 all three segments of the industry. So, they looked at
2 production, and they looked at transmission, and they
3 looked at distribution.

4 The numbers I was referring to, which are way
5 below the 1 percent of leakage rate, was distribution.
6 And we're at the .1 and .2 level.

7 In general, the EDF studies tell us that the
8 large emissions are at the production, and at the
9 wellhead. That's one of the reasons why the Obama
10 Administration moved forward, and EPA moved forward with
11 green wellhead completions. That was the single biggest
12 factor that reduces methane from production.

13 There's some other production activities that
14 are being looked at to reduce, you know, gross emitters,
15 or high volume emissions. Pipeline systems need to be,
16 you know, tested, and leaks identified, replacements
17 over time.

18 But I think the big sector was the production
19 sector and that's been the focus at the Federal level.

20 The big concern has been distribution companies
21 and the data is now telling us that they're a much, much
22 tighter system. Particularly in the west, which are
23 newer systems. In the east we have some challenges in
24 the urban setting, in New York, in Philly, in Boston, in
25 Baltimore and Washington. These are very old systems

1 and they still have a lot of cast iron. So, we need to
2 modernize those systems.

3 But we're talking about California and we're
4 pretty tight.

5 MR. MALNIGHT: I do think it's important to
6 remember, too, I mean I think the staff report, the
7 staff white paper did a great job of highlighting. When
8 we look at methane emissions, and its carbon, and its
9 GHG impact, I mean, you know, the pipeline systems
10 represent a pretty small portion of methane emission.
11 You know, about 7 and a half percent of methane
12 emission. So, it's a tight system, as George said.

13 From my perspective, the big issue is how do we
14 go capture the 100 percent emissions from the rest of
15 the sectors and put it into a pretty tight pipeline
16 system, where it can be combusted and have much better
17 and much lower emissions and GHG potential.

18 MR. MINTER: To drive that home, I mean 80
19 percent of all methane to atmosphere in California, in
20 the California inventory is stuff we're talking about
21 capturing and putting into the pipeline. We really need
22 to focus on that. And that's going into the air every
23 day. We've got to get a handle on that.

24 CHAIR WEISENMILLER: Thanks a lot. We could
25 certainly go on for more depth on this, but --

1 MR. MINTER: We're hungry.

2 CHAIR WEISENMILLER: Yeah, you're between
3 everyone and lunch. So, we're going to try to catch up
4 and get everyone back here at 1:00. So again, thanks.
5 And again, thanks for being here, we appreciate the
6 conversation and it's good to start having that dialogue
7 from a strategic level.

8 MR. MALNIGHT: Thank you, everyone.

9 (Off the record at 12:23 p.m.)

10 (On the record at 1:07 p.m.)

11 MS. RAITT: Our next panel is on the discussion
12 on Progress, Success, Lessons Learned From Existing
13 Projects.

14 And Elizabeth John, from the Energy Commission,
15 is the Moderator.

16 Oh, and I'll just mention we do have one or two
17 folks on WebEx for this panel.

18 MS. JOHN: Good afternoon. My name is Elizabeth
19 John and I am the Supervisor of the Biofuels Unit, in
20 our Fuels and Transportation Division.

21 We will begin our panel discussion on Progress,
22 Success, Lessons Learned From Existing Projects.

23 With us in the room and on the phone are five
24 individuals that have developed projects that use
25 biomethane and biogas for electricity generation and

1 transportation fuel use in California.

2 From left to right we have Mike Silva, from CR&R
3 Waste Haulers; Lyle Schlyer from Calgren Renewable
4 Energy; Gogo Heinrich from the City of San Mateo. And
5 then on the phone we have Neil Black, from California
6 Bioenergy. And we may have Steve Zurn from Glendale
7 Water and Power.

8 So, first, I'm going to ask each of the
9 panelists to briefly describe their project and
10 discussing how the project assists California in meeting
11 its SB 1383 goals. And then, I'll ask four questions
12 about lessons learned on each project. And then, in the
13 interest of time I'd just ask that each panelist limit
14 their response to about two to three minutes.

15 So, we'll start with Mike.

16 MR. SILVA: Good afternoon. I'm Mike Silva,
17 with CR&R Environmental. We're in the trash business
18 and we haul about 50 different cities throughout
19 Southern California.

20 Our project is an anaerobic digestion facility.
21 It's pretty unique that it's a hybrid and we can take
22 solids and liquid simultaneously. So, we actually take
23 food waste and green waste, as well as fats, oils, and
24 greases, and wine, and beer and things like that.

25 We're in the City of Paris and we're built in

1 four phases. Each phase is about 82,000 tons a year.
2 Our partners on the project are three companies. One's
3 called Eisenmann. The other one's Greenlane. And the
4 last one is WM Lyles.

5 And to the best of our knowledge, it's the
6 largest project in the world and the most sophisticated.
7 We've been visited by literally hundreds of people in
8 the States, and at least 10 foreign countries. And
9 probably the ones most interested are China and Vietnam.

10 Is that a good summary?

11 MR. SCHLYER: Lyle Schlyer, President of Calgren
12 Renewable Fuels. Calgren has produced and used a modest
13 amount of dairy digester biogas at its renewable energy
14 complex in Pixley, California for several years.
15 Pursuant to our SB 1383 project, the biogas usage will
16 go from about 3 to 5 percent of our fuel requirements to
17 65 percent or more.

18 In case you're unfamiliar with us, we produce
19 fuel ethanol from corn sorghum, and by the end of the
20 year we will be producing biodiesel, as well.

21 We're located in Tulare County, near its many
22 dairies. Late last year we signed up 11 of those
23 dairies and will install ten lagoon cover digesters to
24 capture biogas generated by their manure.

25 Why ten digesters for 11 dairies? In case

1 you've been paying attention. Two of the adjacent
2 dairies are relatively small and are sharing a digester.
3 So, this is a dairy cluster project by definition.

4 We are installing a private pipeline to convey
5 the raw biogas to our Pixley complex. I think it's
6 about 24 miles of private pipeline that we're
7 installing. There it will be scrubbed of hydrogen
8 sulfide and a portion of the treated biogas will be used
9 to make supplemental process steam, just as we've always
10 done with our current, on-site dairy manure digester.

11 CO2 will be removed from the remainder. We're
12 going to use a membrane system. So, it can either
13 refuel CNG-powered vehicles or be used to fuel our
14 cogeneration turbines. Most of it will be used for our
15 renewable fuel production at first.

16 But in addition to our production operations we
17 currently manage, and we've done it for several years,
18 the carbon credits at two unrelated and remotely located
19 CNG refueling stations.

20 To get our biomethane to these facilities, along
21 with other remote locations that we may subsequently
22 sign up, and we'll be pushing to do that, of course, we
23 will interconnect to SoCalGas's utility pipeline system.
24 According to their recent capacity study, there's room
25 in the utility line running along the front of our

1 property.

2 We are also in discussions with our established
3 grain and fuel haulers. These are folks with medium
4 duty, I would call them, maybe heavy duty, light heavy
5 duty trucks, and we will do a demonstration project for
6 them. So that they can try out CNG in their vehicles,
7 we'll refuel them at our site.

8 MS. HEINRICH: Good afternoon. My name is Gogo
9 Heinrich. I am the Senior Project Manager with the City
10 of San Mateo. We have completed our CNG project with
11 the California Energy Commission.

12 We are a municipality of about 100,000 plus
13 people and I like to tell them that your gas is our gas.
14 We are taking the gas from the digesters at the
15 treatment plant, cleaning it up with the Unison
16 Solutions' equipment, piping it to the ANG dispensers,
17 and filling up our vehicles.

18 Our biggest challenge has not been construction.
19 We were granted, given the grant for the construction in
20 2014 and we were able to start pumping gas in August of
21 last year.

22 Our big challenge is trying to find the vehicles
23 to pump the gas into. We have one Chevy Impala, two
24 Ford pickup trucks. And at the last council meeting we
25 were given permission to purchase 17 more light duty

1 trucks. So, we are capable of doing 500 gas gallon
2 equivalents per day. However, since November we have
3 only been able to do 500 gas gallon equivalents for four
4 months.

5 So, we also have our RIN credits and LCFS
6 credits. We have those registered and are eligible to
7 get money back. I think our first check is probably
8 going to be like \$500.

9 So, if you can help us with the vehicle
10 situation that would be greatly appreciated. But our
11 system is working. It's working great. And we
12 appreciate all the help and assistance we got from the
13 Energy Commission.

14 MS. JOHN: And then, do we have Neil on the
15 phone?

16 MS. RAITT: I don't think we have him, yet.

17 MR. BLACK: Yes, I'm here. Are you able to hear
18 me?

19 MS. RAITT: Yes.

20 MS. JOHN: Yes.

21 MR. BLACK: Great. So, thank you for inviting
22 me on the panel today. And we're dairy digester
23 developers, also. And I think an important takeaway,
24 already just at the introduction, is that there's
25 significant interest and potential to put dairy sourced

1 biomethane into vehicle fuels in California.

2 At the Kern County cluster, which we've been
3 developing for the past number of years, we have one
4 digester operating today, which is the largest digester
5 in California. And we have two more digesters that will
6 be coming online over the next two or three months. And
7 we are grateful for the Energy Commission funds, and
8 funding from CDFA for those two projects.

9 All three of those projects are initially
10 electricity projects. And similar to what was outlined
11 that Calgren is doing, we have fully permitted a low-
12 pressure gas gathering line between 15 different dairies
13 in the cluster.

14 And our goal is that the next 12 dairy digesters
15 in the cluster would all be having their biogas, which
16 would be captured at individual digesters at each dairy,
17 through the low-pressure gas gathering line, brought to
18 the centralized facility, and cleaned up and put into
19 the utility pipeline.

20 We'll also be taking a portion of the biogas
21 from our initial three projects and putting that biogas
22 into the pipeline, too.

23 The opportunity really is emblematic of what
24 could be done in multiple dairy clusters throughout the
25 State. While we're focused today on a discussion of

1 what we're doing in Kern County, we're already working
2 in developing clusters throughout the Central Valley,
3 where they are also near a pipeline, with a pipeline
4 that has the capacity to take the cleaned up biogas, and
5 then deliver it to others to be able to use it for
6 vehicle fuel.

7 The Low Carbon Fuel Standard is key to what we
8 do and certainty in the program, and certainty in some
9 level of price stability is fundamental for our
10 continued focus on vehicle fuels as the preferred course
11 of capturing dairy biogas and helping achieve the very
12 aggressive goals of a 40 percent reduction of dairy
13 methane from what is now coming from dairy lagoon
14 management. That 40 percent reduction by 2030.

15 But I think it's very achievable, reflecting the
16 sophistication that the dairy industry has developed
17 over the past number of years with digesters to achieve
18 that goal. And if we're very focused on near term
19 project development and then I think there will be many,
20 many projects that will then follow in the handful of
21 the years we have between now and 2024, when mandates
22 would potentially come into effect.

23 MS. JOHN: Thank you. And do we have Steve Zurn
24 on the phone?

25 MR. ZURN: I am here.

1 MS. JOHN: Hi Steve. Can you give a brief
2 introduction of your project?

3 MR. ZURN: Sure. The City of Glendale owns its
4 own landfill and also owns its own electric and water
5 utility.

6 So, we use that to our advantage and in 1992
7 developed the Public/Private Partnership Project,
8 whereby we took the biogas generated at the landfill and
9 processed it at the site, but then piped it to our main
10 power generating facility. It was about five and a half
11 miles across town.

12 And here we are, 25 years later, and both the
13 main power generating equipment and the landfill gas
14 processing equipment, both are ready to be upgraded.
15 And with technology changing and methodology improving,
16 what we've decided to do is split the projects.

17 And so, we are pursuing a biogas project at the
18 landfill that will remain at the landfill site. In
19 other words, we're going to look at purchasing
20 reciprocating engines that are designed and manufactured
21 specifically to burn biogas and landfill gas.

22 And our biogas is very low quality. It's
23 probably somewhere between 30 and 34 percent methane.
24 That caused us a problem at the main generating facility
25 in that we didn't generate enough Btu, so we had to

1 blend it with natural gas, which reduced our RPS
2 qualification for the gas. It also was very corrosive
3 to the main power island equipment.

4 Now, by putting it into these reciprocating
5 engines that were built to burn this kind of gas, they
6 can burn 100 percent, we have the capability to put the
7 power right into the grid at that point, at the landfill
8 site. So, this is about a 12-megawatt-per-year project,
9 based on the current gas curve at the landfill.

10 Our local Air Quality Management District
11 prefers this method because, A, we're not blending it
12 with fossil fuel and, B we're keeping it right at the
13 landfill site, and burning it in engines that are more
14 efficient.

15 So, and we will get 100 percent renewable
16 portfolio credit for it, and we will reduce the wear and
17 tear on the main power island equipment by burning the
18 gas in specialized units.

19 In addition, we are negotiating with a firm to
20 potentially put in an anaerobic digestion system at the
21 landfill to handle organic waste. And this will burn.
22 This will also produce a gas which will be much higher
23 quality because we, obviously, could control the fuel.
24 And we have the capability to use that gas, as well, in
25 these new engines to produce additional electricity.

1 So, that's kind of where we're at right now.

2 Status, we have negotiated the engines at the
3 landfill, with this company called Jenbacher. And we
4 are now pursuing the permitting through the South Coast
5 Air Quality Management District. So, we're moving
6 ahead.

7 MS. JOHN: Great, thank you. So, my first
8 question to the panel is how would you characterize the
9 success of your project and key ingredients for success?

10 MR. SILVA: I was asked that question in my last
11 seminar. And the key is tenacity, period. We've been
12 working at this thing for ten years. It took us five
13 years of research. Then it took us two years to get all
14 the permits. We probably have 20 permits on the
15 facility. And we've been building for three years.

16 When we're all done, I'm going to go into a
17 couple of segues here, that Lyle reminded me to do here,
18 is that, you know, our goal is to make 4 million gallons
19 of RNG and run my entire fleet off that. WE run about a
20 thousand trucks throughout Southern California.

21 And right now we're just completing, with the
22 gas company, the first interconnect I believe in the
23 State that's going to put RNG into the actual pipeline
24 system. And we did the entire gas cleanup system
25 ourselves, and the pipeline. So, we're one of the first

1 ones to finish the interconnect process. We should be
2 in the pipeline within two months.

3 Overall success, you know, you've really got to
4 check all the boxes, feedstock, a willing host city.
5 We've been partners with the City of Paris for almost 25
6 years. You're not going to be able to build these in
7 every city, as you know. You've got to have the
8 political will.

9 We have 14 cities signed up that were willing to
10 pay extra to get a better-than-going-to-the-dump
11 solution. They have been willing to pay that and pass
12 that cost through.

13 You have to have an off take. We're in a
14 fortunate position that we run a thousand trucks, so
15 we're not beholden to anybody and we can use all the
16 fuel ourselves.

17 And then financing, our project right now is
18 about at \$50 million. We spent \$40 million of our own.
19 We've received about \$10 million from the CEC,
20 CalRecycle, and AQMD. All three agencies have invested
21 heavily into our project. So, I would say that's been
22 the keys to success.

23 MR. SCHLYER: As far as our project, I think it
24 makes sense because we have a background in low carbon
25 vehicle fuels, renewable fuels. We've worked closely

1 with Air Resources Board to figure out how to maximize
2 the amount of benefits we will get under the Low Carbon
3 Fuel Standard by using -- well, actually, by avoiding
4 methane emissions at the dairies.

5 Coupling that with the assurance of a ten-year
6 run, I guess you'd say, a minimum ten-year run that
7 we'll get under SB 1383, will allow us to amortize our
8 investment. And it's a real key to the success of our
9 project.

10 There are other things that we get out of being
11 an existing renewable fuels producer, other benefits.
12 Air permitting went very smoothly because we weren't
13 creating new emission sources. We're just backing out
14 fossil fuels and burning, essentially, renewable fuels.

15 The same thing with CEQA compliance. Since
16 we're not doing anything different, all we had to do was
17 to update earlier environmental impact studies.

18 Expanding CNG for use in trucks, in lieu of
19 diesel is also an important part of our project. You
20 heard from others on this, earlier in the discussion
21 this morning. We're building upon existing
22 relationships to encourage this to happen.

23 We don't have as many trucks as Mike does. We
24 are teaming with the folks that we've had a long term
25 relationship with. Folks who haul grain for us now,

1 will haul fuel for us now. And we're going to be doing
2 some demonstration projects for them.

3 But these are relatively modest. It takes time
4 to move a commercial trucker, whose -- their main focus
5 isn't just moving to renewable fuels. I think the
6 incentives are there, which we'll talk about later, but
7 the existing relationship is a big part of our success
8 here, too.

9 MS. HEINRICH: Hi. Mike is correct in tenacity
10 is needed to make a success of these projects. Also,
11 being totally naïve works as well. I'm an architect and
12 I had no idea what I was getting into. I do know how to
13 build a project, though. And once we had it built,
14 that's where we are right now. We're just trying to
15 make it work.

16 Working with a small city, such as San Mateo,
17 made it really easy to work with all the other agencies.
18 We were big enough so they would listen to us and small
19 enough so, you know, we weren't into the mega millions
20 of dollars that people would be looking at of being out
21 of pocket.

22 So, our total project was only \$5 million. Our
23 purchase for vehicles, right now we're at about a
24 \$700,000 outlay and we hope to replenish the rest of our
25 vehicles.

1 So that money for the vehicles is part of our
2 fleet, so we were not taking out any other money from
3 the residents of San Mateo in order to do this project.
4 So, everything we had financially was within the realms
5 of the City finances, and with a grant from the CEC it
6 worked out really well.

7 We also did a partnership with the contractor in
8 that we pre-qualified contractors for the project, and
9 we told them at the onset that this is new technology
10 and we were really trying hard to make this work. We
11 were going to have lots of design issues to work out and
12 together, as a team, we worked it out together. So, we
13 were very happy with the outcome.

14 MS. JOHN: Neil?

15 MR. BLACK: We've also benefitted greatly from
16 significant support from the permitting agencies. So,
17 Kern County has just been a great partner to us over the
18 past number of years, as has the Water Board, and the
19 Air District.

20 It's very -- we've all learned a great deal how
21 to build successful lagoon dairy digesters and they
22 operate very well and very dependably.

23 We've had also very significant success at using
24 the biogas for electricity and doing so with keeping NOx
25 emissions very low.

1 The big issue for us, and others, will be
2 learning from the experience of CR&R, and working very
3 closely with SoCalGas of successfully putting the
4 biomethane into the pipeline. That's going to be the
5 key steps and learnings over the next couple of years.
6 And these initial projects will really be the guide for
7 the follow on projects, afterwards.

8 And that standard in California, of course is
9 very high, and so we'll all really need to be focused on
10 making sure we're doing it successfully, and we're
11 sharing that knowledge with others so we're able to
12 continue to grow and build these projects.

13 The transition from electricity to pipeline
14 injection for vehicle fuel use also has been strongly
15 supported by the Air District.

16 While we also recognize that in remote areas, on
17 the dairy side, it will be important to continue to have
18 electricity projects, which in those remote areas those
19 digesters will not be able to access a pipeline.

20 And I think there's also significant learning
21 there to be able to do that in keeping with an overall
22 strategy for the industry where we're taking great steps
23 not only in reducing greenhouse gases, but in improving
24 the air quality in the Central Valley by lowering NOx
25 emissions from diesel trucks, using the new Cummins

1 Westport engines.

2 We also have greatly benefitted from the
3 interest of a wide range of companies, large and small,
4 including our local milk hauling fleets and others, who
5 are very interested in doing the vehicle fuel
6 conversion.

7 And we really need to work with the CEC and
8 others to simplify the programs and having one place for
9 those funding sources to make those steps much easier
10 and much more certain. So, those would be examples of
11 the issues that we face in measuring success in the
12 years to come.

13 MS. JOHN: Thank you. And do we have Steve?

14 MR. ZURN: Yes. We feel the project in Glendale
15 has been tremendously successful. And, obviously, it's
16 been ongoing for 25 years.

17 So, you know, our initial objective there was to
18 take advantage of the facilities that we had in place
19 and to take a naturally occurring source of fuel and put
20 it into much better use, than simply flaring it into the
21 environment.

22 And we've gained, you know, tremendously over
23 the past 25 years from this particular project. Not to
24 mention, as I said, it was a public/private partnership
25 when we started, so the General Fund of the City has

1 benefitted, the ratepayers have benefitted, of GWP, and
2 we've been able to utilize the assets that we have to
3 what we hope has been a betterment to the environment.

4 I think the key ingredient to success here was,
5 again, we're back in '92. So, we were kind of going out
6 on something that folks were a little skeptical about.
7 We had proposed the potential of developing the project
8 in house, with the Public Works Department, the Water
9 and Power Department, and our landfill partner, Los
10 Angeles County Sanitation District.

11 But that was a financial risk that our council
12 wasn't willing to take at the time. So, we went into
13 the public/private partnership, which actually ended up
14 working out very, very well for us.

15 And I think it has been such a successful
16 project that we haven't even hesitated as we have gotten
17 to this point where we need to look at where are we
18 going in the future?

19 Obviously, things have changed a lot since '92
20 in regards to renewable energy. So, our motivation is a
21 little bit different or there's an additional
22 motivation, if you will. But we didn't hesitate to
23 continue this project, to update it, to modernize it,
24 and to make it more effective and efficient as we go
25 forward.

1 So, we feel the project's been a tremendous
2 success. But, you know, back in '92 it was for us, at
3 least, charting a bit of unknown water and getting folks
4 to back you in that particular situation wasn't easy.
5 You know, there wasn't as much information on impacts to
6 the environment and it was kind of just something that
7 was beginning to become a little bit more aware, at
8 least from a public perspective.

9 And so, we felt we were going out a bit on a
10 new, at least blazing a new trail for Glendale. And for
11 those of you who aren't familiar with Glendale, we're
12 not big on blazing our own trails. We usually are very
13 conservative and wait before we make those kind of
14 moves.

15 So, I would think that by taking that
16 opportunity that continued greatly to -- and then,
17 somebody had mentioned tenacity. There's no question
18 about it. It took us three and a half years to
19 negotiate the agreement. So, we definitely were
20 tenacious in wanting to put this project in place.

21 And I think all of those things, together, have
22 been the key ingredients for us and for what we believe
23 the success of the project has benefitted us over the
24 last 25 years.

25 MS. JOHN: So, question two is what is the

1 potential to replicate your progress throughout the
2 State?

3 MR. SILVA: I would think that CR&R has got a
4 pretty good chance. We have the exclusive license on
5 all of our technology in California, because it's the
6 only project they've done so far, outside of Europe.
7 So, we do that.

8 We're already about two months away from
9 starting up phase two, which is another 82,000 tons.
10 And we're starting the planning to do phase three.

11 We've received another \$3 million grant from CEC
12 and we're hoping to get another \$4 million from
13 CalRecycle next month. They had another grant
14 application last year. So, that would give us \$7
15 million towards phase three. If we get that, we'll
16 start phase three.

17 I think I wanted to clarify a couple of things
18 from the earlier discussions this morning. They talked
19 about using, I don't know, 60 million gallons of RNG in
20 the State of California. To the best of my knowledge,
21 100 percent of that's important. That's not California
22 RNG. We're the only ones that are making California
23 RNG. And that's not bragging, that's saying we need to
24 make it in California.

25 Because the stuff coming from out of state

1 doesn't help us with our organics problem, which is my
2 business, which is the waste management side of the
3 business. So, that's kind of a thing there.

4 Also, most of that gas does not meet Rule 30. I
5 had to put two cleanup systems. My interconnect cost \$7
6 million. Even though I'm getting a \$3 million rebate
7 and I'm in line for it, the young lady earlier said that
8 we're the only ones in line for that. It cost \$7
9 million.

10 Before that rebate, no one was going to do the
11 interconnect. If you remember, that used to be a \$1.5
12 million rebate and nobody claimed that rebate. And so
13 far it's doubled to 3 and I'm still the only one in
14 line. I think that kind of speaks volumes and not in a
15 positive way. You know, there should be people running
16 to get into the interconnect and no one's doing that,
17 except for us.

18 So, the gas that's coming into the State, in
19 theory does not meet Rule 30. And I'm not poo-pooing
20 that because I buy it myself, for my own trucks. But we
21 have to spend extra money to meet Rule 30. And based on
22 our analysis is our structure, say -- I'll give you an
23 example. You can inject 950 Btu gas in every other
24 state. California's got to be 990. You can't get to
25 990 without a second cleanup system, which is called a

1 VPSA unit, which I had to purchase.

2 And we actually purchased it from a company in
3 Portugal. And it cost us \$2 million more to get in the
4 pipeline. If we were in Arizona, or Texas, we wouldn't
5 have had to buy that piece of equipment, even though
6 that gas is allowed to come into California. So, it's
7 kind of a weird thing there.

8 So, I got off topic, but I wanted to get those
9 points into the record for today.

10 MR. SCHLYER: Calgren sees tremendous potential
11 to replicate our project. First of all, to expand our
12 pipeline. Those 11 dairies we signed up, it's clear
13 we're going forward. That's what the dairies wanted to
14 see, they wanted to see some real action.

15 We've got additional methane producers who are
16 eager to sign up with an expansion of our existing
17 pipeline.

18 To underscore what we believe is possible, we're
19 building that pipeline to handle two and a half times
20 the volume that we'll get from those first 11 dairies.
21 We fully expect to expand it.

22 The more interesting question is whether the
23 teaming of dairy cluster projects with renewable fuels
24 makes sense elsewhere in the State. We think it does.
25 Definitely in the Central Valley, we see huge

1 opportunities.

2 There was a recent study that was done by UC
3 Berkeley. I see Steve Kafka in the room. He was on the
4 team who authored that study, I think it was in March,
5 that talked about the fact that California dairies are
6 among the most efficient in the world. With that
7 efficiency comes increased methane emissions.

8 Policymakers are right to be concerned about the
9 short-lived climate impacts. That's appropriate. But
10 that same methane may pave the way for a win/win
11 situation by encouraging avoided methane emissions to be
12 monetized under the Low Carbon Fuel Standard, SB 1383
13 has the potential to transform a problem into a
14 solution.

15 It's kind of like what Mike said, let's do it
16 here in California. Why just do it, why just bring it
17 in from Texas and Arizona, and other places. By the
18 way, we were told Arizona is 900, not 990. And Texas is
19 around 965. A big difference here.

20 If you want to team up renewable fuels with
21 dairy digester clusters, they either have to be located
22 pretty close together, like we are, we benefit from
23 that. I don't think we're the only ones. There's about
24 six renewable fuel producers in the Central Valley.

25 But after that, you have to talk about

1 transporting it. And transporting it is tough in
2 California. You've heard it from others.

3 Unlike Mike, I'm not going to get started
4 because if I do, Elizabeth will kick me under the table
5 because I take up too much time.

6 MS. HEINRICH: I think the potential to
7 replicate the City of San Mateo's project is very great.
8 Wherever you have a small municipality and a wastewater
9 treatment plant, they should be able to do this similar
10 project with very minimal costs and great outcome.

11 The City of Petaluma is currently doing the same
12 project and they've been calling me for some advice, and
13 I'm happy to give it. So, I think any city with a
14 wastewater treatment plant can do this.

15 MS. JOHN: Neil?

16 MR. BLACK: What we did in Kern County is we
17 began with electricity, and we're using electricity
18 there was a hedge so that there's a safe, steady revenue
19 stream that then could offset the risks of the
20 volatility and uncertainty of the credit markets for
21 vehicle fuel.

22 Our goal is not to need to hedge it with
23 electricity, but to have a market program, based on the
24 Low Carbon Fuel Standard, that we can count on.

25 Based on the ability to trust that program's

1 certainty, its longevity and its basic economics will
2 enable us in our other clusters just to put the gas into
3 the pipeline and sell it as a vehicle fuel.

4 In addition to the Kern cluster, we're working
5 on four other clusters right now, with the goal for all
6 of those to be putting gas into the pipeline for vehicle
7 fuel.

8 We're independently working with a variety of
9 dairies that are isolated, not near the pipeline, that
10 are prime examples for low NOx electricity generation as
11 the alternative way to reach the overall State goals.

12 The critical issue, then, is the ability to work
13 with ARB and others to make that Low Carbon Fuel
14 Standard program one that we could all count on for the
15 long term.

16 I'm expecting that right now there's going to be
17 a huge over-subscription to a CDFA grant solicitation
18 that's due tomorrow. It will probably have two to three
19 times the amount of grant requests than there are grant
20 dollars, showing there's huge opportunity and potential
21 here, and the importance to provide funding in the near
22 term to help build the momentum that has begun over the
23 past couple of years.

24 MS. JOHN: And then, do we have Steve?

25 MR. ZURN: Yes. Yeah, I definitely think that

1 the project that we originally installed and the one
2 that we're planning to install can both be replicated.
3 Obviously, the situation's a little bit easier for us
4 because of the fact that we own the assets at both ends.
5 But I think any agency, or whether it's a joint powers
6 agency, a county, or a city that has a landfill can
7 partner with either -- if they own the local utility, or
8 who the local utility provider is, even if it's an
9 Investor Owned Utility.

10 So, I think the opportunity there exists. I
11 think as biogas becomes more and more appealing,
12 especially as we move forward with increasing our
13 renewable portfolio standard percentages, I think that
14 folks will be looking at it in more earnest. I think
15 there's a lot of folks that would like there to be more
16 encouragement.

17 And what is that encouragement, whether it's
18 financial or otherwise for people to develop these types
19 of projects because, you know, of the importance of not
20 only managing the methane, but being able to use that is
21 almost -- certainly low carbon. Some folks will tell
22 you that you can design the projects to be virtually
23 zero carbon, which is outstanding.

24 And I think those benefits to both the utility
25 provider, to the agency that owns the landfill, and to

1 certainly the community there's a great benefit.

2 But, you know, when you look at them on the
3 outside, you know, you can see it can be very costly in
4 some cases. So, I think any encouragement and ability
5 for folks to obtain assistance in helping develop some
6 of these projects is a good thing and I think it can
7 only be beneficial to the area and to the State.

8 MS. JOHN: Thank you. Just a quick time check,
9 we have 15 minutes. But I have asked the panel to
10 submit their comments to the docket so that we get a
11 full response.

12 So, the third question is what challenges might
13 interrupt continuing successful operation or impede and
14 expansion or the development of additional projects?

15 MR. SILVA: I'll just job down your checklist
16 there. So, technology development, we believe we've
17 gotten that taken care of. We've married Eisenmann with
18 Greenlane, with SysAdvance. They're all working. We
19 are fueling our trucks as we speak today. And our
20 preliminary tests showed us that we got to 99.2 percent
21 methane. So, we believe we can do that.

22 Future project location. You have to have
23 welcoming cities that have the political will to put
24 facilities like this in their city, just like whether at
25 the transfer station or a landfill.

1 Pipeline injection all depends on that's kind of
2 a roll of the dice of what's in the street in front of
3 you. We happen to have two or three potential
4 connections in Paris, so that worked out for us.

5 Our business model's replicatable because we're
6 in the trash hauling business. So, my clients provide
7 my only feedstock.

8 Financing, someone talked earlier about LCFS and
9 RINs, and we use a couple of brokers to trade those, but
10 they're super volatile, super sophisticated. They're
11 hedging them; they're brokering them, selling them. I
12 mean, it's quite a process.

13 Financing, we do our own financing so we don't
14 have a problem there.

15 Regulatory, we're hoping that everybody stays
16 the course with the enforcement of the various laws that
17 we're trying to compete with.

18 And then, vehicle availability, we're going to
19 the low NOx, Cummins Westport. We're actually running
20 the demo, via AQMD right now, so we're already running
21 that truck.

22 MR. SCHLYER: Calgren sees a lot of challenges
23 here. I tried to pick out a handful that I thought
24 would be instructive. But one is policy consistency.
25 Definitely, you've heard from others, a Low Carbon Fuel

1 Standard makes this happen.

2 It wasn't too long ago the press reported that
3 the Governor was thinking of trading it away against Cap
4 and Trade, I can tell you that this project that we have
5 here came to a temporary halt. It makes no sense
6 without the Low Carbon Fuel Standard.

7 What the lawmakers have done, what the
8 policymakers have pushed for, you folks have pushed for
9 and shows up in SB 1383 is the ten-year ride that we
10 need, to make it make sense. So, policy consistency I
11 would put as number one.

12 Number two, if you can't team -- you know, our
13 project is renewable fuels. If you can't team that in
14 close proximity with dairy clusters, you need to get in
15 the pipeline. And pipeline is my number two. I fully
16 appreciate that at a certain level -- I heard George
17 Minter talk, Steve talk. I have no question that they
18 have a commitment. Their utilities have a commitment to
19 make interconnection happen at a high level. I wish it
20 would filter down to the troops.

21 I started today with a laundry list of things
22 that we had to kind of overcome to get to the point
23 where we're talking seriously about an interconnection.
24 Mike referred to some of them, just the costs and the
25 fact that California is tougher than anybody else. You

1 risk driving these projects outside the State. It's a
2 real shame.

3 It would be -- I'm not going to give my laundry
4 list. I'll be glad to submit it separately, if you
5 want, because Elizabeth will tell me that I've run out
6 of time.

7 There's two other things I would mention,
8 however. One was mentioned previously, so I'll just --
9 I won't spend any time on it. But that is getting
10 haulers. These 12-liter Cummins engines are still
11 pretty new. And we talked to one outfit that had seven
12 of them. They liked the 9-liter, they worked okay. The
13 12-liter, I won't be around for the panel that Cummins
14 is on, but they had to overhaul four of the seven that
15 they put into service.

16 That slows folks down. So, I guess that's in
17 the technology side, but it's on the demand side. You
18 heard other folks talk about the demand side, it's very,
19 very important.

20 But the last thing I would mention is that Neil
21 Black, with Cal Bio, and Calgren aren't the only ones
22 out there trying to do these dairy projects. With the
23 current incentives, as Neil suggested, the CDFA's grant
24 program undoubtedly will be over-subscribed. I'm sure
25 both he and we are just strategizing the heck out of

1 what we can do to score well on these grant applications
2 that we'll be submitting tomorrow.

3 But the point is that as we go out there and
4 look for other projects, we're running into a lot of
5 dairies who say that they can't talk to us, because
6 they're talking with somebody else.

7 But you'll hear a little bit more about that
8 when you hear my comments on what we could do.

9 The point is that when you make the incentives
10 too targeted or too big, sometimes it could cause
11 problems.

12 MS. HEINRICH: My problems seem so petty
13 compared to these mega bucks and mega structures.

14 But our biggest challenge for the City of San
15 Mateo was with the Air Resource Board. We have a very
16 small piece of Unison equipment that basically cleans
17 the gas and we use it for the fuel.

18 The Air Resource Board originally was rating it
19 as a source. We told them it was not a source. We
20 weren't bringing in any new gases. We weren't bringing
21 in any new types of materials. It was simply taking
22 what we have and cleaning it.

23 It took us five months to finally convince them
24 that yes, we only have a giant filter. So, with that we
25 were able to continue on with our project.

1 Luckily, I started the permit process with the
2 Air Resource Board nine months in advance, knowing that
3 they were going to find challenges with this project.

4 The other problem we have is with the Air
5 Resources Board, again, and that is with the location of
6 vehicles to purchase. We found vehicles in other states
7 that you could purchase, that run on CNG. But when you
8 import those into California, they were no longer
9 California certified. So, we have been paying \$10,000,
10 \$15,000 extra per vehicle to get them to the
11 certification that the Air Resources Board would permit
12 us.

13 We have a Chevy Impala that we paid \$10,000
14 extra, so for a total of \$35,000 we have a dual-fuel
15 passenger vehicle.

16 For the Fords that we just purchased, we paid
17 approximately \$10,000 each on those, as well, to convert
18 them to the CNG.

19 So, the extra cost for conversion is something
20 that the City is struggling with right now. We are
21 trying to make sure that we get those LCFS and RIN
22 credits, because that is how we plan to offset the extra
23 cost for the CNG vehicles. Thank you.

24 MS. JOHN: And then, in the interest of time,
25 I'm just going to go to the dais and see if you have any

1 questions for our panel?

2 CHAIR WEISENMILLER: Thank you. Thanks,
3 everyone for being here.

4 Just a couple of questions. The first one is
5 I'm going to ask Steve Zurn the question of how much
6 extra did it cost to get equipment that could use the
7 landfill gas, as opposed to the prior generating units?

8 MR. ZURN: So, when we did the original project
9 it was a public/private partnership and there was tax
10 credits and a lot of things involved. But that was
11 about an \$11 million project that ended up, because of
12 some complications with the gas purchase agreement that
13 the City ended up -- or the utility ended up buying the
14 project about two-thirds of the way through. And it
15 ended up being kind of costly to buy it out.

16 But look to that as opposed to what our estimate
17 for the project coming up, is about \$30 million. Split
18 about \$15 million for equipment and about \$15 for
19 construction.

20 The prices have gone up. At the time that we
21 did the project, we did look at the potential to put
22 turbines at the landfill and use that technology versus
23 piping it to the main power generating facility.

24 However, the turbine technology at that time, it
25 just wasn't there. We didn't feel that that was in our

1 best interest. And in fact, even when we compared
2 turbine technology versus the reciprocating engines
3 today, we felt the reciprocating engines were a better
4 way to go.

5 CHAIR WEISENMILLER: Okay, thanks.

6 The other question, I'm just trying to
7 understand someone, you built the gathering systems for
8 the dairy farms. A long time ago I got involved in the
9 PG&E gas gathering system. And the issue that they ran
10 into was they were amortizing it over too long a period
11 of time, compared to the California gas production. So
12 that they had an incredible amount of uncollected cost.

13 At some stage, what is the amortization period
14 you use?

15 MR. SCHYLER: Ten years. Actually, nine years
16 because we're not sure how quickly we can start to
17 capture credits under LCFS for avoided emissions at the
18 dairies. We're almost forced to do that because that's
19 what we can count on in terms of a revenue stream.

20 Again, it's a combination of LCFS and the ten-
21 year ride we'll get under 1383.

22 So, this is a low pressure pipeline system.
23 We're comfortable with the project. We don't need
24 additional incentives.

25 CHAIR WEISENMILLER: Okay. The other question

1 that came into account with, basically, Dow. Dow, at
2 one point had a pipeline for a long time. It, at some
3 stage, tried providing transportation service for
4 California gas producers to a couple of other buyers.
5 And at some point, and I forgot whether -- I think it
6 was PG&E knocked on their door, at the insistence of the
7 PUC and said, obviously, if you're offering
8 transportation services to more than two, you now have
9 the glory of being a utility. Which ended up in a court
10 case and, obviously, Dow decided it did not want to be
11 regulated as a utility.

12 Do you have any concerns on that front?

13 MR. SCHLYER: I do now, after you raised the
14 subject.

15 (Laughter)

16 MR. SCHLYER: You know, we are out there. Like
17 Mike said, and by the way we hope to be the second one
18 to take advantage of the Rule 39 incentives for doing
19 pipeline interconnection.

20 But some of this is new territory and we're
21 going to have to be careful. We are not aware of any
22 specific issues that are raised by us doing a private
23 pipeline, all with the folks who we've contracted with.
24 So, I think we're okay. But after your question, I'll
25 sure do better research.

1 CHAIR WEISENMILLER: There's a lot of case law
2 on that issue, I can say.

3 MR. SCHLYER: Thank you.

4 CHAIR WEISENMILLER: Which is not a happy
5 outcome, anyway from Dow's perspective. Maybe from
6 PG&E's perspective or the Commission's.

7 Anyone else?

8 COMMISSIONER SCOTT: I do. I had a couple
9 questions. Thank you, panel, so much for being here and
10 providing your information for us. I think it's really
11 helpful to have kind of this practical, on-the-ground
12 information to kind of think through as we go forward.

13 And so I did want to say yes, please, Lyle
14 please do send in your additional written comments, and
15 the rest of the panel, and anybody else who has thoughts
16 on this for us, we'll really appreciate seeing those
17 details.

18 The question that I had and it's about the
19 tenacity component that you all mentioned, and how you
20 have to have tenacity to make these projects come
21 through. And I'm wondering if there are portions of
22 what you needed to be so tenacious on that lend
23 themselves to solutions?

24 Right, so you talked about certifying vehicles,
25 you talked about certifying different pieces of

1 equipment. You've talked about Rule 39 and how that can
2 help with incentives. I mean are there components like
3 that that lend themselves to maybe a little bit of
4 simplification, or is most of that in kind of that
5 personal negotiation as you're setting up the project?

6 MR. SILVA: I guess I would just say our
7 tenacity was basically because we're the first ones.
8 So, AQMD didn't even know what the permits were going to
9 be for when we started with them. The gas company had
10 never done an interconnect before, so I think ours was a
11 lot of first-in problems.

12 MR. SCHLYER: I think from Calgren's
13 perspective, and we're not as far along as Mike is, but
14 we hope to be right behind him, I would say the same
15 thing. It's kind of first in the door. But we'll be
16 glad to share all that experience with others.

17 MR. BLACK: And this is Neil speaking. The good
18 news is there's competition. And so, we have a nice
19 little race with dairy biogas into the pipeline. And
20 that's a wonderful place to be at for the State. And if
21 there's other, extra State funds, I would encourage you
22 to provide funding to all of Calgren's projects, and all
23 of Cal Bio's submitted projects to help speed the
24 development of the industry.

25 And the certainty of knowing that Rule 39 will

1 be around after also the very important separate program
2 of 1383 expires, and the 100 percent incentive. Those
3 type of issues of knowing you can count on something
4 really is very helpful.

5 And, similarly, we might even want to look at
6 grant funding type programs that are more automatic if
7 certain criteria is met versus the kind of laborious
8 process of writing grant applications. So, that would
9 be a couple of thoughts.

10 COMMISSIONER SCOTT: Thank you.

11 MR. COREY: Neil, you may have answered this
12 part with your response. But did I hear you say you're
13 now developing four clusters and in the past you've used
14 electricity as a hedge against price volatility. Are
15 you doing that with these four new dairy clusters or are
16 you developing these in anticipating of maybe getting
17 ones selected under 1383, or I'm just trying to figure
18 out where they fit into your business model?

19 MR. BLACK: And I could go through the details
20 with you offline. But we're significantly betting, for
21 a number of these clusters, on pure vehicle fuels, but
22 we're also anticipating that the Low Carbon Fuel
23 Standard isn't going to go away. And the efforts
24 through 1383 to give some stability and a mechanism to
25 count on it is important in our thinking.

1 And, you know, if those things are to go away
2 we'll have to then say, well, let's rethink this and
3 we're going to have to bring in electricity as a hedge
4 or in some other way. But we're betting that all these
5 efforts that are being done for the Low Carbon Fuel
6 Standard will continue and give us the economics that we
7 need.

8 I'd like to add to that that if the Low Carbon
9 Fuel Standard continues and prices remain good, and the
10 RIN program continues and prices remain good, over the
11 long term we won't need the grant funding that we're
12 turning to right now, and we won't need these other
13 State programs because the economics will be good enough
14 from the revenue streams from the credit programs.

15 MR. RECHTSCHAFFEN: Hey, Neil, this is Richard.
16 Thanks for the response. I figured for you and for the
17 audience it would probably be good for me to say,
18 because there's been several references to the Low
19 Carbon Fuel Standard. The commitment to move forward on
20 that regulation, that's working quite well, is laid out
21 in the draft scoping plan. It will be in the final
22 scoping plan. We're beginning work on that next phase.
23 So, we actually are quite optimistic in terms of the
24 results that we've seen. The coalition that have
25 occurred and continue to occur, and the kind of cleaner

1 fuels that are coming to California, what we want to see
2 is more developed domestically, and that's part of this
3 conversation. So, there's no hedging on that point at
4 all and I want to be crystal clear on that. It is part
5 of the State strategy is we're going to be we're going
6 to continue to move forward and ratchet down on it.

7 But I did want to ask a question. And several
8 of the speakers touched on elements of this, but I just
9 wanted to be even clearer on it. You talked, several of
10 you, about the learnings that have taken place in terms
11 of lagoon technology, capture technology, permit-related
12 experience, some of the interconnection-related issues,
13 pulling packages together of incentives, and the role
14 that the Low Carbon Fuel Standard and so on have. So,
15 if I ask, well, are the pieces in place? And if we're
16 having this conversation in one year, two, three years
17 are we tapping into, you know, ten times the return
18 potential, or ten times what we're already using in
19 California? Is that the answer or is the response, no,
20 there is still a significant issue and this is the
21 issue? I want to make sure I'm clear on that.

22 I'm trying to understand, the elements from your
23 perspective are in place and is it a matter of just
24 moving forward or if, from your perspective, there is a
25 significant issue that needs to be the area of focus

1 where we can really move the needle? And if so, what is
2 it?

3 MR. SCHLYER: From Calgren's perspective, we're
4 ready to move forward. We do not want this to be our
5 last project.

6 MR. SILVA: Yeah, I would say CR&R's in the same
7 situation. And Lyle made a great comment, it's policy
8 consistency. Because we're at the -- we're tied to all
9 of you guys. CEC's in our project, CalRecycle is in our
10 project, AQMD is in our project. I mean that from a
11 grant stand point. My trucks are regulated by AQMD.
12 CalRecycle regulates my organics. CEC's involved in my
13 pipeline.

14 So, if any one of those three people jump ship,
15 we're left holding the bag. So, we've bet the farm on
16 policy consistency. I mean, literally, 40 million
17 bucks. So, that's what we're looking forward to.

18 MR. BLACK: We're not betting the farm, but
19 we're partnered with may farms.

20 (Laughter)

21 MR. BLACK: And we think the opportunity here is
22 great. The other piece of it that's out of all of our
23 control is what happens in Washington with RIN pricing.

24 And so, we're all going to have to watch that
25 and hopefully that we're going to be able to continue to

1 count on RIN revenues. But if there's problems there,
2 then that's going to inform what we're going to have to
3 do together, on a State basis.

4 CHAIR WEISENMILLER: Okay. You know, thanks. I
5 want to thank the panel. And let's go on to the next
6 one.

7 MS. RAITT: Okay, thanks. So, our next panel is
8 on the discussion on Emerging Technologies and Market
9 Opportunities. And Rey Gonzalez, from the Energy
10 Commission, is the moderator.

11 MR. GONZALEZ: Hi, my name is Rey Gonzalez and
12 I'm the Technical Staff Lead for Transportation Research
13 at the Energy Commission.

14 I'm joined by a distinguished panel,
15 representing industry, and economic research. And the
16 panel -- or, excuse me, the discussion for this panel is
17 Emerging Technologies and Market Opportunities.

18 I want to briefly just introduce our panel. To
19 my right is Rebecca Boudreaux, from Oberon Fuels. Bruno
20 Miller, of Fulcrum BioEnergy, Incorporated. Rob White,
21 from Sierra Energy. And Arun Raju of University of
22 California at Riverside. Jack Brouwer, from University
23 of California at Irvine.

24 We have some questions that were prepared and I
25 know my panelists have responses to those questions

1 prepared. But I first want to start by asking our
2 panel, in like two to three minute responses, if they
3 could describe their renewable gas research activities.
4 And I'll start with Rebecca.

5 MS. BOUDREAU: Well, thank you for the
6 opportunity to speak this afternoon. A little
7 background on Oberon Fuels. So, we are a California-
8 based company. Our offices are located in San Diego.

9 We have a commercial demonstration facility in
10 Imperial Valley, two hours east in Brawley. And we are
11 focused on small scale production, converting a variety
12 of waste streams to DME, dimethyl ether, as a cleaner
13 diesel replacement.

14 And so, we have over -- we started six and a
15 half years ago, here in California. And we have since
16 them built this commercial demonstration facility in
17 Southern California. There, we're producing fuel grade
18 DME. This fuel grade DME is the first production of
19 fuel grade DME in North America. And it's now
20 supporting projects by Volvo, Mack, and Ford, as well as
21 after-market conversion companies developing the market
22 for DME as a global transportation fuel.

23 So, Volvo trucks we were supporting with our
24 fuel grade DME projects and starting 2013, in Texas.
25 Mack, we just did the first Mack DME customer

1 demonstration in the world, with the New York City
2 Department of Transportation, a fleet of over 7,000
3 vehicles, and looking at DME addressing both their air
4 quality issues, as well as heavy duty cycle
5 requirements.

6 Ford has converted a 6.7 liter engine, recently
7 started a project converting a Ford F-250 to run on DME.
8 And starting in 2015 was a project building the world's
9 first passenger car running on DME, based in Aachen,
10 Germany, and we supported that with our fuel grade DME,
11 as well.

12 So, in addition to these research activities,
13 developing our technology and developing the market, we
14 also had to develop the regulations for DME as a fuel.
15 When we started there were no regulations in North
16 America for DME as a fuel. A minor detail, right?

17 And so, the first place we started, EPA was not
18 required to register the fuel under Part 79. But when
19 we approached the State of California, some of the folks
20 who are in the room today, we had to work together to
21 develop the pathway for DME as a transportation fuel.
22 It was before the alternative diesel fuel regulation was
23 in place.

24 And so, we had the great opportunity to work
25 with the team at CARB, who -- Floyd Vergara, Jim Aguila,

1 and their teams to work through this pathway. Also, to
2 go through the multimedia assessment of DME as a fuel,
3 which tier one is now completed.

4 We also had to develop international consistency
5 standard for DME as a fuel. So, if you ever have
6 trouble sleeping, you can read ASTM D 7901. It's very
7 exciting. But it gives the fuel specifications and the
8 requirements for DME as a fuel.

9 And working with California Department of Food
10 and Agriculture, on January 1st, 2015 the Code of
11 Regulations was changed so that DME can be legally sold
12 as a fuel.

13 So, just in addition to our background on the
14 research we've done, on our fuel, we've also put the
15 framework in place for the market for DME, as well as
16 the regulations.

17 MR. MILLER: Good afternoon. My name is Bruno
18 Miller. I'm with Fulcrum BioEnergy. Thank you for
19 having us here.

20 Fulcrum is a California-based company. Our
21 headquarters are in Pleasanton, just close to San
22 Francisco. And our process, we take municipal solid
23 waste and turn it into valuable products.

24 Our technology platform includes sorting the
25 waste, to take out the elements that we're targeting.

1 It's mostly the dry, fluffy stuff in the raw, MSW. We
2 gasify it, turn it into a gas, and from there we can go
3 to many products.

4 Right now, we're targeting the liquid fuels
5 market, middle distillates, specifically jet fuel and
6 diesel. But we can also generate a renewable power,
7 renewable gas, renewable hydrogen. It depends on where
8 the market would be.

9 Our focus on the liquid transportation fuels has
10 to do with the interests of our strategic investors. We
11 have United Airlines, Cathay Pacific Airways, ARBP,
12 which is the aviation arm of the big oil company, who
13 are interested in our jet fuel.

14 We also have contracts with Waste Management and
15 Waste Connections to secure the feedstocks for our
16 process.

17 And so, we're building our first facility just
18 outside Reno, and they plan to produce about 10 million
19 gallons of biofuels per year. Thank you.

20 MR. WHITE: Hi, Rob White. I'm with Sierra
21 Energy. I'm their Chief Strategist. Sierra Energy is
22 about a 15 year old company, now. Many of you have
23 probably heard of us and/or followed us. We're just
24 over in Davis, California, so in the shadow here.

25 We've worked primarily with the university on

1 developing our technology and we are now in the process
2 of doing full commissioning for our first full scale
3 commercial plant.

4 We've done several different prototypings,
5 including a full working prototype out at McClellan Air
6 Force Base, the Renewable Energy Testing Center.

7 This plant will be partnered up with the Army,
8 the California Energy Commission, obviously, as well as
9 some other folks, including PG&E.

10 The intent of the plant is to be a full
11 demonstration R&D plant and the outcomes from that plant
12 are not only to demonstrate electricity, but also
13 renewable fuels, including diesel fraction. And
14 hydrogen, ultimately, for the Department of -- excuse
15 me, the Defense Logistics Agency.

16 We'll obviously be generating a synthesis gas to
17 go to those products. And like many of the gasification
18 companies, we wind up being able to take that synthesis
19 gas in other directions. It's just a chemical equation.

20 I think most important to differentiate that as
21 a gasification company, and there are several working in
22 and around the globe, we are slightly different in that
23 we use extremely high temp, based on a blast furnace
24 technology that Kaiser Steel actually generated. That
25 4,000 degrees Fahrenheit means that you're vaporizing

1 and melting all of your product. And we've demonstrated
2 that with several different MSW and other waste
3 profiles.

4 I'll stop there and we'll probably talk more
5 about that as we move forward.

6 MR. RAJU: Good afternoon. My name is Dr. Arun
7 Raju. I'm the Director of Center for Renewable Natural
8 Gas at UC Riverside. I also, before I joined UCR,
9 worked in two different startups, commercializing some
10 of the technologies that we're talking about. So, my
11 comments are based on that experience, as well.

12 I want to thank the Chair, and the members of
13 the dais, and also the Energy Commission staff, Tim and
14 Rey, for engaging us and, you know, working with us
15 consistently.

16 The Center for Renewable Natural Gas was
17 established by UCR, with the goal of significantly
18 increasing RNG production and use across the State. The
19 reason is because we believe that RNG has a key role to
20 play in helping the State achieve air quality,
21 greenhouse gas, and waste management goals.

22 In fact, I would even say that if RNG doesn't
23 play that role, many of these goals will be very
24 difficult to achieve.

25 So, to this end, the Center is designed to do

1 applied research and demonstration. We have pilot scale
2 gasifiers operating. We do lifecycle analysis. We do
3 end use technology development. And we do independent
4 technology evaluation and optimization, both for State
5 agencies, but also for private entities. And we do
6 policy and outreach.

7 As part of the outreach effort, we did a
8 symposium on renewable natural gas. Several of the
9 speakers here, were there.

10 And many of the issues discussed today came up
11 and the Executive Director of the Energy Commission, Rob
12 Oglesby, gave a keynote, setting up the framework for
13 this discussion. So, a lot of my comments are from that
14 symposium, as well.

15 MR. BROUWER: Hi, my name is Jack Brouwer. I'm
16 a Professor at the University of California at Irvine.
17 And I do research on electrochemical systems dynamics
18 and thermodynamics. So, that includes things like
19 batteries, and fuel cells, and electrolyzers.

20 And I do research that's directly related to
21 renewable biogas. As a matter of fact, I was fortunate
22 to work with the Orange County Sanitation District to
23 convert their biogas via a high temperature fuel cell
24 into renewable and zero GHG, and zero criteria pollutant
25 emissions, power, heat, and hydrogen for zero emissions

1 transportations application.

2 So, this was a really cool project that enabled
3 us to investigate electrochemical systems in the context
4 of renewable biogas.

5 I also do a lot of work on integrated energy
6 systems that consider all of these electrochemical
7 energy conversion devices in the context of renewable
8 primary energy. And that means a lot of solar, wind,
9 and other renewable electricity generators.

10 And in this context, we have found that there
11 are certain features of power to gas, hydrogen energy
12 storage, and these topics that I think are going to be
13 essential for us to achieve our goal of high renewable
14 use in society. And I'm pleased to talk about those
15 here today a bit.

16 MR. GONZALEZ: Thanks Jack.

17 Okay, we'll get started with our first question.
18 And this will be for the first three panelists, and I'll
19 explain when I get to Arun and Jack.

20 And the question is, how will your technology
21 expand the use of renewable gas and where do you see it
22 fitting into a market application?

23 MS. BOUDREAUX: So, the first question I'm often
24 asked about DME is, well, if you have renewable natural
25 gas, or biogas, biomethane, why do you need to convert

1 it into another molecule? Why do more chemistry to it?
2 And it's not just because I'm a chemist by training and
3 I want to make a new molecule, there is a reason behind
4 that.

5 And I think that is actually highlighted this
6 morning in some of the presentations. One of the big
7 barriers for the widespread use of renewable natural gas
8 that was mentioned was the market size. And we need to
9 increase market demand. We need to get more trucks
10 running on renewable natural gas. And DME is a solution
11 for that. By doing some chemistry to that molecule,
12 that methane, you actually get a true compression
13 ignition fuel. You don't need spark plugs added to the
14 engine, which reduce efficiency.

15 It actually combusts in a compression ignition
16 engine. C number is 55 to 60. And then, you get the
17 power and torque of a diesel compression ignition
18 engine.

19 So, there also still are numerous duty cycles
20 that diesel can only touch. And you can look at the
21 South Coast Air Quality Management District as an
22 example. Garbage, refuse collection trucks have to run
23 on CNG, and LNG, and that's mandated. When those
24 garbage collection trucks come back to the material
25 recovery facility, all of that refuse is collected and

1 some of it is sent to the landfill and often have to go
2 over the Grapevine.

3 And the Grapevine is an example of a duty cycle
4 that is primarily only running on diesel today because
5 you need the true power and torque of a compression
6 ignition engine.

7 DME, because it compress ignites, can be used in
8 such duty cycles and so it gives you that opportunity.

9 Another aspect, besides the market demand
10 expanding that use, that was highlighted this morning,
11 was on interconnection. With DME, there is no
12 interconnection. The concept of DME is you do that
13 chemistry, local production of DME and its local
14 consumption is then used in -- while we've primarily
15 focused on heavy duty transportation initially, it can
16 be used in Gensets. It can be used in lighter duty
17 vehicles. The Ford F-250 is running on that. You know,
18 as these markets develop, it is the opportunity to be
19 locally consumed.

20 And another issue that was brought up this
21 morning is the public perception of natural gas, and
22 overcoming that barrier, that marketing aspect. And by
23 actually converting that methane to another molecule,
24 you're dealing with something totally differently. And
25 it's something that's new to the public. So sometimes

1 new is scary, but it's also the opportunity to educate
2 the public on a new opportunity.

3 So, that's, you know, trying to figure out why
4 bother converting to another molecule, it can address
5 those issues that were highlighted this morning.

6 So the fuel itself, to give a little bit of
7 background on it, so DME, dimethyl ether is
8 carbon/oxygen/carbon, some hydrogens around it. And why
9 that's important is because there's no direct bond
10 between those carbon atoms. On a combustion diesel
11 engines there's no particulate matter.

12 And people ask, well, what is the driving force
13 for another fuel? Don't we have enough fuels out there?
14 And it really comes down to simplicity. So, you have a
15 simple fuel, a simple molecule, no particulate matter.
16 It's being made from a variety of methane sources, so
17 these streams that we're talking about today.

18 Another aspect of DME is actually the carbon
19 dioxide, which has to be scrubbed out for most
20 applications, you can keep that in there. So, both the
21 methane and carbon dioxide get converted to DME. CO₂
22 actually makes the process work better.

23 So, you have a simple fuel made from a variety
24 of methane sources. It can be also made from syngas.
25 Then you have a simplified engine, so a compression

1 ignition engine, no efficiency-reducing spark plugs in
2 it. So, you can take off the diesel particulate filter
3 because there's particulate matter on it. And you get
4 that duty cycle, the power and torque of a compression
5 ignition diesel engine. And then, a simplified
6 infrastructure. So, you get diesel-like performance,
7 but it handles like propane. So, we're talking very low
8 cost infrastructure.

9 We built a one-off DME dispenser. In 2013 we
10 announced that our plans would involve a commercialized
11 DME as a transportation fuel in North America. We built
12 a one-off DME dispenser, it was \$20,000. So, it's a
13 propane dispenser, you change the seals, it pumps at the
14 rate of diesel.

15 So, you get this simple fuel, simple engine,
16 simplified infrastructure. And so, that's where we
17 really feel like DME has the opportunity expand the
18 market for renewable gas by doing some chemistry and
19 opening up the compression ignition market. About 90
20 percent of heavy duty engines are compression ignition.
21 Opening up that market by converting the molecule.

22 MR. MILLER: So, Fulcrum was started by a group
23 of project developers that wanted to make an impact in
24 the renewables market.

25 So, the first step was to find a proper

1 feedstock that could lead to products that were priced
2 at the right level. And after searching quite a bit,
3 the company honed on the municipal solid waste. So, we
4 went out and secured enough municipal solid waste around
5 the country to produce an estimate of 300 million
6 gallons per year.

7 And while doing this work, we also found that
8 the market for jet fuel was particularly of interest.
9 Because as has been said here today, numerous times,
10 there's no alternative right now for jet fuel. Hydrogen
11 batteries, that's all in the future. But today, in the
12 near term, aircraft will need to fly with some sort of
13 liquid fuels.

14 So, the market pool was there for Fulcrum to
15 take this renewable feedstock, to gasify it and then
16 turn it into a liquid. The molecules that come out of
17 our process are chemically the same as regular jet fuel,
18 so our fuel qualifies as a drop-in fuel, which it's the
19 analogy to the interconnection issue that Rebecca just
20 brought. So, our fuel can go into the existing
21 infrastructure.

22 So, if we would find a solution where we're
23 taking a true waste, a true raw municipal solid waste
24 that we're turning into a gas, that goes into a liquid
25 solution for a market that today has no alternatives,

1 and is desperate to finding that.

2 MR. WHITE: So, to characterize the promise of
3 Sierra Energy's technology would take more time than you
4 want to give me. But I'll say it this way in the aspect
5 of what we're up to as far as renewable gas.

6 Because we're working on a feedstock that many
7 others are just putting into a hole, we're winding up
8 tapping into a market opportunity that much of
9 California doesn't look at as a feed source.

10 The other 49 states look at it that way. Much
11 of the rest of the globe looks at it that way. We
12 don't, yet. I use yet because I think a lot of times we
13 reference the technology, gasification, and think about
14 it much like it's a Pinto, even though there's a Tesla
15 to drive now.

16 And, really, we have to evolve our methodology.
17 So, I think the promise of gasification, not just our
18 own but others, is high if we think about being able to
19 utilize resources that we otherwise are wasting.

20 Most importantly, when we're thinking about how
21 does this meet the renewable gas conversation, or even
22 fuels and opportunities for reduction in emissions, the
23 reality is that waste you leave in the ground, even if
24 you've tapped all of the methane out of it already,
25 still off-gases. You still have a source sitting there.

1 By ending that source, you wind up creating a future
2 opportunity.

3 For us, commercial viability looks like having
4 the plant that we're currently commissioning now, having
5 a second plant which CEC has now, at least tentatively
6 awarded an opportunity for us to build over in Sonora,
7 California, at a place called Chinese Camp, using that
8 forestry biomass. Getting data from those plants and
9 then moving forward in scaling will be really the
10 dictation of how commercially viable things are.

11 The interesting thing that we've found, as we're
12 moving forward for our plant, but I think gasification
13 in general is bigger is not necessarily better. The
14 right size plant seems to be 20 to 50 tons. Those have
15 to be specialty applications. There are things that are
16 taking high value waste and/or high value products and
17 making the equation, the cap. ex. and the op. ex. work
18 from that.

19 But there are gasification companies globally.
20 Enerkem's a great one to talk to, that have proven that
21 you can literally take landfill waste and move forward
22 in a pretty viable way.

23 So commercially I think there's a big path
24 forward. For us, we think our market looks a little
25 different than what others are looking at as far as

1 scaling.

2 MR. GONZALEZ: Thanks. As I mentioned, I wanted
3 to take the same question and kind of give a little spin
4 on it because of both, Arun, your and Jack's ability to
5 do, and experience in early research.

6 And so the question is what do you see as
7 aspirational or promising technologies that could expand
8 the use of renewable gas and where do you see it fitting
9 into a market application?

10 MR. RAJU: Sure. So, I want to focus primarily
11 on thermal chemical conversion pathways. Jack, I think,
12 covered the rest of the pathways.

13 So, before I get into the actual technologies, I
14 want to set it up by, you know, talking about why do we
15 want to do these technologies? The reason is because we
16 want to use all the available resources.

17 And why do we want to do that? There's two
18 reasons. Because number one we have to use all the
19 available resources to be able to make a meaningful
20 impact on the greenhouse gas emissions.

21 Number two is waste management. You know, it's
22 dangerous to think of these technologies as just energy
23 production processes. They're also waste management
24 techniques. Because if we don't manage our waste
25 streams in a skillful way, you know, where are they

1 going to go? They're going to eventually end up in the
2 atmosphere, often in the form of methane.

3 You know, if we take the 100 million dead trees
4 in the forest, they're going to be a wildfire hazard,
5 resulting in black carbon, which is also a short-lived
6 climate pollutant.

7 So, it's important to be able to use all of
8 these resources, not just a very small fraction. You
9 know, we saw the supply curve in the morning
10 presentation. And if we look at the different types of
11 feedstocks, we have to be able to reach far to the right
12 of the X axis, to be able to reach woody biomass, and
13 municipal solid waste to really make a difference.

14 And to do that all the technology options have
15 to play a role. We have to have biological pathways,
16 digesters and landfill gas upgrading. But also,
17 thermochemical conversion and, you know, power to gas.

18 So, thermochemical conversion really gives us
19 access to this huge quantity of feedstock of resources,
20 or waste, however you want to characterize them, by
21 being able to convert all of those.

22 And, you know, we have partial oxygenation, or
23 oxygen of airborne processes. We have hydrogasification
24 processes and we have pyrolysis technologies.

25 And, you know, in my experience all three are

1 important. The reason is the feedstock is very diverse
2 and it's very distributed. You know, none of these
3 projects that we've been hearing about today are
4 designed by the world's largest engineering companies.
5 Technip or Parsons are not working on this because
6 there's no blueprint that they can take and replicate
7 across the country or even across the State that they do
8 for refineries or hydrogen plants.

9 All of these projects have to figure out the
10 right combination of feedstock product and scale. So,
11 some of these technologies work better for feedstocks
12 with high moisture content, like biosolids. Some of
13 these technologies work for feedstocks that are
14 hazardous, with heavy metals or high sulfur.

15 So, I would think that those examples of
16 technologies in all of these pathways, you know, oxygen
17 blown hydrogasification and pyrolysis process that are
18 capable of converting a segment of the feedstocks.

19 And I'm not going to go into specific
20 technologies. I have them in my written comments. But
21 all three technologies have to play a role and it's
22 important to encourage and kind of go through pilot
23 demonstration of these processes, and help them find the
24 right framework where they can be commercially viable.
25 Thank you.

1 COMMISSIONER SCOTT: Can I ask a -- I want to
2 ask a follow up to both what Rob said and what Arun
3 said. And that is this morning we heard from our
4 panelists that one of the best ways to get this done and
5 really make it cost effective is to be at scale.

6 And so, what I heard both of you say, in
7 slightly different ways, is that the technologies in
8 these spaces are smaller and that they almost have to be
9 designed in a one-off way. It doesn't lend itself to a
10 template or any of the things that might make them more
11 simple and drive the costs down, so that they can then
12 become competitive, really, in this marketplace.

13 And so I just wondered, you know, based on what
14 you said do the co-benefits come in and help outweigh
15 the costs that are going to need to be in this space?
16 Or, I'd like to kind of understand how you get from one-
17 off, really high cost things to something that, you
18 know, is utilizing these feedstocks and has enough value
19 of its own that it kind of counter balances those costs.

20 MR. RAJU: Sure. I think, you know, the key is
21 that we do recognize that there's really no template or,
22 you know, a plan that we can just implement. And so,
23 it's going to be definitely on a case-by-case basis.

24 And I know there are some technology developers
25 that will say we can take anything that has carbon in it

1 and we can produce RNG or power. But oftentimes it's
2 very difficult to do in a commercially viable, efficient
3 manner.

4 So, I think this has to be approached on a case-
5 by-case basis. And sometimes the biorefinery approach,
6 where there's three or four revenue streams making, you
7 know, biochemical, and power and fuels works. In some
8 cases a direct, you know, biomass power plant makes more
9 sense.

10 So, it's really based on both my private
11 industry experience and at the university. You know, it
12 takes as much work to figure out the right combination
13 of what's going to work as it is to develop the
14 technology and, you know, raise the resources.

15 COMMISSIONER SCOTT: The reason I asked that, of
16 course, is because we're supposed to look at the cost
17 benefits and the cost effectiveness of the various
18 technologies and so I was just wondering what your
19 thoughts were there.

20 MS. BOUDREAU: And, Commissioner Scott, I can
21 add a few points there. So, when we look at our small
22 scale technology, while we're smaller the way we can
23 achieve economies of scale is building numerous of those
24 smaller processes. And it really comes down to the
25 fabrication of the process.

1 So, when we decided on the volume of production
2 that we were targeting, we picked a volume that we felt
3 that we could serve multiple feedstocks with. We didn't
4 want to go too big or too small to get those economics.
5 So, we picked a size range that we felt served the most
6 markets. And instead of building one project per year,
7 if we build five of those small production units, we do
8 get economies of scale there because we're replicating
9 in that way.

10 MR. WHITE: And, Commissioner Scott, if I left
11 you with the impression that we think all of our
12 projects will be one-offs, they're not. They will all
13 have different applicability, different feedstocks and
14 different outcomes.

15 The middle part, what we do, the gasification
16 will be replicable over and over and over again. And
17 that's what we're working on for commercial scale is how
18 do we packet that piece, get it shrink wrapped and ready
19 for the dock?

20 The biggest challenge that we have ultimately in
21 doing that comes as what do you put into it and what do
22 you want out of it. So, it's those front end pieces
23 that really dictate what that middle piece has to look
24 like.

25 MR. MILLER: Yes, I think just to round up, I

1 think there's many examples in the past where people
2 went either too big or too small. And I think based on
3 that experience, what I think I hear here, in the table,
4 is we've learned that you have to right size it.

5 And the same way that Oberon is doing, once we
6 have our right size design, which we actually do, then
7 the idea is to replicate it. And that's how you get the
8 economies of scale without breaking the bank because you
9 went too big.

10 MR. BROUWER: And that's a really nice lead in
11 to electrochemical energy conversion because it's very
12 different from the thermal conversion in that it does
13 scale all the way down to small sizes. And can be
14 efficient and ultralow emissions even at these very
15 small sizes.

16 And that's why you see most of these things,
17 like fuel cells and electrolyzers that are modular.
18 They make them in 100 kilowatt sizes, but even at 100
19 kilowatts they can be like 60 to 80 percent efficient.

20 So, this is a remarkable feature of
21 electrochemical energy conversion that I'd like to
22 emphasize.

23 And besides that, I want to make two main
24 points. The first is that biogas resources can most
25 efficiently and with the lowest air quality emissions,

1 and greenhouse gas emission make electricity and heat.
2 It's one of these ways that I think we must use our
3 biogas in the future, electrochemically converting it
4 locally. Zero greenhouse, zero criteria pollutant
5 emissions.

6 The second thing we must do, I think, which will
7 have a much larger scale impact on greenhouse gas and
8 criteria pollutant emissions reductions is to use
9 hydrogen as an energy carrier in society.

10 We already heard from George Minter, for
11 example, that only 5 percent of his through put could be
12 substituted for by biomass and biogas resources in the
13 State. Okay?

14 We know that we could, alternatively, make
15 renewable hydrogen and move that around in society.
16 Maybe not exactly in the natural gas system. Maybe it's
17 in converted natural gas system over time. Maybe it's
18 in a purpose built system, and we have some of that
19 already in society, to make zero emissions. Zero
20 criteria pollutant emissions and zero greenhouse gas
21 emissions conversion with fuel cells on the back end.

22 So, on the front end we take this opportunity
23 that we have right now for using excess, cheap,
24 renewable power and encouraging more and more
25 installations of this excess cheap renewable power, we

1 put it through electrolyzers to make renewable hydrogen,
2 and we move it around through society in a much cheaper
3 way than renewable electricity.

4 I want to also suggest that it's also more
5 environmentally sensitive to move energy around via gas,
6 cheaper and more environmentally sensitive than it is to
7 move it around as electricity.

8 We don't have to build all these overhead wires
9 from the desert to our places of living. Instead, we
10 use underground pipelines.

11 And there are certain features that you cannot
12 get with other forms of energy moving around in society.
13 Okay, and this is really important. Hydrogen offers
14 these opportunities that no other technology can, like
15 long duration, massive amounts of renewable energy can
16 be made in this way.

17 Secondly, if you have anything that's long
18 duration storage, seasonal storage, annual storage,
19 there's not another technology besides perhaps pumped
20 hydro that could offer something like that.

21 And recent studies, especially now finally
22 getting to Chair Weisenmiller's comment, have shown that
23 we can make renewable hydrogen from solar electricity.
24 Okay, at current market prices. And reasonable prices
25 for the electrolyzer. Storage in salt caverns and

1 conversion later, in a natural gas combined cycle plant,
2 at cheaper cost than pumped hydro. Cheaper than pumped
3 hydro.

4 And you can buy electrolyzers today for order of
5 \$500 per kilowatt. This is proven by a sale that NEL
6 made just earlier this month to a French company. Okay,
7 literally selling electrolyzers today for \$522 per
8 kilowatt.

9 So, there's been tremendous progress in this
10 whole area of making renewable gas in the form of
11 hydrogen.

12 MR. GONZALEZ: Okay, let's go to our next
13 question. And that is what challenges or barriers might
14 interrupt the development and commercialization of your
15 technology?

16 MS. BOUDREAU: The biggest barrier for DME has
17 been money. The lack, just to put it simply. Do you
18 want more? No, kidding.

19 (Laughter)

20 MS. BOUDREAU: So, the challenge for DME is the
21 lack of representation in the State of California's
22 Transportation Fuel Policy.

23 And in the context of SB 1383, one way that can
24 be changed is by defining renewable gas as renewable
25 natural gas by a methane biogas and DME. So, by

1 expanding that definition of renewable gas to include
2 DME, that will give the policy framework that this
3 innovative fuel can in parallel develop with the others.

4 The other challenges for DME have been on the
5 commercialization movement. And so today there really
6 aren't any more technical challenges on DME. It can be
7 produced small scale, large scale. It can be run in
8 light duty vehicles, medium duty, heavy duty, Gensets.

9 The challenge comes down to two questions. How
10 do you scale DME economically? And with the performance
11 of the fuel and its economics will customers adopt it?

12 And so that's why last month we launched a DME
13 100 project, to put 100 DME vehicles on the road in 2018
14 and 2019. So, we're bringing together players across
15 the supply chain, from fuel production, big oil and no
16 gas, who know retail, they know lubricants, they know
17 oils. Infrastructure developers, fleets, and OEMs, and
18 after-market conversion companies to say once and for
19 all is DME going to move forward as a transportation
20 fuel?

21 So, we're building that consortium. We're
22 determining which regions across North America this will
23 take place. And I think it's also an opportunity for
24 the State of California to come in and be a part of
25 that.

1 MR. MILLER: Yes, I think I'm going to get
2 repetitive here, too. So, access to capital is one of
3 the main challenges. And we're in a similar situation.
4 We have the feedstock agreements, we have off-take
5 agreements, the technology's proven. We have a
6 permitted site. And then, it's a matter of raising the
7 funding.

8 It's linked to policy stability, as we've heard
9 numerous times today. RINs and LCFS credits. These are
10 volatile markets. They come up and down. And that's a
11 fact that investors don't like, so we need a way to deal
12 with that.

13 To the extent that we can create programs that
14 help to reduce the volatility, it's going to really help
15 to raise the capital.

16 In our case, the LCFS, we think it's a great
17 program. Aviation fuels are not yet included, but we're
18 working with CARB and we're very encouraged by the
19 progress we're making there.

20 And then, finally, I would say that we're a
21 California company and we have big plans to make a
22 production facilities here in this State. But you
23 probably recognize that there's other places where it's
24 maybe a little quicker, easier to get one of these
25 facilities built. And to the extent that we can

1 simplify the process here, we'd love to come here and
2 build many more plants.

3 MR. WHITE: So, I would actually make three
4 points. Number one, I'm an innovation guy. Anybody who
5 knows me would tell you that that's what I do.

6 So, in that respect and California being the
7 cradle of innovation, let's just call it that, the
8 easiest way to get innovation is to think about end
9 points and end goals, and not about how you get there.
10 The objective should be the driver for our regulatory
11 environment.

12 That doesn't mean we don't do regulation. That
13 means we're looking at the end point. If you have to
14 put some sideboards on because you have unintended
15 consequences, that makes sense. But, really, we should
16 be getting there.

17 That follows into a conversation around
18 gasification in general. As you're well aware, RPS
19 defines biogas as anaerobic digestion, landfill gas, and
20 gas from gasification. But our California laws don't
21 allow injection of gasification. Don't allow injection
22 into the pipelines of biogas from gasification.

23 That means that three-quarters of all potential
24 biogas production in California is going to come from
25 mostly anaerobic digestion and we're not going to wind

1 up taking into account for the other opportunities.

2 It also means the majority of RPS-eligible
3 biogas cannot be injected into the utility pipelines.
4 Meaning that we should probably think about looking at
5 Health and Safety Code 25420, and looking at amending
6 that in order to make that end point of what we're
7 trying to achieve more viable.

8 The last thing I'll say about this and, again,
9 going back to that conversation around innovation, is
10 I'll be the first probably in this panel, and maybe all
11 day, to say capital is really not our issue. If you
12 connect end points of projects together with the project
13 themselves.

14 I'll give you an example. And I'm going to go
15 on Jack's hydrogen bandwagon for one brief moment.

16 We have, working with the Port of Sacramento, as
17 well as California Fuel Cell Partnership, Ballard, BAE,
18 the Sacramento Air Quality Management District, and some
19 others, a project evolving where we, Sierra Energy,
20 would run locomotives, which is another piece of our
21 business, on hydrogen. We'd do a demonstration.

22 If you've checked around in California, there
23 are no hydrogen locomotives operating currently. There
24 have been tests. There have been others, but those have
25 all gone away.

1 As an operator of three different short lines
2 throughout the north part of the State, we think
3 hydrogen is a great opportunity space for heavy
4 locomotive and short haul on those lines.

5 We also think that marrying our technology, or
6 gasification technologies, or even hydrogen generating
7 technologies with that process also creates and
8 opportunity, because we're then putting the resource
9 together with the end point.

10 It would probably not shock you that we're also
11 having a conversation, similarly, with a local municipal
12 utility district about their whole fleet going over to
13 hydrogen and us, again, helping to provide that
14 opportunity.

15 So, my creating those projects, no longer is
16 capital really the driver because you have an end point
17 user, you have an opportunity to pull that together.

18 And if you think about projects like ours,
19 again, we're not trying to go to 300, 400 tons per day
20 scale, these are projects that are much easy for
21 investor, or a venture capitalist investor to swallow.
22 In fact, we've already shown that we can do that. And
23 our largest investor to date is an infrastructure
24 company.

25 So, those are the things I would say we might

1 look at as challenges, but more importantly we need to
2 think about the end point and really take off the gloves
3 to get to where we want to be.

4 MR. RAJU: So, I was happy to hear that there
5 was only one primary challenge, because I have a long
6 list here.

7 (Laughter)

8 MR. RAJU: Because a lot of these technologies
9 are still in an R&D stage, you know, technology
10 development itself is a challenge.

11 So, as I mentioned before, these feedstocks are
12 very different and many of the feedstocks are very
13 difficult to convert. So, tar formation, you know,
14 insufficient carbon conversion, all of these are
15 problems.

16 So, what needs to happen with these technologies
17 is that they need to move from the lab or from the pilot
18 scale to pre-commercial and commercial atmosphere
19 through, you know, applied research and development.
20 So, that's the number one challenge in figuring out
21 which technologies are efficient, or how to make them
22 efficient and move them along so they can actually enter
23 the market and make a difference.

24 And the second challenge is this configuration
25 of feedstock, scale, product and the business model that

1 I was talking about before. So, to figure out what will
2 work for each of these technologies, where they can make
3 the most difference.

4 And, you know, each of the companies here have a
5 very different approach to renewable energy. They all
6 have very different products, different pathways. So,
7 that's important. And it's very difficult to figure it
8 out, especially when the technology is still under
9 development, that they don't know what it's going to
10 look like when it turns into a commercial plant.

11 Is it modular scale-based process, or a very
12 large, 500 tons per day gasifier? So, that's the second
13 challenge.

14 And the third one is of perception. So, this is
15 primarily public perception or, you know, the regulatory
16 environment where these technologies are not seen as
17 some -- you know, seen as a viable pathway to a
18 renewable future.

19 So that's also, I'm realizing more and more that
20 is an important challenge.

21 CHAIR WEISENMILLER: Just to follow up. You
22 know, you talked about the entire curve. Well, we don't
23 have enough money for the entire curve. I mean, we need
24 to identify which resources, you know, are the most --
25 where are our best bets now?

1 I mean, I know in the scoping plan they had a
2 number for renewable gas is like \$1,000. I can do a
3 hell of a lot of conservation for less than that, is the
4 bottom line. I can do a hell of a lot of other
5 renewables for less than that, or transportation.

6 But what are the best bets here? So, certainly,
7 if you have studies that can point to us which
8 technologies, which feedstocks are really the best bets
9 for, you know, R&D money, that's very interesting.

10 But I mean, again, just particularly in the
11 Trump era don't assume the sky's the limit and that, you
12 know, any and all ideas can really be tested out.

13 And then the other thing is just, certainly, I'd
14 point out the combustion engineering experience where in
15 the 80s they were really going big time, and a waste of
16 energy. Built a plant in Hawaii and another one in
17 Hartford. Combustion engineering doesn't exist anymore
18 and that's because of these particular projects and the
19 technology issues they ran into.

20 So, again, you know, we need to figure out what
21 are the best bets. And certainly, to the extent our
22 academic friends can help us on that, again realizing
23 it's not unlimited money, and we have to figure out how
24 wisely to spend it.

25 MR. RAJU: Yes, absolutely.

1 CHAIR WEISENMILLER: Yeah.

2 MR. BROUWER: So, a couple of comments. I
3 believe that fuel cell technology and electrolysis
4 technology are going to be essential for our 100 percent
5 renewable future, which we won't get to, inevitably,
6 because we can't keep using the fossil resources. We're
7 using them in an unsustainable way today.

8 And so, in the early term, I think that means
9 that we must enable stationary fuel cell technologies to
10 use biogas. This is one of the ways in which we can
11 have low GHG, low criteria pollutant emissions
12 electricity production. Okay, so renewable means
13 producing electricity.

14 And eventually evolve those to using the
15 renewable hydrogen we make from the excess solar and
16 wind that we have in society.

17 And when it comes to that part of it, we need to
18 have access to wholesale electricity prices. Because in
19 the end, the electrolyzer is a very small component of
20 the total dollars per kilogram of hydrogen that is made
21 cost.

22 Okay, the biggest expense is the price you pay
23 for electricity. And because electrolyzers can offer
24 all sorts of ancillary services, including the new
25 ancillary services we need for handling the duck curve

1 and things like this. Right? We don't really have rate
2 structures or services that currently handle things like
3 we are experiencing already today. So, we need this
4 access to wholesale markets for these renewable hydrogen
5 generators.

6 And then it would be great if there could be
7 some way in which you could support or at least put a
8 floor to the hydrogen price that someone's willing to
9 pay for a long time on the back end. Right? And then,
10 the electricity price you pay on the front end because
11 you're doing these kinds of services that are good for
12 the State.

13 So, I think it's really the policies in that
14 framework. It's not necessarily supporting new research
15 on electrolyzers, or new research on pipeline injection,
16 or anything. It's mainly, hey, the financiers of these
17 kinds of projects need to know I'm going to have some
18 certainty on the electricity price and some certainty on
19 the hydrogen price that I'm selling. I think those are
20 the key things that could be enabled.

21 CHAIR WEISENMILLER: Yeah, but I think you have
22 understand with the CCAs, there's nobody signing PPAs at
23 this point, you know, outside the POU's. You know, if
24 you talk to PG&E, depending upon the denominator,
25 they're going to be at 70 or 80 percent, you know.

1 MR. BROUWER: Yeah.

2 CHAIR WEISENMILLER: And you look at the CCAs
3 and they're not really credit worthy.

4 MR. BROUWER: Yeah.

5 CHAIR WEISENMILLER: So, outside of the munis,
6 there's nobody who's going to sign a fixed price off
7 take with you for anything. And you have to compete.

8 I know in the German model, again, when I met
9 with Reiner Baake, or Erita Gor (phonetic), his paper
10 there, his push initially was to say Norway. You know,
11 and his other big push was to do the coupling of the
12 markets between Germany, France and Poland.

13 And, you know, basically, his analogy was
14 storing power in the grid.

15 MR. BROUWER: Yeah.

16 CHAIR WEISENMILLER: You know, and so certainly
17 the Germans have continued to do research in that area.
18 But if you say where is Reiner putting his time? As far
19 as I can tell, from the speeches he's given with me in
20 the room, it's really looking at that storing it in the
21 grid and pushing the batteries along. And, certainly,
22 spending some time on the renewable gas. But it's not -
23 - again, I don't think that -- you know, DENA has a
24 higher priority on that, than Reiner does.

25 MR. BROUWER: So, I believe that in the -- if

1 you're talking about short term storage, I totally agree
2 because that's what we mostly need in society today.
3 Right? Let's say the duck curve, kind of like
4 distributing it from the middle of the day to the
5 evening for example, then I think you're right that we
6 actually need batteries more than we need something like
7 hydrogen energy storage.

8 However, there are certain features in society
9 that we will need, which are eventually the long term
10 storage, or massive amounts of storage that will be only
11 met, cost effectively, by these kinds of ideas.

12 And then, secondly, there are some end uses that
13 can't be met by electricity. And you heard George
14 Minter talk about some of these, too, industrial uses,
15 chemical uses and things like that.

16 CHAIR WEISENMILLER: Yeah, but I think the
17 unique thing for California -- you know, Germany, 3
18 percent of their power comes from hydro, you know, and
19 that's decreasing.

20 MR. BROUWER: Yeah.

21 CHAIR WEISENMILLER: You know, frankly, I mean
22 you can't get a pump storage project to be economic if
23 zero off peak is zero on peak.

24 MR. BROUWER: Yeah.

25 CHAIR WEISENMILLER: You know, it just doesn't

1 work. We have a lot of hydro. We have a swing from,
2 you know, 25,000 gigawatt hours on average to 10, when
3 we had the drought, to 40 or 50, now. So, you know, how
4 we deal with that swing, I mean, you know, again, that
5 may ultimately be something where we need some long term
6 storage. Now, whether that is hydrogen or other -- you
7 know, it's sort of the issues people are going to have
8 to figure out.

9 But, you know, we have a unique reliance on
10 hydro, a unique reliance on volatility. We're going to
11 have to do a long term storage. You just don't build,
12 you know, geothermal wind machines so you can run them
13 every ten years when it's a drought. You know, at least
14 it's not a good idea.

15 MR. BROUWER: I totally agree. And, yet, the
16 technical features that I'm talking about I believe can
17 be most cost effectively accomplished with a hydrogen
18 energy storage idea for doing this.

19 CHAIR WEISENMILLER: Okay. Now, the other
20 question is back to the Dow example. So, you build your
21 hydrogen pipeline, you offer the hydrogen to various
22 parties. I don't know, but you could conceivably be
23 deemed a utility under PUC regulation.

24 Now, maybe you want cost of service. But again,
25 there are a lot of regulatory issues on that. And then,

1 God knows who permits the hydrogen pipelines. So that,
2 again, could be a PUC safety and everything else issue.

3 MR. BROUWER: But currently today, in the Los
4 Angeles area, for example, we have about, I can't
5 remember, it's 25 miles of hydrogen pipelines. They go
6 through various jurisdictions, underneath streets and
7 across properties of various of parties.

8 CHAIR WEISENMILLER: But how many of the people
9 in that area know that they're running in their
10 backyard.

11 MR. BROUWER: Not too many people know that is
12 absolutely what we are doing. And that's, actually, an
13 interesting opportunity that we could use that very
14 pipeline, built for hydrogen, to put renewable hydrogen
15 into that, okay.

16 MR. RAJU: So, I have a simple solution for this
17 problem, methanation. So, we could take the hydrogen
18 and take that into methane.

19 CHAIR WEISENMILLER: My impression is that's
20 where the Germans have written that. You know, you can
21 fill it in. But what I understand from the Germans,
22 they've stopped thinking about methanation.

23 MR. RAJU: Well, I think in the short term it
24 can play a big role. I mean, 50, 100 years from now
25 everything is electrified and flying electric cars, so

1 we won't be talking about renewable methane. But in the
2 short term, before we build that new infrastructure,
3 methanation could bridge, you know, help tie this
4 electricity grid with the fuel infrastructure and create
5 kind of a foundational infrastructure. Kind of like the
6 internet did for telecommunications. Where we can
7 transport and shift renewable energy across sectors and
8 across seasons.

9 CHAIR WEISENMILLER: Well, I mean, that -- you
10 know, the one thing Germany is very clear at this stage
11 -- you know, I mean, if you look at Germany, their
12 greenhouse gas emissions are not going down.

13 MR. BROUWER: Right.

14 CHAIR WEISENMILLER: And, you know, part of that
15 and you look at the characteristic of resources, they
16 get a hell of a lot of solar in May, and in January when
17 they need it, there's not much. So, they have a unique
18 set of issues there and they also realize that they
19 really have to start looking at transportation and they
20 have to start looking at buildings. You know, they have
21 to do a number of things if they're ever going to move
22 the needle on greenhouse gas, which they just haven't.

23 That's part of the real driver on that. But
24 again, back to this is California, we have a much
25 different situation.

1 And what we really need to hear from both of you
2 is, again, what's our best bang for our buck on research
3 opportunities. You know, on the technology and on the
4 market side.

5 MR. RAJU: So, we've been definitely, at the
6 CRNG, spending more and more of our efforts on figuring
7 out this configuration of technology, feedstock and
8 location. So, you know, I'll be happy to share all of
9 that information with you.

10 CHAIR WEISENMILLER: Yeah. But I mean, again,
11 both of you need to overlay cost with everything else.

12 MR. RAJU: Yeah.

13 CHAIR WEISENMILLER: Yeah. Any other questions?

14 MR. COREY: I do have a follow up question for
15 Bruno. You talked about -- renewable jet is what you
16 were talking about. And you were talking about, really,
17 a commercial product used by a commercial industry.

18 And I'm interested in your perspective about
19 aviation stepping in that space. Now, some would say
20 I'm interested in just even the structure of the
21 contracts, the long term thinking of the aviation
22 sector. Because I think there's some folks that would
23 say, well, aviation steps in this space they're just
24 going to be another competitor for another small pool of
25 feedstock, and you're just going to be kind of moving

1 the chairs around the deck. Others would say, no, no,
2 these are long term, big players and it's actually going
3 to move the market. And I'm interested in your take on
4 that issue?

5 MR. MILLER: Yeah, that's a great question. So,
6 listening to my CO speak of -- give, basically, an
7 answer to that same question, Fulcrum got into jet fuel
8 because the airlines came to us and said we need this
9 product.

10 For the aviation sector, there is no near term
11 replacement for jet fuel, for liquid fuel. And when you
12 look at the commitments that the industry has made in
13 terms of reducing their greenhouse gas footprint, the
14 only viable alternative to meet those goals are
15 renewable liquid fuels.

16 So, that's a commitment by the airlines. It's a
17 long term commitment. We have signed off-take
18 agreements with three entities, United, Cathay Pacific
19 and Air BP for a total of about 200 million gallons per
20 year, for ten years. So, we're talking, you know,
21 almost two billion gallons. That's a very strong
22 commitment.

23 And we continue talking with other interested
24 parties in the aviation sector. So this is, you know,
25 from our perspective that demand is there. And we wish

1 we could be up and running with more facilities right
2 now. We have access to the feedstock, to the municipal
3 solid waste, the raw materials. And so, what we need is
4 the little black box in the middle to produce the fuel.
5 But it's a market signal that is definitely there.

6 CHAIR WEISENMILLER: You know, obviously, under
7 Secretary Mabus who, unfortunately, is not there now,
8 you know, obviously, there was the green fleet.
9 Certainly, a lot of push by the Navy in this area. Did
10 you guys try anything there?

11 MR. MILLER: Absolutely, yeah. So, we have a
12 grant from DOD for \$70 million dollars to -- that are
13 going towards the facility in Reno that we're building.
14 There's no doubt that the military has had a great
15 interest in this. The Navy, both for the marine diesel
16 and also for the jet fuel.

17 And even though we have a new administration, we
18 continue seeing a lot of interest from the Navy. The
19 way they characterize it, it's one of their major
20 expenses and it's one of their battle critical, or
21 mission critical assets. And to the extent they can
22 produce it domestically, renewably it helps them.

23 CHAIR WEISENMILLER: You know, the current
24 secretary has written a report, when he was at Hoover
25 Institute on Alternative Fuels. So, hopefully, that

1 policy is maintained.

2 MR. RECHTSCHAFFEN: Rob, have you had experience
3 -- you mentioned some of the challenges with products
4 from gasification. Have you had experience in other
5 states, or maybe Bruno, too, if you're relaying on
6 gasification where we have a different policy
7 architecture, or are you just limited -- are your
8 facilities just limited here in California?

9 MR. WHITE: So, our current facility that we
10 have up and commissioning right now, is here in
11 California. Ironically, though, we have 12 other
12 parties that are interested. One of them is here in
13 California, the other 11 are not. And their biggest
14 push forward in moving to the next step has nothing to
15 do with challenges based on regulation around
16 gasification. It has everything to do with finding the
17 right feedstock for the right output.

18 So, their challenges are very different than
19 what we wind up being here in California.

20 MR. MILLER: Yes, I'm here thinking. The
21 gasification aspect particularly is not the main issue,
22 but it's more the environmental permits, the siting, and
23 so forth.

24 Our facilities are big, but not that big, so we
25 qualify as a small source facility. So, the air permits

1 are not that onerous.

2 CHAIR WEISENMILLER: I want to thank everyone
3 for their contribution.

4 Let's take a break until 3:15, and start up
5 promptly, but give everyone a chance to at least stretch
6 their legs and get ready for the last push.

7 Again, thanks. I'm looking forward to your
8 written comments.

9 (Off the record at 3:03 p.m.)

10 (On the record at 3:17 p.m.)

11 MS. RAITT: So, our next panel is on a
12 discussion of Market Maturity, Business Models, and
13 Factors That Attract Private Project Financing. And
14 John Kato, from the Energy Commission, is our moderator.

15 MR. KATO: Thank you. So, obviously, there's no
16 presentations for this panel. And we're going to put up
17 later the actual questions on the screen that are really
18 central to the discussion.

19 But I want to kind of entertain that rather than
20 going on a methodical QA/QA, that the dais is encouraged
21 to just simply jump in with relevant questions.

22 Especially with the scope of the discussions that have
23 already occurred, if you have already have questions,
24 just jump on in. So, we definitely encourage that.

25 Before we kick off, I want to give the

1 opportunity for our panelists to give a little, one
2 minute or so kind of introduction and maybe some opening
3 remarks.

4 I found that in our pre-meeting they were very,
5 very dynamic and very full of a wealth of information.
6 And I think they'll add a level of realism to the
7 investment part of this discussion.

8 MR. DANNAN: All right, thank you, John.
9 Hopefully, we won't disappoint. My name's John Dannan.
10 I represent Generate Capital. I'll explain who we are.
11 But thank you for having us. It's a pleasure to be here
12 and we're grateful to share our views on the
13 opportunities and also what's needed to catalyze the
14 industry, you know, specifically the biogas industry in
15 California.

16 So, just briefly, Generate Capital, we are a
17 private investment company focused on renewable energy,
18 resource efficiency, sustainability type projects. And
19 we really invest in sort of solar energy efficiency and
20 waste to value businesses. And so, I head the waste to
21 value team. And that's, you know, sort of what we're
22 here for to talk about today, really sort of the
23 digesters and the various other biogas opportunities,
24 and certain other technologies.

25 As you may tell from, you know, those verticals

1 that we invest in, you know, we're actually focused on
2 the smaller scale of investment. So, within solar it's
3 residential. Sorry, that's commercial/industrial,
4 sorry. Within energy storage it's sort of everything,
5 that's all small scale.

6 And within waste to value, that's where our
7 bigger projects lie, but that's still sort of \$10 to \$20
8 million projects. Really, in the grand scheme of things
9 on the distributed small scale.

10 And so, Commissioner Scott, you mentioned
11 standardization. That is huge for our investment model
12 and our business model, and how to really drive
13 deployment of capital on a repeatable basis.

14 Just in terms of what we do in the space, we own
15 two food waste digesters. One in New York State, one in
16 Michigan. We own one wood waste to, you know, product
17 business. And then, in California we're building one
18 industrial wastewater treatment, with anaerobic digester
19 capacity facilities at a brewery. Now, that's the
20 background and I'll hand it over.

21 MR. VITALI: Thank you, Chair Weisenmiller and
22 the folks on the dais. You've shown that you have the
23 stamina and performance of a biogas developer today.

24 (Laughter)

25 MR. RECHTSCHAFFEN: I'd like the record to

1 reflect that they're dropping like flies, but the three
2 of us are here and we're here for the duration.

3 MR. VITALI: Absolutely. Ben Vitali. I'm with
4 Equilibrium Capital. We have offices in San Francisco,
5 Portland, and London. We're a financial manager. We
6 have \$1.7 billion under our management on our platform.
7 Mostly in real estate, agriculture, and water,
8 wastewater and renewable energy.

9 So, my team leads our investment efforts in the
10 water and wastewater sector, including facilities that
11 process various organic waste streams, including
12 anaerobic digestion. But we have facilities that don't
13 generate energy at all. They're just really a
14 processing facility for various streams of waste
15 streams, whether they're biosolids, or food wastes, or
16 other types of organic waste streams and wastewater
17 streams.

18 We have been investing in a sector for, really,
19 since 2009. We have a current portfolio and a current
20 fund of a few hundred million dollars. But which is our
21 latest investment vehicle. But we have been testing
22 what business models work well in different sectors.

23 And so, we launched our institutional investment
24 fund a couple of years ago and were fortunate enough to
25 have several pension funds, and endowments, and

1 sovereign wealth funds, including a couple of California
2 Public Pension funds investing in us. So, when we say
3 we're investing and we have a fiduciary responsibility,
4 the pensioners are really looking over our back to see
5 how we're doing.

6 So, we'll talk a little about, I think, how we
7 look at the risk in the return. So, we've been talking
8 about capital a lot, but the capital has a return and it
9 has a risk profile. So, we'll talk a little bit about
10 the four or five things that we need to see in projects
11 to scale these sectors, and what risks we're willing to
12 take and not willing to take, at least at this point.
13 And that helps frame some of the aspects when we say
14 it's kind of a bottleneck. You'll be able to frame that
15 because it's just a risk that we can't take for the
16 return that we're getting.

17 Happy to be here, thank you.

18 MS. WEBSTER-HAWKINS: Good afternoon. I'm Renee
19 Webster-Hawkins. I'm the Executive Director of the
20 California Pollution Control Financing Authority. Our
21 Chair is the State Treasurer.

22 We run a number of financing programs which
23 either directly or indirectly assist in the area of
24 renewable fuels.

25 CPCFA was founded in 1972, primarily to issue

1 tax exempt bonds for pollution control projects.
2 Mainly focused on solid waste management and wastewater
3 solutions.

4 And, obviously, our portfolio and the projects
5 in our portfolio has evolved as both the technologies
6 have evolved, as well as the environmental policies.
7 Landfill diversion requirements in the 90s certainly
8 drove our volume robustly.

9 Interestingly enough, in the 2000s -- I was
10 reminded of an earlier discussion about public
11 perception around some of the policies. We had a number
12 of projects come forward involving dairies, primarily
13 for groundwater protection, to install liners and the
14 like. But there was quite a concern from the public
15 that the projects were actually enabling the increase in
16 the size of the head and the herds at the dairies. So,
17 it's, you know, the public perception is always there
18 with these kinds of projects.

19 But most excitingly, especially in the last ten
20 years, our projects really have evolved to include or be
21 primarily focused on sorting or converting either solid
22 waste to energy or organic waste to energy.

23 We've had a number of projects, including CR&R,
24 which you heard from earlier. Anaerobic digesters co-
25 located at material resource and recycling facilities,

1 MRRFs, primarily where the CNG provides fuel for their
2 collection fleet, and amply so. That's been a really
3 successful business model.

4 There's been some other projects which we've co-
5 participated in, along with grants from the Energy
6 Commission, and CalRecycle.

7 Notably, too, you know, just in the area of
8 methane emission reductions, we just approved a project
9 that is about methane abatement. And Cal AG is a
10 facility that's going to break ground up in Willows, in
11 August, and it's going to convert rice straw into medium
12 density fiberboard. And it's a prototype here in the
13 U.S. and their data suggests that they're going to avert
14 57,000 tons of methane a year because they will be
15 removing the rice straw from the fields prior to the
16 decomposition process, which produces the methane.

17 So, interesting sort of side note in terms of
18 methane emissions reduction.

19 We also run a couple of other programs, some
20 other credit enhancement programs which we can discuss,
21 but that also provide backstop to traditional lenders
22 investing in some of these projects.

23 MR. KATO: Thank you. So, with that I think we
24 can begin entertaining some of those questions. And so,
25 we'll go with John and then we'll go down the line here

1 and ask the same question. Kind of what is your view of
2 the potential for growth and, really, appetite and
3 opportunity for private investment in what we've
4 discussed today. And especially the submarket sectors
5 for either power generation or transportation?

6 MR. DANNAN: So, great, thank you. Well, I
7 think the quick answer, the potential for growth an
8 appetite for private investment I think is sizeable.
9 You know, going all the way back to I think it was the
10 first session, with CalRecycle. You know, they sort of
11 talked about the organic waste diversion rules and
12 that's going to drive about 20 million tons of organic
13 product. I mean, you know, it's not all going to be
14 capable for digesters, but that's 20 100,000-ton
15 digesters. That's huge. That's a lot of private
16 investment.

17 You know, you could be anywhere from sort of
18 just for that, like half a billion to a billion dollars.

19 And, you know, you add in the dairy vertical,
20 you add in sort of the wood waste and the other sort of
21 verticals that are in this industry and we think over
22 the next decade there's probably multi-billion dollar
23 investment. So, growth absolutely there.

24 In terms of appetite, you know, our company has
25 focused on, really, within our waste to value business,

1 organic waste management and building the infrastructure
2 for that. And so, we're getting organized around states
3 where there are organic waste diversion rules. Where
4 there are, you know, good pricing programs. Such as
5 biomass. You know, you sort of bring these things
6 together and suddenly you have one thing that will drive
7 a long term feedstock contract from a reputable party
8 such as, you know, Republic Waste, or Ecology, or
9 another large waste management company.

10 The other side is providing our guaranteed off
11 take and suddenly your business model starts to take
12 shape from a contractual perspective.

13 And now what you really need to do is fix the
14 middle, which is the developers and operators and
15 bringing the projects to bear.

16 And so, I think all of the key pieces that make
17 -- you know, for the growth of the industry are here.
18 And I could go into the sub-verticals, but I'll pause.

19 MR. KATO: Thank you. Ben.

20 MR. VITALI: Yeah, so we haven't invested yet in
21 California. We have several other projects in other
22 states including projects that inject into the pipeline
23 to send biogas here for LCFS. So, you might want to cut
24 my mic off. But I wanted to let you know that and
25 disclose that.

1 We have been actively looking at projects here
2 and we have development funding, a sleeve in our fund
3 that some of the grant funding has kind of acted like
4 development funding, so it's kind of early stage, high
5 risk funding. And so, we're providing some of that
6 funding because our product development partners need
7 that support, both technical support as well as the
8 funding, itself.

9 And, you know, from the market perspective it's
10 certainly -- you know, we come at it as the same way
11 that John, and Generate do, that we're solving multiple
12 problems. But we're solving the waste problem first.
13 And we happen to get paid by generating the energy or,
14 you know, renewable gas.

15 So, in that regard, a couple of the panelists
16 earlier said, well, we're not going to be thinking about
17 biogas in a hundred years. Well, I think we will be
18 because we're going to have people, and we're going to
19 have animals, and we're probably going to still be
20 eating meat and things like that a hundred years from.
21 So, we're still going to have these problems to solve.

22 So, the business model, though, is what requires
23 this steadfast hand. And that's where a lot of the
24 early projects that we've seen in California, in the
25 early days that CEC funded were for electricity

1 generation.

2 When we talk about sustainability at our firm,
3 it starts with financial sustainability. Oh, yeah,
4 great, we have positive environmental outcomes that we
5 measure, and monitor, and report to our investors. But
6 at the end of the day it's financial sustainability,
7 first. And so, those aspects have to be built into the
8 project at the very beginning.

9 And so, one of the issues that we have when we
10 look at, like just focusing on one element of the
11 business model, to kind of spur this market forward is
12 really around the RNG pricing. You've heard it easily
13 20 times today. We can get around that a little bit,
14 but the way we get around that is we have other revenue
15 sources, like tip fees, in the right -- for us, in the
16 right proportion, and we can contract some of that risk
17 with a fixed price or a fixed and floating price. So,
18 that doesn't change.

19 Just in the past week, on the LCFS credit
20 pricing, the 30 percent swing, right. So, that's highly
21 volatile. And so, a floor would be -- you know, if we
22 had a floor at the right level, we'd probably do every
23 project we saw, if the project had the feedstock.
24 Right? So, in this case you heard from a number of
25 panelists in various panelists if you have the

1 feedstock, and you have a long term component of that
2 feedstock at least as a minimum, and the right contract
3 structures on the revenue then, great, you can look at
4 the op. ex.

5 And so, then the third thing is that op. ex.
6 What does it cost to operate the facility? What is the
7 energy draw for this gas conditioning equipment, and the
8 other pumps and motors, and everything you have to have
9 to run one of these facilities? It's not insignificant.

10 So, shaving that by putting CHP on site. So, we
11 have these complex projects that we're bringing in to,
12 you know, all these different dimensions that you're
13 used to, but it's done at this relatively small scale.
14 And I think that that complexity is one of the things
15 that's inhibited growth as well.

16 So, the complexity and dimensions of these
17 projects are clear. The developers are still learning.
18 And I think those aspects are present here in
19 California, in order to kind of really enable the market
20 growth, from our perspective.

21 MR. RECHTSCHAFFEN: Can I maybe jump ahead, but
22 just ask you, as things are evolving are we at the point
23 where you're seeing things -- they're still complex, but
24 are they getting less risky? Is it we've now moved far
25 enough so that you can understand how these projects

1 work, the results, the revenue stream, and you're
2 starting to see less risk, or are you still looking and
3 we have to climb a bigger hill and more risk before you
4 feel more comfortable.

5 Apart from a price floor, which you said would
6 make you invest in every project you saw.

7 MR. VITALI: If you had the feedstock, yeah.

8 MR. RECHTSCHAFFEN: If you had the feedstock.
9 And I can ask both of you guys for that. Just where, in
10 terms of the movement over the past five to ten years in
11 where you're going do you see us --

12 MR. DANNAN: This gets into a standardization.
13 I'm going to dive into a bit more detail and distinguish
14 between different feedstocks and types of projects.

15 So, you know, and I'm going to say something
16 that may be a little contrarian, as it relates to the
17 dairy projects. But let's start with food waste.

18 I agree with everything Ben said. You know, we
19 typically, when we're looking at projects, we're looking
20 at sort of the tip fees, too. And our projects are
21 typically two-thirds of the RIN. You know, anywhere
22 from half to two-thirds. So, we're looking for the
23 project to essentially break even on a tip fee basis.

24 And then, sort of the power off take is really,
25 or the gas off take is really what's going to make the

1 returns palatable.

2 And so, you know, for us, we -- Generate Capital
3 has not invested in an RNG project, yet, on the biogas
4 side. Both of our digesters are the power. And that's
5 because we're a private company, we have a 20-year time
6 horizon. And, obviously, 20-year contracts or even 10-
7 year contracts have not existed for the RINs or LCFS.

8 And so that mechanism that CARB is working on
9 would truly be a game changer. And, you know, outside
10 of that we need to be able to get those contracts.

11 And so, you know, CalRecycle and what they're
12 working on with organic waste diversion is going to help
13 that happen. But you definitely need both of those
14 pieces, you know, for the project to make sense. The
15 technology in the middle is very proven.

16 We're frankly worried when we see someone trying
17 to tinker with the process of anaerobic digester. It's
18 old, it's proven, it works.

19 You know, and there's plenty of talent in the
20 industry and you've heard a lot from it today. It does
21 need a bit of organizing. I think that's one of our
22 roles, as capital providers, is to try and organize the
23 industry better and build those operating companies and
24 development companies that really have the skills to
25 repeatedly design projects with more and more

1 standardization, and drive the costs down, and operate
2 them to a high level of credibility. That's food waste.

3 On the dairy side, it's absolutely there. You
4 don't get paid for, you know, manure generally in dairy
5 projects, but you don't need a pre-packaging facility.
6 If we're talking about covered lagoons, it's like \$4 to
7 \$5 million for a megawatt. It's much cheaper. I can be
8 really standardized.

9 There are developers out there building
10 standardized projects right now, and they can be
11 deployed today, rapidly. You know, I think there's a
12 big opportunity there. And this is with biomass, this
13 is not for RNG. And so, this is where I'm going to be a
14 bit contrarian.

15 I don't really think that the RNG side makes as
16 much sense on the dairy as the power side today, even
17 absent the potential contracts. Just because of the
18 equipment you need and the very expensive sort of
19 interconnects that you're going to have to do, you need
20 a much bigger scale.

21 And so, if you look at the 1,300, 1,250,
22 whatever it is, dairies, you know, maybe 500 of them
23 meet the criteria for scale, and infrastructure and
24 operations that would be good enough for us to put a
25 power project on.

1 I'm guessing less than 100, maybe even 50 would
2 meet that same criteria individually, to put a gas
3 project on.

4 And then you go to clusters, and that's kind of
5 difficult. Because if I sit back and I say do I want to
6 build a food waste project, with Republic Service giving
7 me my waste, or do I want to build a project with 20
8 farms, or 10 farms as my feedstock providers giving me
9 my waste? I'm going to go to the food waste every time,
10 just from a management of counter parties, risk of
11 counter parties, complexity of operation perspective.

12 That was sort of my contrarian comment, so I'll
13 hold it there.

14 CHAIR WEISENMILLER: No, that's good. I think
15 at this point we're trying to move the needle some. So,
16 instead of saying we have to solve everyone's problem
17 across the board, if we can at least identify some
18 areas, some sub-markets, some technology where we can
19 actually make something happen, that would be a good
20 step.

21 MR. DANNAN: Okay.

22 CHAIR WEISENMILLER: You know, again. And at
23 the same time, the more you can help us on, well, what's
24 -- you know, I remember one of his ex-colleagues, Mark
25 Faron (phonetic) had made the point of -- something that

1 was pending before the PUC and he was saying, well, wait
2 a minute, we're the dumb money in the deal of just, you
3 know, there was a variety of -- you know, it was like
4 why is no venture capital going into this thing and
5 somehow it's us? And, ultimately, Mark convinced them
6 not to do that.

7 So, again, I think we're trying to get some
8 solid business that we can focus on and get something
9 done. Realizing it may not solve all the issues, but I
10 think if we could get some progress on some of these,
11 get some models of what can really be financeable or
12 standardized, then over time you can expand that.

13 MR. VITALI: Yeah, I think if you look at the
14 number of projects that each developer that spoke today
15 has completed that answers your question where we're at
16 in that growth curve. We're still early, but it's not
17 too early.

18 And we have invested in a dairy-based project
19 that co-digests. And to co-digest, I think there's one
20 dairy project here that I know of, in California that
21 digest material, along with manure.

22 Why that's so important is because from a
23 biological stand point in a digester, you know, you have
24 this buffering capacity. So, if you use a lot of
25 biosolids or you use a lot of manure, and you bring out

1 variable feedstock, and industrial or commercial food
2 waste on top of that, it naturally acts as a buffer to
3 take that less consistent input.

4 And so that's an element that one of the reasons
5 why it's hard to do dairy, only, as you've heard from
6 some of the folks here.

7 You know, another thing that we've had, just on
8 the in-state versus out-of-state projects, and kind of
9 where we're at, but kind of another key element, is
10 really on the -- you know, there are elements that are
11 necessary and sufficient in these projects. And so,
12 that pricing around the gas is necessary and it's got to
13 be at a sufficient level.

14 An aspect that is important, but maybe not --
15 it's necessary to have clear cost going on, for if
16 you're going to interconnect into the pipeline. And so,
17 the sufficiency is what is that cost?

18 So, I think Point Loma, I think was \$12 million
19 or something for the interconnect into the pipeline,
20 something like that. I've heard different numbers for
21 different projects that were talked about today. We've
22 seen probably 150 different projects at our firm.

23 A good benchmark, one of our projects for
24 interconnect, the tap and everything associated with it
25 into an interstate pipeline is like \$1.2 million. So,

1 if you want a bogey to shoot for, there's one. So, it's
2 outside of California, yeah.

3 So, but the gas conditioning we're using is of
4 high quality, so kind of the same systems that you'd be
5 seeing here, like on the CR&R project, for example,
6 something like that.

7 But I would focus in on those necessary and
8 sufficient aspects for those projects. And for us,
9 permitting co-digestion is key.

10 You know, on the op. ex. side we've got to deal
11 with the effluent. So, when you're in an urban setting,
12 it's very difficult for the effluent management. And if
13 you're in rural setting, on a farm, then it's a very,
14 very different issue. You have these large lagoons and
15 storage, and seasonality of the land application, and
16 those kinds of things. So, siting is a big issue if
17 you're trying to co-digest. Siting areas where you can
18 manage the effluent, as well as manage the
19 transportation cost.

20 So, you know, we'd love to see our first
21 investment here in California. Hopefully, it will be
22 before long.

23 MR. KATO: And then, Renee, if you want to wrap
24 up, please, the first question on the potential from
25 your agency to --

1 MS. WEBSTER-HAWKINS: Sure. You know, obviously
2 there's great potential for growth. But the appetite in
3 the lending sector I would say is tentative. You know,
4 different from John and Ben, lenders are much more
5 conservative and base their underwriting decisions on
6 data which, quite frankly, my conversations with many of
7 our lenders, both in our loss reserve and bond programs,
8 does not exist currently in the State of California for
9 projects in California, given the economics and the
10 market drivers.

11 You know, there's more appetite for the kinds of
12 projects where either there's multiple outputs from the
13 project, from projects like CR&R, where you have the
14 project sponsor is also the facility owner, with a long
15 track record, and their own equity in the larger
16 project.

17 Lenders are quite wary of sort of the business
18 model that seems to be, at least in these early days,
19 where there's a project proponent coming in, proposing
20 to say, lease the use of a dairy from a farmer, and have
21 the farmer -- you know, it would really be a third-party
22 operator as the energy operator.

23 Lenders want the property owner to have their
24 stake in the deal.

25 So, there's just a number of factors. And,

1 unfortunately, for a number of lenders located in the
2 State of California, that are sort of what I view as the
3 early adopters and have stuck their toe in the water in
4 a couple of these projects, if they've lost they're
5 actually using the words "never again". So, it's quite
6 -- you know, we're at a place where all of these
7 projects, even if they've been able to attract or have
8 their own equity investment need access to conventional
9 lending for working capital or, perhaps for the
10 construction phase. And that's something that I think
11 that as the State of California, it's an appropriate
12 question to ask to what degree can we shore up some of
13 the reticence around the lending to serve as either a
14 gap financing, or backstop for traditional lending.

15 MR. VIALI: Yeah, just to comment on that, you
16 know, we have experience adding debt to our facilities,
17 both construction debt, as well as term debt. And we've
18 been able to perform syndicates with lenders, including
19 regional banks. And, you know, sometimes there have
20 been -- you know, there have been some equipment
21 financing options. I know some projects were financed
22 on the debt side with Caterpillar Finance, for example.
23 But there is an education process.

24 So, I would say we're very early in that
25 process. And I think what we try to do is make sure

1 that there are long term, secure feedstock sources that
2 can be underwritten, that there are contracted revenues
3 to that serve as coverage ratio. And, for example,
4 that's why we had to fix part of the gas pricing and had
5 a tip fee. We had a ten-year agreements on feedstock,
6 which is pretty unique. But we got lending for
7 construction based on those two components that were
8 fixed, set pricing. And we didn't get it on any value
9 for, and really didn't want to, for the RINs and LCFS
10 that were floated. And we also hedged the gas, right.
11 So, we've got big enough projects where we can hedge the
12 brown gas, which is a little -- it gets you a little
13 bit. It doesn't get you a lot. But that's how we
14 structure some of the risks to try to get the lenders
15 interested.

16 MR. DANNAN: And I think just on the lending,
17 just to round that off, where I see that going -- I was
18 a project finance banker, a lender for the last decade
19 or so, you know, prior to starting this job. You know,
20 the history of the industry, and not just in California,
21 there's been a high failure rate and it's mainly been AG
22 projects, and they've mainly been fairly small, and
23 they've mainly been funded by a lot of grants.

24 So, there's been no room for the mainstream
25 financing market, anyway. And there's, you know, just

1 been a lot of free money, which has led to a higher
2 failure rate, you know, frankly.

3 What we'll see with the coming sort of food
4 waste, the diversion of food waste projects, they're
5 bigger. They cost \$25 million, they're not \$5 million.
6 They can't be grant funded. They need to be funded by,
7 you know, institutional type investors, such as Generate
8 or Equilibrium.

9 And, you know, by virtue of us needing these
10 contracted feedstocks, and needing these contracted off
11 takes, they immediately -- these projects are going to
12 be much more palatable to lenders.

13 And then I think, you know, you can either do it
14 on a project-by-project basis, or we can follow sort of
15 the route that the landfill gas industry took which is,
16 you know, an investor will get a portfolio of projects
17 and then they'll be very attractive to lenders because
18 then you've got cross-collateralization. And that's --
19 you know, between all those things, I think the lending
20 environment will look much better very soon.

21 CHAIR WEISENMILLER: And my question's going to
22 Renee, and sort of two questions. One is it's always
23 attractive to try to figure out how to work with you
24 because, conceivably, we can leverage money. Instead of
25 here's a grant, you know, there's some potential of

1 getting leverage out of it. But then you're back to
2 what's the financial community appetite for that.

3 And, certainly, it gives us comfort to the
4 extent we have a more sophisticated due diligence that
5 we're going to do. And, you know, from the banks that
6 sort of another part of the attraction.

7 But you referred to work out. So, what's been
8 the experience? You know, your agency's been around
9 long enough you must have played in this arena some.
10 What's been the experience? What's been the issues?

11 MS. WEBSTER-HAWKINS: Well, I think again the
12 stronger projects are those where, ironically, the main
13 point of the project is not to produce a renewable fuel,
14 but that it's an important, and maybe even necessary,
15 but important secondary goal of the business. And CR&R
16 is the classic example. And this is from a lender's
17 perspective because there's, you know, obviously the
18 assets from the borrower are present. The business
19 plan, it's a mature company.

20 From the lender's perspective, they always come
21 back to wanting the State to take the first loss on some
22 portion. And that is a reflection, and not eternally,
23 but certainly during this early growth period of this
24 industry, where the data is still coming into view, so
25 they can truly then have a stronger base upon which to

1 make shorter, long-term underwriting decisions.

2 You know, a very concrete piece is, you know, to
3 the extent that a proponent is phasing their financing
4 between construction and operation, there is a gap. The
5 USDA Loan guarantees that a lot of projects look to
6 don't start until the project is up and running to a
7 certain standard of performance.

8 And with these projects, with project delays and
9 perfecting the through put, whether it's securing the
10 feedstock or actually perfecting the machinery itself,
11 the construction phase is going beyond a lender's
12 comfort zone, as well as the length of time that the
13 USDA honors for these kind of take out financings.

14 So, you know, that could be -- I mean, it's a
15 piece. It's certainly not a great, big piece. But it's
16 a piece where I think as a State we could look at and
17 seeing if we could replicate some sort of loan guarantee
18 where the State would similarly have, whether it's a
19 guarantee -- it could actually be a guarantee, it could
20 be a loan participation, or something where the State
21 has a first loss position to help buffer the
22 uncertainty with the projects, at least from the
23 lender's perspective.

24 MR. VITALI: And we would say that the USDA kind
25 of personal guarantees that are required on the back end

1 of that make it impractical in many cases, unless it's
2 an actual farm that's adding additional leverage already
3 on the farm. So, I mean, there are ways to combine
4 that.

5 We would bridge, we would just bridge it to
6 whatever the lender's requirements were, a commercial
7 operation or whatever. But that's another important
8 point with respect to if the State were to consider
9 something like a guarantee program, can't expect those
10 kind of personal guarantees and transaction costs for
11 that. They're just kind of too high. The cost would
12 just add too much to the debt cost.

13 COMMISSIONER SCOTT: I've got a question. We
14 talked a little bit on the two previous panels, on the
15 existing projects and what they needed, and lessons
16 learned, and challenges there. And then, also on the
17 emerging markets and emerging opportunities. And pretty
18 much from all of them we heard what they're looking for
19 is additional capital. And that the grant opportunities
20 that are here in the State are fantastic, but not enough
21 for what they need to get going.

22 And I feel like what I heard, maybe John, both
23 you and Ben say in your remarks, was that with all the
24 grants in the space it's kind of blocking out -- well,
25 maybe that's not quite how you said it. I have to look

1 back at my notes. But it's sort of I think you said,
2 oh, there's places where we might invest, but there's
3 grants going there anyway, so we don't need to put the
4 money in that space.

5 So I'm wondering is, is that because that the
6 industry's just not far enough along quite yet for you
7 to feel comfortable investing in California? Is it
8 because the projects, we do all of these through very
9 competitive grant solicitations. And so, it's the same
10 set of projects that you might consider funding that are
11 getting those grants, and so we're sort of cross-
12 competing, if that's the right word, with each other?
13 I'm just trying to reconcile a little bit the
14 information about everyone wanting more capital. And,
15 of course, everyone always wants more dollars. Versus,
16 you know, the grants here in the State potentially
17 blocking out private investment.

18 MR. DANNAN: Well, that was my comment so I'll
19 take the first stab at it. I'll just wind it back a
20 bit. I mean, I was putting a bit of a historical
21 context there, so that's not necessarily today, but the
22 history of the biogas industry. And it was in the
23 context of debt providers.

24 So, a lot of projects were built with a lot of
25 money from, we can call it USDA, but the stimulus in the

1 late 2000s and early, you know, 2010s. And so, that was
2 the context of that.

3 I think one thing I was about to follow on from
4 the last two comments was the staging, the lifecycle of
5 an investment is very important. So, Generate Capital
6 comes in when a project is construction ready. So, that
7 means it's been through the development cycle and the
8 grants will have been awarded. Typically, well, some of
9 them will have been awarded during the development
10 cycle, some come later. And so, we'll come in at that
11 stage.

12 And, you know, one of the important things about
13 what the grants are doing is it helps the developers get
14 a project finished that has been difficult in other
15 states, and in other parts of the industry.

16 So, you know, they're not crowding us out. You
17 know, I think we generally like the grants there. But I
18 think my point was just a portion of sometimes there is
19 such a thing as too much money. And I'm coming at this
20 purely from the AD or composting industry where, you
21 know, they're proven technologies to generate capital.
22 To take a step back, we're not going to invest in
23 technologies that are not commercially proven. That's
24 venture capital. That's a different set of investors,
25 different risk profile.

1 And so, you know, most of the previous panel was
2 really what I would sort of term venture. And so, my
3 comments have been not really related to that panel, if
4 that helps clarify.

5 COMMISSIONER SCOTT: Got it. That's helpful,
6 thanks.

7 MR. VITALI: Yeah, on that, we're a little
8 different. We have this project development sleeve of
9 funding that we can provide, and we'd be happy to match,
10 you know, grant funding on that.

11 We've looked at two projects that were CEC grant
12 recipients and, you know, I think teams can never
13 underestimate the complexity and the twists and turns
14 during the development process. And the length of time.
15 Right, so the time kills. The project developers don't
16 have the runway in capital, working capital to spend
17 another year, or two, or three, or four working on it.
18 Right? We have a very narrow two and a half to three
19 year investment period. We need to be in and
20 developed, and funded, and out, right? And a
21 commercially operating and yielding asset in a very
22 short period of time compared to how long -- we've
23 funded projects that have been in development for ten
24 years to get a permit. Ten years. Right, we're closing
25 on it, we're signing the deal tomorrow, or Thursday.

1 And so, there's a lot of just effort, and twists
2 and turns, and starts and restarts. And so, being clear
3 on that stage gate process, we are very clear on that
4 stage. We're almost stingy with that sleeve of money,
5 but we can match that and would be happy to find an
6 innovative way to think about that.

7 But it's really in that early stage that has
8 been, I think, a challenge in the past for some projects
9 that have had fits and starts.

10 And then I guess the question is how can we
11 collectively finance projects that are in replication
12 mode, so the second, and third, and fourth. Because
13 you're capturing the cycles of learning there in the
14 development teams and the technology providers.

15 Like you're seeing at CR&R, they're on their
16 first project, right? Cal Bio, they're working on their
17 second project, really on site there in Kerns. So,
18 you're starting to see those -- you probably need three
19 or four projects to capture those cycles of learning.

20 And we don't have any cost curve improvements,
21 really. You know, we like solar, right? So, it's this
22 steady state of cost unless the construction costs are
23 going up, maybe. So that's, I think another different
24 element in our types of projects that we're looking at.

25 MR. RECHTSCHAFFEN: I don't know if you were

1 here for the morning panel. Professor Jaffe said in the
2 oil and gas sector, investors typically have been
3 looking for rates of return of 18 percent. I don't know
4 historically, or if that applies currently.

5 MR. VITALI: Yeah.

6 MR. RECHTSCHAFFEN: And she said in this space
7 it's we're really thinking of more like 12 percent.
8 It's probably very hard to generalize, but does that
9 ring true with your companies, or the investors who you
10 guys are attracting?

11 MR. VITALI: We need to see a high rate of
12 return. 12 percent at a blended rate might work, if
13 you're talking about the full capital stack. But we're
14 looking at project level equity returns, which are below
15 private equity returns, right, but more than
16 infrastructure, like large scale infrastructure. It's
17 more an opportunistic or value add kind of project
18 return.

19 It's very similar to real estate. So, you have
20 core real estate that can be in the low single -- or
21 high single digits, but you have value added real estate
22 that you're in the teens because you're taking
23 construction risk, you're taking development risk. And
24 so, it just depends on that risk profile that you're
25 taking.

1 I think, you know, we're looking at not just
2 digesters and energy projects. We're looking at water
3 and water reuse, and fit-for-purpose water. And, you
4 know, composting and biosolids processing. We're
5 looking at a wide variety of investments that we have in
6 the fund. But these projects, you know, have a risk
7 profile that you need those returns.

8 CHAIR WEISENMILLER: Yeah, I was going to say my
9 experience from, you know, many years of project finance
10 was that basically there's sort of the risk required --
11 you know, if someone's in the development phase, there's
12 one. The construction phase and then operating. There
13 are different phases on the required returns as you go
14 through it.

15 I think this is probably a good time to thank
16 everyone for their participation at this stage.
17 Certainly encourage you, you know, in writing to sort of
18 give us additional ideas.

19 Again, I think what we're trying to do is
20 particularly identify the best sectors, the best
21 markets, the best technologies that we can move along.
22 Some of the others, frankly, might need more research or
23 a variety of different things.

24 And, certainly, at the same time we've heard the
25 story that at least in terms of from a policy

1 perspective it's important to figure out what we're
2 doing with landfills, it's important what we're doing
3 with dairies. And they may be the -- anyway, some of
4 this may be easier, some of it may be harder. But it
5 would be at least good to get something done, even if
6 we're just picking up the easiest ones, initially, to
7 try to grow the industry.

8 MR. DANNAN: Can I throw one more thing out?

9 CHAIR WEISENMILLER: Sure.

10 MR. DANNAN: It's really for the CFA folks, and
11 they're sort of not here. But Ben touched on it and
12 we've been talking about power and energy a lot. With
13 digesters, you have the effluent, the digestate. And
14 stepping away from California, the broad industry, the
15 single, number one reason for projects failing is
16 digestate management, and not managing the costs, and
17 not contracting it, and not doing it properly.

18 On agricultural dairy digesters they can use it
19 right there. On the food waste digesters, which is
20 where the growth trajectory will be in California, and
21 where the opportunity is, you know, digestate management
22 will be the single largest line item cost for a digester
23 project.

24 So, if there's a way to incentivize the use of
25 that digestate to be used in agricultural, or in some

1 other way, not even as a revenue, but just as a zero
2 cost proposition, that would be a major catalyst for the
3 industry.

4 MR. RECHTSCHAFFEN: Not just because -- Ben, did
5 you -- I was going to change the subject.

6 MR. VITALI: Just one other thing to leave you
7 with. So, we talked about the pricing around the LCFS,
8 and the RINs, and the voluntarily managing that with a
9 floor is very important. But also on the demand side
10 for the gas because we see that demand slowing or
11 filling up the current demand need that was talked a
12 little bit about earlier. And so, finding other
13 pathways to use that renewable gas that gets us
14 something that's fixed price, with an escalator that
15 gets the returns that we're looking for. Right, it
16 doesn't need to be at today's value for that renewable
17 gas. It needs to be, but reasonable, if it's going to
18 be fixed for 20 years. And so, I would try and find
19 ways, other pathways for that, whether it's a hydrogen
20 pathway or whether it's a shorter term, you know, for
21 other refineries using the gas, for lowering the carbon
22 intensity of drop in fuels or something.

23 So, looking at the demand side of it is
24 important right now.

25 MR. RECHTSCHAFFEN: I was just going to

1 encourage you, to the extent you can, to participate at
2 the PUC in the process we're undertaking to develop the
3 five dairy biomethane pipeline infrastructure projects.
4 And part of what we're trying to figure out is what
5 lessons we learn from the first five, and then what's a
6 sustainable model for replicating those projects and
7 having many more of them.

8 And as the Chair said, we're not going to be
9 able to rely on taxpayer money, even ratepayer money
10 going forward. We have to find more sustainable
11 mechanisms. And it would be very helpful to have the
12 expertise of the investment market in some of those
13 proceedings.

14 So, if you can keep an eye on that and
15 participate as appropriate, that would be great.

16 CHAIR WEISENMILLER: Thanks for your help today.

17 MS. RAITT: So, the next panel is a discussion
18 on Demand Vehicle Fleets and Other Factors.

19 CHAIR WEISENMILLER: Yeah.

20 MR. OLSON: If we could have our panel members
21 join us at the table?

22 Okay, this is our last panel of the day and
23 we're going to cover Demand Vehicle Fleets and Other
24 Factors. I'd like to introduce the speakers.

25 Cliff Gladstein, of Gladstein, Neandross and

1 Associates, right next to me, to my right. To his
2 right, Jose Castaneda of Cummins-Westport. And then,
3 Sam McLaughlin from Volvo, North America. And Dean
4 Saito of South Coast Air Quality Management District.

5 So, we distributed -- gentlemen, if you could
6 introduce yourselves and a short, real short kind of
7 description of what you're doing, the kind of projects
8 or your activities in this area.

9 And then we'll go through the -- we have a
10 series of questions, but I think given the time, maybe
11 concentrate on the first two related to fleets, and
12 maybe the third on demand, if we have the time.

13 So, let's start with Cliff Gladstein.

14 MR. GLADSTEIN: Does it have to be short?

15 MR. OLSON: Yes.

16 MR. GLADSTEIN: My name is Cliff Gladstein. I'm
17 the President and Founder of Gladstein, Neandross and
18 Associates. We're primarily an alternative fuel vehicle
19 consultancy. We've been in business for over 23 years.
20 We've been at the forefront of the effort to replace
21 diesel in the heavy duty sector with cleaner,
22 domestically produced alternative fuels.

23 We have been developing clean fuel deployment
24 projects since our inception in 1994. We've probably
25 done as many, if not more, projects than most of the

1 people sitting in this room, and in tandem with most of
2 the people sitting in this room.

3 We've built over 100 alternative fueling
4 stations, deployed over 3,000 heavy duty vehicles,
5 written grant applications, successful grand
6 applications for \$335 million to support the programs
7 and the clients that we work for. Probably totaling
8 about \$2 billion in public and private investment.

9 Our clients are just a cross-section of private
10 and public fleets across the nation, Waste Management,
11 Wal-Mart. Harris Ranch was one of our very first
12 projects down in the Central Valley. UPS, et cetera, et
13 cetera, et cetera.

14 And in recent years we have gotten into the RNG
15 space, as well. Over the last year I've been working
16 with wastewater treatment facilities, landfill
17 operators, food processors, dairy project developers.
18 I'm probably missing some. To help them assess the
19 opportunities for them to convert their organic
20 feedstock into revenue streams.

21 Primarily on the assessment and identification
22 of off takers. Since our space is the heavy duty
23 natural gas vehicle space.

24 MR. OLSON: Jose.

25 MR. CASTANEDA: Joe Castaneda, with Cummins-

1 Westport. For those who don't know, Cummins-Westport is
2 a joint venture between Cummins, Inc. and Westport
3 Innovations.

4 Together, as a joint venture, we manufacture the
5 natural gas engines, which are commonly referred to as
6 near zero engines that have been mentioned today, in
7 three different modes.

8 So, we have a long history, about 20 years
9 running as a joint venture, manufacturing those engines.
10 Cummins, Inc. is a company that also manufactures diesel
11 engines for several applications and many ranges. So,
12 we're certainly excited about the potential for the
13 market to -- I'm responsible, specifically, for the
14 California market and natural gas development, so I
15 participate on a few different partnership and
16 coalitions. But Cummins is not interested and not
17 interested about California as a market, about cleaning
18 the air of natural gas that my focus is almost
19 exclusively on the California market.

20 MR. OLSON: Okay, Sam McLaughlin.

21 MR. MCLAUGHLIN: Yes, it is now, thanks. Work
22 for Volvo Group, North America, out of their research
23 technology office.

24 Of course, Volvo here in the U.S. makes heavy
25 duty engines, transmissions, axels for heavy duty Class

1 8 trucks for Mack and Volvo brand, Preedlow bus, Nova
2 bus, and Volvo construction equipment.

3 Thank all of you for the opportunity here to
4 talk about DME, dimethyl ether-fueled vehicles today.

5 A little bit of background there. Volvo, for
6 probably a ten-year period, has worked with dimethyl
7 ether. We've produced about 17 trucks over a ten-year
8 period, and projects in Sweden, Texas the latest one,
9 Department of Sanitation for New York City was the
10 latest Mack Truck project.

11 And I think what I'd like to show today is how
12 DME can directly support the SB 1383 goals by reducing
13 risk of methane emissions and eliminating black carbon,
14 because of its engine process.

15 So, yeah, DME is a simple molecule, C₂H₆O. It
16 burns sootless due to the lack of carbon bond. It's
17 nontoxic. It's not a greenhouse gas. It also
18 represents a 90-percent reduction in wheel-to-wheel
19 carbon when it's made from a bioDME process.

20 It also represents a 9 percent reduction in
21 carbon from in-cylinder combustion, when compared to
22 diesel fuel.

23 It's got a high Cetane number which makes it
24 excellent for the compression ignition engine, which
25 runs at -- it allows a higher thermal efficiency than a

1 spark ignition.

2 95 percent of the parts of our DME engines are
3 common with our diesel engine today, and the ability to
4 burn sootless eliminates the diesel particulate filter
5 from the after-treatment system.

6 So, in the vehicle, unlike most alternative
7 fuels today, there really is no lack of power or torque
8 in performance of the vehicle. It has very good power
9 density. And a DME vehicle is also capable of similar
10 or equivalent fuel mileage efficiency, and mileage range
11 for the truck.

12 So, that's some background and I'll come back
13 around.

14 MR. OLSON: Okay, and Dean, please introduce
15 yourself.

16 MR. SAITO: Good afternoon. My name is Dean
17 Saito and I manage the On-road Strategies Unit in the
18 South Coast Air Quality Management District.

19 A main driver in the South Coast for the use of
20 renewable natural gas is the need to achieve a 45-
21 percent reduction in NOx by 2023 and a 55-percent
22 reduction in 2032.

23 Because 80 percent of our inventory is
24 attributed to mobile source, we recognize that it's
25 going to take -- it's going to require the turnover of

1 the legacy fleet and implementation of zero and near
2 zero emissions.

3 And because of that, we've identified incentive
4 pot of money that's going to be needed to turn over the
5 legacy fleet, at being close to \$1 billion a year.

6 And we recognize that we have to consider all
7 funding pots in order to assess this \$1 billion,
8 including the GGRF funds.

9 So, through the combination of renewable natural
10 gas, along with low NOx engines, we see that as a
11 pathway to getting to near zero and zero emission across
12 the board for many of the locations that we've already
13 established fleet rules for, that mandate alternative
14 fuels.

15 We adopted fleet rules back in 2000 and 2001,
16 which mandated alternative fuels for several vocations,
17 including refuse trucks, street sweepers, transit buses,
18 and we've been implementing those rules since 2000,
19 2001. Thank you.

20 CHAIR WEISENMILLER: So, just generally, just to
21 follow up with you for just a second. So, looking at
22 the air pollution requirements, you know, the SIP, et
23 cetera, how much money do you need to convert the
24 existing fleet?

25 MR. SAITO: Our best estimate of turning over

1 the legacy fleet for heavy duty, we need approximately
2 \$1 billion a year?

3 CHAIR WEISENMILLER: For one year, or ten years
4 or --

5 MR. SAITO: For one year. So, for 14 years,
6 we're talking \$14 billion.

7 CHAIR WEISENMILLER: Okay, so \$14 billion?

8 MR. SAITO: Yes.

9 CHAIR WEISENMILLER: Okay.

10 MR. OLSON: Okay, we'd like to go to the first
11 question and that, I'll just read it. What is needed to
12 increase the number of vehicle product offerings and
13 vehicle volume sales to achieve the SB 1383 goals?

14 And let's go down the line, again, starting with
15 Cliff, you first. And then, brief comments on that
16 question.

17 MR. GLADSTEIN: We gave some thought to this in
18 preparation for this hearing and, of course, prepared
19 remarks and was not prepared to speak extemporaneously.
20 But I will try and endeavor to do so, anyway.

21 I think the key -- many of the issues have been
22 brought up already today, and I don't want to sound
23 terribly redundant as far as the markets are concerned.

24 But I guess the one perspective that I can give
25 you is that our clients, the fleets that we work with,

1 they hate uncertainty. And there is a certain amount of
2 uncertainty that's created by what I would characterize
3 as a -- and I hate to use this term, but I'll do it
4 anyway, even though it might not be very politic. And
5 that's a schizophrenic attitude towards natural gas
6 vehicles by the State of California.

7 There is an inconsistency that is reflected in
8 supportive statements, but not supportive deeds. The
9 resources that are allocated to support the kinds of
10 displacement and kinds of market penetration that we
11 need, particularly, I mean you've heard over and over
12 again today, the market has got to grow. The market for
13 natural gas vehicles, so that we could direct the RNG to
14 those vehicles has got to grow so that we can generate
15 the revenue necessary to support, financially, these RNG
16 projects.

17 But those resources, there's an inconsistent
18 approach to NGVs from the State. And if the State
19 could, from my perspective and from the perspective of a
20 lot of our fleet operators -- because we have fleet
21 operators that come to us and say, we're hearing that
22 California doesn't like natural gas vehicles anymore,
23 and we don't know if we should buy anymore. We don't
24 know if we should invest any more in these technologies
25 because what we're hearing, we're going to be called

1 climate villains.

2 And that's put something of a damper on the
3 market. Now, it hasn't frozen it. But when you have
4 fleets that have invested heavily in natural gas
5 vehicles coming forward and asking us these questions
6 about what is the position of the State of California,
7 now, on natural gas vehicles? That gives us pause in
8 terms of trying to understand what is that message?
9 What is that mixed message that's being sent by the
10 State?

11 So, if there is any one item that I would point
12 to and, of course, it's never so simple, but if the
13 State could be consistent and help create that certainty
14 in the market, that this is a technology, particularly
15 when you marry the near zero emission technology that's
16 being produced by Cummins and will be produced by other
17 manufacturers. I think we're going to hear later this
18 year that there are other manufacturers who are going to
19 be coming to market with heavy duty engines that have a
20 similar emissions performance.

21 And you marry those technologies with the RNG
22 that we really have kind of that answer to so many of
23 the problems that we've been dealing with for so many
24 years.

25 But consistency in position, consistency in

1 support, both in word and deed. And by deed, I mean in
2 resources. I think would be one of the most helpful
3 things that the State of California could do.

4 MR. OLSON: Okay, and Jose?

5 MR. CASTANEDA: I think I'll start by saying I
6 think the vehicle product offering is sufficiently there
7 to make an inroads in the market. We have three
8 different models of our engines that are available in
9 most of the major OEMS. So, we're talking about
10 transit, or school bus, or the waste, or the trucking
11 industry. Each of those industries has options today,
12 where they can go out and purchase a truck of their make
13 of choosing, with a near zero engine.

14 From a volume stand point, I think what the
15 market needs is a bit more support, whether it's funding
16 or incentives.

17 Years ago, the price of oil and the price of
18 natural gas were far enough apart that fleets were
19 motivated to switch based on cost alone. That may be no
20 longer the case, or not sufficiently the case, so they
21 need a few incentives to do that. Whether it's a
22 legislative or emissions goal that says I've got to move
23 based on these targets, or because if it's funding
24 that's available.

25 But I think to achieve or answer the question,

1 the product offering is there. What motivates them to
2 actually take that next step and achieve sales volume, I
3 think the industry is looking for more help from the
4 legislative and from a financial standpoint. And we
5 could brainstorm ideas. But anything from ranging from
6 financial to rewards, to actually enforcing the
7 regulations that are already in place, holding them
8 accountable, as well as recognizing those that have made
9 strides.

10 I think the last piece I'll say is we have a few
11 partners that are very well invested in this space. I
12 think it requires participation from the entire value
13 chain. When we think about goods movement, you've got
14 trucking companies, and air quality, and engine
15 manufacturers that are all interested in cleaning the
16 air.

17 Some of the downstream players, too, the larger
18 conglomerate corporations aren't measured by how their
19 products get to their stores. And so, that they take a
20 vested interest in their entire value chain and say
21 we're green, and we're clean, and we're aware of all the
22 stakeholders along the place, that's when we'll see some
23 significant progress in that.

24 MR. OLSON: And Sam, do you have a comment on
25 what is needed to increase the number of vehicle product

1 offerings and vehicle volumes?

2 MR. MCLAUGHLIN: Yeah, yeah. So, I think, yeah,
3 I mean we understand that DME is a bit behind the
4 development curve that natural gas vehicles are. But I
5 think ultimately, when we look at DME, you know, we
6 truly believe that it's the better overall sustainable
7 solution for heavy duty trucks, for some of the reasons
8 that I mentioned earlier.

9 But also, as it supports 1383 by eliminating
10 black carbon completely from the vehicle.

11 And when I mentioned the risk of methane
12 emissions, what I think about there is as the states
13 begin to roll out natural gas vehicles, you know, is
14 there -- and really, the vehicle companies have done
15 wonderful jobs and I commend them for reducing leakages
16 from vehicles and from fueling. But with DME, you don't
17 have to worry about that, is what I meant by that.

18 So, DME could still use public funding
19 assistance for technology demonstrations. That's where
20 we are in the process right now.

21 I think agency assistance for communicating
22 benefits of certain fuels is also helpful. I think of a
23 parallel from, you know, if we go back a few years,
24 biodiesel. The biodiesel question versus renewable
25 diesel, you know, and we're trying to educate people on

1 what the differences in those fuels are.

2 In some ways we're kind of a similar situation
3 here, where we have dimethyl ether and we're trying to
4 educate people as to what some of the differences are to
5 natural gas vehicles.

6 So, I think DME, yeah, it's ready for a quick
7 win here. I think adding DME to the definition of what
8 a renewable gas is would be a big step in the right
9 direction to help us become a part of the conversation.

10 MR. OLSON: Dean, do you have a comment on this
11 question?

12 MR. SAITO: Yes. As mentioned earlier, with the
13 South Coast implementing the fleet rules for the last 15
14 years, it's actually become the preferred fuel for
15 several vocations, including transit and refuse.

16 And these transit agencies and refuse companies
17 have already begun converting to renewable natural gas
18 at no additional cost to their operation. And this is
19 primarily being driven by the credit for LCFS credit,
20 and the RINs credit. So, they've been able to offer
21 renewable natural gas at no additional cost to these
22 fleets.

23 I think that, I guess stability, or the future
24 market for renewable natural gas is going to be
25 dependent heavily on the LCFS credits and RINs credits,

1 and I think that's important for the industry to know.

2 MR. OLSON: We have another question here that
3 you may have responded to parts of this already. But
4 I'm going to read that second question.

5 What do fleet owners, managers need to see to
6 make commitments and purchase/lease vehicles that can
7 use biogas, biomethane, and renewable gas as a fuel?

8 MR. GLADSTEIN: Aside from what we've already
9 said? Well, in addition to certainty and consistency,
10 money, of course. I think it was mentioned before that
11 the kind of the trajectory of the marketplace over the
12 last ten years has been dramatically impacted by the
13 difference between the price of natural gas and the
14 price of petroleum. And so, for a period of time, say
15 between 2008 and the summer of 2014, that delta between
16 fossil gas, which was primarily driving the alternative
17 fuel vehicle market, particularly in the heavy duty
18 sector. And when I speak, I'm always speaking about
19 replacement of diesel and not the light duty sector.

20 During that period the differential was
21 sufficient to drive the market and hundreds of fleets
22 got into natural gas because it essentially paid for
23 itself. There was a return on that investment,
24 particularly the high mileage fleets.

25 In the post 2014 period, where that delta

1 between petroleum and its byproducts, diesel and
2 gasoline, has diminished. Whereas there's still a
3 favorable delta for natural gas, the issue is that it
4 does not provide that capital, that return on investment
5 fast enough to justify the premium that is paid for, for
6 these natural gas trucks, let alone the slightly higher
7 premium for the near zero emission technologies, which
8 are absolutely the technologies that we want to promote.

9 Just a side note, I mean I've been in the air
10 quality, energy, conservation field for about 30 years.
11 Back a few -- I don't know if it was a few decades ago,
12 and maybe it wasn't that long ago, Dean, when we had the
13 black box, right? We had the black box of the South
14 Coast Air Quality Management District.

15 And what was the black box? The black box was
16 where the air quality planners put all of those future
17 emission reductions that they didn't know how to get and
18 they just kind of basically said, okay, well, this is
19 the portion of our plan that someday a technology will
20 come along that we'll figure out, and we'll deploy it,
21 and that will get us to attainment.

22 Well, the interesting thing is that, for at
23 least the on-road heavy duty sector, we don't need that
24 black box anymore because we now have the technology
25 with the near zero emission engines.

1 And when you marry that technology with RNG, you
2 essentially have a technology that delivers, at least
3 for that sector, the emission reductions that are
4 necessary to meet attainment in 2023 and to meet
5 attainment in 2032. And even need attainment should
6 they ever actually implement the 70 ppb standard, from
7 the Federal government.

8 And so, it's kind of marvelous to be at a time
9 where we have a solution and all we need to do is commit
10 for the deployment of that solution. And we have that
11 very interesting juxtaposition that the solution to our
12 air quality, to our smog, and to our diesel toxics
13 problem is also the solution to get us to the 40 percent
14 reduction in fugitive methane emissions we need under
15 1383.

16 So, the money that the State could put forward
17 to help pay for that incremental cost, that premium that
18 unfortunately the delta between the cost of gas -- and,
19 of course, our metric here is the cost of fossil gas,
20 unfortunately. But that delta, that would be
21 extraordinarily helpful to get fleet operators to commit
22 to deploying the technology.

23 For a lot of the -- I'll go on just a little bit
24 more. For a lot of the RNG producers, there is
25 sufficient head room -- they're not all created equal,

1 of course. But there's some head room when you take
2 into account the RIN revenue and you take into account
3 the LCFS revenue. Certainly, they have to -- the very
4 first thing that they have to do is they have to use
5 their profit to make sure that the gas that they sell is
6 at least as expensive, if not less expensive than fossil
7 gas. I mean, that's the very first thing they have to
8 do.

9 And in some instances they have a little more
10 head room to actually lower that price of gas. So, they
11 can participate in this incentive. Not the incentive
12 for the vehicle, but they can participate in
13 incentivizing the fuel by always ensuring that their
14 fuel is slightly cheaper than fossil gas, to that the
15 fleet operator has that incentive to buy theirs.

16 What the State can do is, I think, help with
17 that premium, and paying that differential between the
18 convention and the natural gas vehicles.

19 MR. OLSON: And I'm going to ask Jose and Sam,
20 in your answer to this if you're willing to elaborate on
21 Cliff's comment about that differential? Is it
22 something that you can describe to us what that
23 differential cost is, if you're going to respond to this
24 question?

25 MR. CASTANEDA: I don't have a number that I can

1 provide, but I can tell you that as a manufacturer of
2 diesel engines, which is the core of Cummins' business,
3 we're very thoughtful about providing the right
4 solution, for the right customer, in the right market.

5 So, when we present an alternative option, which
6 is a natural gas engine, we want to make sure that from
7 a price stand point there's some equivalency between
8 what they're currently operating and what they could be
9 doing. That same goes for its performance, its
10 operating cost, its reliability.

11 And so, many of our customers operate both
12 diesel and natural gas, and they have mixed fleets in
13 that way. So, again, we're very thoughtful about
14 putting a product in front of them that satisfies their
15 need, primarily. Second, it cleans the air. And then
16 there's strategic needs from a financial stand point.

17 One thing I will say, again, our engines, for
18 the record, operate on CNG, LNG, and RNG. And so, the
19 education piece to them is telling them whichever kind
20 of fuel source you use, the engine can accept.

21 WE also want to be very clear that our support
22 for RNG is very strong. I think our engines perform at
23 a .02 NOx, that's the standard testing. They actually
24 perform better than testing in most cases. And coupled
25 with RNG can even get below that.

1 So, we try and be thoughtful about educating our
2 customers on the different types of options they have
3 and helping them understand what's best for them.
4 Rather than just telling them you really should use RNG,
5 because it's the cleanest, we want to be thinking about
6 their operations, their infrastructure, their cost, and
7 give them a variety of options to choose from.

8 But, certainly, from a cost stand point, you
9 know, we're very thoughtful about the price increase or
10 the price premium that they have to pay, and making sure
11 that they have options in front of them when they can do
12 that.

13 MR. MCLAUGHLIN: Yeah, from a vehicle pricing
14 perspective, certainly at production volumes we would
15 expect DME to be on par with a diesel-fueled truck in
16 terms of what that vehicle cost would be. And largely
17 one of the reasons that we think we can do that is, as I
18 mentioned, 95 percent of the parts of the engine are
19 common, so it's really a fuel system development project
20 at that point.

21 But even initially, you know, out of the box if
22 we think of an immature technology coming off of a low
23 volume line, we are targeting to be in the range 15 to
24 20 percent up charge, and no more than that. You know,
25 new here, with an immature vehicle.

1 Also, for the additional t things that fleet
2 owners and managers need, you know, confidence in their
3 vehicles and the availability of their vehicles, and the
4 durability of their vehicles. Again, we think DME
5 brings a very good solution there.

6 Compression ignition engines have always been
7 probably the most durable engine in any marketplace.
8 And that's why they've been successful. And DME uses
9 that basic structure of the engine.

10 Confidence in the availability and price of a
11 fuel. Certainly, the fleet managers want a positive
12 business case for their vehicle. And, obviously, that
13 includes fuel cost, maintenance cost, resale value,
14 service availability. And, you know, it takes -- you
15 know, it really takes a large OEM to be able to deliver
16 some of those service and maintenance processes, I would
17 say.

18 And so, finally, yeah, I guess to wrap it back
19 it really does become an affordability question as to,
20 you know, the resale value, you know, all the
21 operational costs of the truck. And, you know, we think
22 DME is a potential winner.

23 COMMISSIONER SCOTT: I have a follow up to that
24 question, which is that you mentioned, I think, that 95
25 percent of the components are the same on a DME truck,

1 that you don't need a particulate filter. So, that's, I
2 would imagine, something that then costs less. But then
3 you said it's a 15 to 20 percent upcharge for a DME
4 vehicle?

5 MR. MCLAUGHLIN: Yeah, that is low production,
6 you know, like I mentioned.

7 COMMISSIONER SCOTT: Oh, it's because of the
8 economies of scale, okay.

9 MR. MCLAUGHLIN: right. So, we've built about 15
10 to 18 trucks now. The next one that would come off the
11 line for sale to a customer, that would be the range we
12 would target. But certainly, at full production volumes
13 we want it to be on par with the price of a diesel.

14 COMMISSIONER SCOTT: Okay, thanks.

15 MR. OLSON: And so, Dean, could you respond to
16 this question about what the fleet owners and managers
17 would need, from the viewpoint of the Air District?

18 MR. SAITO: Yeah, Tim. I was going to add that
19 with the recent adoption of our AQMP, several months
20 ago, I think from here moving forward the incentive
21 programs offered by the South Coast will only be for
22 zero, near zero vehicles.

23 And, of course, recognizing that it's probably
24 going to include stacking of GGFR programs, along with
25 criteria pollutants, I think it's also going to require

1 the use of renewable natural gas.

2 So, I think as we move forward with all our
3 incentive programs, and like I mentioned before, it's
4 going to take a billion dollars. I think we'll be
5 focusing on zero, near zero emissions for those vehicles
6 as we move forward in achieving our 2023 goals.

7 MR. OLSON: The next question on our list also
8 looks like we've -- you even commented on that, this
9 third question.

10 CHAIR WEISENMILLER: Let me, just before you go
11 on, just on the DME issue. Cliff, Dean, what's your
12 perspective on DME versus RNG, or whatever?

13 MR. RECHTSCHAFFEN: And whether or not it should
14 be considered a renewable natural gas.

15 CHAIR WEISENMILLER: Yeah.

16 MR. GLADSTEIN: Well, if it's made from a
17 renewable feedstock, it should be considered renewable.

18 But DME, I've been doing alternative fuel
19 technology for 30 years, and one thing you may not know
20 about us is that we manage and organize North America's
21 largest alternative and electric vehicle trade show.
22 It's called ACT Expo. It's held every year, usually in
23 May. The last couple of years it's been in Long Beach.

24 And it's the nation's largest assemblage of
25 alternative fuel technology. And where is she? Is she

1 not here? One of your earlier speakers, Ms. Boudreaux,
2 she's been a speaker there several times. And if our
3 customers -- we're fuel agnostic. We don't care what
4 the technology is, what the fuel is, as long as it's
5 commercially available, as long it works, as long as the
6 manufacturers will warranty the technology that they're
7 selling, and as long as it is cost effective for our
8 clients we're agnostic.

9 If there is an electric vehicle, or a fuel cell
10 vehicle, or a vehicle that runs on blueberries, we will
11 look at it for our clients.

12 Our clients are not asking for DME, but that
13 doesn't mean that they wouldn't if it was available. If
14 the fuel was available, if they saw it as a practical,
15 commercially viable, readily available fuel for their
16 operations.

17 So, I guess I don't have a negative view or a
18 positive view about it. It's not really a player in
19 this marketplace. And natural gas is the primary
20 alternative, just in the market.

21 CHAIR WEISENMILLER: Right.

22 MR. GLADSTEIN: And so, that's --

23 CHAIR WEISENMILLER: Okay. Well, two follow
24 ups.

25 MR. GLADSTEIN: Sure.

1 CHAIR WEISENMILLER: One of them is just we've
2 obviously heard SoCalGas talk about, you know, some form
3 of RNG or, you know, CNG, or whatever. Who would be the
4 major entity that would provide the DME?

5 I mean, of a comparable scale to a SoCal? You
6 know, I mean it could be an oil company. I don't care,
7 it's got to be somebody that's got to be the major --

8 MR. GLADSTEIN: I'll turn that question to my
9 colleague from Volvo, your know, or --

10 CHAIR WEISENMILLER: Producer?

11 MR. MCLAUGHLIN: Well, production-wise, I mean
12 you heard Rebecca speak earlier about Oberon. I guess
13 maybe, as far as I can take it there is that I know of -
14 - I personally know of discussions with three major oil
15 companies that have interest in learning more. I think
16 that's about all I should say.

17 CHAIR WEISENMILLER: Okay, just let me ask one
18 last question and then I'll shut up for this one.

19 No, it was just, again, following up on
20 something Cliff said. My recollection is in the
21 legislation there's not a definition of renewable gas.
22 And so, I guess what I'd ask the parties is what is the
23 right definition. You know, to the extent we can try to
24 move things along, one of the things we could do is say
25 here is a definition.

1 And so, to the extent people want to file that
2 in their written comments, that's great.

3 MR. RECHTSCHAFFEN: Well, I don't know if -- you
4 may not want to open up the entire definition of what's
5 renewable gas, since that's highly contested in all the
6 stuff in the Legislature.

7 But I would be very interested in this
8 particular question. But it may be a very legitimate
9 issue for the IEPR, so I don't want to prejudge that.
10 Right, but for this, as a particular application that
11 we're interested in getting people's feedback on for
12 sure, because I hadn't realized this was a live issue
13 with respect to DME, among other things.

14 MR. SAITO: If I might add something on the DME,
15 I do think DME can fill a void, currently, where natural
16 gas cannot fill right now, and that's the 15-liter
17 engine. We anticipate having a near zero certified, 12-
18 liter natural gas engine by the end of this year. But
19 we are not aware of a 15-liter engine that's going to
20 meet the near zero, 90 percent reduction from the 2010
21 standard.

22 So, I do believe that the DME Volvo
23 combination, as long as it can get certified to the
24 optional NOx value, can meet the 15-liter category,
25 where we need that size engine to haul goods.

1 COMMISSIONER SCOTT: So, I was going to follow
2 up on the scale question. You asked a question about
3 the scale on the fuel side, and I had a question about
4 the scale on the vehicle side, as well. Especially, I
5 guess, with respect to the DME trucks. Because we've
6 got, what, about a million medium duty, heavy duty here
7 in California. They're a good chunk of the pollution
8 from the transportation sector that we are trying to
9 reduce the timeline on which we're trying to meet this.

10 You know, we've got the 2023, the 2032, and then
11 we've got our climate goals in 2040. That's a very fast
12 turnover of the fleet. And so, the scale on the
13 vehicles matters a lot, as well. So, not a question,
14 just a --

15 MR. CASTANEDA: Can I take that question? Just
16 from a Cummins-Westport stand point, our engines are
17 manufactured on the same line as our diesel engines. I
18 wouldn't say that we have unlimited capacity, that would
19 be an exaggeration. But 300 engines a day is what our
20 production facilities can crank out.

21 So, if you're placing an order for a million
22 engines, I'll write that down and we can get you those
23 engines.

24 (Laughter)

25 MR. CASTANEDA: But certainly, from a product

1 stand point --

2 MR. MCLAUGHLIN: And we'll add 250 to that, so -
3 -

4 (Laughter)

5 CHAIR WEISENMILLER: And will both you commit to
6 build them in California?

7 MR. CASTANEDA: Are you placing an order for a
8 million engines?

9 CHAIR WEISENMILLER: No. We might in the regs
10 so California content is important to us.

11 MR. OLSON: So, our third question, is there
12 sufficient customer demand in California, and I think
13 you've kind of responded to parts of that. If you would
14 like to add some other comments to that question and
15 demand for renewable gas.

16 MR. GLADSTEIN: I mean, the answer is yes, I
17 think there's sufficient -- there is sufficient demand.
18 You know, earlier in the presentation, I think it was
19 Philip Sheehy, he had a chart that tracked the amount of
20 demand and the amount of renewable fuel. And with that
21 last little segment of demand from L.A. Metro, that it
22 was the portion of the total CNG demand in the State of
23 California that was filled by RNG was approaching 80
24 percent.

25 I wanted to ask him later, I didn't catch him,

1 if he was talking about the total amount of natural gas
2 sold in California for transportation, or just that gas
3 that's registered in the LCFS program. And I think it
4 was the latter.

5 So, there is a little more headroom there. But
6 the fact of the matter is that there is a demand out
7 there amongst fleet operators for natural gas, and there
8 is a tremendous interest in the notion, and I think that
9 you'll -- you know, Mike Silva, from CR&R, I think they
10 discovered this when they were going through some of the
11 most conservative parts of the State and saying, would
12 you be willing to pay more on your trash bill, if we
13 were going to operate an ultra-clean, natural gas
14 vehicle powered by the trash that you gave us in your
15 communities? And these very conservative cities almost
16 unanimously said, yes, we'll pay more.

17 And I think that you'll find the same thing
18 amongst a lot of fleet operators. If you tell us that
19 we're going to run on fuel that's produced locally, and
20 it's basically going to cost us essentially the same as
21 the natural gas that we would get out of the ground, but
22 we could say that we are running on renewable fuel from
23 our cow poo, and from our trash, and from whatever they
24 actually like that idea. It actually is something that
25 motivates them. That and money.

1 MR. CASTANEDA: I agree. I think when we tell
2 our story of our natural gas engines, we talk about CNG
3 and LNG, but we're really relying on the RNG, you know,
4 need and capacity to achieve the sub, you know, .02 NOx
5 levels that we think we can achieve. And again, when we
6 talk about customers in a marketing story, it's just a
7 wonderful story that we can take a waste that's produced
8 out there and use it as fuel. So, we certainly believe
9 the demand is there and we're really counting on that to
10 get us to where we think we need to be.

11 MR. MCLAUGHLIN: Yeah, I would concur, but also
12 say it depends. But I think in the case of DME the
13 answer is yes, because I might like to think of it in
14 the same kind of frame that Jose mentioned. Because I
15 think the ultra-low, NOx natural gas engine is the
16 perfect example of, you know, California and Cummins,
17 together, leading the world in emission reduction.

18 And I'm sure, you know, Cummins' hope is, yes,
19 it's going to start here and grow in many places. And
20 that's the same way we would view DME for heavy duty
21 diesel, also.

22 MR. SAITO: I might note that we have been made
23 aware that for small, alternative fueling stations it's
24 been difficult for them to obtain long term contracts
25 for renewable natural gas.

1 And for that reason, we've recently issued a
2 solicitation, through the MSRC, in conjunction with the
3 South Coast and the Energy Commission, to add additional
4 incentives for small stations, who can demonstrate
5 purchase order of greater than 50 percent RNG, for an
6 additional \$100,000 for their grant, for alternative
7 fueling infrastructure.

8 So, that's something I think that -- even
9 though, Cliff, I think you're right that in South Coast,
10 maybe as much as 80 percent of the natural gas being
11 used as motor vehicle fuel is renewable natural gas, I
12 think there still is a need to help incentivize the
13 smaller stations to obtain long term contracts for
14 renewable natural gas.

15 CHAIR WEISENMILLER: Just following up, you had
16 mentioned sort of \$1 billion for 14 years. Do you have
17 a sense of how much we should scale that up to include
18 the San Joaquin?

19 MR. SAITO: I wouldn't dare to speak for the San
20 Joaquin Valley, now.

21 CHAIR WEISENMILLER: Okay, that's fine. Yeah,
22 so anyway, it's somewhat higher, but we have to ask
23 them, which we can do.

24 MR. GLADSTEIN: One just quick follow up with
25 that. Dean, was that \$14 billion, that wasn't just for

1 the on-road heavy duty sector. Wasn't that \$14 billion
2 across the on-road, the off-road, some of the locomotive
3 technologies and et cetera?

4 MR. SAITO: Yes, it did not include
5 infrastructure, but it did include the vehicles, and off
6 road.

7 MR. GLADSTEIN: And equipment?

8 MR. SAITO: And equipment, yeah.

9 MR. GLADSTEIN: So, just to clarify that.

10 CHAIR WEISENMILLER: Yeah, that helps. If
11 you've got a report or work paper, or something you
12 could docket, I think that would generally be useful for
13 folks, for us.

14 MR. SAITO: Sure, we can submit that.

15 MR. OLSON: So, we're out of time here. And if
16 you have other comments you'd like to put in our record,
17 we appreciate that. And turn it back to you, on the
18 dais.

19 CHAIR WEISENMILLER: Okay, so I'm going to turn
20 to my remaining souls and ask if anyone else has any
21 questions at this stage.

22 COMMISSIONER SCOTT: No, I'm good.

23 MR. RECHTSCHAFFEN: I don't. Thank you for an
24 extremely informative panel, and panels throughout the
25 day.

1 CHAIR WEISENMILLER: Yeah. No, thank you.

2 MR. OLSON: Thank you.

3 CHAIR WEISENMILLER: So, we're at the public
4 comment part of the proceeding. And I believe we have
5 gotten -- so, what we'll do at this point is turn first
6 to people in the room, and then people on the line who
7 want to make a comment. You've got three minutes.

8 And I believe we've got one blue card. Let me
9 see if I can find the note.

10 MS. RAITT: Michael Tureaux (phonetic), if he's
11 still here?

12 CHAIR WEISENMILLER: From JDM1. Okay, anyone
13 else in the room have a public comment, please come up,
14 identify yourself for the court reporter. You can line
15 up, actually.

16 But again, the court reporter's going to need to
17 know who you are. So, after you finish speaking, give
18 them your business card. And I, unfortunately, did not
19 get any blue cards from anyone, but I haven't --

20 MS. LEVIN: There is a pile of them in the box.

21 CHAIR WEISENMILLER: Ah, okay, no wonder. But
22 please, Julia, start.

23 MS. LEVIN: Okay. Julia Levin, Bioenergy
24 Association of California. I want to thank you all, and
25 especially for putting in a long day on this.

1 It is appropriate that we're doing this in the
2 Art Rosenfeld Hearing Room, as Chair Weisenmiller and I,
3 and several other people in the room were at a
4 celebration of Art's life over the weekend.

5 Governor Brown make remarks by video, where he
6 told a story about Art in the very final days of his
7 life, actually on his 90th birthday, asked the Governor
8 to help one last time to pass AB 2206, a bill by Das
9 Williams that in order to reduce short-lived climate
10 pollutants called for policies and incentives to
11 increase renewable gas, including biogas and biomethane.

12 And if that language sounds familiar, it's
13 because that language ended up going into SB 1383 as
14 Section 5.

15 So, you can thank Art for why you are now here
16 talking about renewable gas.

17 CHAIR WEISENMILLER: Right.

18 MS. LEVIN: The reason he was so passionate
19 about it is partly because he followed the science of
20 climate change and understood how urgent it is to reduce
21 short-lived climate pollutants. And I really think we
22 need to bring this discussion back to that goal.

23 There's a reason that it ended up in the bill to
24 reduce short-lived climate pollutants. But ultimately
25 because Art figured out that bioenergy is a really

1 important form of energy efficiency.

2 When you put organic material, when you throw it
3 away in a landfill, or you let dairy waste stay in a
4 pile and rot, and release methane, or you burn
5 agricultural forest waste, you are throwing away an
6 awful lot of energy. And that just bothered Art to no
7 end.

8 So, I hope in honor of Art that you will really
9 take this opportunity to recommend policies and
10 incentives that really do move this market more than a
11 little bit, more than just another one off.

12 And I think, you know, a number of themes became
13 very clear today. The most important, Commissioner
14 Scott, to your question about grants, I don't think we
15 would need so many grants if there was long term market
16 certainty.

17 And the electricity sector is a really good
18 example. Once California passed an RPS, the need for
19 ongoing grants for most renewables really went down.

20 The same thing would happen for renewable gas,
21 if there was a renewable gas standard or a procurement
22 requirement that provided a long term market and long
23 term off take agreements.

24 In the fuel sector, in particular, we need long
25 term contracts the way that we have under the RPS for

1 electricity projects. That is really a big barrier to
2 developing biomethane as a transportation fuel.

3 The second area is we do need increased R&D
4 funding. And Chair Weisenmiller, in our written comment
5 we will provide a list of the critical R&D needs. But I
6 think there are two obvious places to find that R&D
7 funding.

8 Commissioner Rechtschaffen, the R&D fund for
9 gas, the natural gas PIER program is a tiny fraction of
10 what we're investing in R&D in the electricity sector.
11 And that is another reason why the gas sector is still
12 99 percent fossil fuel, unlike the electricity sector
13 where we've moved so far ahead. We need an increase in
14 the natural gas PIER Program to invest in renewable gas
15 to help meet the goals of SB 1383, and also in gas
16 safety.

17 And finally, the last thing I would say is we
18 need technology neutrality. You heard from Rob White,
19 of Sierra Energy, that we can't put RPS eligible biogas,
20 from gasification, in the pipelines right now. It is
21 not legal.

22 CHAIR WEISENMILLER: That's thanks to Tom Hayden
23 and I don't want to bring him back from the grave.

24 MS. LEVIN: No, it's not. It's thanks to Mike
25 Gatto and Assembly Bill, AB 1900, which mis-defined

1 biogas as only the gas from anaerobic digestion, which
2 contradicts the RPS definition of biogas.

3 CHAIR WEISENMILLER: Okay.

4 MS. LEVIN: That needs to be changed. The last
5 thing is --

6 CHAIR WEISENMILLER: Okay, this is the last,
7 yeah.

8 MR. LEVIN: -- CalRecycle, CDFA and the Air
9 Board, really going forward need to set performance
10 criteria, rather than picking technology winners and
11 losers. That's another big barrier to renewable gas
12 development. So, thank you.

13 CHAIR WEISENMILLER: Okay, great. I will go
14 online. I will say I'm looking for one person, as
15 opposed to two, from any organization or company.

16 MR. NOYES: Understood. Graham Noyes, from
17 Noyes Law Corporation. Chair Weisenmiller, Commissioner
18 Scott, Commissioner Rechtschaffen, appreciate the
19 opportunity to speak to this group.

20 I want to recognize the great work that Tim
21 Olson did, in CEC, and all the agencies did in putting
22 together a fabulous program.

23 CHAIR WEISENMILLER: Yeah.

24 MR. NOYES: I'm an attorney that spends most of
25 my time on environmental attributes, so it was really

1 interesting to me to hear as much discussion about RINs
2 and LCFS credits as we did today.

3 Those have been very powerful programs, very
4 powerful market signals. Most of the work that I do
5 revolves around those programs. They're really
6 attracting fuels and companies to California, continuing
7 to succeed.

8 One opportunity that I think is quite
9 interesting to this sector, that wasn't addressed at
10 all, is the renewable hydrogen provision that's in the
11 Low Carbon Fuel Standard. It's not really become
12 operative, yet, in terms of anyone being able to
13 monetize renewable hydrogen. But it is in the
14 regulations, it is available.

15 ARB's indicated their interest in establishing
16 renewable hydrogen pathways. And why it's relevant here
17 is it gets us beyond kind of the demand issue that we've
18 heard with renewable natural gas, where we're starting
19 to approach market saturation with that, because it can
20 go into the refineries. And the refineries have very
21 substantial demand in the refining process.

22 And so, you've got opportunities both from
23 natural gas, renewable natural gas that might be
24 pipeline delivered in, in the same way that renewable
25 natural gas is delivered into CNG stations, now, by

1 moving the renewable attribute downstream. And you also
2 have opportunities to bring, potentially, tube trailers
3 from relatively small scale renewable hydrogen from
4 biogas. Or, as my friend Jack Brouwer was talking
5 about, electrolysis into refineries.

6 So, I think that's another tool in the toolkit
7 that I just wanted to raise with this group.

8 CHAIR WEISENMILLER: Okay, thank you.

9 Next?

10 MR. BIERING: Good afternoon, Brian Biering with
11 Ellison Schneider, on behalf of DairyCares. DairyCares
12 is a trade association representing the interests of
13 dairy farmers, dairy processors, and dairy digest
14 developers.

15 I wanted to touch on one of the key issues in SB
16 1383, which is really the emissions target. And it sets
17 a very aggressive emissions target. And we see a very
18 strong need to act quickly and really encourage dairy
19 digester projects in the near term.

20 We are particularly concerned about the
21 potential regulations coming into effect in 2024, so we
22 really have a short window there to really encourage
23 near term development.

24 We believe there's a tremendous amount of
25 potential in the transportation sector. But as some of

1 the speakers earlier today were commenting, there's a
2 need to really allow for flexibility between both
3 electricity generation and transportation fuels
4 development.

5 We believe that the IEPR will serve as a
6 critical role in really furthering the progress towards
7 SB 1383 and focusing the various efforts. There's a lot
8 of different programs offering grant funding. The LCFS,
9 RINs, and really focusing those efforts.

10 And also, identifying and prioritizing the cost
11 effective reduction strategies, which we believe really
12 are in the dairy sector. So, thank you for the
13 opportunity to comment.

14 CHAIR WEISENMILLER: Okay, thank you.

15 Please.

16 MR. FULKS: Hi, Tom Fulks here, with Mightycomm.
17 One our clients is Oberon Fuels and another one of our
18 clients is Volvo. So, I just wanted to just talk about
19 a little bit of a bookkeeping, housekeeping thing and
20 that is the dates for your public comments for this
21 hearing.

22 We have sat here, along with you, tip of the hat
23 for your endurance and perseverance, and learned a lot.
24 And we would like a little bit of time to be able to
25 reflect what we've learned in the written comments that

1 we submit on behalf of DME, in particular.

2 To that end, I'm wondering if we may be able to
3 get an extension for a week, because of the July 4th
4 holiday, these things coming up. I just thought I'd
5 bring it to your attention that your turnaround time's
6 pretty short. And so, if you could --

7 CHAIR WEISENMILLER: Actually, if you could just
8 drop a note on that, I'll look at it.

9 Heather, when are these due?

10 MS. RAITT: They're due July 11th.

11 MR. FULKS: Yeah, maybe push it out just a few
12 days, just because you had a lot of content today, so
13 for what it's worth.

14 CHAIR WEISENMILLER: Okay.

15 MR. FULKS: Secondly, I wanted to tell a story
16 about renewable diesel versus biodiesel. We had the
17 same discussion 10 years ago, 11 years ago, we also work
18 with Neste. Had the same exact question. I've never
19 heard of this, this is the same thing. We're like, no,
20 it's a different thing. And who's going to make this
21 fuel, why would they come?

22 And today, 11 years later, renewable diesel
23 makes up 18 percent of your compliance fuel under the
24 LCFS. At the time, nobody was making it or selling it
25 in great volume.

1 So, the point, of course, is the market will
2 respond if things go well.

3 With regard to the IEPR, we would encourage your
4 staff to just consider expanding the definition of
5 renewable gas to include DME, primarily because we don't
6 see a downside to it. You open up your potential use of
7 methane to compression ignition engines, to that whole
8 universe of technology.

9 And I really can't understand why there would be
10 anybody arguing against it considering it's using
11 methane. It's the same as renewable diesel was using
12 the same feedstock as biodiesel.

13 So, the request for the preparation of the IEPR
14 would be to please include that, that expanded
15 definition.

16 And in closing, I'll remind you of another
17 hearing I had with Jim Boyd, years ago, in deciding
18 which spending categories would go into the AB 118
19 program. And I begged the Commission to create a
20 category of cool things we haven't thought of, yet.

21 And this, to me, DME would be one of those
22 things that right now, or at the time we haven't really
23 thought -- we don't know what we don't know. So, why
24 not include some language in there that accommodates
25 innovation? So, for what it's worth.

1 CHAIR WEISENMILLER: Again, you know, I ask
2 people for their suggested definitions and I guess
3 should say why. And, you know, again, Cliff raises the
4 concern given all the legislative controversy. But it
5 seems like we need to have something and at least for
6 purposes of what we're talking about here.

7 So, again, encourage anyone who wants to, go
8 ahead. I just want to find out where people stand on
9 the issue of the definition.

10 MR. FULKS: Okay, we'll put it in writing for
11 you, thank you.

12 CHAIR WEISENMILLER: Okay, thanks.

13 Come on up.

14 MR. OLINEK: Spencer Olinek, Pacific Gas &
15 Electric. And I only have one client, but I would
16 second the request.

17 CHAIR WEISENMILLER: it's a big client, yeah.

18 MR. OLINEK: Yeah, it's hard to add to what he
19 said, but also ask for more time given the recent
20 release of the staff white paper and the holiday
21 weekend. I was going to say maybe the 28th, but we'll
22 take what we can get. So, thank you.

23 CHAIR WEISENMILLER: Okay, thank you.

24 Please.

25 MR. SCHUCHARD: Good afternoon Chair

1 Weisenmiller and Commissioners. I'm Ryan Schuchard with
2 CalStart. We are, among other things, co-chair of the
3 digester group for the dairy working group that was
4 discussed.

5 Also, we're administrator for HFIP, which has
6 the low NOx incentive program, which now has the 100
7 percent RNG requirement. And just as an update, we've
8 designed the program, it's working now, and there's RNG
9 contracts taking place through that. So, in case you
10 didn't know, just wanted to inform you.

11 And two comments in general. One, I just wanted
12 to endorse what I've heard several people say, starting
13 with Professor Jaffe this morning, which is, one of the
14 key limiting factors to this whole industry is more low
15 NOx trucks on the road, natural gas trucks on the road.

16 And a key limiting factor to that is more
17 incentives on the hood of those vehicles at the
18 dealership.

19 And then the second thing is that, and also as
20 part of context, CalStart operates the San Joaquin Clean
21 Transportation Center, with Energy Commission funding.
22 And through that center we've been talking with
23 truckers, and truck dealers and others, to try and
24 understand what is actually needed.

25 And one of the things we've heard is that it's a

1 lot of small owner operators whose trucks we need to
2 convert from dirty diesels to natural gas trucks. And
3 generally speaking, about an 18 month payback is a good
4 benchmark, I would say. And if so, if you want to look
5 at a payback period analysis and how do you get, you
6 know, this little bit of delta we have for a better
7 natural gas price, it generally takes quite a bit more
8 than that.

9 So, I'd be happy to provide more detail if
10 needed. But I wanted to say there's more than just we
11 need money. We can look at specifics --

12 CHAIR WEISENMILLER: Yeah. Well, certainly, if
13 you have more analysis or programs you want to submit
14 into the record with your comments that would be good.
15 You're not expecting all of us to be quite on our toes
16 at 4:59, after a long day. Thanks.

17 MR. SCHUCHARD: Thank you very much.

18 CHAIR WEISENMILLER: Please.

19 MR. BOCCADORO: Thank you. Michael Boccadoro on
20 behalf of West Coast Advisors. I'm going to speak today
21 on behalf of the AG Energy Consumers Association, one of
22 our clients.

23 And ACA's kind of unique in this space because
24 we wear two hats. We're very supportive of biogas
25 development. We've been at the forefront of many of the

1 pieces of legislation. We'll be working closely with
2 the PUC on the five dairy biomethane pilot projects and
3 so forth.

4 We're also a ratepayer advocacy organization,
5 with over 25 years of experience representing the AG and
6 food processing customers, and water agencies at the
7 California Public Utilities Commission. So, we look at
8 these things a little bit differently than others.

9 And we didn't hear a lot today about cost. Amy
10 Jaffe got into some of the cost curves for some of this
11 biogas, and it's very expensive. And we have to keep
12 that in mind. Because I think to the point you made
13 earlier, at some of these cost and benefit equations,
14 it's going to be a lot more cost effectively to convert
15 to electricity in some cases, and get out of natural gas
16 entirely, or through conservation. It's just going to
17 make more sense to put the investment there.

18 Having said that, it is really important that we
19 move biogas forward. 1383 really dictates that we have
20 a focus on short-lived climate pollutants. And that
21 means in the short term not losing sight of biomethane.
22 That's where the short-lived climate pollutant benefits
23 to the State, and helping the State get to the 40
24 percent below -- the 40 percent reduction in methane
25 that is mandated by the short-live climate pollutant

1 land. And that means dairy, wastewater, and landfill
2 and really not losing sight of that focus in the short
3 term. That will serve this Commission well as you make
4 recommendations back about how we structure incentives
5 going forward.

6 We're not at all supportive of the gas
7 companies' push for a renewable gas standard. We've
8 been opposed to that from the beginning. Even a small
9 amount of renewable gas put into the pipeline can add to
10 the cost to a conventional gas system 40 percent. A 40
11 percent increase for some of my food processing clients
12 puts them out of business.

13 Contrary to what Mr. Minter said, there is not
14 an appetite for renewable gas by the industry sector at
15 all in California. If we get to that point where that's
16 our only choice, we'll be out of business. We'll be
17 manufacturing somewhere else. It's that simple. Thank
18 you.

19 CHAIR WEISENMILLER: Thank you.

20 Please

21 MR. EDGAR: Commissioners, my name is Evan
22 Edgar. I'm with the Clean Fleets Coalition and the
23 California Compost Coalition. We represent the garbage
24 industry. Not CNR, or the smaller, multi-family
25 generational companies throughout California. We're

1 heavy duty, we're near term for short-lived climate
2 pollutants.

3 We co-locate at AD facilities and compost
4 facilities out of recycling yards. We're a closed loop,
5 sustainable business model. We're community scale,
6 which means we don't need a pipeline. We're about 100
7 tons a day of food waste and green waste, for enough
8 fuel for a fleet of 40 trucks, which we own.

9 I thanked the CEC for a grant a couple of years
10 ago, for the Blue Line AD facility, \$2.6 million.
11 They've been up and running for two years. It's proven,
12 it's operating and it can be replicated throughout the
13 State.

14 I'm here today because I support SB 1383. We
15 have feedstock control. 75 percent of organics out of
16 the landfill by 2025, we're on the road to zero waste.

17 I'm here for the fuel, we're carbon negative.
18 We going to get off diesel.

19 I'm here for the fleet. We have a tethered
20 fleet and we're invested in CNG fleets in order to have
21 the low NOx engine. We're all in.

22 Clean Fleets Coalition represents about 15,000
23 refuse fleets statewide as a whole, so we're in as a
24 community to invest in this.

25 We have facilities that are net zero now, with

1 greenhouse gases.

2 And we bet on the farm. We make digestate and
3 compost, that's organic compost for near zero pesticide
4 use and to sequester carbon at the farm.

5 And as part of the disadvantaged communities, we
6 get grants from CalRecycle, with is 100 percent VAC when
7 they invest in grants. And it's the most cost effective
8 on a Cap and Trade scale, \$4 to \$9 per ton of grant
9 invested in compost and anaerobic digestion.

10 With that, the typical community scale model of
11 100 tons a day can produce 330,000 DGE, or RNG gas, for
12 a fleet of 40 vehicles. It's a closed loop, we don't
13 need a pipeline.

14 But what do I need today? What's my ask? Four
15 things. One, landfill, we have a landfill crisis. We
16 have too much landfill capacity and it's too cheap. A
17 buck 40 a ton, since 1993 is the Integrated Waste
18 Management account. For the last four years, the
19 landfills are filling up with garbage.

20 We have a statewide recycling goal go get to 75
21 percent by 2020. We're at 50 percent and we're going to
22 be 45 percent this year CalRecycle has a dirty secret,
23 they're filling up the landfills.

24 We need to raise, we heard that this morning,
25 have an intersection or interruption in the landfill

1 crisis by raising the tip fee to ten bucks a ton, and
2 that will raise about \$300 million to invest in compost
3 and AD.

4 Number two, the fleet play. It costs about
5 \$50,000 extra to go from diesel to the low NOx engine.
6 We need about \$100 million a year, in the next seven
7 years, in the refuse sector to make that play. We're
8 all in. But over at CARB, they're picking to fund ZEVs
9 over near zero and RNG. We've been on this battle for
10 three years and we can't get there.

11 We need to have carbon certainty and we need to
12 have local government buy in. But the biggest thing
13 today is we have a landfill crisis. Let's raise the tip
14 fee ten bucks a ton and fund this system. Thank you.

15 CHAIR WEISENMILLER: Thanks. Please, come on
16 up.

17 MS. DARLINGTON: Okay, I think I can say good
18 evening, I may be your last speaker.

19 My name is Christiana Darlington. I'm with the
20 Placer County Air Pollution Control District. We
21 represent six cities and the County of Placer.

22 What I'm here today or this afternoon to talk to
23 you briefly about is to remember that one of the most
24 important reductions that you can make in short-lived
25 climate pollutants comes from looking at the reduction

1 of wildfire, particularly catastrophic wildfire. And
2 that wood waste is part of the discussion in this bill,
3 in 1383, and the work you're doing under the IEPR.

4 I would encourage you to consider including
5 details about wood and what you're going to do with wood
6 waste in the IEPR, particularly to support programs that
7 already exist in your sister agencies, like the BioMAT
8 program. Like what you're seeing happening with the
9 Tree Mortality Task Force, in partnership with CalFire,
10 and the Governor's Office, and other entities of the
11 State. And making sure that all the entities are
12 working together with the same set of goals, which is to
13 reduce the highest contributor to the short-live climate
14 pollutants, which is wildfire, which is what it says in
15 the short-live climate pollutant plan and what it said
16 in the predecessing drafts, the earlier drafts of the
17 plan, and in the bills.

18 So, just wanted to encourage you to consider
19 fuel reduction activities and the conversion of wood
20 waste into more than just electricity. Also, into some
21 of these fuel options and things like that. And you
22 need to build those pathways to allow that waste to be
23 used in that way. And you have the capacity to do that.
24 You have the capacity to open new pathways for that type
25 of waste.

1 And I did want to emphasize that from an air
2 pollution perspective, composting is not the answer for
3 wood waste in California. It's a small amount of wood
4 waste can be used for composting. But a lot of water
5 and other resources are needed to convert wood into
6 compost. And our friends in that sector are telling us
7 we do not have the capacity. We do not have a place to
8 put the forest waste that's coming out.

9 Remember, we have over 100 million dead trees
10 sitting in the Sierra right now and it's only rising.
11 And we need a place to use that wood and dispose of that
12 in a safe way that's also, you know, utilizing a huge
13 resource.

14 So, on behalf of the residents of Placer and our
15 cities, I just wanted to make sure to emphasize the use
16 of the IEPR in that way. Thank you.

17 CHAIR WEISENMILLER: Okay, thank you.

18 Anyone else in the room?

19 Anyone on the telephone line?

20 MS. RAITT: We do have a Johannes Escudero, I
21 believe. Did you want to make a comment.

22 MR. ESCUDERO: Yes. Can you hear me okay?

23 MS. RAITT: Yes, go ahead.

24 CHAIR WEISENMILLER: Yes, we can.

25 MR. ESCUDERO: Chairman Weisenmiller and

1 Commissioners Scott, and Rechtschaffen, and those
2 present, as you know the Coalition for Renewable Natural
3 Gas represents each sector of the renewable natural gas
4 industry, including producers of more than 90 percent of
5 all the renewable natural gas produced in the U.S. and
6 Canada.

7 And in consideration of your time and the fact
8 that a number of our members were present and
9 participated on multiple panels throughout the day,
10 we'll defer to our written comments to provide a more
11 comprehensive response to information and answer
12 questions, posed at the workshop, that we deem warrants
13 a response from the renewable natural gas industry.

14 Quickly, we do not disagree with an expanded
15 definition of renewable gas that includes other gases,
16 that includes other gases, including but not limited to
17 renewable hydrogen, and/or DME, both, which can be
18 derived from renewable natural gas as a feedstock.

19 We would just caution, however, that unless
20 further defined the term "renewable gas" only identifies
21 the source of gas as renewable, but does not address the
22 underlying question or quality of the gas being
23 compatible with conventional natural gas.

24 And in order to meet the goals of SB 1383, we
25 need to increase the development, deployment and

1 utilization of RNG that's interchangeable with natural
2 gas and that's ideally interconnected with and
3 transported by the existing natural gas pipeline
4 distribution system to transportation fuel end users.

5 Again, we'd be happy to provide a list of
6 recommended definitions as it relates to biogas,
7 biomethane, and NRG, that we've worked diligently with
8 industry across North America to develop consensus on.

9 Lastly, I cannot reiterate the importance of the
10 PUC doing everything it can to expedite execution of a
11 contract with the California Council on Science and
12 Technology to initiate the Biomethane Pipeline Access
13 Requirement Study, pursuant to SB 40, which a number of
14 us, including those in the room, worked diligently to
15 pass towards the end of session this last year.

16 In tandem, with market certainty, including but
17 not limited to through California's Low Carbon Fuel
18 Standard, and Cap and Trade program, both of which have
19 frequently come under fire. Unless we can get pipeline
20 access, the question about market certainty will become
21 a moot point and industry will continue to develop
22 projects outside the State.

23 So, I leave you with those brief comments.
24 Again, with a commitment to follow up in writing with
25 more comprehensive detail.

1 But thank you, again, for the fantastic work
2 you've done including holding the workshop today.

3 CHAIR WEISENMILLER: Thank you.

4 Anyone else on the line?

5 MS. RAITT: That's everybody for WebEx.

6 CHAIR WEISENMILLER: So, Heather, do you want to
7 talk about the filing deadline?

8 MS. RAITT: Sure. Well, it's July 11th, I'm not
9 sure if we decided to extend it, but we can put out a
10 public notice to extend it.

11 CHAIR WEISENMILLER: Sounds good, we're going to
12 put -- it says July 11th, I think we were talking of,
13 basically, the close of business on Friday of that week.
14 That being said, I don't think anyone is going to -- I
15 don't think Tim is desperate to read it over the
16 weekend. But I'm hesitant on saying Monday for fear it
17 suddenly slides to the end of the day on Monday.

18 So, either Friday, end of the day, or first
19 thing Monday morning, that would be good.

20 MS. RAITT: So, July 14th, then?

21 CHAIR WEISENMILLER: Yeah. So, just I'm going
22 to say a very few words, since it's been a long day.
23 But I particularly wanted to thank everyone for their
24 participation today. And I certainly wanted to also
25 call out Tim, for helping structure this workshop. A

1 lot of time and effort went into it. Certainly, John
2 and Kevin worked with him on that part, too.

3 But the bottom line is you just don't open the
4 door and expect things to come together the way they
5 did. You have to put a lot of work into organizing it
6 and trying to think about a coherent structure. I think
7 we packed just about as much as we could pack into one
8 day, if not slightly more than we should have tried.

9 But anyway, so again looking forward to your
10 comments and thanks for your participation.

11 Janea?

12 COMMISSIONER SCOTT: Yeah, I would just echo,
13 again, thank you, Tim for putting this together, and all
14 of the Energy Commission staff, and our fantastic
15 panelists who did spend a lot of time to make sure that
16 we had great information today. And I think that we
17 really got that. I learned a lot. There's a lot for us
18 to think about.

19 I'm looking forward to seeing the written
20 comments that people put in place, because I know we
21 kind of hit a lot of this at sort of the 40,000 foot
22 level, but there's more detail that goes along with all
23 of the topics that we talked about. So, I just want to
24 echo the thanks to our excellent panelists, and the
25 Energy Commission staff, and PUC staff, ARB, and CDFA

1 for joining us today.

2 MR. RECHTSCHAFFEN: And CalRecycle.

3 COMMISSIONER SCOTT: And CalRecycle.

4 MR. RECHTSCHAFFEN: I want to echo the thanks of
5 the two Commissioners. And this really is a problem
6 that requires multiple agencies weighing in. The
7 statute requires us doing this collaboratively, but we
8 really appreciate all the agencies working on this
9 together, and the Energy Commission taking the lead and
10 soliciting the input of all the sister agencies. So,
11 thank you very much.

12 CHAIR WEISENMILLER: Yeah, I would just note, I
13 think Richard was pretty clear this is a very high
14 priority for him. But I'm not sure if it was an Act of
15 God, but it was even a higher priority that kept pulling
16 him out of the room. But anyway, he certainly was here
17 for us, also.

18 So, anyway, thanks again. The meeting is
19 adjourned.

20 (Thereupon, the Workshop was adjourned at
21 5:12 p.m.)

22 --oOo--

23

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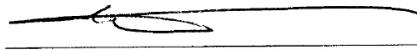
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