

STATE OF CALIFORNIA - THE RESOURCES AGENCY
BEFORE THE
CALIFORNIA ENERGY COMMISSION (CEC)

In the matter of,)
) Docket No. 12-HYD-1
Public Workshop)
)
_____)

**Public Workshop Regarding
Approaches for Selecting Locations for the
Hydrogen Infrastructure Network**

California Energy Commission
1516 Ninth Street
First Floor, Hearing Room A
Sacramento, California

Friday, June 29, 2012
9:13 a.m.

Reported by:
Kent Odell

STAFF

Jim McKinney
 Jean Baronas
 Tobias Muench
 Amanda Stein

Also Present (* Via WebEx)

Presenters

Robert Boyd, Boyd Hydrogen, LLC
 *Paul Staples, HyGen
 Garrett Poppe, Hydrogen Frontier
 Steve Eckhardt, Linde Group, North America
 Norman Ingram, California Department of Food and
 Agriculture, Division of Measurement Standards
 Gerhard Achtelik, Air Resources Board
 Christina Zhang-Tillman, Air Resources Board
 Dr. Joan Ogden, University of California, Davis
 Dr. Tim Brown, University of California, Irvine
 *Sharalyn Savin, Plug Power
 *Jim Petrecky, Plug Power

Public Comment

Dr. Matt Miyasato, South Coast AQMD
 Ron Nies, California Food and Agriculture, Division of
 Measurement Standards
 Larry Watkins, AQMD
 Jared Farnsworth, Toyota
 *Ed Kiezek, Air Products
 Jon Sheers, Center for Energy Efficiency and Real
 Technology
 *Steve Ellis, American Honda
 Bill Elrick, California Fuel Cell Partnership
 *Peter Ehlers, CSA Group
 *Alex Keros, General Motors
 *Matt Forrest, Mercedes Benz
 *Ghassan Sleiman Hydrogenics USA
 *Brandon Jones, Central Coast Clean Cities Coalition
 *James Carmichael, Naval Facilities
 *James Provenzano, Clean Air Now
 *Charles Powars, St. Croix Research
 Aaron Harris, Sandia National Labs

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P R O C E E D I N G S

1
2 JUNE 29, 2012 9:13 A.M.

3 MS. BARONAS: Good morning, everyone. Hi, my
4 name is Jean Baronas. I work with the Emerging Fuels
5 and Technology Office at the Fuels and Transportation
6 Division of the California Energy Commission. I'd like
7 to convene the June 29th Hydrogen Workshop.

8 Thank you all for attending. And I just want to
9 thank everyone who sent in presentation materials, quite
10 comprehensive, quite interesting. They are a part of
11 the public record today.

12 The next slide, please. Here's our agenda for
13 the day. Planning on welcome and introduction by Jim
14 McKinney, a summary of the workshop, which I will
15 intersperse during the day, and I will also have some
16 opening comments on the June 22nd workshop.

17 The presentations from the June 22nd workshop
18 are in the public domain and thank you for those.

19 We'll talk about station performance and
20 technical requirements, followed by lunch.

21 And, hopefully, I'll take a read on who would
22 like a break in the morning. We can continue right
23 through, have a break, it's all up to you, it's your
24 day.

25 Other possible elements of a potential future

1 hydrogen solicitation will also be discussed.

2 And we'll have a comment period, followed by
3 wrap-up, conclusion and next steps.

4 We did receive the many presentations, as I
5 commented, and so with your indulgence I'm planning to
6 hold those presentations in A to Z order by organization
7 name.

8 Is that okay?

9 Hearing no objections, that's our protocol for
10 the day.

11 So at this time I'd like to introduce Jim
12 McKinney, Office Manager of the Emerging Fuels and
13 Technology Office.

14 MR. MC KINNEY: Good morning, everybody and
15 thank you, Jean.

16 As Jean said, Jean did a great job of moderating
17 our session last week, so she will again be our
18 moderator this week.

19 Again, Jim McKinney, Manager of the Emerging
20 Fuels and Technologies Office.

21 I just wanted to say a few kind of comments and
22 observations. First of all just thank you so much to
23 everybody who participated last week, we just found your
24 input invaluable. We've shared that internally, with
25 our Deputy Director, and Commissioner Carla Peterman,

1 she's very interested in how many people are attending
2 and what the input is. So, we greatly appreciate that.

3 We know we're asking a lot of you. This is the
4 second of what will be three workshops that we have as
5 we prepare to revise and release our, you know, \$30
6 million solicitation for hydrogen fueling infrastructure
7 here, in California.

8 Turn the page down here. Can you do that for
9 me?

10 MS. BARONAS: Are you looking for summary
11 slides?

12 MR. MC KINNEY: Yes, the one that had our
13 funding summary up there.

14 MS. BARONAS: Sorry, I don't know that.

15 MR. MC KINNEY: Did that one get loaded, the
16 slide I sent you guys last night?

17 Okay, we're good. We're good.

18 Through the -- okay, so through the end of
19 fiscal year '12-'13, which will start next week, we will
20 have invested a total of \$55 million in hydrogen fueling
21 infrastructure, modeling support from the UCI, street
22 team. That also includes our investment with the
23 Department of Weights and Measures, at CDFR, to develop
24 retail standards for fueling.

25 We have \$3 million in the Emeryville AC Transit

1 bus station.

2 And just recently a demonstration fuel cell bus
3 project, also connected with the San Francisco Station.

4 I think there's been a little bit of question,
5 you know, is the State of California still committed to
6 hydrogen given the incident at Emeryville, and given the
7 San Francisco Airport Commission to not continue with a
8 hydrogen fueling station on its property.

9 The State of California is committed to this.
10 The Energy Commission is equally committed to this. And
11 as I said last time, we are now in a leadership role in
12 the amount of money we have to disburse to those
13 companies that can build the best possible hydrogen
14 fueling stations throughout the clusters in Southern
15 California and Northern California.

16 One more observation, I think, in regards to the
17 incident at Emeryville, Sandia National Lab is doing the
18 failure analyses and that report is forthcoming. We
19 will ensure that if there are any measures, standards or
20 recommendations from that report, that are appropriate
21 for our next solicitation that we will incorporate those
22 measures into our next hydrogen fueling solicitation.

23 Most of what we want to do today, as we did last
24 week, and as I think we'll do July 10, at Diamond Bar,
25 at the South Coast AQMD headquarters is listen and have

1 an active dialogue with you.

2 So again, we're doing a lot of listening, we're
3 doing a lot of conferring internally, and we'll continue
4 that. I think after July 10 we'll start to dig in and
5 develop some formulations for what the next solicitation
6 will look like.

7 But for now, again, we're going to listen, we'll
8 ask questions.

9 Toby is very strong on station performance
10 measures, so he'll be joining the dialogue today.

11 The main topics today, I think as you all
12 understand, so station performance and we had a lot of
13 good discussion on that last week, renewable hydrogen,
14 and then some other elements around eligibility, market
15 diversity that go into identifying the best possible
16 applications for a hydrogen fueling station.

17 So, that's pretty much what I wanted to say. So
18 again, thank you for coming, for your participation, we
19 look forward to another full day of active dialogue with
20 all of you.

21 So, I'll turn it back to Jean.

22 MS. BARONAS: Okay, thank you for that, Jim
23 McKinney.

24 So, moving on to the Power Point that's
25 projected, in summary the June 22nd workshop had a very

1 large number of participants, in my personal opinion.
2 We had approximately 30 people in person and 40 by
3 WebEx.

4 There were five government agencies in
5 attendance and they are listed, California Air Resources
6 Board, South Coast Air Quality Management District, Bay
7 Area Quality Management District, U.S. Department of
8 Energy, and the California Drug, Food and Agriculture
9 Department of Measurement Standards.

10 Did I get it right? I didn't.

11 So, what is it, please?

12 MR. NIES: California Department of Food and
13 Agriculture, Division of Measurement Standards.

14 MS. BARONAS: Wonderful, thank you for that.

15 And then we had two academic institutions
16 present, UC Irvine and UC Davis. And I'm happy to see
17 both representatives here today, thank you very much for
18 coming in.

19 Three other organizations, the California Fuel
20 Cell Partnership, CEERT, Energy Independence Now.

21 Five auto makers, Daimler Benz, Daimler Mercedes
22 Benz, correction, General Motors, Honda, Nissan, Toyota.

23 Seven station developers and technology
24 providers, Air Products, Hydrogen Frontier, Hydrogenics,
25 HyGen Industries, Linde, Nuvera, Power Tec and PhyChip.

1 And as I mentioned earlier, the presentations
2 are available online.

3 So, what did we talk about? Here's some very
4 brief remarks from the moderator. We heard you on June
5 22nd. We heard you say there's no need to start from
6 scratch, to leverage existing processes and knowledge in
7 developing the next solicitation.

8 We perceive that vehicles cannot be deployed
9 without sufficient stations in the right locations.

10 We all talked about limited public funds, how
11 precious every dollar is.

12 We talked about finding deadlines, coverage,
13 accelerated vehicle deployments and network reliability
14 and these all require careful planning.

15 A general comment was made along this line,
16 "build it and they will come will not be viable."

17 Station coverage must be adequate until hydrogen
18 infrastructure can be self-sustaining, and this includes
19 the design for redundancy. There was quite a bit of
20 discussion on redundancy, what it means mathematically,
21 what it means to the market, what it means to the
22 consumer.

23 And then we focused on expanding overall fueling
24 capacity.

25 What makes a good location? This was bandied

1 about. It was quite lively, I felt. I'm not sure how
2 you did, you felt about that, those of you who were
3 here.

4 But we talked about how a good location could be
5 potentially located within early adopter clusters and
6 there was a lot of discussion around this concept. It
7 remains an open question, I think.

8 We talked about a good location being supportive
9 of nearby stations, but not duplication of a station.

10 And one, a pretty salient point I remember from
11 the meeting was that we want to provide enough funding
12 opportunity so the customer finds the network appealing.

13 So, that concludes my remarks on a general
14 summary of the June 22nd workshop.

15 And so let's swing into the station performance
16 and technical requirements. This is 01, slide 01.

17 And so, workshop objectives, I'm going to talk
18 about these all day, summarize the input from June 22nd.
19 Please chime in as the day proceeds and comment back if
20 something comes to mind that gives us a perspective
21 today, in terms of what we discussed on June 22nd.

22 Another objective is to present possible
23 eligibility and criteria requirements for the
24 development of the next hydrogen infrastructure
25 solicitation.

1 And then, finally, to receive feedback and
2 suggestions on these topics.

3 Here is potential minimum performance
4 requirements, as a slide, and here are three generalized
5 bullets. Yes, I see three.

6 And so these are items that were discussed,
7 they've been discussed, they've been around. Minimum
8 nominal capacity per station over a 12-hour period, this
9 is a potential minimum performance requirement.

10 Minimum 20-kilogram-per-hour peak fueling
11 capacity, including back to back, that's a potential
12 minimum performance requirement of a future hydrogen
13 solicitation.

14 Both 350-BAR and 750-BAR dispensed -- thank you,
15 correction. Both 350-BAR and 700-BAR dispensing
16 pressures. Thank you, Toby. These are other potential
17 minimum requirements.

18 And so, if you keep these as possible
19 requirements in the back of your mind, let's then hear
20 presentations from interested parties, who sent in
21 materials.

22 And as stated earlier, we're going to take these
23 presentations A to Z, starting out with Boyd.

24 And so let me make a general comment from the
25 moderator, that the presentations are quite

1 comprehensive. Thank you so much for all the work you
2 did in sending in these materials. Quite comprehensive,
3 many discuss items other than minimum performance
4 requirements, they cross the board.

5 But the point is to set the state for today and
6 to get everyone to think about what's possible, what's
7 really possible for the next solicitation.

8 So, kindly pull up the Boyd presentation.

9 MR. MC KINNEY: And Jean, before we get to that,
10 I would like to add something to these points that we
11 had up here on some of the minimum technical standards.

12 So one of the other, I think, good points of
13 discussion last week was what does the network look
14 like? And it will be, at some point in time, a
15 combination of what we call the high volume, you know,
16 central cluster stations, high through-put, high
17 capacity.

18 We're going to have connector stations and those
19 might be, you know, intra, regional intra, within a
20 metro area.

21 And then we're going to have destination
22 stations.

23 So, clearly, those are stations with different
24 sizings, different performance standards, different
25 capacities and different costs.

1 One of the things that we would like to hear
2 from all you today is, you know, are we ready at this
3 point in time to go beyond kind of the high volume
4 central station concept as we come up to -- you know,
5 the 15 to 20 stations we'll get out of this \$29 million
6 will put us around 40, you know, give or take some, 40
7 stations statewide. That's a good number and that's
8 getting close to the magic, the first kind of magic
9 number milestone, 45, as articulated by the Fuel Cell
10 Partnership.

11 And so, again, we'd like to hear your
12 observations, suggestions, recommendations on how we
13 think about these minimum standards for these three
14 different classes of stations.

15 MS. BARONAS: Thank you for that, Jim.

16 So, we have five presentations and so kindly
17 limit your remarks to ten minutes or less. And as the
18 moderator, I will remind you of the three minute out, so
19 to speak. I'm sorry for the interruption in the
20 advance.

21 The first presenter, Robert Boyd, of Boyd
22 Hydrogen, LLC.

23 MR. BOYD: Good morning. Can you hear me?
24 Thanks.

25 You can go to the next slide. Oh, I don't

1 see -- just a little background on myself and I've been
2 involved in hydrogen fueling since about 2002, and
3 worked for BOC and Linde for a number of years, and
4 developed the -- one of the first stations in North
5 America, up in British Columbia, that was able to do
6 buses, as well as cars.

7 And I've been active in codes and standards
8 development for a long time in regards to hydrogen
9 vehicle fueling, both at SAE and Compressed Gas
10 Association, CSA, worked on fire codes and MFPA
11 documents.

12 Next slide, please. So, I put together what I
13 thought were some of the top priorities for where we are
14 right now. And there's -- not all of the slide is on
15 the screen, I'm not sure -- okay, thank you.

16 And what we see right now is we need the
17 stations to be built and installed. A lot of the
18 stations, as you know, have been -- gotten funding and
19 haven't been built.

20 And so one of the priorities, I think right now,
21 is to try to identify people that actually can build
22 stations and put them in.

23 Stations must be publicly accessible, so we're
24 talking about public sale of hydrogen, limited or easy
25 user agreements. We've had a lot of problems with -- we

1 hear of a lot of problems with user agreements,
2 liability, and so being able to sell hydrogen as a fuel
3 is important.

4 And then we need to be able to dispense H70, or
5 70 megapascal, or 700 BAR hydrogen with reasonable
6 speed, roughly in the one- to two-kilogram per minute
7 range, so that the consumer has a pleasurable
8 experience.

9 And, yes, we need lots of stations and lots of
10 options, and places to fuel.

11 The next slide, please. I tried to put together
12 a little bit of what I saw in terms of large stations,
13 small stations, medium stations.

14 With a small station, you know, might be able to
15 do five to ten cars per day, 25 to 50 kilograms per day.
16 And I threw some rough numbers in there just to show,
17 you know, \$37,000 to \$140,000 a year looks like revenue
18 that you might get from the dispenser, if you're selling
19 at \$10 a kilogram. But that looks like a lot of money,
20 but it's not a lot of money.

21 When, of course, you get to a large station that
22 could do 150 to 600 kilograms a day, then this starts to
23 look a little bit more sustainable. And so for large
24 corporations you'll see this is sort of the sweet spot
25 in terms of what a dispenser could do.

1 We get a little bit further into the
2 performance, but what I think you'll see is that the
3 maximum one dispenser could do is about 60 kilograms an
4 hour. And if you think, well, maybe we'll be running
5 five hours a day, maybe two or three in the morning, two
6 or three at night, and one at noon, you know, five hours
7 times 60 is a reasonable number that you might expect
8 from a dispenser.

9 Next slide, please. Oh, so for fueling
10 performance, and this is my opinion, I know Honda is
11 still deploying cars at 350 BAR. I should say H35, I'm
12 sorry..

13 But 700 BAR service is purely what we need, I
14 think. Most of the OEMs have all standardized on 700
15 BAR systems.

16 The dispenser must be able to do what we call
17 back-to-back fills. And that will require some
18 flexibility on fueling time. In some cases the first
19 fill, if the station hasn't been used, the first fill
20 might be a little bit warm and so it might be a little
21 bit slow while the dispenser cools down.

22 And then if you're doing two, three, four fills
23 sequentially, you might over-tax the station's cooling
24 capacity and you might also find the hydrogen warming up
25 a little bit. So, some flexibility.

1 Now, we're developing some more flexible
2 standard in SAE 2601. However, all of these fueling
3 protocols are designed to be certified by what we call
4 CSA HGV-4.3. CSA has been tasked to develop a metric, a
5 way of measuring the performance of a dispenser. And in
6 the development of 4.3 we've allowed for some
7 flexibility in measuring the performance so that we can
8 certify a dispenser -- or CSA could certify a dispenser
9 that it would meet 2601.

10 And 2601, some of the requirements in 2601 are
11 in the process of being more closely identified as
12 either limits or guidelines. And so guidelines would be
13 something you could perhaps break. You could go a
14 little bit slower on a warm day and that would be okay,
15 and not a safety problem.

16 So, being able to certify stations to 4.3 is the
17 way to validate compliance with the performance
18 requirements of 2601.

19 The next slide, please.

20 MS. BARONAS: Pardon me, three minutes.

21 MR. BOYD: Thank you. The next slide, please.

22 So, what does the Energy Commission need to put
23 into the requirements? Well, in order to get retail
24 sales first off, again -- actually, these are in three
25 different -- first off you've got fuel quality. And so

1 we have a good standard, 2719, and there's an
2 infrastructure set up to be able to test dispensers.
3 And so, fuel quality we're pretty good on in terms of
4 defining our standards.

5 Meter accuracy, there's work being done at DMS
6 and NIST to define the test methods that would validate
7 dispenser accuracy. And the DMS folks are moving
8 forward and actually getting close, have permitted the
9 first station. And so, we're making some progress on
10 that and that's good.

11 And then the third thing is the dispenser
12 performance in terms of safety and fuel speed.

13 Next.

14 MS. BARONAS: Conclusion, please.

15 MR. BOYD: Yes. Or one, quickly, here,
16 permitting challenges. I can't leave this one go.
17 We've got a lot of fire code issues and problems, and
18 you have to recognize that when you go -- someone goes
19 to permit a station, the fire code doesn't permit
20 hydrogen fueling stations the way we want to.

21 We've got some targets to have good code by
22 2015, but until now, up until 2016 you're going to have
23 to reach out to the local AHJ. And that needs to be
24 part of every project and it's less success criteria.
25 If you don't reach out to the AHJ early, you're going to

1 have problems.

2 Next slide really quickly and then the
3 conclusion. Renewable hydrogen, I'll let you -- this
4 one here --

5 MS. BARONAS: We have an extension series of
6 presentations on the topic today.

7 MR. BOYD: Okay, yeah. I would just submit one
8 comment. I feel like it's unfair to burden hydrogen
9 with a renewable element when you don't have that for
10 CNG, or electricity, or any other alternative.

11 I know it's a little -- next slide and let's go.
12 Thank you for your time.

13 MS. BARONAS: Thank you for concluding your
14 remarks. Thank you.

15 And so I am not certain, is Plug Power on WebEx?
16 Are the WebEx participants self-muted at this point
17 because we have you wide open, we are not muting you.

18 Okay, so --

19 MR. STAPLES: Hello.

20 MS. BARONAS: Hi. Are you with Plug Power?

21 MR. STAPLES: No, no, I'm sorry. I just walked
22 in the room, my apologies.

23 MS. BARONAS: Thank you. Is a Plug Power
24 representative on the phone?

25 Okay, I'm thinking that I'm going to move Plug

1 Power to the section in the afternoon on bus and non-
2 road projects. Any opposition to that idea?

3 Thank you. Hearing none, this is what we will
4 plan for. Hopefully, the representative will be there.

5 Thank you, Mr. Boyd, appreciate your
6 presentation.

7 And now we're moving on to HyGen. A to Z order
8 here, HyGen.

9 MR. STAPLES: Yes, I'm here, thank you.
10 My name is Paul Staples, I'm the Chairman and CEO of
11 HyGen Industries.

12 We've developed the very first, a world first
13 commercially permitted solar hydrogen generating
14 facility, fueling station and vehicle fleet, our team
15 did, in El Segundo in 1994.

16 We've also developed hydrogen, also developed
17 the Santa Monica program and project which led to about
18 five city programs in Southern California and Los
19 Angeles.

20 I have to, first of all, comment don't burden,
21 burden the small user with renewable. I don't get that
22 at all. It's not a burden, it's what we should be doing
23 for every one of them, okay. So, there is no burden for
24 the small producer. Okay, the cost, have you taken a
25 look at the cost of the current systems going in by both

1 delivered hydrogen and on-site generation from our
2 fossil fuels and it's just as expensive as renewables.
3 So, just a quick comment.

4 The next slide, please. Now, the objective of
5 this presentation is to review the -- part of it is to
6 review what happened on the 22nd and some of the
7 recommendations made. Okay, I'll quickly go through
8 that.

9 Again, it isn't rocket science. A, as far as
10 locating stations, anyone who owns a vehicle or lives in
11 an area in a main cluster area for a couple of years or
12 more knows where the locations need to be. It's not
13 proprietary, confidential data to locate, no need for
14 that.

15 Don't over-analyze. Everyone knows where
16 they're supposed to be. They're supposed to be in high-
17 traffic areas in affluent neighborhoods, and along our
18 freeways, so let's just do it, okay, because over-
19 analyzing, it's not that complicated to figure out.
20 There are plenty of consultants out there that could
21 tell you the same thing. So, that's basically it.

22 And a preference, if a preference is needed, for
23 instance if you have to stations within a couple of
24 miles of each other and you have to choose one, you
25 choose the cleanest one, first of all, the most

1 sustainable one. After that it's the best location.

2 And like I said, if it is a couple miles away,
3 there's no reason you can't fund both of them,
4 redundancy is a good thing.

5 Now, how would be -- what I advise the Energy
6 Commission is the optimal -- choose the optimal
7 locations? Well, like I said, if you need a consultant,
8 there are plenty of them out there that work with them.
9 I'm working with one right now. I'm not going to tell
10 who because I don't want you stealing him away from me.

11 And they provide excellent data for locating,
12 siting, building and supplying these stations, gas
13 stations. And those are the ones, just check the Yellow
14 Pages.

15 The next slide, please. Yeah, how would we
16 advise the Energy Commission to choose the optimal, best
17 locations for these fueling stations?

18 First of all don't change out what's laid in the
19 RFP right now. At least three months before the RFP is
20 released and never after the release because you can't
21 be pulling the line back every time and completely
22 throwing out months, possibly years of work from many,
23 many people who have been seeking and recruiting
24 locations based on what was listed and what they were
25 told in the RFP. You don't get to do that and that

1 happens.

2 Approaches for selecting locations in the
3 hydrogen fueling stations for California's
4 infrastructure and network strategy? First, identify
5 preferred areas in the RFP, which you've already done,
6 and go outside and so who's the dog in the fight. No
7 oil companies, no auto manufacturers, nobody with a
8 conflict of interest should be reviewing proposals
9 before they're submitted. Okay. It's just simply
10 unacceptable.

11 You cannot be doing that sort of thing
12 and having people with a conflict of interest getting in
13 there, and choosing, and picking winners and losers.
14 So that's one thing, first of all.

15 And some of the other, prior things that we made
16 recommendations was is to form a TAC committee, a
17 technical advisory committee with members of the
18 Sustainable Hydrogen Workgroup at the California Air
19 Resources Board, and one of the members of the CEC
20 Project and Program Management staff, or an outside
21 consulting firm with no conflict of interest, possible
22 candidate. SAIC, they perform the same services for the
23 MSRC down in Los Angeles, at the AQMD.

24 Auto makers can provide, should be able to
25 provide advice on locations and technical specs, but no

1 direct view of applicant's information. It's not right
2 to be sharing it with an outside entity who doesn't --
3 who is not providing the funding. They want to be able
4 to review and approve locations, let them put their own
5 money up and run their own RFP, and they can do whatever
6 they please.

7 TAC review selection -- I've never heard of a
8 situation where someone who was a partner with an
9 industrial gas company, and other people, okay, who are
10 applicants get to review locations of government
11 funding. It doesn't make any sense.

12 So, review selections from technical
13 consultants, and auto makers, and location preferences
14 are indicated in the RFP, you vote to approve it and
15 submit it to the overseeing authority, and then it's
16 either all up or all down. You don't get to -- and you
17 start over. You don't get to cherry pick what members
18 on the committee or on the board may want or may not
19 want, okay. It's very crucial for that.

20 This is important for bringing credibility to
21 this process, otherwise nobody's going to believe it and
22 you're not going to get anybody else to participate, and
23 waste their time doing all the work just to know at the
24 end they don't stand a chance.

25 MS. BARONAS: Excuse me, Mr. Staples, this is

1 Jean, the moderator.

2 MR. STAPLES: Yes. Okay, is it getting long?

3 MS. BARONAS: What?

4 MR. STAPLES: I'm sorry, is it getting long?

5 MS. BARONAS: No, it's not getting long, I just
6 want to build on what you said. Our notes clearly
7 document quite a bit of what you said already,
8 especially about the technical advisory committee, and
9 it was brought up by quite a few people. And the
10 staff's notes cover that.

11 But what I want to do is direct your attention
12 and shift your focus to some new materials that you
13 submitted, because I've reviewed your presentation
14 you're on now, but I'd like you to shift over to, for
15 example --

16 MR. STAPLES: Okay.

17 MS. BARONAS: I mean I really would like --
18 personally, I would like to hear number four, discussing
19 the market diversity. This is new, compared to what you
20 presented last week.

21 MR. STAPLES: Okay.

22 MS. BARONAS: And then to make it even --

23 MR. STAPLES: Go back one more slide. Go back
24 one more slide, okay.

25 All right, here's where we get into the other

1 aspects of it. First of all, technical requirements are
2 for the hydrogen fueling dispensers, just like a lot of
3 what we were talking about. I think we really need to
4 limit or, you know, completely eliminate the 700 BAR
5 requirement. It really is an over-burden for the
6 infrastructure. The cost, it doubles the cost of
7 everything. I mean and it really isn't difficult.

8 I've done this, so people cannot sit down, talk
9 to me and tell me I don't know what I'm talking about
10 because you can build it into the vehicle. Honda's
11 doing it. There's no reason why any -- all these other
12 guys have to have 700 BAR. You're adding, nearly
13 doubling the cost of the infrastructure by requiring it.

14 And everybody says the same thing, 700 BAR is
15 not necessary. You can get to 250, 300, even 400 miles
16 at a 350, okay.

17 MS. BARONAS: Okay, thank you, sir, for --

18 MR. STAPLES: So, it's really adding to the
19 cost, okay.

20 MS. BARONAS: Thank you for that, Mr. Staples.
21 So, you've reached the three-minute mark, so kindly
22 conclude within three minutes.

23 MR. STAPLES: Three minutes.

24 MS. BARONAS: Thank you.

25 MR. STAPLES: Three minutes?

1 MS. BARONAS: Yes, sir.

2 MR. STAPLES: I thought we had ten minutes.

3 MS. BARONAS: Yes, each presenter has ten
4 minutes. You started your presentation, in fact, at
5 9:35.

6 MR. STAPLES: Oh, okay, I'm sorry. All right.
7 Well, thank you very much. If there are any questions,
8 feel free to ask.

9 MS. BARONAS: Okay, this is Jean Baronas from
10 the California Energy Commission. Your presentation
11 will be entered into the public record, Mr. Staples, no
12 question.

13 But I do want to clarify one of your points,
14 under Item 5, where you discuss the Public Adviser's
15 Office. I just want to clarify, for the record, that
16 the Public Adviser acts as a liaison to help the public,
17 to help them understand California Energy Commission's
18 policies and procedures. And that the Public Adviser,
19 at this time, is not involved in solicitation
20 development processes.

21 MR. STAPLES: Oh, I agree. I understand. But
22 when they bring up an issue --

23 MS. BARONAS: For the record. Thank you.

24 MR. STAPLES: I understand.

25 MS. BARONAS: Thank you, Mr. Staples, for your

1 input today.

2 Moving on to the next presenter -- yes, please,
3 Matt.

4 DR. MIYASATO: Hi, this is Matt Miyasato, South
5 Coast AQMD. I just want to make a clarifying comment,
6 at the beginning of the presentation Mr. Staples
7 indicated that HyGen was involved with the Santa Monica
8 hydrogen fueling station which led to the five cities
9 project that was done by the AQMD and that's just not
10 the case.

11 That station was awarded by the AQMD to Air
12 Products and has been run by each of the different
13 cities.

14 MS. BARONAS: May I --

15 MR. STAPLES: That is true, but we developed the
16 project. We developed the program with the City of
17 Santa Monica. I'm on the menu as far as the header as
18 having done so. There's no two questions about it,
19 okay, that was the case.

20 My proposal to -- unsolicited proposal to the
21 AQMD was then taken by you and turned into an RFP, which
22 led for the whole program.

23 I lobbied hard for the program and everything
24 so, please, don't sit there and say that I don't know
25 what I'm talking about or that I'm lying, because I'm

1 not. It's a fact.

2 MS. BARONAS: Thank you, Mr. Staples, for that.

3 Both of your comments are now entered into the public
4 record. Thank you very much Dr. Miyasato and, also, Mr.
5 Staples.

6 Moving on in the agenda, we have a presentation
7 from Hydrogen Frontier. Again, this is A to Z order.
8 And so today we have Garrett Poppe.

9 MR. POPPE: Hello, my name is Garrett Poppe, I
10 work for Hydrogen Frontier. My job is mostly I take
11 existing technology and make it work a little bit
12 better.

13 You can move to the next slide. Now, just to
14 summarize what Dan went over at the last meeting is
15 there's a few ideas we have. You want to -- in the
16 future you want to anticipate demand, so how you can do
17 that is with a scalable station.

18 We can consider centralized generation to
19 augment low-volume stations and we can build twice as
20 many low-volume stations that are scalable up to a high-
21 volume station until we know what the actual market
22 demand becomes.

23 And this might be more efficient in creating a
24 larger network of stations.

25 Now, accessibility, he went over that a little

1 bit. Mutual cost agreements with station owners, that's
2 a difficulty.

3 Just to comment on what Bob Boyd said, too,
4 earlier, is that he said that the renewable part of
5 energy is kind of a burden. And it is a little bit in
6 the beginning, but we can always move to that in the
7 future until we get a network in place.

8 Can you move to the next slide, please? All
9 right, there's some optimal technical requirements for
10 hydrogen fueling dispensers.

11 The duration of fill, a customer wants a short
12 fill time. This is something important, the 700 BAR,
13 that 350 BAR does not have.

14 Faster fills, they require specialized
15 equipment, chillers, other things such as that. At the
16 moment there seems to be multiple standards for COM,
17 non-COM, cars are using 700 and 350, and everybody's
18 going off of VJ2601 fill tables.

19 One question that has been brought up is this
20 going to be proprietary, VJ2601? I've heard rumors that
21 it's going to be proprietary.

22 MS. BARONAS: Are you talking about the SAE
23 standard? So, by definition an ANSI accredited group,
24 like SAE, is totally an open process. Does anyone know
25 any differently on that.

1 MR. KIEZEK: Yeah, this is Ed Kiezek of Air
2 Products. I think if you read through SAE J26 on you
3 will see that there are citings for four air products
4 patents that apply to that standard and it's well
5 publicized.

6 MS. BARONAS: Thank you for that.

7 MR. POPPE: So, if we all have to abide by a
8 standard that's patented, what comes with that sort of
9 thing?

10 MS. BARONAS: So, in an ANCIH accredited process
11 patents are possible. However, they go along with
12 what's called reasonably and non-discriminatory terms,
13 RAN processing. So, it would -- the technology is then
14 in the public.

15 Does anyone know any different in the SAE case?
16 There you go.

17 MR. KIEZEK: Well, this is Ed Kiezek again.
18 Just so everybody's clear, we stated categorically that
19 we would make available license terms that are
20 reasonable and customary for those patents so that
21 anyone who chose to can practice J2601, if they such
22 require those patents to do so.

23 MR. MC KINNEY: Great, thanks Ed. Jim McKinney
24 here, Energy Commission, I'd like to flag this for a
25 point of discussion as we get into the roundtable and

1 Q&E.

2 MR. POPPE: Okay, can you move to the next
3 slide, please? Now, ease of use is going to be very
4 important at the dispenser, the customer must know how
5 to fill a vehicle. I've seen customers come in there
6 and they don't know what's going, or it's different at
7 some stations. So, I think the dispenser sequence must
8 be the same for every station so that a customer can go
9 to any station and know exactly how to use the
10 dispenser.

11 Displays sometimes have a problem being in the
12 light so maybe we can come to a system where there's
13 buttons, or something, some sequence that you wouldn't
14 have to actually enter PIN numbers in a display, and
15 sometimes that gets a little confusing for people.

16 The next slide, please. Safety, now the
17 dispenser must be foolproof. Customers will make
18 mistakes, especially with filling with gas, so they must
19 be a redundant system that can't possibly be broken.

20 We need to increase the safety for non-com
21 fills. I notice that there's not really anything in
22 place if you go -- if you have two dispensers, a 350 BAR
23 and a 700, that if you go -- somebody could fill at the
24 350 BAR, non-chilled, and then go to the 700 BAR and
25 fill chilled, and the tank could overheat if it's a non-

1 com 700 BAR. So, we have to have other -- all com for a
2 700 BAR or all com for a 350 BAR, or something has to be
3 done about that.

4 I agree with some other presenters, station and
5 dispensers must be certified under a uniform standard,
6 so there must be some kind of committee that can come by
7 and say the station's certified for the safety of all
8 stations.

9 Next slide, please?

10 MS. BARONAS: Please conclude in three minutes.

11 MR. POPPE: Okay. Point of sale, stations will
12 need a method to charge per fill. It's the only way
13 that I think that we can really make profit and make it
14 down to the customer. It must match current charging
15 methods, which I think is very possible.

16 Back-to-back fills, I think this is something
17 that can be done unlimited. You know, there's
18 technology out there, you can compress directly to the
19 car. I don't see why any customer would have to wait
20 for a fill.

21 The next slide, please. Now, if we use a
22 scalable design, like I said, we can construct more
23 stations, they'd be cheaper to produce. And 100
24 kilograms a day seems to be what your goal is, but that
25 would require on-site generation for the most part and

1 that almost doubles the cost of a station. So if you
2 can take that part out of it, you can build maybe twice
3 as many stations, especially initially. And then when
4 consumer demand grows you can figure out where to focus
5 on maybe adding generation to the station. As long as
6 you've got the right footprint and the site's picked out
7 properly.

8 Future funding can go towards increasing
9 capacity, while current funding can increase the number
10 of stations.

11 The next slide, please. Now, there's a question
12 about funding options for assistance in application
13 development. I've got a few ideas, you can design a
14 submission for a prototype and that can get approved for
15 development, just the same way as a bid would.

16 You can hold a large-prize competition like, you
17 know, X prize or something.

18 Or you can do milestone funding. You create a
19 series of milestones for the technology you're
20 developing and each time you reach that milestone you
21 can get paid.

22 The next slide, please. What we need to do is
23 increase priority for destination stations and stations
24 that connect cluster stations because I notice that the
25 people we have now, they don't want to just drive around

1 town, they want to go someplace.

2 Let's consider achievements of previous awards,
3 you know, companies that can't build stations on time,
4 or on budget, shouldn't be awarded the next time around.

5 Let's set specific objectives now and let
6 consumers dictate future objections.

7 And that's the end of my slides.

8 MS. BARONAS: Garrett, thank you for staying on
9 time.

10 Moving on, the next presenter, in A to Z order,
11 is Linde.

12 MR. ECKHARDT: I'll just wait until they --

13 MS. BARONAS: Okay, Steve, that's great. Thank
14 you.

15 MR. ECKHARDT: Okay, you can move on a couple of
16 slides, I believe.

17 MS. BARONAS: Kindly introduce yourself for the
18 record. We do know who you are, but for the public
19 record, thank you.

20 MR. ECKHARDT: Hi, my name is Steve Eckhardt,
21 I'm a Program Manager for Hydrogen Fueling, for Linde
22 North America

23 The first slide is just the summary of Linde
24 Group, which I went through last week, so we can skip on
25 to the next slide.

1 With respect to cluster station technical
2 performance, to the extent that we provide customers
3 with a fueling experience that matches or is very close
4 to the conventional fueling experience we will succeed
5 in using the infrastructure to drive fuel cell vehicle
6 sales, and reduce emissions in California.

7 This, combined with cost effectiveness, should
8 be the guiding principles for determining minimal
9 technical requirements. So, it's meeting consumer
10 needs, as well as cost effectiveness.

11 The SAE fueling protocol should be a minimum for
12 any car fueling to ensure consumers don't face
13 inexcusable wait times or see their wait time compounded
14 when they arrive at the pump and somebody is already
15 fueling.

16 Fueling capacity should be based on peak fueling
17 hours, which is about 12 hours per day. Obviously,
18 people don't typically fuel at midnight or 3:00 a.m., so
19 we should not use a full 24 hours to calculate a daily
20 capacity.

21 In addition, this will ensure all stations meet
22 a robust, minimum standard to fuel cars in a reasonable
23 fashion during the peak fueling hours.

24 With cluster stations the OEMs desire even
25 greater performance than shown above. However, to be

1 cost effective, these enhanced performance requirements
2 may not be appropriate on every station.

3 Increased performance should not be punished,
4 but encouraged by the CEC through a funding bonus to
5 ensure some stations include these. And I'll talk more
6 about this in the next few slides.

7 Higher through-put is not about hoping for more
8 cars, but putting in the assets so that a station can
9 meet consumer demand in the second year of operation.
10 Not in the fifth year or the eighth year, in the second
11 year.

12 With nearly 10,000 cars on the road in 2015,
13 stations must have the capability to fuel four to five
14 cars per hour over an extended period. On many days
15 this is what's going to happen.

16 I talked about the SAE specification, which is
17 what we recommend as a minimum standard. However, if it
18 is not, it should be incentivized.

19 Finally, a dispenser that can fuel two cars at
20 the same time has been requested by the OEMs. And while
21 we don't believe it should be a minimum requirement, it
22 should be encouraged through incentives.

23 The next slide. So, why is a 300-kilogram or so
24 station needed? This is an example of the Bay Area
25 cluster at the end of 2015, when 2,000 vehicles are

1 expected to be on the road, supported by 68 fueling
2 stations throughout the State.

3 If you look in the upper left-hand corner, this
4 is the rough split of stations in the California Fuel
5 Cell Partnership roadmap.

6 The daily through-put of stations and the
7 clusters will be substantially higher than that for
8 connector stations, or destination stations, which leads
9 to an average cluster station capacity of approximately
10 170 kilograms a day in the Bay Area, for this example.

11 Each station will not have the same through-put
12 and I propose that the through-put of stations may look
13 somewhat like a Bell curve, with some stations
14 dispensing very low quantities, or maybe 25 kilograms a
15 day, which is on the bottom left part of that graph, or
16 as high as 320 kilograms a day which is the point all
17 the way to the right on that, which you can't see.

18 We believe these larger stations, or at least
19 some of them, need to be funded now. Larger through-put
20 stations are usually the best located stations and these
21 well-located sits are likely to be the ones selected
22 earliest in the CEC's solicitation process, as in this
23 year.

24 Larger through-put stations are the ones better
25 known to consumers and these are the ones likely to have

1 been operating for longer.

2 In addition, the longer a station operates, the
3 more the demand is driven in that neighborhood. People
4 see these cars driving around in their neighborhood,
5 people in those neighborhoods are more likely to buy
6 more cars, which puts even more volume on a station.

7 Finally, it is wise for us to prove out these
8 higher through-put stations so when consumers arrive in
9 high numbers these stations can, indeed, operate
10 reliably at its limits. It proves the practicality,
11 fueling a lot of cars over several hours, the economics
12 and the technology.

13 This is key to proving the business model and
14 convincing investors this is a viable proposition.

15 The next slide. This graph comes from DOE-
16 funded study which was based on fueling patterns at
17 Chevron stations in California. This graph shows Monday
18 and Friday fueling patterns, and graphs are available
19 for other days of the week that are relatively similar.

20 Each dot on the graph represents the percentage
21 of fuel dispensed as a percentage of the entire day in
22 that specific hour.

23 As you can see, there's no drop off in demand
24 between rush hours. And if you take the peak 12 hours,
25 it constitutes about 75 percent of the fuel dispensed,

1 and that's roughly from 7:00 a.m. to 7:00 p.m.

2 I would propose this is a reasonable proxy to
3 use to predict how consumers might use a hydrogen
4 fueling station.

5 The next slide. This graph shows the hydrogen
6 fueling pattern for an average day, based on the Chevron
7 data, from the DOE study I just referenced.

8 It shows several-sized hydrogen stations fueling
9 anywhere from 20 to 200 cars per day. The area shaded
10 in purple shows the peak fueling hours, 7 a to 7 p.

11 The station which uses fixed -- the station
12 which fuels 50 cars per day, which is the pink curve,
13 would fuel about 38 of those cars from 7:00 a.m. to 7:00
14 p.m. And during the busiest five hours, it would need
15 to fuel about four cars per hour.

16 For the 90 cars per day, which is the yellow
17 curve, that station needs to fuel six to seven cars per
18 hour for the peak five hours.

19 So, it is important to consider and use the peak
20 12 consecutive fueling hours as a basis for calculating
21 daily capacity. And it is important that these stations
22 can fuel on the order of four to five cars per hour for
23 an extended period of time.

24 Again, this is looking at 2015 vehicle data,
25 which is only about one year after these stations start

1 up in 2014.

2 Thanks for the opportunity to speak.

3 MS. BARONAS: Thank you, Steve.

4 Okay, so is the representative from Plug Power
5 on the telephone?

6 Okay, so as mentioned earlier, that presentation
7 will be used for section non-bus and non-road projects.

8 So, may I see slide 02? Okay, so we are up to
9 B, equipment standardization.

10 So, this slide lists some potential
11 standardization activities that may be part of the
12 overall picture of the future solicitation.

13 And so what's listed here are compliance with a
14 number of SAE standards and also compliance with future
15 Division of Measurement Standards processes.

16 So, we do have a presentation today. Could we
17 please pull up the presentation from CDFA? Thank you
18 for that.

19 And so, kindly introduce yourself for the public
20 record and then proceed.

21 MR. INGRAM: Hello, I'm Norman Ingram, with the
22 Division of Measurement Standards, State of California,
23 Department of Food and Agriculture.

24 We're here to give you some brief overviews of
25 some of where our requirements are based, and just to

1 remind you not to forget about us during your process.

2 So right now we have a tentative code and
3 handbook 44. This is the National Institute of
4 Standards and Technology Handbook 44. This tentative
5 code was derived through consensus representation of
6 regulatory and some industry representatives, as well as
7 representatives from NIST.

8 Currently, as I mentioned, it's a tentative code
9 and those requirements can be found in Handbook 44 for
10 the specifications, tolerances, and other technical
11 requirements for weighing and measuring devices.

12 In addition, we have the NIST Handbook 130 that
13 set out the method of sale. California adopts portions
14 of NIST Handbook 130 when we develop our own regulations
15 regarding method of sale and the retail dispenser
16 labeling, street signage and advertising requirements,
17 as well.

18 Okay, you can go on to the next slide. Now, a
19 little more detail within the dispenser performance
20 requirements, the first thing we have is a type
21 evaluation. That's California State law, that the
22 division requires all commercial weighing and measuring
23 devices, before they even go into service, undergo the
24 process of type evaluation. That's a rather extensive,
25 rigorous testing protocol for performance against

1 Handbook 44, as well as the other technical requirements
2 related to the device.

3 Now, once we get approval the device has
4 undergone the type evaluation process, the device will
5 undergo a routine regulatory compliance. Typically,
6 conventional motor fuel dispensers are on a one-year
7 basis. The same thing -- I believe we predict the same
8 thing for these types of devices, as well, will be
9 tested on an annual basis, after they're type evaluated
10 and installed.

11 Type evaluation assures a couple of things
12 before the device is accepted, to make sure that it does
13 meet all the requirements, it performs and meets the
14 tolerances in the code, as well as making sure the
15 device is correct and appropriate for the installation.

16 So this also includes, you know, as I mentioned
17 earlier, that it be accurate and correct during use, and
18 appropriate.

19 And another highlight here in this particular
20 code is that the units of measure for the hydrogen
21 dispenser are set forth to be in the units of kilograms.

22 In addition, we have the fuel performance
23 requirements. Right now California does plan to adopt
24 SAE J2719 for fuel quality specifications.

25 And then, in addition, in California we have

1 relatively strict, compared to some of the other
2 jurisdictions throughout the country, we have relatively
3 strict advertising and labeling requirements. I mean
4 strict to the sense that we even dictate the size of the
5 letters and so forth, things along that nature.

6 And then, again, the method of sale was to be
7 put at the kilogram.

8 Okay, you can go on to the next slide. And for
9 additional information, as I mentioned earlier, the two
10 NIST publications, they can be accessed on the NIST
11 website and we do have links of our own website here,
12 for our California Business and Professions Code and the
13 California Code of Regulations.

14 And then, as I mentioned, we have links to the
15 NIST website, as well. From there we can download those
16 handbooks for free.

17 And for additional information on fuel pricing,
18 labeling and advertising, you can contact Kevin
19 Batchelor, at the Enforcement Branch of the Division,
20 with his information there as well.

21 So, that kind of concludes our little
22 presentation. Again, it was just a reminder that we're
23 in the background here. We have certain specifications
24 and technical requirements that are really outside or
25 separate from your engineering requirements and safety

1 requirements, and all our requirements deal around the
2 device and the transaction.

3 So, that concludes our presentation, unless
4 anybody has any questions.

5 MS. BARONAS: Any questions for the speaker?

6 MR. MC KINNEY: I've got a question. Thanks
7 very much, Norm, for coming. We don't forget about you,
8 you are part of our process, so don't feel -- at the
9 risk of putting you on the spot, several of our
10 stakeholders have been asking about just your progress
11 to date, you, in developing these standards. You know,
12 as you work, I think, kind of in parallel with our
13 solicitation process as we work to get this next round
14 of stations up and running.

15 MR. INGRAM: Yes, we do that. That is in
16 progress, as well. Of course, maybe as most of you
17 know, we had -- were awarded some agreements and funding
18 from the CEC to develop particular standards and also
19 help develop some of the analytical methods used to
20 detect contaminants.

21 So, along the standards front we did go into a
22 separate agreement with the National Renewable Energy
23 Lab to build a particular standard. Actually, it's
24 three standards. We're looking at three different
25 methods of proving for performance.

1 We're looking at the gravimetric method, which
2 would simply dispense a certain amount into tanks, and
3 then we would weight a tank before and after, and
4 determine the net contents, and compare that to the
5 dispenser.

6 The other method we're looking at is the
7 pressure volume temperature method whereby we have a
8 known cylinder volume instrumented with temperature and
9 pressure sensors to derive a density, so that we can
10 take that density factor and multiply the volume of the
11 cylinder, and come out with a mass amount as well, or a
12 volume amount.

13 And then, finally, the master meter, which is
14 basically a one to one. It's another meter, similar to
15 the one in the device, that would be put in line between
16 the vehicle and the dispenser, then the meter would
17 register the amount dispensed in the vehicle. And
18 again, we would compare that to what the dispenser says.

19 But all three of these methods right now are
20 under development. The standards, the process was
21 relatively a complex, tough process, the parts
22 available, tanks and things like that have changed since
23 we started all this, so we've had to change a little bit
24 of our -- some of our requirements to adjust to what
25 we're actually able to get at this point in time,

1 although, it's very similar to what we requested,
2 anyway.
3 We do have the tanks in procurement, now, and that will
4 really be the basis of the start of everything else on
5 the device, itself, the standard, because once we get
6 the tanks then we can go from there with everything
7 else. That will pretty much dictate the scale
8 requirements of the division size, and capacity, and
9 such.

10 But all this is in progress right now and we
11 anticipate -- I believe we were presented with an
12 updated timeline from NREL that said that they could
13 have this device built, possibly, by the end of August
14 and we would start beta trials early September. And,
15 hopefully, conclude that by the end of September.

16 And then our potential from there is to take the
17 device in the field. Not necessarily to see what the
18 dispensers -- how they perform, but to validate the
19 device in the field.

20 The first process of this is for us to get the
21 device validated in the lab so that we know that we have
22 consistency, the device functions properly, and gives
23 good results.

24 And then after that we'll deploy it in the field
25 and validate it there as well.

1 Again, it's not really to see how the dispensers
2 perform at that point, although that's data we'd be
3 interested in and certainly we'd look at that, but
4 that's not -- that wouldn't be the real purpose to have
5 the device in the field at that point.

6 So, I hope that answered your question. Any
7 others?

8 MS. BARONAS: Yes, this is Jean Baronas. So,
9 your output from the NREL studies, your three
10 specifications, could you kindly explain how they fit
11 into the formal standards process?

12 MR. INGRAM: I'm sorry, I don't -- could you ask
13 me that again?

14 MS. BARONAS: So, the work you're doing with
15 NREL is there a connection with either an adoption
16 process you're planning or considering on the part of
17 the State of California?

18 MR. INGRAM: Well, as far as Weights and
19 Measures is concerned it is to determine out of those
20 three methods, the gravimetric, the BBT, and the master
21 meter, which one would be the most cost-effective,
22 efficient method to use for testing in the field, for
23 routine regulatory testing and, perhaps, for type
24 evaluation as well.

25 Type evaluation's a little different process.

1 The times involved are usually more extensive and the
2 testing is a little more involved, but that's kind of a
3 separate thing.

4 I mean we'd really like to make a determination
5 on the best standard to use for compliance testing. So,
6 it's related in that sense that -- to the weights and
7 measures functions as to which standard we would chose
8 to use.

9 MR. MC KINNEY: Then Norm, if I can build on
10 Jean's question here, I'm fairly ignorant about this
11 part of the business and process, but I imagine there
12 will be some public process for CDFA as you begin to
13 evaluate these different techniques to, you know, assess
14 metering?

15 MR. INGRAM: That, I don't know if I could
16 really answer. Typically, the development of the code
17 was a consensus development to put the specifications
18 and requirements in the code. But as far as the test
19 method, I don't really think the public would have any
20 input on this. It's basically going to be the research
21 data that we obtain from NREL and to analyze that, and
22 make a decision based on that.

23 MS. BARONAS: Okay, so this is the moderator. I
24 see two individuals wanting to speak. Anyone else?
25 Okay --

1 MR. STAPLES: I did have a question.

2 MS. BARONAS: Okay, Paul, I've got two people in
3 queue and then I'll be right back with you.

4 MR. STAPLES: Good, thank you.

5 MS. BARONAS: You're welcome. So, Ron, please,
6 did you raise your hand?

7 MR. NIES: Yeah. Sorry --

8 MS. BARONAS: Who are the other questions?

9 MR. BOYD: This is Bob Boyd questioning Norm.
10 and the output of your NREL project, are you going to
11 have sort of -- is that going to validate the methods
12 that have been in development at NIST or is the output
13 of the NREL contract, say, going to be some actual test
14 devices that can be used to test dispensers in the
15 field?

16 Or is the NREL contract just to really validate
17 the test method?

18 MR. INGRAM: It's really for the method but
19 because there's a device involved to establish that
20 method, I think that's an indirect result of what we're
21 doing.

22 Our tasks were to -- when we entered into an
23 agreement with the CEC, our task was to develop the
24 standard. So, this was our research answer to have NREL
25 develop the device and then we would do studies to

1 determine which would be the best.

2 MR. BOYD: So, if I'm a dispenser or a station
3 operator do I have to use that particular device --

4 MR. INGRAM: Oh, no, no. No.

5 MR. BOYD: -- or can I use any device that, you
6 know, sort of proves meter accuracy?

7 MR. INGRAM: As long as the test equipment
8 presented for the type evaluation and/or compliance, as
9 long as it meets the requirements to -- typically, we
10 have a three-to-one ratio of -- in other words, the
11 instrument that we're testing, we prefer the instruments
12 we're using to validate that instrument have at least
13 three times better the uncertainties in performances.

14 MR. BOYD: Thank you.

15 MS. BARONAS: Thank you for your question.

16 Any other questions, I thought I saw an
17 individual? Ron, did you?

18 MR. NIES: Yes.

19 MS. BARONAS: Ron, please introduce yourself for
20 the public record.

21 MR. NIES: My name's Ron Nies with the Division
22 of Measurement and Standards. And I'm not sure I
23 understood the last question, but I think we need to
24 make the point that if you have a device that you want
25 to use commercially, you have to come to the Division of

1 Measurements and Standards and have that device tested,
2 and prove that it meets the standards.

3 It's just like the county sticker that's on the
4 gasoline and diesel dispensers at the filling stations,
5 they've gone through type evaluation in our office,
6 first, and then they're tested in the field on a regular
7 basis as well. And that's what these standards that
8 we're developing are to be used for.

9 MR. INGRAM: Well, yeah, actually I would like
10 to elaborate on that, if I may --

11 MS. BARONAS: Please introduce yourself for the
12 record.

13 MR. INGRAM: Oh, I'm sorry.

14 MS. BARONAS: Thank you, Norm.

15 MR. INGRAM: This is Norman Ingram again, with
16 Measurements and Standards. And I would like to
17 elaborate a little more on -- I mean you can use other
18 equipment that's provided, provided it does meet certain
19 requirements, so as I mentioned the three-to-one stuff
20 before.

21 But, as well, we do have traceability
22 requirements that the device that's being used be
23 certified by certain laboratories that have authority to
24 do particular calibrations or certifications of that
25 type.

1 So I mean it's just -- it's not really that
2 simple that, yeah, you can use anything. You can as
3 long as they meet these other certain requirements that
4 we have, and those being some of them, you know, as far
5 as the laboratory doing the work on that standard.

6 MR. BOYD: Thank you. This is Bob Boyd again.
7 And just to clarify, when I -- when I say device, I was
8 meaning the device to test the dispenser.

9 MR. INGRAM: Right, yeah.

10 MR. BOYD: And when you're saying device, you're
11 thinking of the dispenser, itself, right?

12 MR. INGRAM: No, and my answers were in
13 reference to your -- I knew you were talking about --

14 MR. BOYD: Yeah, right.

15 MR. INGRAM: So that standard we're using has --

16 MS. BARONAS: Please introduce yourself for the
17 record, Norm, so your response to Mr. Boyd is?

18 MR. INGRAM: The standard.

19 MR. BOYD: Yeah, we're -- we're talking on
20 the -- this is Bob Boyd again. We're talking on the
21 same page and the standard --

22 MR. INGRAM: The standard used to test the
23 dispenser.

24 MR. BOYD: The standard is used to test the --
25 yeah, we're talking nomenclature. The standard is

1 actually a physical thing, not a piece of paper
2 standard. The standard is a standard measure and then
3 the device is the dispenser, so it's a lingo.

4 MS. BARONAS: So I believe what you're -- this
5 is Jean, your moderator. I believe what you're talking
6 about is standard reference material, SRM, there's an
7 actual code name for that. So, that is the device by
8 which someone references measurements back to a standard
9 reference material.

10 So, on the phone we have Mr. Staples, please.

11 MR. STAPLES: Yes, Paul Staples, HyGen
12 Industries. I had a question for the gentleman from
13 Weights and Measures.

14 It's been referenced to the fact that in Europe
15 there are many stations that have been and are being
16 installed, and they've already gone through
17 certification.

18 I've talked to many, several dispenser
19 manufacturers. In fact, none of them are in this
20 country, everyone is elsewhere.

21 But some of them have already had their systems
22 already certified and evaluated on -- for weights and
23 measures. And so what I'm wondering is that if they've
24 already gone through that process, would that quality
25 for the State of California or do you need to do that

1 testing again?

2 MR. INGRAM: Well, here in California --

3 MS. BARONAS: Please identify yourself. Thank
4 you.

5 MR. INGRAM: Hello, again, I'm sorry, this is
6 Normal Ingram with Measurement and Standards, and I'm
7 going to answer Mr. Staples question.

8 In regards to that, devices already being
9 certified or type evaluated, do we accept from other
10 countries?

11 There are similar organizations to ours here in
12 California. In the European community I believe it's
13 the organization of the OIML, the Organization
14 International Metrology Legal, where they have
15 requirements in the weights and measurements community
16 similar to ours, and they perform type evaluations as
17 well, similar to ours.

18 Unfortunately, we don't have a mutual
19 recognition kind of program for these types of devices
20 at this time.

21 So anything that would be done in Europe would
22 have to be duplicated here in North America.

23 We also have some mutual agreements with the
24 Canadian Weights and Measures on certain measuring
25 devices and weighing devices. I'm not sure right now if

1 this particular device would fall under that. I believe
2 there are motor fuel dispenser mutual agreements,
3 whether or not this would be included in that, I don't
4 really know at this point.

5 MR. BOYD: This is Bob Boyd, I just want to make
6 a further comment. I have been and still am a co-chair
7 or, actually, chair of the subcommittee of the NIST team
8 that has developed Handbook 44 and Handbook 130. I've
9 been the chair of Handbook 130, sort of team, sub-team.

10 We have been reaching out, the NIST team, DMS,
11 all of the people that have been on the NIST development
12 team have been reaching out to our European colleagues
13 for about five years, six years now.

14 It's only within the last six months that the
15 Europeans are starting to look at metrology. There are
16 some tests being done currently. But as of six months
17 ago there were no dispensers that had been certified in
18 Europe for weights and measures accuracy.

19 Yes, they are selling hydrogen and they have
20 some local agreements, but there have not been any meter
21 accuracy systems developed in Europe.

22 MS. BARONAS: And thank you for --

23 MR. STAPLES: And what about in Canada?

24 MS. BARONAS: Excuse me, please identify
25 yourself. I believe it's Mr. Staples.

1 MR. STAPLES: Yes, an my apology, Paul Staples
2 again. How about in Canada because that's where most of
3 the ones that I'm aware of in this hemisphere are made?

4 So, I understand that there's certification
5 there and, you know, from some of the dispenser people
6 that I've spoken to, they've got their systems certified
7 in Canada.

8 And being that there's such a close similarity
9 to our current systems and needs, I'm just wondering if
10 their certification would qualify here. And if not,
11 they're willing to provide funding for certification
12 here and we'd like to know how much that's going to be.
13 Thank you.

14 MS. BARONAS: Okay, so I believe Mr. Boyd will
15 respond.

16 MR. BOYD: Thank you very much, this is Bob Boyd
17 again, and speaking for the NIST team.

18 Yeah, we have been working with our Canadian
19 colleagues, as well, but there have not been meter
20 accuracy standards, physical standards developed in a
21 sort of a Federal role. Maybe some local -- in fact,
22 the Safety Authority in British Columbia has been very,
23 very involved in all of the stations and, yes, they have
24 been certified, but not for meter accuracy to the type
25 of Handbook 44 requirements.

1 MR. STAPLES: I see. Thank you very much.

2 MS. BARONAS: And thank you, Mr. Boyd. I do
3 have a question. Since you're on the NIST team, is NIST
4 planning to develop the standard reference material for
5 the metering accuracy testing?

6 MR. INGRAM: Well, when you say -- I'm sorry,
7 this is Norman Ingram.

8 MR. BOYD: Norm, why don't you answer that
9 because you --

10 MR. INGRAM: When you say standard reference
11 material are you referring to a device?

12 MS. BARONAS: Yes, I am. This formal process
13 includes SRMs. They have an entire process there, yes.

14 MR. INGRAM: NIST does supply technical advisers
15 to help develop such things, devices, but they don't
16 particularly develop those devices, themselves, but they
17 do provide input on the development of them.

18 So, I don't think they have, really, any
19 intentions of creating such a particular device.

20 MS. BARONAS: Thank you for your comment.

21 Okay, so moving on in the agenda, please, I took
22 the moderator's prerogative to expand that discussion a
23 little bit longer than the ten minutes. So, thank you
24 so much for the three people here who really helped a
25 lot of us understand the status of this work.

1 Moving on, now, to slide 03, please. So, this
2 slide lists possibilities for station access and
3 experience, we're on Item c of the agenda.

4 So, a few people have discussed this, I believe,
5 in the presentations prior. But just for discussion's
6 sake, let's please have an open discussion here about
7 the potential and the possibility of using these
8 characteristics for a future hydrogen station, and
9 infrastructure, and solicitation.

10 One is open access to current and future FCVs
11 and HICVs, H-I-C-E-V-s. Someone help me with this
12 acronym, how is this properly pronounced?

13 Would you please state your name and speak into
14 the microphone so that it's a part of the public record
15 today?

16 If you would like to take a seat at the table,
17 we can --

18 MR. SHEERS: Sorry, I'm multi-tasking. John
19 Sheers, the Center for Energy Efficiency and Real
20 Technology.

21 Several of the people at the table could also
22 just explain what that is. That's just referring to
23 hydrogen internal combustion engine vehicles.

24 MS. BARONAS: Thank you for --

25 MR. SHEERS: So, it uses the same fuel, but

1 rather than using a fuel cell you're using standard -- a
2 modified combustion engine.

3 MS. BARONAS: Okay, thank you for the
4 clarification, it will be a part of the public record
5 today.

6 And so along the line of open access, one
7 consideration is this concept of no prohibitive, meaning
8 the lack thereof, user agreements to limit the use of
9 the station.

10 Is there any open discussion on this as a
11 possibility for an element of a future solicitation in
12 the area of access and experience?

13 Hearing --

14 DR. MIYASATO: Can I just make a comment?

15 MS. BARONAS: Please, Matt.

16 DR. MIYASATO: Hi, Jean, Matt Miyasato, South
17 Coast AQMD. I think what -- it's a good idea to put
18 some requirement for public access. I think you need to
19 define what your interpretation of "prohibitive" means
20 because that could be interpreted differently by
21 different station operators.

22 Because although as we know now, there are
23 stations that are operational, but not fueling vehicles
24 because of what some would consider prohibitive
25 agreements and others may not think it's as prohibitive.

1 So, just to be cautious, please define that in
2 your solicitation.

3 MS. BARONAS: Thank you, so noted.

4 Please identify yourself, Jared.

5 MR. FARNSWORTH: This is Jared Farnsworth from
6 Toyota. From an OEM perspective, we want the experience
7 to be consistent with conventional vehicles as much as
8 possible. So, we don't want to put up any barriers that
9 potential customers would consider prohibitive and they
10 wouldn't want to buy the vehicle.

11 So, our view is we'd want it to be open with no
12 access agreements.

13 MS. BARONAS: Thank you for the comment.

14 Any other commenters, perhaps on WebEx?

15 MR. STAPLES: I have one question to that issue,
16 Paul Staples with HyGen Industries.

17 MS. BARONAS: Please go ahead, Paul.

18 MR. STAPLES: Okay. Maybe I'm jumping ahead
19 here but under the next category you have 24/7 access.
20 Can I ask a question about that?

21 MS. BARONAS: Please, yes. Thank you for
22 helping to move me along here. Comment on 24/7 access.

23 MR. STAPLES: Yes, 24/7, not every gas station
24 that's out there is open 24/7. Some of them are maybe
25 open from, let's say, 8:00 a.m. to 8:00 p.m., or what

1 have you. What about them? They're not qualified to be
2 a location, even if they're in a great location? I
3 would think that --

4 MS. BARONAS: Mr. Staples, let me just
5 reiterate, I'm so sorry I didn't communicate clearly.
6 This slide simply lists possibilities for --

7 MR. STAPLES: Okay.

8 MS. BARONAS: -- elements of our future work.
9 It's not saying it shall have, it must have. We're
10 saying these are possibilities to be discussed today by
11 all participants.

12 MR. STAPLES: Okay. Well, there are some
13 stations that are not open 24/7. Not all stations are
14 24/7. So, I would like to consider that they're open
15 during most business hours, like 12 or 14 hours a day,
16 that they're not going to be disqualified from
17 participating in this. So, that's my comment.

18 MS. BARONAS: I think I understand your comment
19 to mean that this element should be broader. Thank you.

20 Any other comments or questions on the 23/7
21 access?

22 MR. ELLIS: Yes, this is Steve Ellis with
23 American Honda.

24 MS. BARONAS: Okay Steve, thank you. Please go
25 ahead.

1 MR. ELLIS: Sure, so just a couple of thoughts.
2 One is on the bullet point of open access to all current
3 and future identified vehicles. I think it's important,
4 probably, to also add the word "certified" or
5 "approved."

6 This will be important, I think. I won't speak
7 for the station operators, but this is a point that has
8 come up in the past.

9 As to the user's agreements, our view is that
10 this needs to get to a point where it is identical to
11 gas station operation. Reasonable training, whether
12 done at the actual dispenser, as we see with CNG today,
13 would be fair.

14 But, ultimately, where with a minimal amount of
15 training and due diligence that access to the station
16 would be allowed.

17 And just a thought on the 24/7, I think if
18 there's a day when if a site is awarded that's not 24/7
19 that might be fine.

20 But I would offer that in this early stage when
21 we're really vying for the importance of every station
22 to have kind of unfettered access, in the early days
23 here it may be more important that they be 23/7, but
24 eventually could be not. Just as we live with gasoline
25 stations today.

1 And I think that words today with gasoline
2 simply because we do have so many options. Hence, if
3 one across the street is closed, the other one on the
4 other side might be open. We don't have that luxury
5 today. So, that's just my comments on that.

6 MS. BARONAS: Thank you, Steve. This is Jean
7 Baronas, California Energy Commission, and I just have
8 one question about your comments. You started out by
9 saying add "certified" or "approved", but then I missed
10 what?

11 MR. ELLIS: I'm simply saying that the vehicles,
12 where this bullet says "open access to all current and
13 future FCV and HICEVs" it may be important to add or
14 insert the word "all current approved or certified
15 FCVs."

16 In other words, you want to make sure that the
17 vehicles showing up for fuel are done in a sound manner
18 and that these are vehicles that won't, you know, cause
19 problems in the market.

20 Another way to put that is to be very cautious
21 of what someone may just put together in their garage
22 without a lot of good due diligence in engineering work.

23 MS. BARONAS: Thank you. I'm so glad I asked
24 that question. And here we have Jim McKinney with some
25 comments and questions.

1 MR. MC KINNEY: Yeah, a couple of things. Going
2 back to the open access agreement, can some of those
3 stakeholders here give us an example of something that
4 is considered prohibitive as an access agreement or a
5 user agreement?

6 MR. FARNSWORTH: I think, certainly -- this is
7 Jared Farnsworth. I think having a type of agreement
8 that needs to be signed and gone through before someone
9 can fuel can be very prohibitive, especially like a
10 destination station or a connector station. Because
11 someone may be used to what's in their cluster and they
12 may want to make a trip, but they may not be planning
13 ahead enough to realize they need to sign some type of
14 agreement before they arrive.

15 So, those types of things can be prohibitive to
16 customers, especially if they're stranded now because
17 they can't fuel.

18 MR. MC KINNEY: And again are there -- so thanks
19 for that. And are there current examples of such
20 agreements in use at the present time?

21 MR. FARNSWORTH: Yeah, maybe Steve can answer
22 more clearly for that, he has customers down in the Los
23 Angeles area that maybe are experiencing that, now.

24 MR. ELLIS: Yeah, and the only thing I'll say
25 about that is that I think it was noted earlier that

1 there are stations, let's say, that are up and running,
2 and ready to deliver fuel that not all automakers or,
3 you know, vehicle drivers can access today.

4 So, without getting into the specifics and
5 details of that it's, I think, an indication at this
6 early stage of, you know, a difference in how different
7 station operators or fuel providers feel, you know,
8 toward liability and training issues, and things like
9 that.

10 So, even the point about prohibitive user
11 agreements can be something as simple as pre-use
12 training whereby, for example, we at Honda have been
13 able to go as far as train the trainer at some of the
14 stations, where we can train, literally, an auto
15 dealership sales person to then train that lessee of the
16 car and we were able to train the dealer to do that.

17 Where another station the only way one can gain
18 access to the station is by training that's administered
19 by that station operator, themselves. So, I think as
20 Jared said, that is an example where a customer could
21 arrive at a station and learn that there's basically no
22 way to succeed in getting fueling, either by calling the
23 automaker or without scheduling training in advance with
24 that station operator.

25 So, it's a moment of time and I think this

1 bullet could be expanded to include prohibitive
2 training, whereby reasonable training done in a simple
3 manner would likely be fair.

4 I think a lower bullet does address it. Where
5 did it say? Well, I think I saw it earlier, where
6 training, possibly at the dispenser or menu driven at
7 the dispensers would be okay.

8 MS. BARONAS: Steve, thank you so much for your
9 input.

10 And so Mr. Boyd has a comment.

11 MR. BOYD: Yeah, I just wanted to follow up on
12 Jim's question. The issue, there's a few, there are
13 actually three issues. The primary issue is
14 authorization to fuel. How do you allow someone to take
15 the nozzle and stick it on their car, and fuel?

16 The common way to do that is to use credit cards
17 or cash. You could go up to the cashier and give them
18 some money and then they would authorize the pump to
19 actually distribute fuel.

20 So, one of the problems we have right now is
21 that we don't have a method of sale. So, in order to
22 authorize fueling you then have to have, let's say, a
23 special card, or a PIN number, or some way to access the
24 dispenser.

25 And then each station provider must decide who

1 can fuel at their station and then how to recover some
2 money.

3 So, you might have a user authorization system
4 that's on, say, a company. Toyota would come to a
5 dispenser station operator and say, hey, I want my cars
6 and my customers to fuel there so give me some access
7 PINs, or Mercedes or Honda could do that.

8 So, it's authorization to fuel that is the
9 issue. And if you have a method of sale that's approved
10 and you can tie it into your cash machine, then, or
11 credit card system, that solves your problem.

12 Another issue was brought up by Honda just now,
13 and that was keeping unauthorized vehicles away. We all
14 talk about, you know, the bubba factor. Someone says,
15 well, I've got a Honda Civic and it's a CNG car and I'm
16 going to make it hydrogen. And they're just going to
17 tweak things around a little bit and so they've got --
18 so that would not be an authorized vehicle to fuel.

19 And so, you know, we need some -- right now what
20 we're trying to say is, okay, OEMs can produce cars and
21 maybe me, in my shop, I can't produce a car that should
22 go out and fuel.

23 So, how do you weed out those people that
24 shouldn't be able to fuel?

25 Anyway, I'll leave my -- leave it at there.

1 MS. BARONAS: Okay, thank you for that. So, is
2 the NIST committee looking at a way to authorize this
3 vehicle type?

4 MR. BOYD: No. There has been some discussion
5 at California Fuel Cell Partnership and others about an
6 authorization method that might be an RFID tag that
7 would be issued, and managed by -- let's say the State
8 could somehow be involved and then the OEMs could have
9 these little RFID tags that could go onto the fuel door,
10 and then the dispenser could sense the presence of that
11 tag.

12 And just like that might be the DMV would issue
13 your little stickers that go on the back of your license
14 plate yearly.

15 So, that has been proposed as a method of
16 identification.

17 MS. BARONAS: Thank you so much. There's plenty
18 of open standards there that could be applied, in my
19 personal opinion.

20 MR. BOYD: Yes, that's correct.

21 MS. BARONAS: Yes, so Dr. Brown from University
22 of California at Davis -- University of California at
23 Irvine.

24 (Laughter)

25 DR. BROWN: I already feel bad enough sitting

1 here as Dr. Tim Brown, across from Professor Joan Ogden.

2 This is Joan.

3 MS. BARONAS: I am so sorry, excuse me.

4 University of California at Irvine.

5 DR. BROWN: Thank you.

6 I just want to make some comments, I think
7 everyone in the room's kind of being kind to me right
8 now.

9 Bob's points are well founded, but there's some
10 work-arounds to those. The real issue, I think, was
11 being pointed to earlier was the contractual agreements
12 between automakers, and station operators, and
13 providers.

14 And that's aimed a lot at me, at the Orange
15 County Sanitation District Station, where we had certain
16 user agreements and indemnification language that was
17 appropriate for our UCI station as a research station,
18 back in 2007. We've carried those over to the Orange
19 County Sanitation District Station, which may still be
20 appropriate given sort of the research focus of that
21 station, but is not really appropriate going forward for
22 cookie-cutter retail like station, where we have to have
23 these very onerous agreements between automakers, and
24 station operators, and providers. So, I think that's
25 one of the things that we need to move past.

1 And I believe that the language in the CEC
2 solicitations in the past, in previous hydrogen
3 solicitations have a good language that got away from
4 that method so that it was successful.

5 MS. BARONAS: Kindly just focus on the future.

6 DR. BROWN: The one that was awarded in 2010,
7 the previous stations had some sort of detail about user
8 remittance and that was successful, from my point of
9 view.

10 And we heard that last week I think when Ed
11 Heydorn spoke about having no user agreements for the
12 stations going forward and that seems like the right
13 model.

14 MS. BARONAS: Thank you for your input. I hope
15 you're still speaking to me given that I didn't get your
16 organization correct. So sorry.

17 DR. BROWN: That's fair enough.

18 MS. BARONAS: Thank you. So, now as a time
19 check it's now 20 minutes of 11:00 and so we're a little
20 bit ahead of schedule. Would you like a break?

21 DR. MIYASATO: I have a question.

22 MS. BARONAS: Please.

23 DR. MIYASATO: Before you go -- so, yes, I want
24 a break.

25 But the question I have is the CEC -- this is

1 Matt Miyasato, South Coast AQMD. Are you envisioning
2 that for each of these different characteristics on this
3 slide, for example, you would score station proposals
4 higher if they had more of these attributes or, I mean
5 what's your initial thoughts?

6 MS. BARONAS: So, in my personal opinion and I
7 can't wait to hear others from the staff say something,
8 we're so open right now, we're just putting these ideas
9 on this slide for discussion purposes. Thank you.

10 MR. MUENCH: If I may chime in here, this is
11 Tobias Muench with the Energy Commission.

12 So, I think the idea is that these are all sort
13 of technical minimum requirements of what we're looking
14 for in a station.

15 Although it is, of course, open. These are just
16 possibilities and suggestions right now that we're
17 discussing today.

18 I think we're going to move to the scoring
19 criteria on the next workshop. This is more about
20 technical requirements.

21 Does that answer the question?

22 DR. MIYASATO: Yes, it does.

23 MR. STAPLES: I have a quick question.

24 MS. BARONAS: Just a moment, please, who's on
25 WebEx? Matt, would you respond to Toby?

1 DR. MIYASATO: No, that's -- this is Matt
2 Miyasato, South Coast AQMD. Thank you for that.
3 Although I am a bit concerned if this is your technical
4 minimum requirements, I think we need to vet that more.

5 MR. MC KINNEY: And this is Jim McKinney. Matt,
6 are you prepared to expand on that right now or would
7 you like to --

8 DR. MIYASATO: Well, so for example, credit card
9 operability, that's specific to after a standard
10 developed, a question mark. So, if that's the minimum
11 floor, it seems a bit of the cart before the horse.

12 24/7 axis, I think we talked about that. That's
13 clearly desirable at this stage, but are you going to
14 disqualify good locations because it's not 24/7? Maybe
15 it's 24/6, you know, whatever.

16 So, I think you need to give yourselves some
17 flexibility.

18 MR. MUENCH: Well, understood, understood. I
19 think -- try to see this, please, as points of
20 discussion of how should we handle this? What is
21 everybody's input and suggestions on how to handle this.

22 We all are aware that there's no retail
23 standards or equipment certification for retail
24 standards for sale of hydrogen per kilogram at the pump,
25 yet.

1 So, somehow the credit card operability and the
2 access to fuel needs to be handled, or needs to be
3 required, or needs to be described in what we're looking
4 for, so that's what we need to hear from everybody and
5 that's what we're here for.

6 MR. ELRICK: If I can -- Bill Elrick, from the
7 California Fuel Cell Partnership, just to follow up with
8 what Matt's saying.

9 I think setting a minimum is good and I think in
10 general, and it sounds like the next workshop might get
11 into scoring criteria and priorities. But from 24/7 --
12 what I'm hearing is and what we hear in the industry is
13 within 24/7 or some of these attributes is beyond the
14 minimum enabling additional funds, or cost share, in
15 order to make sure there is some way to set a minimum
16 but, at the same time, reward going to -- if we're
17 looking at these stations being online in 2015 or so,
18 being ready for commercial. And that might be a way to
19 do that.

20 And in that same lineup, we're working so well
21 through the agenda, I did have a quick back step on some
22 of the performance criteria.

23 Some other things is to look at stations, no
24 stations -- not all stations need to or should be alike.
25 So, looking at the criteria for scoring, such as what a

1 cluster station might be versus a connector or
2 destination, and what those requirements may be. A
3 cluster may need to have more retail functions, more
4 capabilities compared to something like a connector or a
5 destination, which might be more scalable; it doesn't
6 need to start at such a minimum.

7 So, you might have different criteria for
8 different station type needs.

9 And then the last one I just wanted to make a
10 quick comment on, I think it was Mr. Poppe mentioned
11 milestone funding. We're still looking at about a three
12 plus year turnaround on station development through
13 these funding mechanisms.

14 So, something that might encourage the stations
15 to be developed quicker, such as a Caltrans type public
16 works projects, where you get done on time or you get
17 paid throughout the process instead of all up front.
18 You know, there's obviously some implications to that,
19 but that's intriguing to me.

20 MS. BARONAS: Thank you, Bill, so much.

21 So, I'd like to see the slide 01, please. And
22 during that transition Mr. Staples, please go ahead.

23 MR. STAPLES: Yeah, just real quick, first of
24 all, the problem of certification will solve a lot of
25 these issues. Certainly, if it's certified for weights

1 and measures you don't need to go through all of that
2 trouble, and you can just sell to whoever comes up with
3 a credit card. And that's, really, what I think the
4 goal should be here, first of all.

5 Finally, the question that was asked was give me
6 an example of a limited access fueling, okay, or a user
7 agreement. And those are usually commercial fuelers who
8 have accounts with big fleet operators who happen to be
9 in publicly accessible locations. And so long as the
10 fueler is willing to provide open access to anyone
11 utilizing hydrogen or fueling hydrogen I don't think
12 that that should be a barrier.

13 But that's basically where, like Pacific Pride,
14 they do commercial fueling with various different fleet
15 operators, and truckers, and that sort of situation.
16 They usually have very good locations and convenient
17 locations that make it very, very attractive to put a
18 fueling system in there.

19 But because they have memberships, where you
20 have to put a card in to be a member, that would be --
21 yes, but so long as they're willing to open that up,
22 okay, for open access for hydrogen, I think it should be
23 perfectly legit, okay.

24 And that was basically my comments on that, on
25 commercial fuel, so thank you.

1 MS. BARONAS: Thank you so much for that input,
2 Mr. Staples, for the public record.

3 And so now we are displaying slide 01. This
4 area seems as though we need to discuss more based on
5 the input.

6 If you recall, we showed this slide at the
7 beginning and then went into the presentations, the
8 contributions, which were quite excellent.

9 But after the break we'd like to start with 01
10 and have some detailed discussions about this concept.

11 So, since it's 10:50, please come back at 11:00.
12 The remainder of the morning includes a number of
13 points. First, slide 01, and then a discussion on
14 renewable hydrogen by both the Air Resources Board and
15 also UC Davis.

16 Thank you, see you at --

17 MR. EHLERS: Hello, hello.

18 MS. BARONAS: Yes?

19 MR. EHLERS: Yeah, this is Peter Ehlers from CSA
20 Group. I was raising my hand through the presentation
21 and was never recognizing, so before we go to break I
22 would like to say a few things on what's transpired.

23 MS. BARONAS: Oh, please accept my apology, I'm
24 so sorry, I didn't see you or hear you. So, please go
25 ahead.

1 MR. EHLERS: Yes, back-stepping to slide 02
2 regarding standardization, it's really important to
3 understand that there is a lot of initiative and a lot
4 of energy outlined by the USD. We road mapped for
5 hydrogen standardization recently and a lot of
6 significant standards are being published, with the
7 expectation by the end of this year they would be
8 recognized by ANSI.

9 Those are specific to what we're doing at CSA
10 Group specific to hydrogen refueling station equipment,
11 both at the system level, as well as at the component
12 level.

13 As I mentioned, these are ANSI recognized
14 standards written in the consensus process. They deal
15 with the safety and performance of valves at the
16 station, they deal with safety and performance of hoses,
17 in-line breakaways, et cetera.

18 And they are all now coming -- becoming
19 available and becoming publicly published.

20 It's very important that the future
21 consideration that goes into these stations take into
22 consideration the requirements that are outlined for the
23 component performance, that would then need to be
24 incorporated into the system via dispensers,
25 compressors, cascade storage devices and controls.

1 The other things that are being also published
2 are system level standards. There was comments made by
3 the Honda Group on certification of vehicles, or having
4 vehicles that are certified to meet some minimum
5 performance requirement.

6 Similarly, there are dispenser performance
7 protocols that have already been published, that do the
8 same for the dispenser to ensure that the dispenser will
9 work in concert with those certified vehicles that the
10 OEMs are now producing.

11 Those go by the CSA HCV4.3 specification. I see
12 in the slides we keep going back to the SAE
13 specifications. It's important to note that the SAE
14 specifications are written from the scope of the
15 automotive manufacturers, not from the scope of station
16 equipment.

17 So, yes, I agree that the SAE standards are
18 important, but they aren't the only ones that should be
19 considered for future specifications on the safety of
20 stations.

21 Really, it comes down to we always want to make
22 sure that we're never compromising the integrity of the
23 fuel source devices on the vehicles. And there's a
24 series of standards that are being developed on the
25 infrastructure and feed side that follow that same

1 thinking process.

2 So, as we begin to expand on the specifications
3 and requirements for hydrogen fueling stations moving
4 forward, I think we need to be very careful with what
5 the specifications will be with requirements all the way
6 through the system from the component level on through.

7 MS. BARONAS: So, this is Jean Baronas. A quick
8 question, is CSA Canadian Standards Association? I'm
9 only guessing?

10 MR. EHLERS: That's what we used to be known as.
11 We're actually an international standards association.
12 Our office is based in Cleveland, Ohio, actually.

13 MS. BARONAS: Okay, so then would you please
14 spell your last name?

15 MR. EHLERS: Sure, it's E-h-l-e-r-s.
16 And we are recognized by the DOE and the NREL standards
17 road map as having the subject area recognition over
18 components and hydrogen requirements.

19 MS. BARONAS: Okay, and then you mentioned CSA,
20 was it CSA 4.3 you mentioned?

21 MR. EHLERS: Yeah, 4.3 would be dispenser
22 performance requirements, so that would be working in
23 concert with the vehicle requirement protocol SAE J2601,
24 they're kind of right hand/left hand standards.

25 MS. BARONAS: Okay. Thank you so much for

1 speaking up. And, again, I apologize for not
2 recognizing you earlier.

3 Have you concluded your remarks?

4 MR. EHLERS: Yes, thank you.

5 MS. BARONAS: Okay, and so now it's 10:55, so
6 our break will take ten minutes. Please come back at
7 11:05. Thank you.

8 (Off the record for a break at 10:58 a.m.)

9 (Reconvened at 11:08 a.m.)

10 MS. BARONAS: Could we please take a seat so we
11 could get started. Thank you. Please have a seat.

12 Thank you for reconvening. So, I'm really
13 happy -- this is Jean Baronas, with the California
14 Energy Commission, I'm really happy to say we have even
15 more presentations. So, it's wonderful to have such
16 input today.

17 Along those lines, I'd like to start this
18 session or this portion of the session with a
19 presentation from the Air Resources Board, Gerhard
20 Achtelik.

21 And then I'm imagining that we move to the
22 discussion of renewable hydrogen.

23 So, Gerhard has a contribution on the station
24 performance and infrastructure.

25 And then, when we're done with his, let's

1 discuss his and then move to slide 01 again.

2 Here is the impact of this, I'm planning to go
3 until 12:30 before we break for lunch because we do have
4 three presentations on renewable hydrogen, one from the
5 Air Resources Board, one from UC Davis, and the third
6 from University of California at Irvine.

7 Does this change in the time, is this okay with
8 people, generally? Okay, okay, thank you for your
9 indulgence.

10 So, please, Gerhard, introduce yourself for the
11 record.

12 MR. ACHELNIK: Thank you, Jean. This is Gerhard
13 Achelik, with the Air Resources Board, and appreciate
14 the opportunity to present today.

15 And I will be covering a lot of the same points
16 that were already talked about earlier today and so I do
17 appreciate just to emphasis -- the opportunity to
18 emphasis those points.

19 If you can go to the next slide, please? And
20 just some ideas, considerations to follow is that -- and
21 we've talked about some of these is match station
22 capacity with expected through-put or with an ability to
23 upgrade, when appropriate.

24 And look at your key through-put points on the
25 12 to -- I'm sorry, 12- to 14-hour period, not a 24-hour

1 period.

2 And not directly implying here that the stations
3 shouldn't be maybe 24 hours, but definitely look at your
4 station capacity to dispense on -- you know, that
5 matches the Bell curve. Not a -- well, I guess it was
6 sort of a Bell curve, a curve that Steve showed earlier.

7 Then the station size consideration, look at
8 considering allowing different sizes for different
9 opportunities of stations. A connector could be the
10 smallest one.

11 And then a future cluster market would be
12 smaller, that's expandable, with the potential to
13 expand.

14 And then an established cluster, with high
15 through-put, would be your largest.

16 So, some of those concepts have been talked
17 about and that's just -- my number are slightly
18 different. But I think it's important to consider three
19 types of stations.

20 The next slide. The safety, ensure the customer
21 gets a safe, full fill in a required amount of time.

22 And then we had a lot of discussion today or
23 points brought up that maybe CSA 4.3 might be, you know,
24 a more appropriate reference. It's something it sounds
25 like we all need to -- or at least I need to learn more

1 about to figure out which reference we look at. 2601
2 certainly has on the vehicle side of it.

3 And for filling a car, you know, one point I'll
4 throw out there, do we need to define what a full
5 vehicle means? We just right now throw out 95 percent
6 state of charge, but maybe it's a done issue already
7 with the stations performing the way they're performing
8 today.

9 A fill time, depending on, you know, a three- to
10 six-minute goal for fills depending on how empty the
11 tank is, not everybody fills with just fumes. Some
12 people come in with fuel in their car, so some kind of
13 range that establishes the minimum.

14 And there should be -- and then back-to-back I
15 say we might not expect the same fuel speed. And I'll
16 say third and fourth, I think you do need to establish
17 an absolute minimum because the -- your connector
18 station might not be -- might not have to be designed
19 to fill a dozen cars in an hour, than where your cluster
20 station needs to be.

21 And so my point I was just trying to make here,
22 make sure no matter what, a station can fill a minimum
23 number of cars back to back, two, three. You don't want
24 to have a customer waiting a half an hour to fill,
25 before their vehicle is ready.

1 And where the connector station, now between
2 Northern and Southern California is the one that's not
3 likely to see a fleet of cars come, that could be the
4 one with the less stringent requirements.

5 The next slide. The other thing is I think
6 we're still at an early enough stage that -- and I just
7 throw some of the partners out that we've had experience
8 with. It's still an early enough stage that with the
9 performance requirements in mind that you look to
10 continue a diversity of participants.

11 I think that we haven't found the final
12 technology, yet, and so it's important to keep that
13 going. You know, even to the point where, because of
14 some of the renewable requirements and other things, we
15 might still consider electrolysis and things that might
16 not be as cost effective strictly on a per-kilogram
17 basis today.

18 But I don't think we've seen the final answer,
19 yet.

20 The next slide. As Jim has pointed out, the
21 Energy Commission has considered, has invested, or will
22 have invested a considerable amount of money by the end
23 of this fiscal year, and a potential \$30 million going
24 out, now.

25 So, I think a lot of flexibility is important

1 here, an appropriate mixture of station capacity,
2 station performance, station technology.

3 I think that -- and from my perspective, a
4 single criterion would not be the ideal way to go
5 forward for that amount of money. I think a lot of
6 variety is desired.

7 And the next slide, which says pretty much the
8 same thing, it just says design -- you know, if you can,
9 design your program opportunity notice to allow a lot of
10 flexibility.

11 Either, as you had brought up last week, Jim, by
12 allowing, you know, having multiple, simultaneous PONs,
13 or a single one that has flexibility.

14 And I emphasize flexibility because ideally we
15 get cluster stations, ideally we get connector stations,
16 and ideally we get destination stations. But I think
17 it's important to put out all these stations.

18 And if you were to get not -- you know, if you
19 designed to get five, or three, let's say destination
20 stations and you only get two bids, I don't want to lose
21 a station. So, emphasize flexibility that there is --
22 while there might be greater value for that one
23 destination station, if we don't get it, there is still
24 value for that cluster station that makes that market
25 more appealing.

1 So, that's sort of what I'm trying to say, don't
2 make it absolutely, give yourself all the flexibility
3 you can get.

4 And, you know, I think that covers a lot of the
5 points that were done before, so that ends my
6 presentation. Thank you.

7 MS. BARONAS: Thank you, Gerhard, appreciate
8 your input.

9 Okay, so now we're moving on to the renewable
10 hydrogen.

11 I'm sorry, please?

12 MR. MC KINNEY: I'm sorry, Jean, can we have a
13 discussion on -- because I thought the idea was to go
14 back to the performance slide before we get into
15 renewables.

16 MS. BARONAS: Ah, yes, I'm so glad -- I'm so
17 glad you brought it up.

18 MR. MC KINNEY: Oh, good. Okay, great.

19 MS. BARONAS: So, please bring up 01, slide 01.
20 Thank you.

21 MR. MC KINNEY: Yeah, and if I might, again, Jim
22 McKinney for the record.

23 There are a couple of themes that emerged from
24 that first discussion that I want to come back to. And
25 thanks, Gerhard, because you just made my job a lot

1 easier here.

2 So, some questions for the stakeholders and
3 again, all around the table. In 2010, the scoring
4 criteria that we used really emphasized, you know, high
5 capacity, high through-put, low cost. At that point in
6 time we were really trying to push down the costs of
7 these initials stations to be, again, more cost
8 effective and be more prudent with the government funds
9 that are the public money that's available.

10 So again, Gerhard, teeing off of what you were
11 saying about, you know, destination stations,
12 connectors, and kind of the core high capacity stations,
13 you know, we have to make some decisions on how we
14 structure the next solicitation and the scoring
15 criteria.

16 So one simple way to do that would be to have
17 some predetermined categories and I think you were
18 emphasizing flexibility.

19 But again this is, I think, a key question to
20 the stakeholder group, you know, are we ready to start
21 moving away from core station funding out to include
22 connectors and destination stations.

23 And I've got some other themes I want to come
24 back to, but why don't we just start with that point of
25 discussion.

1 DR. BROWN: This is Tim Brown from UCI. In the
2 presentation I gave last week on locations, I showed a
3 rollout strategy of where we're at today and where we
4 want to get to the 68, sort of what the first phase may
5 be or, you know, from here on out, first phase, second
6 phase, third phase.

7 Those locations were vetted rigorously with the
8 automakers and deemed the next most valuable stations.
9 We'd have to go back and look exactly how many were
10 cluster stations, how many were destination stations,
11 but I think that would provide a good guideline to the
12 distribution for future -- for the next round of
13 funding, which stations should be these different
14 classifications.

15 MR. FARNSWORTH: This is Jared Farnsworth with
16 Toyota. I agree. And last week we also presented kind
17 of the work flow of process to define those priority
18 locations for those stations.

19 So, we talked about having kind of a third
20 party, in this case we indicated UC Irvine, with their
21 "Street Tool" to gather information from OEMs, and
22 market data, and others. Aggregate those results and
23 then come out with that priority list, rollout list.

24 And then I think another kind of natural outcome
25 from that could be capacity with those priority

1 locations.

2 So I think we would recommend including that as
3 part of that process as you're looking at priority
4 locations or rollout plan, and capacities for those
5 stations.

6 MR. MC KINNEY: Anybody else want to comment on
7 this point?

8 MR. KEROS: Jim, this is Alex, with General
9 Motors.

10 MR. MC KINNEY: Hi, Alex.

11 MR. KEROS: And, you know, to answer your
12 question point blank, yeah, I think we are ready for
13 cluster stations, connector stations, as well as
14 destination stations.

15 Certainly, one strategy to think about that is
16 somewhat tied to the road map is if we're, in these
17 early years, trying to build additional markets. And
18 those additional markets, for example, might be a
19 destination locations, perhaps one of the proposals or
20 those seeking funding from the State would want to try
21 to maximize their potential by, let's say, not competing
22 in this cluster but, you know, going to a destination or
23 a connector location where they feel like their
24 technology can, you know, be maximized or get the most
25 through-put.

1 So, I think the answer is certainly yes and
2 that, at the same time as well, helps build the market
3 across the board.

4 So, I think it's very difficult, as we talked
5 about last week, to say here's station number one,
6 here's station number 68, and everything in between.
7 But provided the proposals are, you know, reviewed, I
8 think we can say this location and this technology makes
9 a lot of sense.

10 MR. POPPE: Garrett Poppe from Hydrogen
11 Frontier. I think if we do split this up into like
12 three categories that it's important to say that, you
13 know, a connector station's not going to take as much
14 through-put as a cluster station, so maybe we should
15 decrease the minimum capacity for each of those
16 stations.

17 MR. MC KINNEY: Jim McKinney, that's exactly
18 right. I mean that's what we need is to have a hard
19 discussion. And whether we do that today, July 10 at
20 South Coast, or afterwards, but these are the kinds of
21 things that we'll need to incorporate into the next
22 solicitation and the scoring criteria.

23 MR. ELLIS: Jim, this is Steve Ellis with
24 American Honda.

25 MR. MC KINNEY: Yeah, go ahead, Steve. And then

1 we have -- sorry, Jean, kind of stepping in here. And
2 then Bill Elrick will be next in line.

3 MS. BARONAS: Please.

4 MR. ELLIS: Okay, so just a couple thoughts.

5 One is very much appreciate the presentation and the
6 comments by Gerhard and generally agree with what he
7 just said.

8 On that note, I think last week one thing that I
9 had suggested is that you try to implement some type of
10 a feedback loop without regard to the technology or the
11 vendor. And I would put it this way, and that is if
12 posed to us, will this location meet our customer needs?
13 I think, you know, that would provide, I think, good
14 value to the process as far as -- and I emphasize
15 location in that particular point.

16 As far as the technology and meeting the needs,
17 then I think these points about the flexibility, whether
18 it's a connector or a destination have to be considered
19 because I think that will be critical to the pathway
20 forward.

21 MR. ELRICK: Bill Elrick, California Fuel Cell
22 Partnership, a couple comments. One, I think we've
23 heard the answer pretty bluntly that industry's looking
24 at now having clusters, connectors and destinations, and
25 the road map does outline and we've seen some of the

1 previous process pull out some of those priorities, so
2 that's, I hope, very clear.

3 The other is that while we may see different
4 needs in these different market types, one thing to keep
5 in mind is, it probably requires quite a bit of
6 discussion, for example, a cluster may not -- I'm sorry,
7 a cluster may have a much higher through-put throughout
8 every day of the week, as I think Linde's slide showed,
9 a good 12-hour period where it really is going to get
10 hit hard and so those clusters need to be ready for
11 that.

12 And while the through-put or the capacity of a
13 destination or connector might be much lower if you
14 think about the use of those locations, they might get
15 hit really hard on a Friday night and a Sunday
16 afternoon.

17 And so while you might think a different
18 capacity is -- it makes sense to what point, because
19 they may sit almost dormant for a week, you know, for
20 six days and really get hit hard on the weekend.

21 So, different ways to cut this, just keep that
22 in mind.

23 DR. OGDEN: Hi, this is Joan Ogden at UC Davis.
24 And I just wanted to say all three of those types of
25 stations add value to a network. And some of the work

1 we've done, particularly my colleague, Mike Nicholas,
2 has looked at what's the value of adding a destination
3 station or adding connector stations, and they're a
4 valuable part.

5 So perhaps, I'm not sure exactly how to do this,
6 but a metric or scoring criteria that looked at a
7 network value, in addition to just the individual
8 station value would help. You know, given extra points,
9 perhaps, to adding a connector station, adding a
10 destination station.

11 And I think, too, one of the earlier points that
12 was made, perhaps by Steve at Linde about, I think,
13 about getting the coverage and then building -- thinking
14 ahead so that you can be flexible to scale things up as
15 the traffic actually evolves and vehicles come. Thanks.

16 MR. MC KINNEY: Okay, any more contributions?

17 MR. STAPLES: Yeah, I'd like to comment.

18 MR. MC KINNEY: Yeah, go ahead, Paul.

19 MR. STAPLES: Paul Staples at HyGen Industries.

20 MR. MC KINNEY: Go ahead, Mr. Staples.

21 MR. STAPLES: Hello? Okay, thank you. Yeah,
22 looking at this on the chart with the -- just going back
23 to some of the thoughts that they had on capacity.

24 I think 100-kilogram minimum a day is good for
25 across the board, okay.

1 And then -- and it has to be scalable up. You
2 have to be able to scale it up if demand increases.
3 Because in the beginning, and much of these stations are
4 going to be sitting idle until the vehicles get out
5 there by the automobile makers, until they spit out
6 enough to where capacities will be -- demands would be
7 increased.

8 So, I would say start off with the 100 but you
9 have to -- in the cluster areas you have to be able to
10 scale it up and scale it up relatively quickly. Once
11 you meet your certain capacity, like 60 or 70 percent
12 capacity, you've got to start planning for your
13 expansion. I think if you put that requirement in, I
14 think you'd do well.

15 Because in the beginning you're going to have
16 assets sitting out there on the ground not really
17 getting a lot of business in the very beginning. We all
18 understand that and know that, and it's something we're
19 really to accept, that's why we have this three-year
20 operating period that is required for those stations to
21 build up market.

22 So, that is what my recommendation is. I agree
23 with CARB on that and I think that having, you know,
24 stations with lower capacity puts it into the potential
25 for being -- coming up short. And I think that it's

1 probably best to just go ahead and say, well, we've got
2 a minimum of 100 kilograms a day capacity. If you can
3 put in more, you get extra points. Okay.

4 And then on the cluster stations, the core
5 cluster stations, those stations that are put in at that
6 capacity will have to show that they'll be able to gear
7 up for higher capacity down the road.

8 That is the reason, a very important reason
9 because you have to make the case of economic viability
10 in the short run. And putting that much money on the
11 ground without getting a return on your investment in
12 the very beginning would probably be prohibitive from an
13 investor's stand point.

14 So, you start off with a small one, a lower cost
15 in the beginning, and then you expand on it as long as
16 the capacity -- as long as you can show that that
17 capacity can be expanded.

18 That's my thought, thank you.

19 MR. MC KINNEY: Great, thank you, Mr. Staples.

20 And I think that's a segue to one of the other
21 points I wanted to raise here.

22 And going back to your presentation, Garrett,
23 where I think you were saying that a 50-kilogram-per-day
24 might be an appropriate minimum for a small station that
25 could be scaled up. Did I get that right?

1 MR. POPPE: Garrett, from Hydrogen Frontier. I
2 think another issue is that when you look -- we want to
3 eventually make this a private enterprise. And when you
4 look at the overhead required for 100-kilogram-per-day
5 station, nobody's going to want to put that money down
6 right away. They want to start out with something small
7 and maybe build two. And the overhead cost is much
8 smaller if you just split that number in half.

9 So, I think we should consider that future
10 about -- we want these to turn into profitable private
11 stations, so let's speak about that today.

12 Let's think about that today, we want it to be
13 profitable and be a private enterprise in the future, so
14 starting out at 100 kilograms is -- I haven't even seen
15 that much traffic, honestly, especially a destination
16 station. I mean do we have solid numbers that there's
17 going to be that many cars for that many stations?

18 MR. MC KINNEY: Yeah, Bill Elrick.

19 MR. ELRICK: Two thoughts. And one that comes
20 to me is that when you ask for scalability and you get
21 the information, it's not just what they can scale up
22 to, but maybe it's a cost analysis that needs to come
23 with that. How much capacity increase for how much
24 money and that's a part of the equation.

25 The other one that looks at coverage, you know,

1 that is the disadvantage of some of these destinations
2 and connectors are they will have lower through-put
3 almost by nature -- well, by nature of the design. And
4 that's something we have to consider, but it comes down
5 to the fundamental of what we see already is when
6 someone goes in, even in today's vehicles that are
7 available for lease, they ask a few simple questions.
8 Fueling near my home? Okay, check if you have it.
9 Fueling near my work? Check, if you have it. I like to
10 go here on the weekend. And if you don't have that,
11 they go home and say tell me when you have that.

12 So, we have to recognize that on one hand those
13 stations are much more difficult to get to a profitable
14 on a through-put capacity, so I think this is where
15 you're hearing different numbers come up for that
16 capacity standard in those cases.

17 But at the same time, if this is going to be a
18 commercial market, the customers are already demanding
19 that so we have to start bringing those into the
20 equation, so that we can say yes to that last question
21 and kick this market off.

22 MR. KEROS: This is Alex with GM, can I make a
23 statement?

24 MR. MC KINNEY: Yes, please.

25 MR. KEROS: Okay, thanks. Just a reminder for

1 everybody, you know, the road map, when we talk purely
2 destination stations, and I think the way we're talking
3 about destinations, which is something that might only
4 be used on a weekend or infrequently.

5 You know, the California Fuel Cell Partnership
6 road map, there's very few of those stations that are
7 characterized in that type of manner.

8 And I'll balance that against, perhaps, some of
9 the "destination stations" but they're also early market
10 stations which are, perhaps, in San Diego, perhaps in
11 Santa Barbara, you know, maybe that sort of blur the
12 lines a little bit.

13 So, I think the CEC wants to consider some
14 minimum standards for perhaps the location type, but
15 we're also going to have to help each other out defining
16 what those are.

17 You know, a station in Lake Tahoe is probably
18 going to look a little bit different than a station,
19 perhaps, in San Diego, even though they're both
20 "destination stations."

21 So, I appreciate it's going to be difficult to
22 create buckets for each of these but, as Gerhard said, I
23 think we're going to need some flexibility to be able to
24 work around those types of different pieces of equipment
25 that really are, I'll say, location appropriate. Thank

1 you.

2 MR. MC KINNEY: Thank you.

3 MR. KIEZEK: This Ed Kiezek of Air Products, can
4 I make a comment?

5 MR. MC KINNEY: I'm sorry, identify yourself
6 again, please?

7 MR. KIEZEK: Ed Kiezek of Air Products.

8 MR. MC KINNEY: Yeah, go ahead, Ed.

9 MR. KIEZEK: I just want to urge the CEC to
10 really look at a lot of the work that's been done in the
11 past. The NPC Future Transportation Fuel Study, the
12 study that was done by MacKenzie for Germany, and really
13 look at what some of the other countries, like Germany,
14 and the stations and the platforms that they're
15 deploying, Japan and the direction that they're heading.

16 I mean the KHK has changed their codes and
17 standards to accept certain delivered product platforms.
18 And I think we've learned quite a bit from the DOE and
19 the Tech Val Program of what works and what doesn't
20 work, and I would urge you to take advantage of that as
21 we move forward.

22 And I think that's important also from the stand
23 point of we need to be commercial now and not experiment
24 and in order to move to 2015, where the automobile
25 manufacturers can put their cars out in the commercial,

1 out in the showrooms. Thank you.

2 MR. MC KINNEY: Okay, thanks.

3 MR. ELLIS: This is Steve Ellis with American
4 Honda.

5 MR. MC KINNEY: Go ahead, Steve.

6 MR. ELLIS: Just a couple of other thoughts.
7 One, I think just a guiding principle that's probably
8 important to adhere to is don't let these, I'm going to
9 call it exceptions, those that are the connectors or
10 destinations, which aren't the front of the cluster or
11 network stations, dictate the rules for the majority.

12 So, I think keeping that in mind, keeping a
13 balance that there may need to be vast flexibility on
14 those at this early stage will be critical.

15 And Jim, I think just one other point to
16 remember, to put it all in perspective. When we use a
17 100-kilogram station, and I'll use it in the context of
18 a connector, with an average take, let's say, of five
19 kilograms of hydrogen that would be 20 vehicles per day.
20 And I think we can all kind of sit back and say, wow, in
21 some of these instances this connector station may not
22 even get close to serving that many vehicles per day,
23 the demand for that just may not be there.

24 So, to Joan's good point, these can have great
25 value for that network. And as Bill described, when

1 asked the question on the showroom floor, whether the
2 customer is a go or no based on the ability to go
3 somewhere, that's critical.

4 But when it comes to the metric of this through-
5 put, it's going to be very likely quite different.

6 MR. MC KINNEY: Okay, thanks Steve.

7 So, again, kind of -- I think the two kind of
8 end points that I heard in this morning's discussion, so
9 Steve Eckhardt was talking about a sample station of 300
10 kilograms a day and then, Garrett, you're talking about
11 something quite a bit smaller at 50.

12 So again, the way we have done this
13 traditionally, going back to 2010, was to really
14 emphasize, you know, these core station, high through-
15 put, high capacity and trying to bring the cost down.
16 So, there are different cost factors with these
17 different sized stations, so we need to be more nimble
18 and I think have different categories, or have different
19 cost-effective criteria going forward if we're going to
20 do this.

21 And I just want to put out one last time, what
22 I'm hearing from the stakeholder group is that, yeah,
23 now's the time to really start funding these other types
24 of stations. Is that -- yeah, Tim?

25 DR. BROWN: This is Tim Brown. I just want to

1 reiterate what Bill Elrick said about the upgrade of
2 stations, this sort of small station with upgrade
3 potential is a great sort of engineering solution to the
4 chicken and egg problem.

5 We need to understand who would be required to
6 fund the upgrade.

7 Certainly, if we have a 500-kilogram-a-day
8 station, when that needs to be upgrade that operator's
9 probably making money and will do that himself. A 25-
10 or 50-kilogram-a-day station probably requires more
11 government money to upgrade, so we need to understand
12 the cost to a through-put benefit there.

13 MR. STAPLES: Can I --

14 MR. MC KINNEY: Let's see, we had Matt Miyasato
15 first and then you, Mr. Staples.

16 MR. STAPLES: Okay, great.

17 DR. MIYASATO: I want to pose a question to the
18 stakeholder group is that -- because I think Jim is
19 struggling here to try to get some clarity on what is
20 prioritized for station roll out.

21 And my interpretation had been that you want to
22 fund or you want to prioritize the clusters, first, and
23 then look toward maybe a second tier or third tier in
24 terms of connector and destinations. Is that not a --
25 I'm looking at Bill Elrick because I know he's been

1 working on the road map, and I'll look to Alex as well.

2 MR. MC KINNEY: But that -- I mean that has been
3 our strategy and we're hearing something a little
4 different today, so you're right. I wouldn't use the
5 word struggle, but I am trying to get clarification on
6 it. This is a really important issue.

7 MR. ELRICK: I think if we're looking at an
8 approximate 30 million -- this is Bill Elrick. If we're
9 looking at a \$30 million funding, we need to be funding
10 both clusters and the connector destinations at this
11 point.

12 At what balance, we probably have to look at
13 some of the prioritization that's gone through, and the
14 road map, and the other analysis to figure it out, and I
15 don't have an accurate number.

16 But yes, I think the cluster is where we need to
17 put most of our focus. We need to really pick out which
18 of these destinations and connectors.

19 As someone said earlier, you know, San Diego is
20 one we hear is really going to quickly move from a
21 destination to its own market pretty quickly, where
22 Tahoe may do that slower. So, that might give you some
23 of that prioritization.

24 So, this timing effect is everything. I don't
25 know if there's more to it than that. I'll do it as I

1 think of it.

2 MR. MC KINNEY: Okay. And then we had something
3 on the line, was that Paul Staples?

4 MR. STAPLES: Yes. In reference to that issue
5 of the -- how do you upgrade them and how do you deal
6 with that, I would say if you're going to go with this
7 suggestion here of a 50 kilogram connector station, and
8 expansion of a future cluster station of 100 kilograms,
9 and then the 200 to 400 kilogram, I think that would be
10 fine as long as you do not require the 200 to 400
11 kilograms.

12 And if it needs upgrades between -- to the 200-
13 or 400-kilogram process within the three-year period,
14 which means it's moving rather quickly than we expected,
15 which I don't think will happen often, but if it does
16 then the station developer should be able to come back
17 to the CEC and submit a proposal for upgrades. Okay.

18 To the extent that after the three-year period
19 is up it's all in the hands of the station owner or the
20 station developer to finance the upgrades.

21 But if it's within the three-year period that is
22 required for you to handle by this RFP, I think that you
23 should be eligible to come back and submit a proposal
24 saying, look, things are going better than we thought
25 and we need to expand a lot quicker than we had

1 anticipated.

2 And I think that would be the approach to go.
3 It will save money because you won't have -- you'll have
4 less transit assets for stations that may or may not be
5 working and, you know, less money invested into those.

6 So, I think that's a prudent approach to
7 consider, just as long as -- if capacity demand
8 increases significantly over the first three years
9 you're allowed to come back to upgrade.

10 Thank you.

11 MR. MC KINNEY: Thanks Paul. And I'm looking at
12 Toby for confirmation here, but I believe our 2010
13 solicitation did allow for upgrades and modifications,
14 right?

15 MR. MUENCH: That's correct, yes, and we did
16 receive proposals for that as well.

17 MR. MC KINNEY: Great, thanks.

18 Bill Elrick and then -- I just want to do a time
19 check here. I think five minutes more, max, on this
20 topic. Jean's looking at her watch so we need to get to
21 the renewable hydrogen.

22 MR. ELRICK: So the other comment I wanted to
23 make, Bill Elrick, California Fuel Cell Partnership, was
24 really we need to look for this next solicitation to
25 think about the coverage equation. We want to get to

1 capacity but we need to get to coverage so that we can
2 lead into capacity.

3 And so that applies both as a network around the
4 State, as we were discussing, it's getting the clusters
5 and some of the key destination connectors so they can
6 start to go further.

7 But also within the cluster, the five primary
8 cluster markets, themselves, getting some coverage
9 within those. So, we want to see those start to
10 develop, not just a little bit of redundancy within
11 them, but the ability to get -- I'll just call it the
12 biggest bang for their buck. If that's where most of
13 the early market customers are going to be we want to --
14 we don't necessarily want to see seven stations in one
15 cluster and another gets one or two.

16 We want to spread this out in a way that we
17 start to see this infrastructure both in the cluster and
18 the statewide network, enable the most amount of
19 customers to come to the market as quick as possible so
20 we can move from coverage to capacity.

21 MR. MC KINNEY: Right. And I am looking at
22 Garrett Poppe, again. So, I think that kind of the
23 small station, you know, scalable model that you're
24 suggesting, I think one thing we have to be mindful of
25 is that I think a lot of the group discussion is

1 assuming that the smaller stations would be out in, say,
2 a resort destination, Palm Springs, Tahoe, something
3 like that.

4 But you're proposing that that model might be
5 appropriate in urban core areas; is that correct?

6 MR. POPPE: Yeah, that's correct. I mean if you
7 can build two stations at 50-kilograms-per-day for the
8 price of one 100-kilogram-per-day station, then your
9 coverage would be increased. And as long as it's a
10 scalable design, you could always upgrade those as
11 demand calls for it.

12 MR. ECKHARDT: This is Steve Eckhardt, with
13 Linde. One thing you just do need to keep in mind,
14 there's a fixed cost at every site no matter how big the
15 station is, so whatever that number is, it varies. But
16 there is always a fixed cost to get a station going no
17 matter the size.

18 MR. ELLIS: Steve Ellis at American Honda, one
19 other time here. Also, I just want to remind you that
20 it goes back to my presentation last week where to your
21 question, Jim about this shift, if it is one, from in-
22 cluster stations to now these connectors and corridors.

23 One of my points last week was that as an
24 automotive -- as an OEM group, we had identified the
25 need for destinations. Specifically, I pointed out San

1 Diego.

2 So when I use that term, kind of heed the voice
3 of the automakers, that's what it was in reference to.
4 But I also wanted to emphasize that this is, again, the
5 voice of our customers.

6 So, it's not just us kind of -- and I apologize
7 for the visual here, but we're not just throwing darts
8 at a wall. We are taking the voice of the customers,
9 plus a lot of other input, as that criteria.

10 So, I think you posed it as a question, do you
11 need to begin the shift to connectors and destinations?
12 My answer is absolutely.

13 MR. MC KINNEY: Great, thanks.

14 MR. FORREST: I'd like to make a comment.

15 MR. MC KINNEY: Excuse me, was that somebody
16 else?

17 MR. FORREST: Yes, this is Matt Forrest with
18 Mercedes Benz and I'd like to make a comment.

19 MR. MC KINNEY: Go ahead, please.

20 MR. FORREST: Yes, I just want to echo what some
21 of the other automakers have said with regards to the
22 customers.

23 You know, certainly, we are here representing
24 them and just wanted to make the comment that as we talk
25 about the station capacities and what size may be

1 appropriate for a certain location, and what the peak
2 fueling rate for a particular hour should be, please do
3 keep in mind that for whatever number of customers you
4 design the station to meet in a particular hour there
5 could always be one additional person to arrive after
6 that number has done their fill.

7 And you certainly don't want to make that person
8 wait an additional hour, or something like that, before
9 they can do their fill.

10 So as you go through and you look at how many
11 vehicles the station should be able to fill in an hour,
12 what the capacity should be, please always keep in mind
13 the plus one. What is the next person going to
14 experience as they go to that station?

15 You don't want to have the station completely
16 shut down for some recovery period, you want it to be in
17 some mode where it can provide a very good fill, but
18 maybe not as good as the first fill in that peak time.

19 So, again, please just keep the customer in mind
20 as you go through because they're the ones that are
21 going to be driving this entire process, and their
22 opinion is going to matter the most.

23 So thank you.

24 MS. BARONAS: So, Matt, this is Jean Baronas
25 again, would you please spell your last name?

1 MR. FORREST: I'm sorry, who were you referring
2 to?

3 MS. BARONAS: You, please, Matt, your last name?

4 MR. FORREST: Yes, Matt Forrest, F-o-r-r-e-s-t.

5 MS. BARONAS: Thank you.

6 MR. FORREST: With Mercedes Benz.

7 MS. BARONAS: Thank you very much.

8 Are there any other comments or questions before
9 we move on to renewable hydrogen?

10 MR. SLEIMAN: This is Ghassan at Hydrogenics.
11 Can you hear me?

12 MS. BARONAS: Yes, we can. Please state your
13 name again?

14 MR. SLEIMAN: It's Ghassan Sleiman, Hydrogenics
15 USA.

16 MS. BARONAS: Please go ahead.

17 MR. SLEIMAN: I'd just like to add the comment
18 that if there are stations out there that are in closer
19 locations, that have been working, and just need a small
20 amount of funding to be upgraded to meet today's OEM
21 requirements, that they also should be considered.

22 MS. BARONAS: Thank you for your input.

23 MR. SLEIMAN: You're welcome.

24 MR. STAPLES: I would certainly have to agree
25 with that.

1 MS. BARONAS: Thank you all of you on WebEx.

2 So, now we're going to move on to the renewable
3 hydrogen point of our agenda. So, Christina.

4 MS. ZHANG-TILLMAN: Okay.

5 MS. BARONAS: For the record please introduce
6 yourself and your organization.

7 MS. ZHANG-TILLMAN: This is Christina Zhang-
8 Tillman. I'm the lead staff on SB 1505, the Energy and
9 Environmental Standards for Hydrogen. And I'm just
10 waiting for my slide to come up.

11 MS. BARONAS: Okay.

12 MS. ZHANG-TILLMAN: All right. Thank you and
13 good afternoon. I am one of the staff leading on the SB
14 1505 and today I wanted to give you and update on where
15 we are.

16 Next slide, please. Just as a quick overview,
17 so we're all on the same page, SB 1505 establishes the
18 environmental and energy standards for hydrogen that is
19 used for transportation.

20 What is the legislative intent behind that is
21 that hydrogen that is produced is done in an
22 environmentally responsible manner, which means that
23 ultimately we will move away from fuels that are
24 produced non-renewably.

25 Next slide, please. Overarching requirements

1 under SB 1505, there are mainly two. The first one is
2 emissions requirements, so SB 1505 requires a 50 percent
3 reduction of compounds of NOx, basically NOx,
4 nitrogen/oxygen compounds, and reactive organic gases.
5 These are measured on a well-to-tank basis.

6 There's a 30 percent reduction requirement for
7 greenhouse gases and that is measured on a well-to-wheel
8 basis. And, basically, no increase in toxic air
9 contaminants measured on a well-to-tank basis.

10 For the energy requirement, SB 1505 requires a
11 33.3 percent and that percentage must be made from
12 renewable sources.

13 So I'm sure everybody's aware of that, I just
14 wanted to make sure that everybody was on the same page
15 on SB 1505.

16 Next slide, please. The applicability, if SB
17 1505 was enacted today it would apply immediately to
18 State-funded stations. And to all of the stations in
19 California once a threshold is reached, and that
20 threshold is 3,500 metric tons per year, or 3.5 million
21 kilograms.

22 This is approximately about 10,000 kilograms per
23 day or about 14,000 vehicles in state.

24 Okay, the next slide. In 2007 ARB actually
25 started SB 1505 development and over the next three

1 years there were a series of workshops and meetings held
2 with stakeholders. Some of you may have participated
3 and my predecessor, Ben Diehl, was the lead staff on
4 that.

5 In 2010 we actually developed a draft regulatory
6 package, including the reg language, as well as the
7 initial statement of reason.

8 So this is what happened for the last three
9 years, so this is the progress to date.

10 However, that regulatory package was never
11 presented to the Board in 2010, mainly because in 2010
12 something else came along that included hydrogen, and
13 that was the low-carbon fuel standard.

14 Some of you may be familiar with the low-carbon
15 fuel standard, the LCFS, which includes all the
16 transportation fuels that is produced, imported, or
17 supplied for sale in California, and it also includes
18 hydrogen as one of the fuels.

19 Now, under the LCFS, hydrogen is not required to
20 meet the 10 percent reduction. There's a 10 percent
21 reduction in carbon intensity.

22 But hydrogen is considered an opt-in fuel. And
23 the reason why I bring that up today is there are
24 elements of SB 1505 and LCFS that are in parallel. And
25 so because of that we had to take another look at SB

1 1505 to make sure that the elements that we're
2 developing are in alignment with the regulation that is
3 existing today, and also trying to implement this as
4 easily as possible.

5 So the next slide. So, these are the elements
6 that we're going to be looking at to refine under SB
7 1505. The first two are basically renewable.

8 What are the sources of renewable fuels and if
9 those sources are not available, what other options are
10 there. So, what are the eligible renewable credits that
11 can be used to meet the 33.3 percent?

12 We also want to look at some definitions of
13 regulated parties. I think we have work-shopped these
14 throughout the, you know, 2007 to 2010 period, but
15 because when the LCFS came online there was some
16 discussion about who are the regulated parties, how the
17 regulated parties can change based on contractual
18 agreements.

19 So, it's a little bit complicated under LCFS,
20 but because they affect the same regulated parties,
21 potentially under SB 1505, we want to make sure there is
22 consistency.

23 Another area that is of significant work that
24 we're going to be undertaking is the lifecycle
25 assessment of the hydrogen production pathways.

1 Again, under the LCFS that work was done and
2 that specifically targets the GHG portion of SB 1505.

3 So in other words there are sections of SB 1505
4 and -- SB 1505 and LCFS that are literally in parallel.
5 And if we were to proceed without looking at LCFS, we
6 would actually be duplicating some of the work.

7 So with that lifecycle assessment it's very
8 intensive and we're going to be looking at to expand our
9 resources within my team to make sure that, you know, we
10 have enough resources to do this kind of lifecycle
11 assessment work.

12 The other areas that we want to look at is the
13 33.3, how do you actually calculate that?

14 There's a variety of options to do that. I
15 think Ben Diehl has proposed one method. There's
16 obviously other ideas that we can present to the
17 stakeholders, so we want to revisit that as well.

18 And the last one is the reporting requirements
19 and determination of compliance. So we have stated in
20 the past that there may be some needs for regulated
21 parties to submit their information, their lifecycle
22 assessment, all of that done by themselves.

23 And we could possibly integrate that with LCFS
24 because there's overlaps within the LCFS and SB 1505.

25 So, basically, some of the key areas that we

1 want to look at, we want to revisit mainly to ensure
2 that there is an alignment with existing regulation, and
3 to also just to make sure that the implementation is
4 simplified a little bit.

5 The next slide. Since we're talking about
6 renewables today, I want to talk about some of our
7 current thoughts on what are eligible renewable sources.

8 So this is just a preliminary list and we are
9 open to discussion on additional possible sources.

10 So, there are three primary areas. The
11 renewable feedstocks is one. So hydrogen that is
12 produced by biomass, digester gas, municipal solid waste
13 or landfill gas, those could qualify for, you know,
14 eligible renewable sources.

15 We also want to expand it to look at electricity
16 as well, so hydrogen that is produced from electricity
17 that is produced renewably, so in other words those by
18 solar, or photovoltaic, fuel cell, wind.

19 Now, some of that list you have already seen,
20 already, so we want to make sure that we incorporate a
21 lot of the suggestions that were already made by the
22 stakeholders.

23 The next slide. We also wanted to expand
24 renewable credits. So in the case where there is not
25 enough resources, of feedstocks, or electricity that's

1 generated renewably, one of the options is to look at
2 credits that are generated by other programs and these
3 credits are generated from renewable sources, such as
4 electricity and biogas.

5 Another option is also to incorporate LCFS
6 credits that are generated from biomethane, renewable
7 hydrogen, or electricity.

8 So, again, we are open to discussion on, you
9 know, some of the details of what is considered eligible
10 renewable resources, how do you actually calculate the
11 33.3 percent.

12 So right now we are working on the details of
13 that, trying to vet that through internal management as
14 well. But if you have any suggestions, please feel free
15 to contact me. And the next slide is my contact
16 information.

17 And that concludes the presentation.

18 MR. MC KINNEY: So, Madam Moderator, I have a
19 follow-up question.

20 MS. BARONAS: Please, go ahead.

21 MR. MC KINNEY: Thank you very much, Christina,
22 this is really good. And thanks, Gerhard.

23 Do you guys have a schedule here? It sounds
24 like you're thinking about resurrecting the ISO and the
25 draft reg, and maybe revisiting a lot of these issues.

1 Has that been scheduled or is that still a work in
2 progress?

3 MR. ACHELNIK: This is Gerhard Achteplik. It's
4 still in -- the details are still a work in progress.
5 We're working on it for a 2013 Board meeting sometime,
6 but it's probably going to be in the later half because
7 there's a lot of work.

8 And this is a very complex regulation, it covers
9 everything from production to vehicles. You know,
10 there's a lot of things in here, a lot more complex than
11 how we typically work.

12 MS. ZHANG-TILLMAN: Yeah, there's some areas
13 that we want to revisit to make sure that because SB
14 1505 actually predates the LCFS, so it was designed --
15 it was designed sort of ahead of that. And now the LCFS
16 is in place and it covers hydrogen and we want to
17 revisit some of the elements that I described up there
18 to make sure that we have consistency with the LCFS.

19 Now, the two things that could possibly take
20 some time is the lifecycle assessment of the different
21 pathways of producing hydrogen.

22 You know, people have different ways of making
23 hydrogen. And even though we have four -- I think LCFS
24 has four pathways right now. It could be, you know,
25 very different, there could be variations.

1 And so looking at individual ways of producing
2 hydrogen, that could cause some time.

3 The other thing is we want to make sure that
4 when LCFS, for hydrogen producers who are going into
5 LCFS to generate these credits, we don't want them to
6 report duplicate information because, essentially, when
7 they submit information to the LCFS it qualifies for,
8 you know, for partial submission for SB 1505.

9 So, we want to design a system where information
10 can be utilized across different programs and not having
11 people to duplicate that, so that's another area that we
12 will work on.

13 So, it could take some time and we will need to
14 have internal teams agree on a set schedule. So right
15 now we don't have a set schedule but, like I said, those
16 are some of the items that we will be looking at.

17 MS. BARONAS: Thank you for that, Christina.

18 So, Bill Elrick, please.

19 MR. ELRICK: Yeah, if I could just ask two quick
20 questions. How do you plan on collecting the data when
21 the trigger is met and are fuel cell transit buses going
22 to be included in that calculation?

23 MR. ACHELNIK: The best we have right now is
24 looking at the stations that are being rolled out. And
25 the transit buses, the legislation includes transit

1 buses. I think you asked are we included transit buses
2 and fuel cells, is that what you said?

3 MR. ELRICK: In the trigger.

4 MR. ACHTELIK: In the trigger.

5 MR. ELRICK: Because, obviously, that will
6 impact the trigger timing.

7 MR. ACHTELIK: I mean it allows an exemption on
8 the transit agencies, so even though they are included
9 in needing to use the renewable requirement.

10 So will it be included in the volume? It's not
11 a hundred percent defined, yeah.

12 MS. BARONAS: You had a second question?

13 MR. ELRICK: The other was more about how -- do
14 you have a plan for how you'll collect the data as the
15 trigger happens? Thinking about this will be an all-
16 stations, you know, all fuel through-put will then be
17 part of that process.

18 MS. ZHANG-TILLMAN: Right and that's part of the
19 reporting and compliance strategy that we're going to be
20 looking at. So it's probably going to be an automated
21 system, where they will be submitting information there,
22 and that will help us understand how much hydrogen that
23 is being dispensed for transportation use.

24 And just to kind of give you a feedback, LCFS
25 already asks for that, to require hydrogen producers who

1 are going into the LCFS to report the number, in
2 kilograms, that they are supplying for transportation
3 use, which means hydrogen quantification comes into play
4 as well.

5 MR. ACHELNIK: This is Gerhard Achteplik with the
6 Air Resources Board. Just, you know, since we envision,
7 you know, a trigger around 13,000 vehicles or 14,000
8 vehicles, the absolute hydrogen through-put today isn't
9 critical. But we clearly need to have this piece of
10 legislation in place well before then.

11 You know, so we have -- while we don't have the
12 absolute value today, we have our timeline in order to
13 make sure we are ready before those cars roll out.

14 And I'll say that, practically speaking, the
15 number is low enough that, you know, any entity
16 basically has to look at this as a requirement that's in
17 place.

18 We have to look at it if you're using government
19 funding, but if you're looking at building a major
20 station that you expect to serve the future, if the
21 number's low enough, you need to think of it as being in
22 place.

23 MS. BARONAS: Okay, thank you Christina and
24 Gerhard.

25 So, moving on to Dr. Ogden's presentation, Joan.

1 DR. OGDEN: Thank you. I'm Joan Ogden; I'm a
2 professor at the University of California, Davis. And
3 I'm going to talk today about some results from a couple
4 of studies that we did looking at both near-term and
5 long-term prospects for renewable hydrogen in
6 California.

7 And this is perhaps background material for this
8 discussion. So next slide, please.

9 So as you all know there are many different
10 hydrogen supply pathways and, like electricity, you can
11 make hydrogen from a lot of different resources.

12 And I've shown some of the possible resources
13 there, a number of them are renewable. You can make
14 hydrogen from wind, or solar power, and electrolysis,
15 from biomass gasification, and also from biogases, and
16 so on, as Christina mentioned.

17 You can also make hydrogen from fossil fuels and
18 even from nuclear power via electrolysis. Most hydrogen
19 today comes from natural gas, in the United States.

20 Okay, next. This is a graph that was put
21 together by the Department of Energy that shows the
22 well-to-wheels greenhouse gas emissions of hydrogen
23 compared to other types of vehicles, so this is kind of
24 a complex graph and I'll spend a minute on it.

25 Up at the top there, in the gray area, the top

1 bar, that's today's gasoline vehicle, and it gives a
2 gram CO2 per mile. So, this is the amount of greenhouse
3 gas emissions that would be emitted counting all of the
4 steps, counting the extraction of the oil, the refining
5 process, as well as using the fuel in the car.

6 And then this is compared to various
7 improvements, some improved internal combustion engine
8 vehicles, hybrid vehicles, like the Prius type vehicles,
9 that sort of thing, with gasoline, and then plug-in
10 hybrids, electric vehicles.

11 And then at the bottom there, with the little
12 red border around it, are hydrogen fuel cell vehicles.
13 And we see there, the top bar there is hydrogen made
14 from natural gas, and that's pretty much how it's made
15 today.

16 Roughly half of what you would have with a
17 conventional gasoline car and still quite a bit less
18 than even improved internal combustion engine cars.

19 And then you see some other bars below that for
20 fuel cells that show what could be achieved with
21 different types of renewables coming in.

22 This also shows coal, but it show, I think,
23 biomass and wind.

24 Anyway, the point of this is that you can do a
25 lot of greenhouse gas reductions with hydrogen in a fuel

1 cell.

2 The initial, about 50 percent reduction from
3 today's car is largely because of the higher efficiency
4 of the fuel cell car compared to an ICE. And then you
5 can -- by de-carbonizing the fuel source you can bring
6 it down quite a bit lower.

7 So you can -- with renewable hydrogen you can
8 have very low well-to-wheel submissions.

9 The next slide, please. This is a slide that
10 shows delivered costs and the bar there that says
11 "competes with gasoline at \$2 to \$4 gallon", that's on a
12 cents-per-mile basis.

13 And we cost it out. This was part of a study
14 that was done with the National Academies, and some Way
15 to Work also done through some research at UC Davis.

16 And we see there are a number of renewable
17 options there when you look at future technologies that
18 kind of get into that competitive range.

19 And we see wind electrolysis there and so on,
20 and biomass gasification are -- both have the potential
21 of getting down into that range of being competing of a
22 cent-per-mile basis.

23 This is assumes newer technology and scaled up
24 production.

25 Next. We did some looking at near-term

1 renewable hydrogen pathways as part of a study we did in
2 2009 and '10, with support from several of the auto
3 companies, including Toyota, Honda, Daimler, GM, as well
4 as Shell and Chevron.

5 And so we wanted to look at what some near-term
6 options were that might be brought to bear, say, in the
7 next few years and in light of SB 1505.

8 So, we did some costing and some looking at
9 designs for on-site reformer with using pipeline-
10 delivered biomethane. So the idea being there that
11 you'd put green methane in. You'd could also think
12 about buying credits, if you had a trading machine in
13 place.

14 An on-site reformer using bioethanol, so a
15 liquid fuel being reformed at the station.

16 On-site electrolysis using green electricity by
17 the grid, that is you'd pay extra to have renewable
18 electric credits that you would buy. And there are
19 programs like that available throughout California.

20 And then, finally, on-site electrolysis with
21 solar PV at the station.

22 So the next slide. So, these are just some
23 rough-cost numbers and don't hold me to three-place
24 accuracy on those.

25 But what we did was to look at a couple of

1 cases. One was an on-site reformer with 33 percent
2 biomethane. We assumed a cost for biomethane based on
3 some supply curves for California that we'd seen. Plus,
4 33 percent green electricity assuming you have a three-
5 cent premium for green electricity.

6 And that electricity is used at the station for
7 compression and that sort of thing.

8 And we found that this increased the hydrogen
9 cost by about half-a-dollar-a-kilogram compared to a
10 natural gas reformer, which is not a huge amount. It's
11 maybe a 10 percent, you know, increase in the cost.

12 If we went to a hundred percent biomethane and a
13 hundred percent green electricity, under those
14 conditions we found an increase in cost of about \$1.5-a-
15 kilogram compared to an on-site natural gas reformer.

16 And looking at on-site electrolysis with 33
17 percent green electricity, at that same premium we had
18 an increase, again, of about half-a-dollar-per-kilogram.

19 And with on-site electrolysis, with PV
20 electricity, which was more expensive to produce, we had
21 an increase of about \$5 a kilogram.

22 So the overall message here is that meeting the
23 33 percent renewable, at least for these rough
24 calculations, certainly doesn't double the cost of
25 hydrogen. It looks like it's -- it would increase it

1 somewhat, but according to at least these estimates it
2 wouldn't be -- it wouldn't be that much more than using
3 the fossil alternative, natural gas as the source, or
4 using regular electricity as well.

5 So the next slide. We also have looked at some
6 long-term resources for hydrogen production within the
7 State of California. And this is an ongoing study that
8 my colleague, Chris Yang, and I are working on right
9 now.

10 And we look at a number of different cases. We
11 looked at some supply curves for renewables within the
12 State. For biomass we used the "Western Governors'
13 Association Study," and we looked at kind of a range of
14 a possible biomass supply that could be brought to bear.

15 We looked at some fraction of that being
16 available for hydrogen production.

17 And we find that the biomass, it could fuel
18 something, like we estimate, between 8 and 25 million
19 fuel cell vehicles in the State.

20 And looking to projections, say out to 2035,
21 2050, this might be somewhere between 20 and maybe 60
22 percent of the fuel cell vehicles that could be out
23 there, say, in 2050. If you look, for example, some of
24 the CARB scenarios that looked at some of these.

25 Renewable electricity is a huge resource and we

1 looked, again, at making renewable electricity -- or
2 making hydrogen for renewable electricity is a bit more
3 expensive because the electricity cost is higher, but
4 you could easily fuel millions of fuel cell vehicles
5 with this.

6 And so the point of this slide is really that
7 the resources are large, renewable resources are large
8 within the State.

9 The next slide, please. This just shows a high
10 biomass case for California, and this is an amount of
11 hydrogen over time, the supply building up rapidly
12 beyond 20/20.

13 A little bit of initial hydrogen made from on-
14 site natural gas, which we think will be the least
15 expensive and most well-known way to do it, but then
16 phasing in biomass hydrogen with pipeline delivery over
17 time.

18 And the supply mix is shown in colors there, the
19 orange is biomass, the blue is natural gas. And the
20 black line shows the carbon intensity per kilogram of
21 hydrogen over time. It comes down rapidly as you phase
22 in renewables.

23 The next slide, please.

24 Here's a case where we limit the biomass and we
25 say we're not going to do coal. We do have natural gas

1 and here we have a supply mix that has a fair amount of
2 natural gas in it, about two-thirds and one third
3 biomass. The GHG emissions are less than they are now
4 per unit fuel, but they're a bit higher than the all
5 renewable case.

6 Next slide shows a case where we don't have
7 biomass and we say no fossil fuels. And then we have
8 renewable electrolysis coming in as our -- these supply
9 mixes were based on kind of least-cost options under
10 these constraints.

11 There we have still a fair amount of biomass and
12 we have a lot of -- on-site electrolysis is the red bar
13 coming up there, and this is gives you a very low carbon
14 signature by 2050.

15 So next slide. This is just estimate of costs.
16 The case there that sort of angles up, that's the case
17 where you bring in a lot of electrolytic hydrogen and we
18 see the costs are on the order of a few dollars, maybe
19 three dollars a kilogram greater in that future, where
20 you do have a lot of reliance on wind and solar power,
21 and electrolysis.

22 The other cases, all the costs estimated in this
23 study are, you know, quite reasonable, they're in the \$3
24 to \$4 kilogram range and maybe up at around \$6 with the
25 renewable electrolysis.

1 So next slide, I think that may be the last one.
2 That's my last one. Okay, so this is an ongoing study.
3 We're continuing this and we're refining these
4 estimates. These are kind of first-cut estimates, but I
5 think the message to take away is that renewable
6 resources are quite large within the State that could be
7 made to make hydrogen.

8 The renewable hydrogen is somewhat larger higher
9 cost, but not outrageously higher cost in these kind of
10 looking at this mature point of view for those
11 technologies. And you can accomplish a fair amount of
12 greenhouse gas reduction with these. Thanks.

13 MS. BARONAS: Any questions or comments for Dr.
14 Ogden?

15 MR. ELLIS: Yes, this is Steve Ellis at American
16 Honda.

17 MS. BARONAS: Go ahead, Steve.

18 MR. ELLIS: Joan, just a quick question. If you
19 were to go back to I think one of the original slides
20 that showed the array of technologies and their fuel to
21 reduction in grams per mile -- the next one. There we
22 go.

23 In this particular case it doesn't show, for
24 example, a fuel-cell electric vehicle ever getting to
25 zero as it does for a battery-electric vehicle. Is

1 there a case that that would be true? Because in this
2 case it shows zero all to low carbon renewable.

3 I think of some other options that would allow
4 this such as, you know, entirely renewable electrolysis.
5 Because this graph does not make reference to the
6 economic aspect of it, so would that be the case that
7 could be added?

8 DR. OGDEN: Yes, that's a very good point. This
9 is a graph from the Department of Energy's website and,
10 really, the reason I pulled it is because it had such a
11 wide array of vehicles on the same basis.

12 However, as you point out, there are other
13 pathways for hydrogen that are not included here, that
14 should be. I would say the biomass gasification pathway
15 could even be brought pretty close to zero. I think the
16 reason that in this study that it wasn't was it was
17 assumed you were still using fossil fuels for
18 cultivating and trucking biomass around.

19 But certainly with wind or solar electrolysis
20 you could bring this down to zero. There are even some
21 studies that have said you could go negative if you had
22 the biomass hydrogen, captured the CO2 and sequestered
23 it.

24 So there are many other pathways and this is not
25 meant to be a comprehensive list. And in fact we've

1 done some studies looking at these others and you're
2 right, there could be essentially zero.

3 MR. ELLIS: Okay and then just one follow up and
4 that is that I think at times there is, I'll say
5 misinformation, or a lack of understanding and I think
6 this graph does convey it very well that all things
7 should be relative to what we're doing today. Hence, at
8 the top today's gasoline vehicle.

9 And that at times we'll see articles written or
10 hear presentations where a reference is made to how
11 hydrogen is made in the majority, which is from methane
12 or natural gas, and then it will simply say but there
13 are significant CO2 emissions.

14 Without kind of the next statement which is,
15 however, in average and I know speaking from our stand
16 point, with the Honda, this would represent a 60 percent
17 CO2 reduction compared to a comparable gasoline vehicle.

18 So simply saying that there's this sense that if
19 you make it from natural gas it may be negative when, in
20 reality, it's a significant and very, very large
21 contribution toward the reduction of CO2.

22 DR. OGDEN: So I think that's a very important
23 point, Steve, and I would certainly agree.

24 MR. ELLIS: Okay, thank you.

25 MR. STAPLES: I have a comment.

1 MS. BARONAS: Oh, please go ahead Mr. Staples.

2 MR. STAPLES: Yes. First of all sequestration
3 is a myth, it doesn't exist and it can't be done in any
4 kind of a large commercial scale. Okay, so that's a
5 myth, okay. It's never going to happen. And even in
6 Texas they will not permit such activities by the oil
7 companies because they're afraid of the possibility of
8 leakage into people's underground, you know, garages and
9 houses.

10 So, that's not going to happen or at least they
11 won't give you indemnification, okay, and that's the
12 problem with that.

13 As far as on-site electrolysis, I would have to
14 say that I disagree with the numbers that you're stating
15 there because our CFO has done a very extensive
16 projection based on these possible options. And we
17 start off with an \$8-a-kilogram cost, okay. Retail cost
18 and that includes profit, okay.

19 And it drops down by the end of the three-year
20 period to almost \$5 a kilogram, with profit, and so I do
21 not see where those numbers jive, okay, in the short
22 term.

23 That's with an expansion system, an expansion
24 system that would bring it up to 350 kilograms a day.

25 MS. BARONAS: Okay.

1 MR. STAPLES: Outside SMR will increase the CO2
2 and it will increase in cost and demand as fossil fuel
3 is fossil fuel. So I do not see how those situations
4 pan out the way that you're talking about.

5 MS. BARONAS: So thank you Mr. Staples, in the
6 interest of time, Dr. Ogden?

7 DR. OGDEN: Yes, I'd be happy to send you my
8 spreadsheet with all the costs if you want to look
9 through how the calculations are done on this.

10 As far as CCS, there are industrial scale
11 projects going on all over the world so it actually does
12 exist and can be done. And we'll see how well it works.
13 Not saying that's a panacea, but I do think we need to
14 look at it.

15 And in terms of the cost numbers, the fact
16 that -- I mean most studies would say that renewable
17 electricity, at least for the near term, can be somewhat
18 expensive. There are certain circumstances where you
19 might have time and date pricing, or different
20 valuations on electricity that would be spilled,
21 otherwise, and there are lots of ways to do those
22 calculations.

23 So I think in the interest of time, you know, if
24 you'd like to we can talk about that offline.

25 MS. BARONAS: Thank you so much Dr. Ogden.

1 MR. STAPLES: I'd be glad to.

2 MS. BARONAS: And in the interest of time I'd
3 like to move on to Tim Brown of UCI. Dr. Brown will
4 talk about renewable hydrogen.

5 DR. BROWN: Luckily, in the interest of time,
6 pretty much in my presentation has just been said
7 between the two presentations prior to me, so I'll go
8 very quickly.

9 I want to talk about renewable hydrogen and SB
10 1505. So, two motivations for renewable hydrogen within
11 the State, there's California regulations and there's
12 environmental benefits, both of which we've just heard
13 about.

14 To speak about the California regulations,
15 first, SB 1505, these five points were just made
16 previously. The one thing I can add here is that my
17 numbers come out to 10,000 vehicles statewide, I kind of
18 rounded down.

19 One thing I'd add that the 50 percent local
20 emissions of NOx and reactive organic gases that's
21 required is quite easily met with steam methane
22 reformation of, you know, natural gas from a pipeline.
23 So, basically, the go-to strategy for hydrogen
24 production today easily meets this requirement.

25 Also, easily meets the 30 percent greenhouse gas

1 reduction because of the efficiency of the process and
2 the efficiency of the fuel cell vehicles. And also
3 easily meets the zero toxic increase of air pollutants,
4 air contaminants with steam reformation from natural gas
5 from the natural gas pipeline.

6 The one burdensome point of this standard is, of
7 course, the one-third production of hydrogen from
8 renewable sources. Easily accomplished with mature
9 technology today, but it adds a cost.

10 Just to talk about the environmental benefits,
11 this is quite different from Joan's graph because it's
12 straight up and down instead of sideways.

13 My vertical bars --

14 MS. BARONAS: You don't have to rush, we have
15 time for you.

16 DR. BROWN: Lunch started 15 minutes ago.

17 (Laughter)

18 DR. BROWN: I'm rushing for myself.

19 MS. BARONAS: No, we value what you're saying
20 so --

21 DR. BROWN: So I have a graph here showing
22 greenhouse gas emissions of CO2 equivalent grams per
23 mile. My numbers are a bit higher, so about 540 grams
24 per mile for a current gasoline vehicle fleet. This
25 comes from the ARB. They project that by 2020 we're

1 going to get down to around 400. And by 2025, a
2 gasoline vehicle fleet can get down to 350. We can go a
3 little lower than this, but not a lot lower with
4 gasoline.

5 In comes hydrogen and today, at the USI station,
6 our calculations show that we're at about 250, a little
7 below 250 grams per mile today with our current fuel
8 cell vehicle fleet and our current hydrogen station. So
9 this is over twice as good as current gasoline cars and
10 even better than what's projected for gasoline cars in
11 2025.

12 This is doubly impressive when we look at our
13 hydrogen station, which uses liquid hydrogen which, of
14 course, has a high electricity generation footprint.

15 We also include a 435-mile delivery route from a
16 facility in Sacramento down to Irvine, and of course the
17 route back using a diesel truck.

18 And the most important factor here is a low-
19 capacity air station. We serve 35 kilograms a day on
20 average and so that means that all of the electrical
21 loads at the station, the lighting, the controls, the
22 safety standards or the safety controls, the
23 refrigeration unit that cycles on and off all night
24 long, all of those are distributed over a very few
25 number of kilograms leading to a higher greenhouse gas

1 footprint.

2 So we can do much better, then. This is almost
3 a worst case for hydrogen stations and, yet, it's very
4 good using natural gas and this includes no renewables.

5 ARB's projection for fuel cell vehicles is much
6 lower than this, about 150 grams per mile, and this is
7 due to the 33 percent renewable standard, so this is
8 easily achievable.

9 But as we progress to greater quantities of
10 renewables we can really bring this down quite low. And
11 apologize to Steve Ellis for not making it quite zero,
12 but we could achieve quite zero with rigorous
13 implementation.

14 So what are potential sources for renewable
15 hydrogen? We've been through this as well, biogas,
16 renewable electricity, or direct biological process.

17 For the biogas, the traditional method would be
18 steam methane reformation. We also have the tri-
19 generation process, which I'll talk about in a minute,
20 and through that process we get renewable hydrogen.

21 For electricity it would be done through
22 electrolysis, putting water into hydrogen oxygen. The
23 hydrogen is then renewable hydrogen.

24 And direct biological processes rely on bacteria
25 or algae to produce renewable hydrogen. Today we don't

1 think this is viable in the near term, shouldn't be
2 considered in any sort of solicitation today. The costs
3 are prohibitive, if the potential exists there for it to
4 work at all, although, biogas and renewable electricity
5 are certainly matured enough technologies to be used.

6 To look at biogas, first, steam methane
7 reformation, we'll take methane, CH₄, combine it with
8 high temperature steam to yield hydrogen and CO₂.

9 If we're using biogas, that CO₂ is in a closed
10 cycle, such as the CO₂ is captured out of the atmosphere
11 by the biogas material, it's then converted into CO₂ and
12 release during steam methane reformation. It's a closed
13 cycle so it's essentially a zero CO₂ footprint.

14 To look at this for biogas, there requires a
15 clean-up step before it can be used in an SMR facility.
16 That biogas can come from wastewater treatment
17 facilities, landfill gas, dairy farms, or gasified
18 biomass.

19 And today the best way of doing this would not
20 be to site the SMR at the biogas, but would require a
21 pipeline injection. So you would inject this cleaned-up
22 biomass into the existing natural gas pipeline, then
23 route it to the steam methane reformation unit and this
24 is, of course, called directed biogas.

25 The problem exists in California, however,

1 though, that the AB 4037, the Hayden law, precludes the
2 injection of landfill gas today.

3 Out-of-state landfill gas is perfectly
4 acceptable, but in state it's not.

5 Although waste water treatment gas and dairy
6 farm gas can be injected with the right clean-up
7 procedures.

8 Talking more about tri-generation, this is where
9 we're using a stationary fuel cell to produce heat,
10 electricity, and hydrogen. So the biogas would be
11 cleaned up, injected into a large stationary fuel cell
12 to produce heat and electricity, as fuel cells are apt
13 to do. It could be used in commercial buildings or
14 industrial settings.

15 But then the third product of hydrogen is
16 generated by injecting additional biogas into the fuel
17 cell and using the inherent reformation capabilities of
18 that fuel cell.

19 And this is an extremely efficient process, it
20 turns out to be actually the most efficient process for
21 creating hydrogen from a gaseous fuel.

22 Here's a photo of the Orange County Sanitation
23 District, where we are doing just this. You can see all
24 of the components here, the fuel cell, and the
25 electrical equipment, and the gas clean-up equipment.

1 This project has a number of partners, many of
2 whom are in this room. Of course, Air Products and Fuel
3 Cell Energy, but also ourselves, the Orange County
4 Sanitation District, the USDOE, the ARB, and the AQMD.
5 And this is a successful project. It's been years in
6 the making but we are actually fueling some vehicles
7 now, and we're pushing through the contractual issues.

8 Just as a map here showing the available
9 landfill and waste water treatment plants in Southern
10 California, there's quite a few. We've done extensive
11 mapping of where these are located and their actual
12 potentials of using biogas.

13 You see the outline, the gray of the South Coast
14 Air Basin. There's actually about 10 million cars in
15 this region. Biogas potential from these sites, just
16 waste water treatment and landfills, not including any
17 biomass, or dairies or any of the other things, there's
18 enough potential to fuel about 20 percent of the cars in
19 this region.

20 However, 90 percent of this biogas comes from
21 landfills, which can't be injected in the pipeline,
22 which makes it very difficult to use for hydrogen
23 production.

24 So, if we look at these two supply chains here
25 of biogas and renewable electricity -- I want to go into

1 this one, first, I forgot about that, renewable
2 electricity using electrolysis.

3 Here's a snapshot of the California grid system
4 showing some average days in spring, showing the amount
5 of megawatts in the State, and the types of generation
6 used to supply the load.

7 You see the base load on the bottom, which is
8 coal and nuclear power plants, and then see the
9 geothermal. And then you see a screen in light green,
10 which is the wind and solar.

11 And up at the top right you see this is an 14
12 percent RPS renewable standard, so this represents 14
13 percent wind and solar today, maybe a couple of years
14 ago. You see it's quite intermittent, not predictable
15 from day to day.

16 The black represents load following, it's a
17 single-cycle and combined-cycle gas turbines.

18 The blue is hydro-electric power plants and the
19 red are the peakers that just make up the very tip-top
20 high ramp rate generators.

21 As we move forward in time and you see here that
22 there's about 40 percent capacity factor for the wind.
23 So we're installing this wind and we're using 40 percent
24 of its nameplate capacity, that's pretty darn good.

25 As we step forward to a higher renewable

1 portfolio standard, this is 20 percent, we're still
2 using a lot of the wind, we're using 38 percent of its
3 capacity factor. And you'll see that the green
4 increases dramatically and it still has this variation,
5 this intermittency, you know, there are some days when
6 the wind doesn't blow.

7 And this is sort of the peak where the load
8 following in the hydroelectric power plants can really
9 keep up.

10 If we go beyond this, they can't keep up with
11 these intermittencies and we'll see that here as we step
12 forward to the 33-percent renewable which, of course, is
13 the requirement for the year 2020.

14 The wind becomes so dominant that the other
15 power plants can't adjust quickly enough and you end up
16 with all of this excess electricity wind power, shown
17 here in the orange. This is curtailed wind.

18 It turns out that for annual -- on an annual
19 basis 27 percent of the renewable generation can't be
20 used and this is 12 and a half thousand gigawatt hours
21 over the course of the year.

22 So in comes fuel cell vehicles and we can use
23 those cars. If we produce hydrogen through
24 electrolysis, using just the curtailed power, we can
25 supply a fleet of 1.2 million fuel cell vehicles. This

1 would be, you know, projected for the year 2020, when we
2 have 33 percent renewable power.

3 If we impose a seven-and-a-half-cents-per-
4 kilowatt hour on that curtailed renewable, which would
5 be a great deal for the grid, which would otherwise not
6 be able to sell that electricity, that could generate
7 hydrogen at \$3.50 per kilogram.

8 This actually jives well with Professor Ogden's
9 numbers. This is a per-kilogram for generation, only,
10 it doesn't include transportation or amortization of the
11 equipment, or anything like that.

12 So you can see it can be produced quite
13 economically if the electricity generation is there.

14 So these two pathways, certain drivers here,
15 drivers for biogas would be a policy and perhaps some
16 sort of incentives structured from the 118 program.

17 These are most likely in the near term, but
18 there is a cost premium over natural gas because of the
19 desire for this fuel source for a variety of reasons,
20 not just hydrogen, but also meeting renewable portfolio
21 standards for electricity generation.

22 And for renewable electricity, again, drivers SB
23 1505, RPS standards and potentially incentive from this
24 program.

25 To use it, this curtailed amount of renewable

1 energy, don't see that happening in the near term, it's
2 more mid or further off, and it requires more
3 infrastructure.

4 For the biogas we could use existing SMR
5 facilities and simply inject biogas, as opposed to
6 methane.

7 Whereas with the renewable electricity we have
8 to install new equipment, electrolyzers and whatnot.

9 That's all I have. I guess I just want to add
10 that I think that, as it's been stated earlier today,
11 but the -- it's more important to get more stations out
12 there, natural gas being used for hydrogen today is
13 still a huge environmental improvement over gasoline and
14 we shouldn't put the renewable standard in front of
15 getting more stations out to get us down this pathway of
16 reaching the environmental goals.

17 Thank you.

18 MS. BARONAS: And thank you so much, Dr. Brown.
19 So at this time I'll open it up to questions and
20 comments.

21 MR. MUENCH: Just a quick comment.

22 MR. STAPLES: I have a comment.

23 MR. MUENCH: Tim, just a quick comment. I
24 really like your picture of the Orange County Sanitation
25 District Facility, but I want to point out that's the

1 Tri-generation plant that you showed. The actual
2 fueling station is much more user friendly --

3 DR. BROWN: Absolutely.

4 MR. MUENCH: -- and less industrially looking.

5 DR. BROWN: The fueling station's about, oh, a
6 thousand feet away, something like that.

7 MR. MUENCH: Since we'll be talking about user
8 friendliness and retail-like experience.

9 DR. BROWN: Yes, that's not a good picture to
10 represent that.

11 MS. BARONAS: Any other questions or comments
12 for Dr. Brown?

13 MS. ZHANG-TILLMAN: I have a question. So, in
14 your graph, when you showed that the gasoline number's
15 going down, is that just due to the vehicle efficiency
16 or is that due to existing regulation, such as the LCFS?

17 DR. BROWN: That's a good question. I took
18 those numbers from ARB Statement of Reasons for Clean
19 Cars, I believe.

20 MS. ZHANG-TILLMAN: Okay.

21 DR. BROWN: So, you may know better than I do.
22 My guess is it's efficiency numbers.

23 MS. ZHANG-TILLMAN: I think in that particular
24 case it's just the vehicle efficiency that was
25 considered.

1 DR. BROWN: Okay.

2 MS. ZHANG-TILLMAN: The reason why I ask is we
3 just had some recent activity with the CFO, the Clean
4 Fuel Outlet, and in that we also looked at hydrogen
5 pathways relative to gasoline, obviously to look at the
6 benefits of hydrogen.

7 And in that analysis, which I did that, we also
8 looked at the LCFS impact, because LCFS requires
9 gasoline to reduce carbon intensity value over the 2010
10 to 2020 period, and so that has an effect.

11 And if you take that into account, plus the
12 vehicle efficiency, SMR, you know hydrogen by SMR, with
13 liquid, especially, may not necessarily have that
14 positive. So that might come up slightly negative.

15 DR. BROWN: Yeah, it certainly depends on where
16 the electricity's coming from.

17 MS. ZHANG-TILLMAN: Right, exactly. And we're
18 assuming existing -- you know the existing pathways
19 already released in the LCFS, that's what we went by,
20 and that looks at the -- well, if you look at the liquid
21 pathway, that was not something very positive that we --
22 you know, it did not come out to be 100 percent
23 positive, as everybody was thinking.

24 So, that's just kind of out there. I don't want
25 people to think that, you know, because hydrogen, it's

1 very clear, that obviously everybody's going to agree to
2 this and it's the cleanest technology out there.

3 We have done some numbers, as well, and in time
4 frames that are far -- you know, maybe beyond 2017, when
5 the LCFS pushes gasoline to have ethanol contents that
6 are much, you know, lower in CI, that could also have
7 another effect, that's what I'm trying to say.

8 DR. BROWN: Maybe, I mean it depends on your
9 numbers, your calculations, I haven't seen them. Ours
10 certainly point to hydrogen being an excellent carbon
11 reduction regardless of the use or not of liquefaction.

12 We also need to consider all the other aspects
13 of hydrogen as well --

14 MS. ZHANG-TILLMAN: Right.

15 DR. BROWN: -- such as domestic fuel source,
16 whereas we're trying to reduce the carbon intensity of
17 gasoline using ethanol, and the ethanol comes from
18 overseas, then we're moving away from, perhaps, the
19 domestic resource that we're trying to --

20 MS. ZHANG-TILLMAN: Exactly. And again, this is
21 why we have to coordinate as much as possible with the
22 existing regulation that takes into effect the fuels
23 that we are going to be looking at and comparing to.

24 MS. BARONAS: Okay, this concludes our morning
25 discussion. Would you please take a lunch and come back

1 at 1:30. Thank you.

2 MR. STAPLES: Is it possible to comment about
3 the last presenter?

4 MS. BARONAS: So, Paul, can you join us after
5 lunch, please?

6 MR. STAPLES: So I'll be able to comment then?

7 MS. BARONAS: Yes, thank you.

8 MR. STAPLES: Thank you. Thank you.

9 (Off the record for lunch at 12:22 p.m.)

10 (Reconvene at 1:40 p.m.)

11 MS. BARONAS: Would the people on WebEx please
12 mute their phones. Thank you.

13 Hello, this is Jean Baronas with the California
14 Energy Commission and we're going to continue our June
15 29th workshop.

16 So this afternoon I'd like to continue the
17 renewable hydrogen discussion and move into other
18 possible elements of a future solicitation, those being
19 market diversity, bus and non-road projects, and then
20 project readiness.

21 So, if we could please continue with our
22 discussion of the renewable hydrogen. Sorry for the
23 lunch cutting that right in half, but I think people
24 were hungry.

25 So, let's think about what we heard. We heard,

1 I think, Dr. Ogden, we heard Tim Brown, and we heard
2 ARB. Not in that order, it was ARB, Dr. Ogden and Tim
3 Brown.

4 So, let's reconstruct where we can go with that
5 because is this -- that's the open question is, is this
6 a part of the vision for the State? How is this a part,
7 if it is, for the vision of the network of hydrogen
8 fueling stations?

9 MR. STAPLES: Can I --

10 MS. BARONAS: Okay, so Mr. Staples go ahead and
11 finish your thought because I know we cut you off
12 earlier.

13 MR. STAPLES: Well, you didn't, it was just
14 getting late and you all needed to have lunch, and I get
15 it.

16 I just wanted to respond to the UCI
17 presentation. There are projections on renewable
18 hydrogen really, probably, are nearest, closest to what
19 mine are, as opposed to Davis's, because I think there's
20 some consideration there thinking that we're not just
21 going to be buying, you know, energy or putting on
22 photovoltaics at the station, or wind at the station.
23 And we're going to be actually be buying it from power
24 producers, which is the method that I have chosen and I
25 have made contact with power producers willing to

1 participate.

2 Won't get to that 7.5 cents per kilowatt hour at
3 the very beginning, but we can anticipate that as the
4 market grows and as the purchase guarantee increases,
5 because you have to guarantee a certain amount and it's
6 kind of hard when you're not really sure what the
7 capacity needs are going to be.

8 However, when you start getting these vehicles
9 rolled out those prices are going to come down
10 significantly. Expansion is in our plan and it's not
11 nearly as expensive as the original system.

12 So, I just wanted to comment on that and well,
13 you know, say thank you, UCI, I enjoyed your
14 presentation very much.

15 MS. BARONAS: Okay, thank you Mr. Staples.

16 MR. STAPLES: That's it.

17 MS. BARONAS: Thank you very much.

18 And so, Jim McKinney, please help me reframe the
19 question for renewable hydrogen.

20 MR. STAPLES: Did you hear me?

21 MS. BARONAS: Yes. Thank you, Mr. Staples, we
22 did hear you, yes.

23 MR. MC KINNEY: Yeah, so for the renewable
24 hydrogen question and, again, thanks both to Joan, and
25 Tim, and Gerhard with ARB, on those presentations. And

1 I was kind of pleasantly surprised to be reminded of how
2 much ARB has done already on the 1505 standard and
3 regulation.

4 So kind of part of what we're going to start
5 doing this workshop and then the July 10 workshop is
6 kind of going from, you know, background and concept to
7 some things that we can measure or require in the
8 solicitations.

9 So, SB 1505, it is a statute, we see the need to
10 comply with it. And so since we're offering public
11 money ergo that needs to be one-third renewable hydrogen
12 in the mix.

13 And so a couple of things I wanted to say, one
14 is that there -- I guess in our view, at the staff
15 level, there are kind of three basic ways to get at
16 this. I mean one is a direct physical pathway, so that
17 could be on-site production or some pathway within
18 state, biogas, renewable power, et cetera, you know,
19 feeding into the hydrogen manufacturing process.

20 Another option is some type of in-state credit
21 trading system and to me, personally, the thought of
22 linking that into the LCFS credit markets makes a lot of
23 sense because that market is up and running now.

24 They've done all the heavy lifting on how you -- who is
25 an eligible party, how do you track credits and all

1 that. I think that's a very interesting option.

2 And the third is some type of out-of-state
3 credit trading system or documentation system.

4 And so we will be deciding between, you know,
5 some combination of those, or one or the other. And in
6 a minute I'd like to ask for comment on those because I
7 think there's definitely pros and cons all the way
8 around.

9 Another thing that we've kicked around at the
10 staff level is perhaps some kind of set-aside for a
11 demonstration, you know, on-site renewable hydrogen
12 production system, so something like that.

13 And lastly I just want to say, in terms of, you
14 know, policy intent for the AB 118 program we do have
15 sustainability regulations in our regulations. And I
16 think there's been some concern about, say, burdening a
17 new market that's struggling to get off the ground with
18 an additional sustainability or renewable hydrogen
19 measure.

20 We heard all the exact same concerns with
21 biofuels production several years ago and we continued
22 to require the market to have sustainability aspects to
23 their projects and the market responded, and we've had a
24 lot of really innovative proposals over the years on how
25 you can develop next generation, you know, ethanol,

1 biodiesel, renewable diesel, biogas, you know, with
2 alternative feedstocks, or cellulosic processes, or
3 gasification, et cetera.

4 So there is a precedent there and, again, it's a
5 question of degree and measure at this early point with
6 the hydrogen industry.

7 So, that's what I wanted to put out. And again,
8 we're looking for specific comment, you know, either
9 today if you want to have preliminary discussion, or
10 written comments later.

11 But again, what kind of makes sense? Again, so
12 in-state direct pathways, in-state credits, out-of-state
13 credits, some type of set aside for demonstration
14 renewable hydrogen projects.

15 MR. JONES: I actually had a question.

16 MS. BARONAS: Okay, would you please identify
17 yourself?

18 MR. JONES: Sure. My name is Brandon Jones; I'm
19 from the Central Coast Clean Cities Coalition. This is
20 a question for Dr. Brown.

21 What source of energy, whether it's biogas,
22 renewable, or conventional electricity that's used to
23 make hydrogen do you see as like the best balance
24 between providing like a return on investment and
25 emission reduction?

1 DR. BROWN: That's a difficult question. So I
2 guess I can try to answer it -- pose it a little bit
3 differently and it's sort of where's the -- in terms of
4 renewable fuels what's the best use of the fuel? Or
5 even in natural gas terms, what's the best use for that
6 fuel in reaching our greenhouse gas benefits, for
7 example?

8 So, if we're going to use natural gas for
9 vehicles we have a lower carbon footprint if we use the
10 natural gas through an SMR unit, in a fuel cell vehicle,
11 than if we were to combust that natural gas in a
12 combustion vehicle.

13 So if you want to use natural gas or -- so there
14 are a number of supply chains there. Another one would
15 be burning the natural gas in a combined cycle power
16 plant to produce electricity for electric vehicles.

17 Of any of those pathways, the hydrogen fuel cell
18 vehicle is the lowest greenhouse gas impact.

19 Similarly, because biomethane is essentially
20 methane and it would undergo the exact same processes.
21 If you're going to use biomethane, the lowest carbon
22 signature for that, for transportation is to use it in a
23 fuel cell vehicle.

24 For renewable electricity it's the opposite,
25 it's actually, it's much more efficient to use that

1 renewable electricity in an electric vehicle. That gets
2 to other questions as to whether the market's going to
3 accept electric vehicles en masse, et cetera.

4 But so, the bottom line is if you have gas, it's
5 best to use it as the gas in a vehicle. If you have
6 electricity, it's best to use it as electricity in a
7 vehicle. Though, of course, you can flip flop those two
8 with different technologies in between.

9 Does that address your question?

10 MR. JONES: Yeah, thanks a lot.

11 MS. BARONAS: Okay, thank you Dr. Brown.

12 So, back to the options laid out by Jim
13 McKinney, could we have an open discussion on maybe pros
14 and cons of the various options, or strengths and
15 weaknesses of the options.

16 Yes, please, Steve.

17 MR. ECKHARDT: Steve Eckhardt with Linde. The
18 options you listed, Jim, the in-state trading, in-state
19 or out-of-state credits, direct physical pathway, those
20 all seem reasonable to us.

21 You know, we're trying to meet a pretty high
22 hurdle, you know, higher than what other fuels need to.
23 So I think we need to consider -- you know, be flexible
24 and consider all sorts of options that are considered
25 elsewhere.

1 You know, for example, in terms of biogas
2 credits the SGIP program, accept in-state/out-of-state
3 credits. Utilities, in meeting their requirements, they
4 buy out-of-state or in-state biogas and the rules should
5 really be no different for hydrogen.

6 So, flexibility to allow as many viable and
7 appropriate sources as possible is -- I think is
8 appropriate because we are trying to meet a high hurdle.

9 With respect to some of the costs of renewable
10 hydrogen, I'd like to have a chance to look at and
11 comment on what Dr. Ogden had presented. Those costs
12 look pretty aggressive or, say, low so I'd like to just
13 understand where those came from.

14 But it would be our view that, you know,
15 renewable hydrogen, that adder, it's not an inexpensive
16 adder.

17 MS. BARONAS: Thank you Steve.

18 So are there any other comments? Bob Boyd.

19 MR. BOYD: Yeah, this is Bob Boyd. You know, in
20 looking at Professor's Ogden's slides, it really seemed
21 to me that she was talking about large-scale production
22 methods and the numbers that she was really looking at
23 were what would be the cost of adding a renewable
24 component to large-scale hydrogen production methods?

25 And I use the "large" word over and over again

1 because when we're talking about hydrogen fueling
2 stations of 100 kilograms a day, or 200 kilograms a day,
3 or 300, those are not large SMRs. That's not -- so,
4 trying to burden a small project that's going to be
5 doing 100 to 300 kilograms a day with a renewable
6 requirement is really unfair to the expectations that
7 these projects are going to succeed.

8 The focus on renewability really should be down
9 the road, ten years from now, when we're out at
10 thousands and thousands of tons a day. Thank you.

11 MS. BARONAS: Okay, thank you for that.

12 Any other comments along this line? Hi, please.

13 MR. STAPLES: Yeah, I do.

14 MS. BARONAS: Just a moment, please, we have an
15 in-person comment here.

16 MR. STAPLES: Okay, sorry.

17 MR. ELRICK: Okay, Bill Elrick, California Fuel
18 Cell Partnership. I think I would just echo what I
19 heard a minute ago from Linde on the source of the
20 hydrogen and the process, or the credits, you know,
21 being the most flexible that gets -- if the goal is to
22 get the appropriate and proper, to allow that to be
23 flexible, however that might need to happen.

24 To go to the set-aside question, I think that's
25 a really interesting approach. I think in the last pond

1 there was some production funding listed, before it was
2 pulled back, and maybe something like that could be
3 considered, a broader range.

4 MS. BARONAS: And couch that in more of a
5 futuristic solicitation, please.

6 MR. ELRICK: Okay, sure. I think maybe if you
7 look at production specifically for renewable, a set-
8 aside is an interesting thing, trying to especially both
9 encourage, because we all want to get further down the
10 renewable stream faster, but knowing that it incurs a
11 cost, a set-aside is one approach.

12 Another might be to -- and this is an arbitrary
13 number but if you went, instead of 33 percent, if
14 someone showed through the proper process and credit
15 that they could do a hundred percent in any way that's
16 appropriate, maybe there's either a set-aside or an
17 incentive of additional funding, so you might have some
18 extra money that allows that to happen.

19 MS. BARONAS: Are there other questions or
20 comments?

21 MR. STAPLES: Yes.

22 MS. BARONAS: Okay, just a moment, please. On
23 the WebEx, would everyone please mute their telephone
24 set?

25 And then, Mr. Staples, go ahead.

1 MR. STAPLES: Yes, in reference to the last
2 presentation -- I've got to turn down my speaker volume
3 otherwise I'm getting feedback.

4 In reference to the last -- my name is Paul
5 Staples, I'm Chairman and CEO of HyGen Industries.

6 If an SMR, on-site generator, or any on-site
7 generator, or any generator of hydrogen needs credits to
8 offset the pollution that they're creating, well, so be
9 it, it's just like any other stationary source of
10 pollution, they have to be treated the same. Okay, no
11 different.

12 They can change by basically going to
13 renewables.

14 And if there is to be some credits purchased
15 there should be a requirement that a portion of the
16 credits, because it's from a renewable generator who is
17 generating credits, because they're doing a 100 percent
18 renewable offsetting air pollution created by fossil
19 fuel.

20 And so, I mean that just seems to make sense,
21 okay, if we're going to go this route. It helps the
22 renewable end of things and it also gives the incentive
23 to go to renewables for those who are choosing an easier
24 option. That's all, thank you.

25 MS. BARONAS: Thank you. Thank you for your

1 input.

2 So, this is Jean Baronas at the California
3 Energy Commission. Jim McKinney outlined, at a high
4 level, five different approaches, so if we could just
5 review, tell me if I have it right? Four? That's like
6 a catcher's sign for the Giant's, okay, fast ball, fast
7 ball.

8 Okay. I was told you could put jokes in this
9 transcripts, actually, the court reporter told me it's
10 okay so -- in the last meeting.

11 So for on-site generation, okay, and then credit
12 trading linked to LCFS. And then out-of-state credit
13 and then a set-aside.

14 MR. MC KINNEY: Set-aside, yeah.

15 MS. BARONAS: And that's it.

16 MR. MC KINNEY: Oh, you're right. And then, Jim
17 McKinney, some other demonstration of physical pathways
18 within the State, you know, say from in-state biogas
19 directly linked to kind of the volume metric hydrogen
20 production facility. So, you were right.

21 MS. BARONAS: Okay.

22 MR. MC KINNEY: I think Steve Eckhardt has his
23 hand up.

24 MS. BARONAS: Please go ahead, Steve.

25 MR. ECKHARDT: This is Steve Eckhardt with

1 Linde. The other -- Jim, you had made another comment
2 about the potential for demonstration projects, I guess
3 you had said.

4 MR. MC KINNEY: Uh-huh.

5 MR. ECKHARDT: So a project to demonstrate some
6 new method of renewable hydrogen production, is that
7 what you were referring to?

8 MR. MC KINNEY: Well, for example, with our
9 current EVSC or electric charger solicitation we've got
10 some money set aside for level three chargers, with kind
11 of different features. So, you know, stuff that's not
12 quite at the point of market standardization, but we see
13 it coming rapidly.

14 So this is not my strong technical area, by a
15 long shot, for renewable hydrogen but, you know, some --
16 I guess the Fountain Valley Station, with the DOE
17 funding; is that right, Toby? I just want to make sure
18 I got my facts straight here, is that --

19 MR. ECKHARDT: Yeah, I mean that's one of the
20 comments I wanted to make was that the DOE does do
21 funding for a demonstration type project and you should
22 just, you know, consider that the DOE, and I don't think
23 anybody's here from the DOE, oftentimes will subsidize
24 the demonstration portion of it. The, you know, hey,
25 we're trying to introduce something new, it hasn't been

1 proven. Oftentimes it's a good way to get DOE funding
2 and they come into a project, to where the CEC doesn't
3 need to risk the money on something unproven.

4 MR. MC KINNEY: Okay.

5 MR. ECKHARDT: So something to consider.

6 MR. MC KINNEY: Yeah, yeah, I mean it's my
7 general understanding that, you know, the cost of on-
8 site renewable SMR is quite a bit higher than some of
9 the other industrial sale approaches. So, again,
10 looking for a way to perhaps incorporate that in,
11 perhaps not, and it's something we're putting out to the
12 stakeholder group.

13 MS. BARONAS: So, if I may --

14 MR. SLEIMAN: This is Ghassan from Hydrogenics.

15 MS. BARONAS: Okay, Ghassan, could you hold your
16 question just a moment, I want to build on a question
17 raised in the room.

18 MR. SLEIMAN: Sure.

19 MS. BARONAS: Okay, thank you.

20 So, Steve, just building on what you've said, it
21 makes me think that some of the ideas in the room are
22 not demonstration, is that --

23 MR. ECKHARDT: Which ideas? I mean in terms of
24 do you mean technologies or --

25 MS. BARONAS: Yes.

1 MR. ECKHARDT: I mean nothing in terms of, you
2 know, SMR, or use of biogas, electrolysis, none of
3 that's demonstration, that's all been proven. So, no, I
4 wouldn't necessarily classify those as demonstration,
5 but we'll have to comment on maybe a specific --
6 understand the specifics better to make a better
7 comment.

8 MS. BARONAS: So you were saying earlier that
9 this idea of a set-aside to demonstrate renewable
10 hydrogen or make a proof of concept was kind of
11 interesting. And then you said that, you know, you'd
12 heard, or you'd see, or witnessed DOE actually funding
13 this kind of work.

14 So then I went to is it correct to assume that
15 by considering that in a future solicitation that we
16 would in fact be considering demonstration?

17 MR. ECKHARDT: Well, like I said, most of what's
18 being discussed here I wouldn't classify as
19 demonstration. I mean I -- and people should comment.
20 I mean, like I said, electrolysis and SMR, using wind
21 for an electrolysis, using biogas for SMR production of
22 hydrogen, it's all proven, so wouldn't classify that at
23 all as demonstration.

24 When I mentioned demonstration I was thinking of
25 it as, for example, what was done at Fountain Valley.

1 That was demonstration, nobody had done that before.
2 That was a classic demonstration of something new that
3 needed to be proven, that had a lot of uncertainty
4 around it.

5 MS. BARONAS: So back to Jim's point of four
6 options, does anyone have an opinion of the strengths of
7 one over the other, or are they all equally weighted?

8 MR. SLEIMAN: This is Ghassan from Hydrogenics.

9 MS. BARONAS: Ah, Ghassan, thank you so much. I
10 forgot, I'm so sorry. Please go ahead and then Gerhard
11 is next.

12 MR. SLEIMAN: Yeah, I've been trying to talk but
13 I didn't realize that I had both mutes on my laptop and
14 on my WebEx at the same time.

15 Yeah, so on the four points I think that, you
16 know, keeping it in California makes a lot of sense, so
17 interstate credit trading -- credit trading within
18 California makes a whole lot of sense. It just adds
19 more cars and just helps us in that aspect.

20 But the tenders, the overall hydrogen
21 infrastructure, I can see reasons for flexibility.

22 From our point of view, we continue to meet
23 demands with off-site generation. And I do agree --
24 well, we do agree that a portion for on-site generation
25 does make sense.

1 If we go with one technology, then that would be
2 then we wouldn't have -- it would be dictated the way
3 forward in the future, and people will just have a lot
4 of examples of the projects that are currently being
5 used, and that's going to be the way of the future. So
6 we need the difference by as much as possible, without
7 changing the infrastructure a whole lot.

8 MS. BARONAS: Okay, thank you for your comment.
9 And, again, I apologize for not acknowledging you
10 earlier, even after you went off double mute.

11 So, Gerhard, you had your hand up?

12 MR. ACHELNIK: Yeah, this is Gerhard Achelik
13 with the Air Resources Board. And I was just going to
14 support -- at least the top, the first four items that
15 Jim mentioned. I'm not sure about the fifth one because
16 I wasn't sure if I followed it a hundred percent.

17 But I think what we've heard in the room is the
18 options, there's enough demand for renewables that we
19 need to keep all the options open, you know, for in-
20 state, out-of-state, and direct production.

21 And some thoughts would be just to -- is to
22 allow additional funds for the most expensive. I think
23 the direct production is the most costly.

24 And then I like the idea of the set-aside. I
25 mean the Fountain Valley, Orange County Project is

1 unique. There are potential opportunities for other
2 ones that I think could still be classified as
3 demonstrations, especially if you get different
4 technology providers involved.

5 For landfill, a landfill project, even though in
6 concept it's similar, it certainly would have a lot of
7 new challenges because landfill gases are a lot less
8 predictable than waste water treatment plants.

9 So, you know, that clearly to me would be a new
10 demonstration. I guess to me, but there's probably
11 people here who already know more about it than I do.
12 Tim, we should talk.

13 So I think I like all four of the concepts and
14 the fifth one I'll just say I'm not speaking for or
15 against because I wasn't quite clear if I got the
16 distinction on it.

17 MS. BARONAS: Thank you for your comments. Dr.
18 Brown?

19 DR. BROWN: Yeah, this is Tim. I just want to
20 say that I think you should support any renewable sort
21 of supply chain for hydrogen fuel.

22 By incentivizing one versus the other it's
23 really almost dictating the equipment, the suppliers
24 that can meet the solicitation. Different technologies
25 rely on a different renewable pathway.

1 And then on the topic of research or
2 demonstration stations being, you know, intimately
3 involved in the Orange County Sanitation District
4 Station, I think it's absolutely necessary to do those
5 kinds of things and move hydrogen and fuel cell vehicles
6 towards the sustainable future that we really want it to
7 get at. But I don't know that that needs to be done
8 through the CEC funding.

9 Again, as Steve said, DOE can support those kind
10 of maybe research aspects. Right now the crux is to get
11 to this threshold number of network of stations needed
12 to get these cars on the road, not to reinvent the wheel
13 and try new things, necessarily.

14 MS. BARONAS: Yes, Bill, please.

15 MR. ELRICK: Bill Elrick. Yeah, thinking about
16 this I do think our goal is to get this market going and
17 so coverage and the fuel locations really should be our
18 priority, and looking at meeting customer needs, and
19 getting those stations out there.

20 So I think, thinking further about this
21 demonstration set-aside, I think on one hand it has to
22 meet the minimum retail needs. Otherwise, we're going
23 in a very different direction than this and there might
24 be other, better funding pots to that.

25 And then putting that into the set-aside,

1 perhaps instead of -- because you could get in the same
2 trap when you might set some money aside, and either it
3 isn't pursued and it might sit on the table.

4 But instead, if the goal is to really get more
5 renewables into the system, looking at it as a
6 percentage base and if we go back to some of the slides
7 Joan showed, and she had some numbers on how much it
8 costs to go from 33 to, say, 100 percent, or maybe
9 there's a middle ground of 50 percent, to look at a
10 funding process where 33 is the minimum, that's the
11 requirement. And those that get to 50 percent, if we've
12 got enough information to say it costs, and I'm making
13 these numbers up, but 20 percent more to get to 50
14 consider that as part of the incentive approach.

15 And if somebody's offering 100 percent and we
16 know it costs them 45 percent more in costs, then
17 offering that as an incentive. And that way we're
18 incentivizing more renewable into the system, we're
19 allowing it to happen, and we're actually giving them
20 the promotion and the incentive to do it, instead of
21 really making it a cost economics where they can't.

22 MS. BARONAS: Yes, Steve, please.

23 MR. ECKHARDT: My concern on this, the renewable
24 hydrogen item, I mean we're already being held to a
25 higher standard on the 33 percent. And we need to meet

1 33 percent, that's law, so that's fine.

2 But my concern is if we focus on it too much,
3 try incentivize people to make it as green as possible,
4 why are we further handicapping hydrogen? Why are we
5 doing that when we could be trying to put more stations
6 in, or putting in better performing stations, or putting
7 in another dispensing and giving consumers what they
8 want.

9 Consumers want stations that work, they want
10 enough stations.

11 And to fund a lot of money to throw in even more
12 renewable hydrogen, I just would ask the CEC to consider
13 the value created, how we're meeting customer needs and
14 do we need to further, I'll say handicap hydrogen, by
15 adding to the cost by making it even more renewable.

16 I think we need to meet the needs of the
17 consumers so people buy cars, because if that doesn't
18 happen, then we'll have failed.

19 MS. BARONAS: So noted.

20 Mr. Boyd?

21 MR. BOYD: Yes, thank you, Bob Boyd.

22 I wanted to just reiterate what Steve was saying and
23 that is that we should be funding the development of
24 stations and not funding new hydrogen pathways.

25 Hydrogen pathways will follow the cars. If the cars

1 come out and the demand is there, then renewable
2 pathways will follow. But right now we need to get
3 stations out there.

4 MS. BARONAS: Okay, so noted. Thank you for
5 your frankness and guidance, it's very, very much
6 appreciated. And so now I --

7 MR. STAPLES: One more comment?

8 MS. BARONAS: Yes. Please hold on sir. And
9 Toby, do you have --

10 MR. MUENCH: Just a quick note here about the
11 set-aside and the demonstration idea. I mean a lot of
12 these on-site technologies have been done before and I
13 just remembered -- I remembered right, Larry, your
14 station was a -- the old station was an electrolysis
15 driven by solar PV, I believe.

16 Maybe you can say a few words about the
17 experiences with cost, and with that station, with the
18 technology, how much demonstration, how much reality,
19 how much, you know, deployment this is.

20 I mean I know it's being converted to a
21 different type of technology, but I think the past
22 experiences could be interesting.

23 MR. WATKINS: I can't really comment on the --
24 the costs are skewed. We had four, five, ten hydrogen
25 vehicles, now we have one. And the cost of producing

1 hydrogen via sunlight is expensive at the outset. If I
2 could load the station up, it would be lower on a dollar
3 per kilo basis. And it's an old technology. It's,
4 what, Ghassan, if you're still on, it was 2005 I believe
5 it was commissioned. We still have it, it's still up
6 and running, still doing a good job. We haven't
7 converted it, yet.

8 Does that answer your question, yeah?

9 MS. BARONAS: So kindly give your name again and
10 your affiliation for the record?

11 MR. WATKINS: I apologize, Larry Watkins, AQMD.

12 MS. BARONAS: Okay, so --

13 MR. SLEIMAN: It was 2004.

14 MS. BARONAS: It was 2004.

15 MR. WATKINS: Okay, thank you.

16 MS. BARONAS: Thank you.

17 MR. SLEIMAN: And the technology, he's correct,
18 the technology is obsolete, actually.

19 MS. BARONAS: Okay, thank you for that.

20 MR. WATKINS: There's a story that goes along
21 with that.

22 MS. BARONAS: I'm sure. So can we then move on
23 to the next topic? Okay, thank you for that.

24 MR. STAPLES: I'd like to make one more comment
25 on the last comment.

1 MS. BARONAS: Okay, Mr. Staples, kindly be
2 brief.

3 MR. STAPLES: Yes.

4 MS. BARONAS: Thank you.

5 MR. STAPLES: Yes, I'll be brief. When Dr. Zlie
6 (phonetic), when I called Dr. Zlie to join me on this he
7 made me promise that we were going to do it renewably,
8 and only renewably, and I promised him I would never do
9 anything else because that's where it's at.

10 And if we get entrenched in a -- and it killed
11 him. He had a stroke and he shows up the next day at
12 the AQMD to argue for it

13 So, that's one of the things that drives me.
14 And the thing is here is that however we start it now,
15 that's the way it will be in the future, that's what the
16 entrenchment will be. Infrastructure doesn't change
17 overnight, it doesn't change without a fight, and that's
18 what we're going to be doing here in ten years, 15 or 20
19 years is fighting this fight again.

20 Stop the fighting and give the incentives for
21 renewables because that is the only way that this
22 paradigm survives.

23 We've been doing gasoline and petroleum for a
24 hundred years and they're still fighting the change.

25 Thank you.

1 MS. BARONAS: Thank you, so noted, Mr. Staples.

2 So at this time I'd like to bring up slide 06,
3 please, if we could please talk about market diversity.

4 So these are simply concepts and ideas for
5 discussion and we could have new ideas, other than
6 what's here. But if we look at this slide, wondering
7 about possible mechanisms in the future solicitation to
8 promote market diversity. That's the general tenor of
9 this discussion.

10 And so there are numerous ideas, I'm sure. But
11 if we look at number of stations per proposal as a
12 possible cap, number of awarded stations, and then total
13 funding awarded as potentially thresholds.

14 Could people here please give comments about
15 these ideas?

16 MR. MC KINNEY: Jean?

17 MS. BARONAS: Yes, go ahead.

18 MR. MC KINNEY: Jim McKinney here, let me just
19 build on what Jean introduced here. A lot of the
20 feedback that we've heard over the years is that there
21 is a strong desire to have kind of a good, robust
22 market, with lots of players on the fuel provider side,
23 station developer/station operator side, and we concur
24 with that.

25 And so some of the things, to put a little more

1 flesh on some of these ideas, for example the ARV Clean
2 Vehicle Rebate Program, in order to drive market
3 diversity put a 50 percent cap on the total dollar
4 amount, I believe, or on a voucher level. So, 50
5 percent is a maximum that any one manufacturer could get
6 in one calendar year.

7 That's been somewhat controversial but, again,
8 it's helping to maintain or create market diversity.
9 So, that's what we mean.

10 So, we don't have any numbers up there but,
11 again, just wanted to give you a better idea of the
12 kinds of stuff that we're considering here.

13 And we don't -- we don't want to inadvertently
14 use these, you know, large dollar amounts that are
15 coming through the Energy Commission ARFET Program right
16 now to create, you know, a de facto monopoly early on in
17 the game for what will be, I think, a pretty high
18 revenue business opportunity going forward.

19 MS. BARONAS: Maybe you're new to some of these
20 questions, but the staff has been mulling over these
21 options.

22 So, do you have a comment, Garrett?

23 MR. POPPE: Yes, Garrett Poppe, Hydrogen
24 Frontier. I think if you're going to put caps on
25 stations why limit the number of stations. Instead,

1 limit the awards, the total amount awarded and that way
2 people can be competitive for building more stations.
3 And that's about the only thing I have to say about
4 that.

5 MS. BARONAS: Thank you for your input. Any
6 other comments?

7 MR. STAPLES: On WebEx.

8 MS. BARONAS: Oh, hello, Mr. Staples, please go
9 ahead.

10 MR. STAPLES: I'm sorry, I'm trying not to
11 monopolize this, but there are so many great ideas, and
12 so many great things being discussed here, so please
13 excuse me for being here.

14 But I wouldn't put any caps on anything, as long
15 as it's 100 percent renewable. That's my choice.

16 Naturally, if I was going to put a cap on
17 anything, it would be on fossil fuel generating
18 stations, and awarded stations.

19 But I don't want to put any restrictions on how
20 many we can get out all at once. If you've got a good
21 price and your price is very, very low and very
22 competitive for the systems that you're putting out
23 there, and you've got really great locations, you
24 shouldn't put a cap on it. It's as simple as that,
25 okay, that's the way I feel.

1 But everybody needs to have a chance to present,
2 and be reviewed, and be considered, that's the only
3 thing I want to make sure. I do not want gatekeepers
4 keeping me out or keeping anyone else out.

5 Okay, if you qualify in the areas that you're
6 looking for in the RFP, and you have the resources and
7 your proposal is good, and you've got 20 stations that
8 will fit within the budget, and it's the best of all
9 options, then that's the one you should choose. Thank
10 you.

11 MS. BARONAS: Thank you for your input.

12 Any other commenters? Please go.

13 DR. BROWN: I'll just mention -- this is Tim
14 Brown, I'll just mention what I said before about the
15 renewable options, I think you need to keep that as open
16 as possible to allow as many applicants as possible.

17 And also, within the station performance
18 criteria, of course there need to be sort of maybe
19 minimum boundaries on those kind of things based, I
20 would say, primarily on automaker input.

21 But you can't have a hard and fast rule,
22 perhaps, because that may dictate one technology versus
23 another.

24 MS. BARONAS: This is Jean Baronas with the
25 California Energy Commission. So I'm curious about how

1 you define station performance and if you include mean
2 time between failure in performance?

3 DR. BROWN: I have not. Generally, when I said
4 performance, I'm thinking of length of fill time, back-
5 to-back fills, these sort of things, capacity.

6 Mean time between failures, it would be nice if
7 that information was robust and available to help judge
8 one station versus another. I'm not familiar with it
9 enough, the station technologies, to know if that
10 information has been developed and if it's reliable. If
11 it is, that would be an additional, that would be a very
12 valuable criteria to judge stations on.

13 MS. BARONAS: Thank you.

14 Yes, Steve.

15 MR. ECKHARDT: Steve Eckhardt with Linde, two
16 comments on the caps. One is if you consider caps,
17 certainly need to consider it with respect to the
18 totality of what's submitted. If you have a lot of
19 diversity, obviously, you have more ability to do that
20 because you have more to choose from.

21 But if you only have a couple of people then
22 that can get problematic.

23 So, ultimately, if a cap is used and it ends up
24 limiting the number of stations or funding that goes
25 out, that would be very bad.

1 As far as -- I think I'll just stop there, I
2 think that really is the crux of what I want to say for
3 right now.

4 MR. MC KINNEY: Hello, Jim McKinney, I have a
5 follow up to that. So I think what you're suggesting is
6 that we need to structure the process where we get the
7 maximum possible number of applicants coming in and
8 they're not inadvertently, you know, dissuaded or
9 screened out due to some other factor, whether it's
10 station performance or, say, you know, non-congruence
11 with where some of the car target markets might be, and
12 that kind of thing.

13 MR. ECKHARDT: I mean I made some comments last
14 week about ensuring that there are certain minimums, and
15 today, certain minimums in certain geographic focus
16 areas. So that, to me, is still the most critical thing
17 is to make sure we stay within certain geographic focus
18 areas.

19 From what I can understand, from the last
20 solicitation, it seems like there's more than enough
21 parties who are participating.

22 MS. BARONAS: But we need to think in terms of a
23 future solicitation.

24 MR. ECKHARDT: Well, again, I think the
25 geographic focus, I think, is more important than caps.

1 I think minimums are more important than caps. You
2 know, awarding money to somebody who comes in with a 5-
3 kilogram-a-day station, that has a 15-minute fueling,
4 just to get diversification that, I don't think, would
5 be a good thing.

6 I think to the extent that, you know, if there
7 is a great deal of diversification in the number of
8 submittals you have, certainly it does aid in creating
9 great diversification.

10 But as I said the last time around, from what I
11 understand and what I know of what's been submitted, I
12 don't think that's an issue. It seems as though there's
13 plenty of parties who are interested in submitting
14 proposals.

15 MS. BARONAS: Thank you for that.

16 MR. FORREST: I'd like to make a comment.

17 MS. BARONAS: Yes, please, go ahead and identify
18 yourself.

19 MR. FORREST: Yes, this Matt Forrest with
20 Mercedes Benz. And I just want to point out that with
21 respect to the upcoming solicitation and the diversity,
22 please don't lose sight of the value of experience.

23 Certainly, with some of the setbacks with
24 respect to the previous PONs that we've seen in the
25 past, the delays with those stations, we need stations

1 that can be executed from beginning to end in a year or
2 so, so that we can make our 2015 deadline that's
3 outlined in the CACP road map.

4 And if we have a disproportionate balance among
5 respondents who have never built a station before, or
6 don't have a satisfactory -- or, you know, enough
7 experience to be able to provide a station as soon as
8 needed then, you know, I don't know that there's -- I
9 think we have to be careful about the balance and I'm
10 just trying to point that.

11 And not to say that I want to discourage
12 anybody, but we need these stations to arrive on time
13 and I think that's more important than the diversity at
14 this point. Thank you.

15 MS. BARONAS: Okay, Steve.

16 MR. ECKHARDT: Yeah, I would agree with that. I
17 think that to the extent that you consider caps, I think
18 it needs to be kind of at the bottom of the list to some
19 extent. There are other -- a whole lot, in my view, a
20 lot of other things that are a lot more important, like
21 making sure we get the stations out there.

22 MS. BARONAS: Okay, thank you.

23 Please mute your phone.

24 MR. SLEIMAN: This is Ghassan.

25 MS. BARONAS: Ghassan, hello, please go ahead.

1 MR. SLEIMAN: Yes, in terms of caps I'd like to
2 just make a comment. I'd like to see a cap on certain
3 technology in a single geographical area so that we
4 don't have the same station in the same geographical
5 area where there's a quality issue, or with a station
6 then that whole area is shut down.

7 So that can apply to Santa Monica, the area, so
8 that you have a diversity, just like Matt said, of
9 experienced operators or station providers that can
10 provide fuel in that area.

11 And in terms of how much money to give an
12 applicant, that is really up to the CEC to decide, but I
13 can see a 50 percent share for a single ST over and over
14 again, that can --

15 MS. BARONAS: Okay, thank you for your input.

16 In the interest of time, I'd like to move on to
17 the next discussion topic, which is bus and non-road
18 projects. I'd like to see slide number 7.

19 Yes, please go ahead, Tim.

20 DR. BROWN: This is Tim, I just want to make one
21 quick comment about the previous discussion. Hydrogen
22 is very dependent on transportation and so by limiting
23 geographic areas you would perhaps be limiting
24 technologies as well.

25 So, I understand Ghassan's point, and it's a

1 good one, that we want diversity. We also have to be
2 careful not to place geographic boundaries that may, you
3 know, incentivize one technology versus another.

4 MR. SLEIMAN: Let me just answer that. What I
5 mean -- this is Ghassan again, from Hydrogenics. Limit
6 the number of technologies in a geographical area. So,
7 you have ten stations and that was the number that was
8 selected, put in ten stations but make them technology
9 that -- you know, that works technology-wise.

10 MS. BARONAS: Okay, Ghassan, thank you so much.

11 And so moving on to slide 07, here the topic is
12 about bus and non-road hydrogen projects.

13 And so, here are some open questions; possible
14 funding for stations that serve more than the light-duty
15 vehicle market.

16 Potential benefits of ways to increase the
17 market viability of proposed stations and how to
18 demonstrate a broader market viability of hydrogen.

19 Looking at existing policy where funds are
20 intended for stations that serve transportation
21 purposes.

22 So, is the writer of this slide in the room? I
23 hope so. I don't know.

24 So, if you could think that through, under
25 existing policy, is what's meant in the first hyphen

1 under existing policy up on the board, does it mean
2 transit applications? I can't tell.

3 And then stations serving non-road projects and
4 including bus projects.

5 Dr. Brown?

6 DR. BROWN: This is Tim. I think it would be an
7 excellent opportunity to combine both, although if we go
8 back to the location, if we think of location as being
9 the top criteria, the no/no-go criteria. We, in our
10 research, have looked for these types of sites and
11 haven't found any.

12 So, if there's a site within the correct, you
13 know, geographic areas where these stations need to go
14 that can serve either light-duty vehicles and mass
15 transit, or light-duty vehicles and forklifts then, by
16 all means, that would be an excellent way to increase
17 the loading of the station and utilize the hydrogen and
18 bring the cost down. But we haven't been able to find
19 those sites. It's just not -- you know, forklift
20 operations aren't usually located near the affluent
21 neighborhoods where fuel cell cars will be purchased.

22 MS. BARONAS: Usually located where?

23 DR. BROWN: Near the areas, the high -- the
24 initial market interest regions.

25 MS. BARONAS: Any other commenters? Go ahead,

1 Bill, please.

2 MR. ELRICK: So I think your last slide, with
3 the existing policy, has some very good verbiage there
4 in that the AB 118 is built for light-duty vehicles and
5 that should be the focus.

6 Where a bus or non-road application can
7 complement that is great, it's really difficult to find.
8 to find a transit yard that is in the right location
9 and, for all the other various reasons, works for both
10 sides is difficult. But where you can find it is
11 fabulous because it promotes many things. The same with
12 it being a forklift or other project.

13 So, I don't think you should rule them out but I
14 think it's very important to make sure the focus is on
15 the light duty where AB 118 is developed.

16 And in that I think going a step further,
17 looking at, again, the different types of stations, a
18 cluster versus a connector, for example, might give you
19 some of that, might reinforce this need for flexibility
20 in that a station in downtown Santa Monica, or downtown
21 Irvine, where it is a very heavy used cluster station
22 and you're looking to get tens and hundreds of vehicles
23 into these areas, and more, that could be a disruption
24 if it's not developed right. So that's one side of the
25 equation.

1 On the other hand a connector, say something
2 that connects Northern and Southern California, you
3 might see that a forklift project, for example, could be
4 a great complement. And as long as you did have access,
5 because somebody might be driving through in the middle
6 of the night, so you really have to consider that the
7 access is there and they don't have to sign up ahead of
8 time, or any of this, that might be one where you're a
9 little more flexible in order to make that work and make
10 this market really get where it needs to be.

11 MS. SAVIN: Hello, this is Sharalyn Savin,
12 calling in from Plug Power.

13 MS. BARONAS: Hi. Carolyn?

14 MS. SAVIN: I don't know if this is the
15 appropriate time to contribute our thoughts or not.

16 MS. BARONAS: Yes, it absolutely is. Would you
17 please spell your last name?

18 MS. SAVIN: Yes, and I'm here with a colleague,
19 I'll do both for you. My last name is Savin, S-a-v, as
20 in Victor, i-n.

21 MS. BARONAS: Yes.

22 MS. SAVIN: And my first name is Sharalyn, S-h-
23 a-r-a-l-y-n.

24 MS. BARONAS: Okay.

25 MS. SAVIN: I'm associate counselor and director

1 of government programs.

2 I also have with me Jim Petrecky, P-e-t-r-e-c-k-
3 y.

4 MS. BARONAS: Okay.

5 MS. SAVIN: He is the director of product
6 management.

7 MS. BARONAS: Very good. Thank you so much for
8 calling in and interjecting at exactly the right time.
9 We mentioned earlier this morning we wanted to have your
10 presentation, now, but we didn't hear back from you on
11 the phone, so I wasn't sure you were still on the phone.

12 Could we please bring up the Plug Power
13 presentation?

14 MS. SAVIN: Yeah, actually, I know that your
15 time is running a little short and you've run over a
16 little bit, but if you want to advance to slide 9 in
17 this presentation, we can keep this pretty succinct.

18 MS. BARONAS: Okay, up to slide 9.

19 MS. SAVIN: I'm first going to allow Jim to
20 speak to what you're looking at and then I'd like to
21 follow with some of the difficulties we've had
22 regardless of technically being eligible to participate
23 in these types of applications. Jim.

24 MR. PETRECKY: Hello, everyone. What you see
25 here is the proposal for the hydrogen highway, as

1 proposed by NREL. What we've done is overlaid the
2 current Plug Power customer base, there's about 30 sites
3 that are in the United States. And when you overlay
4 those site locations with the hydrogen highway, you'll
5 see that we are becoming nodes along that hydrogen
6 highway.

7 By definition, the distribution centers that we
8 have our fuel cells in are along major trucking routes.
9 So, by extension of investing in our technology, the
10 government would be investing into the hydrogen highway.

11 If you go to the next slide, I focused in at
12 California and we currently have five customers, with
13 six locations.

14 There are clusters in the north, around the San
15 Francisco area, and in the south at the Los Angeles
16 area.

17 What you'll see is that investing into Plug
18 Power's technology, customers of the fuel cell vehicles
19 would be able to refill their hydrogen cars along
20 several locations within those major cities.

21 And the last slide I want to show you, if you go
22 to 11, is what we are doing within our product
23 catalogue. As you know, right now we are concentrating
24 on forklift trucks and you see the types of numbers in
25 terms of the hydrogen costs for a dollar per kilogram.

1 So, our fuel cell customers at distribution
2 centers usually have about \$8 or \$9 per kilogram.

3 We are looking to expand our product catalogue
4 into on-road applications, which is the TRUs, the
5 refrigerated trailers.

6 And by having a customer have both forklift
7 trucks and TRUs, we would increase the volume of
8 hydrogen consumption to the point where the all-in costs
9 of hydrogen drops from about \$9 a kilogram down to about
10 \$6 a kilogram.

11 And so people that have fuel cell vehicles would
12 also enjoy that cost reduction because of pushing out
13 the volume versus cost curve.

14 MS. SAVIN: Now, unless there are any questions
15 about those three slides, I wanted to speak to the
16 present situation and the push and pull we seem to have
17 right now with our customers in trying to engage in
18 these solicitations, at least for the last two years.

19 Are there questions or may I move on?

20 MR. STAPLES: Well, I have some comments on the
21 previous --

22 MS. BARONAS: Pardon me, if I may -- if I may
23 interject. Sharalyn, this is Jean Baronas in the
24 California Energy Commission, could you please frame
25 your next comments as those that would be important to

1 us going forward in the future?

2 MS. SAVIN: Sure. Sure, no problem.

3 MS. BARONAS: Okay, please go ahead.

4 MS. SAVIN: Okay. Moving forward, since you
5 have noted that there is an eligibility for our
6 application so long as we serve the purpose of wanting
7 to have fuel stations for fuel cell vehicles.

8 We've had many customers, including Sysco, ask
9 us why they're -- why people aren't seeking out to just
10 do simple extensions of the hydrogen infrastructure
11 already on site for outdoor dispensing stations for
12 vehicles.

13 This investment already has been made by the
14 customer in the major infrastructure, they've already
15 laid out the \$800,000 to a million, in some instances,
16 to put the hydrogen infrastructure in, and we'd simply
17 be adding a pipeline dispenser to an outdoor dispenser
18 for vehicles to use.

19 It would not be a full retail station, they
20 would have availability of assistance, if it was so
21 required, and they would have the availability of
22 reduced cost hydrogen because it is coming at such a
23 volume at the site.

24 But there seems to be a misunderstanding that
25 because we are allowed to participate we have been able

1 to do so with the types of restrictions and minimum
2 requirements set forth such far.

3 That's why moving forward we have a very, very
4 excited customer base that wants to be better able to
5 leverage their technology. They're very comfortable
6 with hydrogen refueling, they've been doing it. They
7 really want to help promote it more globally.

8 And the major expenses had been laid. We are
9 talking, as compared to building ground up a regular
10 hydrogen gas station, if you will, you have the majority
11 of the investment already made and we're just simply
12 looking for an extra funding from the State to
13 facilitate another dispenser for cars.

14 We strongly believe that if the CEC better
15 understands our customers' flexibility, where they can
16 move and where they can't move in making this available
17 in an unrestricted way, that you would have a number of
18 stations at a very low cost along the thoroughfares that
19 seem to be targeted for international hydrogen highway,
20 and in California as per NREL. I'm not sure if this
21 group agrees with that.

22 But we are very interested and we'd like to know
23 how to best complement -- how to best complement your
24 desire to have this done. We have customers who are
25 more than willing to be partners and there seems to be

1 some type of gap and misunderstanding on how to have it
2 happen.

3 But it seems to be quite an economical solution
4 for all parties involved.

5 MS. BARONAS: So thank you so much for your
6 input and I'm calling on Larry Watkins, from the AQMD,
7 to comment.

8 MR. WATKINS: Hi Jim, Hi Sharalyn, this is Larry
9 Watkins.

10 MS. SAVIN: Hi Larry.

11 MR. WATKINS: Hi. I happen to agree with Plug
12 Power's comments so far. They're correct, there's a lot
13 of infrastructure that they are laying. There's the
14 hydrogen stations that they're putting in for their
15 customers are tried and true, and they work day in and
16 day out.

17 I don't -- I stepped out of the room for just a
18 moment, I don't know if Jim mentioned how many tens of
19 thousands of fills you've done last year. Can you
20 comment on that, Jim, real quick?

21 MS. SAVIN: I don't know that we have those
22 numbers in front of us.

23 MR. WATKINS: Okay.

24 MS. SAVIN: But I can certainly provide them to
25 the CEC.

1 MR. WATKINS: Andy can always say those, they're
2 always on the tip of his tongue.

3 But in any event, earlier, just before you came
4 on to the phone, Sharalyn, we were talking about
5 appropriate market diversity and siting of these kinds
6 of stations. And we were talking about the cluster
7 groups and there's not necessarily large warehousing
8 operations, per se, in and around the clusters that have
9 been identified by the OEMs and the Fuel Cell
10 Partnership.

11 However, from a connector station stand point,
12 Bill, you mentioned this directly, it makes a lot of
13 sense. And that's where, oh, companies like Sysco, that
14 you had up on an earlier slide, I saw it fleeting, it
15 makes a lot of sense.

16 And, yes, I believe that you could have a lot of
17 more hydrogen fueling stations but without the "retail
18 experience" that's being required by the PONs.

19 Now, having said that, having learned something
20 from the CNG world, a lot of those stations weren't, in
21 the early days, shining examples of a retail fueling
22 station.

23 In fact, the one in Glendale was famous as a
24 high through-put, it looked like a -- well, it looked
25 like an empty lot, say, for a dispenser.

1 Sand Canyon, that's not a -- that's the highest
2 through-put private station, I believe, in the State, if
3 not the nation, and it's basically unmanned and it's
4 nothing pretty, there is no convenience store, but
5 they're providing fuel to a tremendous amount of people.

6 So, I don't know that you necessarily need a C-
7 store or the entire retail experience. Although, if
8 we're targeting the high-end consumer that's what
9 they're used to.

10 So then is a station down in Torrance really the
11 kind of high end station that would cater to the folks
12 coming off of the P.V. Peninsula?

13 It's just a question. It's a question.

14 But, anyway, I'm agreeing with your statement
15 that you could have more hydrogen fueling, at a lower
16 cost, building upon these kinds of stations, these kinds
17 of sites that you're providing hydrogen to. And it's
18 not just you, it's others as well.

19 MS. SAVIN: Yes.

20 MS. BARONAS: This is Jean Baronas from the
21 California Energy Commission.

22 Is the retail-like experience one of the major
23 characteristics that differentiates the station from
24 what we've talked about thus far today, or are there
25 other characteristics?

1 MR. ELLIS: This is Steve Ellis with American
2 Honda. Can you hear okay, Jean?

3 MS. BARONAS: Please go ahead, Steve.

4 MR. ELLIS: Okay, thanks. I think what we've
5 just seen is a great potential that does need to be
6 explored and there's some opportunity there. At the
7 same time, we've been posed with this question for, I'd
8 say, at least five years, and I think it was good that
9 Larry brought up some of the CNG experience.

10 And I'll just weigh in on a couple of these
11 points, but I also want to make sure that I leave it in
12 a very positive way, and in the context of your point,
13 Jean, about everything toward the future.

14 When I say exploring the opportunity, I would
15 say someone should maybe look at all the potential sites
16 that Sharalyn is proposing and maybe try to find one or
17 two that could best serve that -- the value of
18 customers. And it would probably require some
19 integration through the partnership with us automakers
20 on the front end just, you know, from a location stand
21 point.

22 At the same time, as I presented last week, we
23 do represent the voice of our customers. And, you know,
24 while we hold certain things close to the vest, we're
25 willing to share for these purposes that we do focus

1 groups with the customers. We ask them about what they
2 expect of a station.

3 So, I'll be very specific, some of our Clarity
4 customers actually are also ex-drivers of CNG vehicles
5 and have used some of those same stations that Larry
6 mentioned, and they are differentiating. They are
7 saying that that type is what they do seek to avoid
8 seeing developed over the future, that they do
9 appreciate the value of a well-lit, easy ingress/egress
10 station, without mixed vehicle types, hence, medium,
11 heavy duty.

12 And, of course, I know the discussion came up
13 earlier about 24/7, without gates and access to get
14 through.

15 At the same time, I think when it comes to like
16 a connector or even a destination that might be lightly
17 used, then they're going to be less judgmental. So, it
18 comes down to what could be called their primary
19 station, their primary use versus an exception.

20 So, what I'm offering is that in the beginning
21 here one way to approach what Sharalyn's proposing would
22 be to look for some of these in an area that typically
23 is industrial, but could be leveraged as a connector or
24 a destination.

25 But to your question, Jean, the customers are

1 clearly weighing in that they expect an operation very
2 similar to what they do with gasoline today. And even
3 the Irvine, Sand Canyon CNG station is what I would call
4 unacceptable as a pathway forward.

5 MS. BARONAS: Thank you, Steve, so much for your
6 candid --

7 MR. ELLIS: Thanks.

8 MS. BARONAS: -- candid input.

9 So, I'm so sorry to put you on the spot, Bill,
10 but Steve mentioned something and it kind of got garbled
11 with the transmission, but something about how the Fuel
12 Cell Partnership members would have to be consulted, or
13 weigh in, or get more consensus from.

14 Can you speak to that? Did you hear that, too,
15 or --

16 MR. ELRICK: I'll look to Steve to see if I
17 caught it right, but I think he was -- in part he might
18 have been referencing the group. But I think he might
19 have been specifically referencing the OEM workgroup.
20 Is that right, Steve?

21 MS. BARONAS: Hi Steve, we're waiting for your
22 response on WebEx.

23 MR. ELLIS: I'm sorry, I had my phone muted.
24 That is absolutely true, Bill, in reference to the OEM
25 workgroup or at least automakers because, again, we are

1 the voice of our customer. And if we wanted to work
2 closer with Sharalyn about looking at some of these
3 potential sites, no different than we have in the past
4 looked at potential sites and how it might align with
5 our customers and the market needs, I think a good way
6 to do that would be through the Partnership.

7 MS. BARONAS: Thank you.

8 MR. ELRICK: And if I can add, this is Bill, you
9 know, that's what the road map was trying to identify,
10 and all the research and process that went into that was
11 to outline that pathway.

12 And the one thing that strikes me right now, as
13 we deal with this and everything we have, and last week,
14 is it makes your job harder but it's -- none of this is
15 very black and white, and there's a lot of balance and
16 flexibility, and finding enough guidance and criteria to
17 give people the same understanding of where to go
18 forward.

19 But at the same time, that flexibility to see
20 when something like this might be an amazing fit and
21 when it might have some restrictions on it, just as an
22 example.

23 MS. BARONAS: Okay, thank you for the input, all
24 of you.

25 Any other comments?

1 DR. BROWN: This is Tim.

2 MS. BARONAS: Go ahead, Tim please.

3 DR. BROWN: Just to add one thing, the forklift
4 sites are generally 350 BAR. The incremental cost to
5 add 350 BAR vehicle fueling would be very low. The
6 incremental cost to add 700 BAR for vehicle refilling
7 may be higher, I don't not know, but that would be
8 something to consider when looking at these. What seems
9 like a very easy opportunity might be more challenging
10 when you add the performance restrictions.

11 MR. PETRECKY: I agree, there is 350 BAR at the
12 material handling distribution centers. But a booster,
13 with a compression ratio of 2 to 1, to bump it up to 700
14 BAR would be a relatively low expense compared to, you
15 know, a full site.

16 MS. BARONAS: So, please identify yourself and
17 your organization, who just spoke on WebEx.

18 MR. PETRECKY: Sorry, this is Jim Petrecky from
19 Plug Power.

20 MR. ELLIS: Also, this is Steve Ellis. Jim and
21 Sharalyn, once again appreciate your thought into this.
22 And I also was just thinking maybe we consider turning
23 it around another way, which would be if we identified
24 these locations to you from a connector and destination
25 stand point, whether you'd be interested in looking at

1 an opportunity to find a customer there that aligns with
2 your side of the business, so to speak, and if those two
3 dots could possibly be aligned.

4 MS. BARONAS: Please identify yourself and
5 your -- excuse me. Please identify yourself and your
6 organization. I believe it was Steve who just spoke,
7 but I need your first and last name, and your
8 affiliation.

9 MR. ELLIS: Yep. Sorry, Jean, yeah, it was
10 Steve Ellis with Honda.

11 MS. BARONAS: Okay, thank you.

12 Go ahead, Sharalyn.

13 MS. SAVIN: Yes, I wanted to say that we are
14 very, very open to having any conversation at all about
15 this, to try to facilitate a pathway moving forward.

16 We are very cognizant that there is not going to
17 be a one-size-fits-all station. I think the discussion
18 relative to having connector sites makes a lot of sense
19 in light of what the focus group conversations are
20 saying.

21 But at the end of the day we offer, comparably,
22 a much lower-cost solution that provides the same type
23 of hydrogen.

24 And relative to the 700 or 750 BAR, to the 350
25 BAR, our customers are aware of that and they do know

1 that there's going to be some extra expense associated
2 with putting in a dispenser that can meet the needs of
3 an on-road vehicles.

4 Nonetheless, they're still very enthusiastic and
5 I have gotten frequent calls, particularly from Sysco,
6 relative to what and who they can engage to try to be a
7 partner in this.

8 MS. BARONAS: Okay, thank you.

9 MS. SAVIN: So, thank you for at least being
10 willing to consider where we fit in this puzzle, because
11 I think this entire group believes that the faster we
12 can make this available, in whatever form, the faster
13 we'll promote this technology and fuel cell vehicles.

14 MS. BARONAS: Thank you, Sharalyn. So, again,
15 I'm going to put Bill on the spot and just say no, or do
16 this, if it's no-no. But is there an action item on the
17 part of your organization to follow up?

18 MR. ELRICK: With -- yeah, I would say that the
19 road map was our first effort to make sure it was a very
20 clear, public, transparent pathway of where industry is
21 trying to head to get to this commercialization stage.

22 And Plug Power or any group out there, to make
23 this work, you know, we're beyond our membership. We
24 are trying to make this work.

25 So I would just say I can make my contact

1 information available, I'm findable on the web. But in
2 this case, to match locations versus what's been in the
3 road map and where we're going, I'm more than happy for
4 me or our staff to find the complementary efforts.

5 I'm not sure if that's what you were asking
6 but I'll --

7 MS. BARONAS: Yeah, it is.

8 MR. ELRICK: -- I'll put my name out there,
9 yeah.

10 MS. BARONAS: Okay. And to the extent that I
11 can personally help, or maybe Larry, I don't know. It
12 just seems like we need more time to flesh this out and
13 to understand it better.

14 MS. SAVIN: Yes. This is Sharalyn Savin and I
15 think, ultimately, it comes down to softening retail
16 expectations for connector station applications, if you
17 are looking for a direct input for an action item.

18 And if you need more specifics on what that
19 looks like, we are available any time to have that
20 conversation.

21 I am sorry but, Bill, I did miss where you were
22 from and your last name.

23 MR. ELRICK: Bill Elrick, E-l-r-i-c-k, with the
24 California Fuel Cell Partnership.

25 MS. SAVIN: Thanks very much, Bill, I'm sorry.

1 MR. ELRICK: No problem.

2 MS. BARONAS: Glad someone is following protocol
3 here and it certainly wasn't the moderator this time.
4 Thank you, Sharalyn.

5 MS. SAVIN: Oh, no, I didn't mean to say it like
6 that.

7 MS. BARONAS: No, it's good. It's actually
8 good, actually. We're happy over here, we're good.

9 MS. SAVIN: Okay.

10 MS. BARONAS: Okay, so if we could please -- oh,
11 Tobias Muench from the California Energy Commission.

12 MR. MUENCH: Just a quick question to the Plug
13 Power folks, Sharalyn and Jim, can you give us an idea
14 of what your typical capacity of peak fueling through-
15 put, with these existing stations, these Sysco type
16 forklift stations, what they provide?

17 MR. PETRECKY: Currently, the liquid cryogenic
18 storage tank holds about 20,000 gallons. So, a lot of
19 times there's about 200 kilograms a day, 150 to 200
20 kilograms a day that's being used by the material
21 handling equipment. And the tanks will be refilled,
22 generally, every one to two weeks.

23 So, there's plenty of capacity, if that's the
24 question.

25 Additionally, there can be changes to the liquid

1 hydrogen infrastructure that's on site to accommodate
2 more consumption if, you know, there's high traffic to
3 an outside dispenser, then there can be changes to the
4 liquid hydrogen infrastructure on the site.

5 MR. MUENCH: Is that hydrogen stored liquid or
6 gaseous on board the forklifts?

7 MR. PETRECKY: On the forklift, itself, it's
8 gaseous. So, in the liquid hydrogen infrastructure
9 that's on site it is transported and stored in liquid
10 form due to the energy density efficiency. And then it
11 is vaporized to gaseous form and compressed using
12 centrifugal and then dispensed at 350 BAR.

13 MS. BARONAS: Thank you very much.

14 MR. MUENCH: Thank you.

15 MS. BARONAS: And, Larry, please identify
16 yourself.

17 MR. WATKINS: Larry Watkins, AQMD. I was
18 prepared. I was going to say, if Matt Miyasato was
19 here, he was going to volunteer my services, anyway, so
20 I'm happy to provide whatever help I can. Not only to
21 Plug, but to the others that aren't here today.

22 Nuvera was here last week, they have a very
23 interesting business model, the same with Hydrogen
24 Frontier and, well, all of the rest of them. We're in
25 the game to help as much as we can. Thank you.

1 MS. BARONAS: Thank you so much. This is Jean
2 Baronas of the California Energy Commission.

3 So, Sharalyn, I'm curious to know if your sector
4 is using near-fill communications or RFID as part of
5 your user interface?

6 MR. PETRECKY: This is Jim Petrecky from Plug
7 Power. The hydrogen infrastructure has telemetry for
8 24/7 remote monitoring. I think that's the question
9 that you're -- or the answer that you're looking for, is
10 that right?

11 MS. BARONAS: Part of it. I'm also looking for
12 the user interface, this retail-like experience.
13 There's so many standards available to usurp the retail-
14 like experience with near --

15 MR. BOYD: This is Bob Boyd, I'll take just a
16 quick stab at that. And the indoor fueling, forklift
17 market is using 350 BAR and it's a standard, relatively
18 standard SAE interface, but it's not fast fueling the
19 way vehicles are fueling. The typical forklifts are two
20 kilograms content each and they fill in maybe two
21 minutes, something like that, so that's roughly one-
22 kilogram-a-minute fueling.

23 They would not use IRDA, they would not use 700
24 BAR, they would not use --

25 MS. BARONAS: I'm going to another angle on

1 this. There was discussion about retail-like façade,
2 experience, appearance, retail-like. And I'm asking if
3 your market sector uses any communication standards to
4 either identify the user, charge the user, any of the
5 commerce-centric points.

6 MR. BOYD: The model is really, typically more
7 than the industrial gas company supplies liquid to the
8 tank and bills on a tank load that they drop off. And
9 then the compressor pressurizes the hydrogen to a series
10 of dispensers that are around the building, and then the
11 dispensers tend to be fairly dumb and people are
12 opportunity fueling.

13 And, now, there are some vendors that are using
14 RFID tags to identify the vehicles as they fuel, but
15 that's optional, that's nothing with the fueling
16 protocol.

17 MS. BARONAS: But it is happening a little bit,
18 at least, in this sector that we're talking about now?

19 MR. BOYD: Yes.

20 MS. BARONAS: Okay, thank you, that's all.

21 MR. PETRECKY: This is Jim Petrecky from Plug.

22 MS. BARONAS: Okay, Jim, go ahead.

23 MR. PETRECKY: I'd just like to add it is
24 correct that the dispensers -- I guess they don't have
25 the types of dials, or electric -- or electronic

1 displays that show, you know, number of kilograms and
2 that kind of thing because it is being used within the
3 distribution center, and the invoicing from the merchant
4 hydrogen providers is on a gross, or aggregate scale
5 instead of, you know, on a user-by-user or forklift-by-
6 forklift basis.

7 But those types of dispensers, I mean that's
8 just one element of the total liquid hydrogen
9 infrastructure, so it can be, you know, swapped out for
10 something that's a little smarter.

11 The fuel cells and the forklift trucks do have
12 IDs and so when they communicate with the dispensers
13 there is an exchange of information and the dispenser,
14 itself, can recognize forklifts or fuel cell systems.

15 MS. BARONAS: Okay, thank you for the input.

16 Do you have more?

17 MR. ELRICK: I think they covered it. This is
18 Bill Elrick. I think the biggest change and it would
19 probably be addressed through an upgrade system is it's
20 a single user, essentially, in these environments versus
21 multiple automakers, or multiple customers, so that's --
22 but that would be addressed in an upgrade process.

23 MS. BARONAS: Okay, thank you for the input.

24 So, I'd like to move on. Yes?

25 MR. ELLIS: Just one last point on this, this is

1 Steve Ellis once again, with American Honda.

2 I think there could also be a model here that
3 could be looked at and I started looking at some of the
4 locations that Sharalyn and Jim showed, and one example
5 is Oxnard, at a Proctor & Gamble plant there.

6 Now, if I'm correct, I think some of the same
7 fuel providers that are supplying fuel to our vehicles
8 today are also providing kind of inside-the-building
9 hardware to supply the material handling equipment.

10 So it makes me wonder, again, if the synergies
11 align properly, these makers already have experience
12 doing both, the vehicles, the light-duty vehicles that
13 we know as automakers, and also that equipment.

14 In this particular location it appears that the
15 plant is, you know, within a half-a-mile on the 101
16 freeway on what some of us have described as a route up
17 the coast toward Santa Barbara and things like that.

18 So I'm just putting it out that on the CNG side
19 we have examples where all the compression and, let's
20 say the hardware, are what's called inside the fence or
21 inside the gate of a gas, like Southern California Gas,
22 PG&E. And then what they do is they provide a cutout,
23 outside the fence, where a dispenser is placed, along
24 with a payment system and kind of a well-lit open area.

25 Most of those serve fleets today. But I think,

1 once again, if we differentiate this as, you know, a
2 connector station and understanding that the
3 requirements for that may be less stringent than a
4 station inside the cluster, or especially in the
5 community where the customer lives, this could be an
6 example of how that would work well.

7 MS. SAVIN: Yes, this is Sharalyn Savin from
8 Plug Power. That is exactly what is being proposed.

9 MR. ELLIS: Okay, thank you.

10 MR. STAPLES: I have a comment. Hello.

11 MS. BARONAS: Yes, this is Jean, please go
12 ahead.

13 MR. STAPLES: Okay, yeah, this is Paul Staples
14 from HyGen Industries.

15 I have to say I agree with the Honda's analysis
16 of the situation. If the situation exists in a
17 commercially easily access location, without restriction
18 in and out, I say great, okay, that's fine.

19 But the purpose of this is to get commercial
20 fueling stations out there for the commercial public to
21 purchase and fuel vehicles.

22 And for that, and particularly in cluster areas,
23 I think that that's going to be critical.

24 Connector stations, you know, when you're in a
25 tight spot and you need the fuel, you pretty much will

1 bypass the whole commercial fueling experience in order
2 to get fuel, and that's true. And they should be
3 available for that and if there's any funding that could
4 be provided for that, to be able to provide that kind of
5 emergency fueling, and local fueling, I think that's
6 great.

7 But I think, basically, our main focus has to be
8 on commercial fueling stations.

9 One other issue, someone mentioned experience is
10 critical. Yeah, experience is critical, but this is all
11 new for all of us. There aren't a whole lot of people
12 out there that have installed, you know, 20, 30, 10, 15
13 fueling stations all at the same time, all in a year or
14 two process. So, this is all new for all of us.

15 MS. BARONAS: Thank you, Paul.

16 MR. STAPLES: And there's no one here that can
17 claim that kind of experience because it's never been
18 done before. So, from that perspective, I thank you for
19 the opportunity to comment.

20 MS. BARONAS: Okay, thank you, Paul, for that.
21 In the interest of time --

22 MR. CARMICHAEL: Hello, this is James
23 Carmichael, may I make a comment, a brief one?

24 MS. BARONAS: Yes, please. Please go ahead.

25 MR. CARMICHAEL: This is James Carmichael with

1 Naval Facilities. I'd just like to echo Plug and Play's
2 interest, maybe in future solicitations, for reducing
3 the retail experience requirements for connector
4 stations.

5 In terms of the fueling station, hydrogen
6 fueling station we have at Camp Pendleton, we would --
7 we can't really provide a full retail experience, so we
8 would like to see for, maybe in the future, a possible
9 reduction in that.

10 And then also, for future solicitations, we
11 would also be interested in possible funding for
12 stations that will serve bus and non-road projects. We
13 are looking into hydrogen buses for Camp Pendleton, so
14 that is an interest for us. And I just wanted to echo
15 what Plug and Power said.

16 MS. BARONAS: Thank you so much. Would you
17 please spell your last name?

18 MR. CARMICHAEL: James Carmichael, C-a-r-m-i-c-
19 h-a-e-l.

20 MS. BARONAS: Thank you so much.

21 MR. CARMICHAEL: And I'm with Naval Facilities.

22 MS. BARONAS: Thank you so much for your input.

23 Okay, so we're going to --

24 MR. SLEIMAN: This is Ghassan from Hydrogenics.

25 MS. BARONAS: Yes, please, Ghassan. Go ahead,

1 please.

2 MR. SLEIMAN: Can someone mute that line? Thank
3 you.

4 This is just to add to the discussion, reducing
5 the requirements for a retail station, for a connector
6 station, I fully agree with that.

7 The value in a station, generally speaking,
8 connector stations are upgraded commercial stations or
9 have the majority of their fueling occur on weekends or
10 on holidays.

11 So, if that same station can have a good
12 through-put during the weekdays that should add to the
13 value or the scoring of that station. If they have a
14 shuttle bus, they have forklifts on site that can use
15 the hydrogen.

16 And I would like those to be considered as a
17 high a priority as other stations and will be useful.
18 Thank you.

19 MS. BARONAS: Thank you so much.

20 MR. KIEZEK: This is Ed Kiezek from Air
21 Products, can I make a comment?

22 MS. BARONAS: Yes, please, go ahead.

23 MR. KIEZEK: Yeah, Ed Kiezek from Air Products.
24 You know, obviously, we work with Plug and we've got
25 somewhere around 20 of these material handling station

1 opportunities that are running.

2 I just want to be clear that, you know, the user
3 interface there that would apply to J2601 doesn't exist.
4 You still need to add a considerable amount of
5 equipment, like cooling, storage and compression.

6 So, the capital, and we've looked at this, is
7 not necessarily insignificant.

8 I will say that the 350 BAR that we have -- all
9 of the stations that we have run 100 percent on, and I'm
10 sure would never shut anybody down. But I'd like also
11 like to add that if you open to the material handling
12 sites, there are other industrial gas companies --
13 industrial gas customers in California that you would
14 almost have to open this up to, as well, because they
15 obviously have significant amounts of hydrogen on site.

16 MS. BARONAS: Thank you so much for your very
17 valuable input.

18 Would all of you please mute your phones on
19 WebEx? Thank you.

20 Okay, so in the interest of time I'd like to
21 pull up slide 08, kind of our last topics for the day.

22 So, just making notes here. Okay, so here
23 talking about some ideas, and please chime in, for the
24 future solicitation in the area of product readiness.

25 And so, one idea is about the station developers

1 being ready and committed to their proposed locations
2 and that they should actually document the commitments
3 with their applications.

4 So, why is that? Well, we want thorough,
5 thorough input to make good decisions. And so that
6 would include letters of commitment from site owners and
7 station owners about the plans to provide hydrogen fuel
8 at the retail station.

9 Proposed addresses being clearly documented, I
10 mean, literally, street address clearly documented, zip
11 code, nothing left open or wondering about.

12 A letter from the CEQA lead agency that includes
13 documentation reflecting advance discussion with the
14 local CEQA lead agency, for example, do they concur that
15 the project would be exempt, either categorically or
16 statutorily, and/or a mitigated negative declaration, or
17 is it even a project.

18 And then, finally, demonstrated proof or
19 evidence of regional and local first responder in fire
20 protection expert's involvement and their outreach.

21 So, these are simply concepts today that we'd
22 like to talk about with you as potential parts of the
23 future solicitation.

24 So, I'd like to open it up for comments. Jim
25 McKinney.

1 MR. MC KINNEY: Yeah, Jim McKinney, let me
2 expand on what Jean has put on the table here. Across
3 the board, in our solicitations and proposals, we are
4 seeing an increasing number of issues, problematic
5 issues with getting documentation of CEQA compliance
6 with the local lead agency. And we are building these
7 project readiness concepts into all our solicitations.

8 You know, we thought it would be most acute on,
9 say, bio refineries, where you've got a major industrial
10 facility that you're siting.

11 It's actually been more troubling on things like
12 CNG stations. So, given that there may be some
13 ramifications from the Emeryville incident and, say,
14 some increased level of questioning from local lead
15 agencies or permitting authorities, CUPAs, local fire
16 marshals, et cetera, it's really important that our
17 applicants get a jump start on these issues.

18 And one that's just critical is initiating that
19 dialogue with the local lead agency before the proposal
20 is submitted, so we have documentation of that, and so
21 that that local lead agency is queued up and knows what
22 to expect, and knows that they need to make a
23 determination if they want to be lead agency, or defer
24 to the Energy Commission, which also can assert lead
25 agency jurisdiction if the local lead agency chooses not

1 to do that or cannot do that. So that's what we mean
2 here.

3 And, again, this is something that we've got
4 issues across the board on fuel categories, vehicle --
5 not vehicles -- fuel categories and solicitations, so
6 some version of this will be in the future solicitation.

7 MS. BARONAS: So are there any comments or
8 questions?

9 MR. STAPLES: I do.

10 MS. BARONAS: Okay, Paul, go ahead.

11 MR. STAPLES: Paul Staples with HyGen. Yeah, I
12 have a question for the CEC folks at this juncture, on
13 this issue, on CEQA.

14 The renewable generated hydrogen that I'm
15 proposing is one hundred percent renewable. Is, you
16 know, made from solar, wind, wave, whatever, through a
17 power purchase agreement. There's absolutely no carbon
18 involved in the process and none being released, even in
19 the vehicles. So, can we just get a -- can you guys
20 just get an exemption for that kind of an approach,
21 rather than having to add to the workload?

22 It's just that's the way it was done when we did
23 the Clean Air Now Project, it was no CEQA, we were
24 exempt, okay, because of the way we were doing it.

25 And if that is the case, why not just go ahead

1 and make that determination so that you can avoid that
2 problem. That would be an incentive that would be very
3 helpful to anyone proposing that kind of an approach.

4 MR. MC KINNEY: So, Paul, this is Jim McKinney
5 and thanks for raising that. I've invited staff
6 counsel, Amanda Stein, to join me here at the
7 microphone.

8 CEQA doesn't really care if it's renewable
9 hydrogen or not. It is what is the footprint and the
10 potential for adverse effect from the trenching, from
11 the increased traffic, potentially, from anything that
12 goes with installing a new portion of a station, an
13 existing gasoline station

14 So, everybody who applies for our program really
15 needs to be familiar with this part of CEQA. Many a
16 qualified applicant have stumbled on this issue over the
17 years.

18 And, Amanda, do you want to add anything to
19 this?

20 MS. STEIN: I guess I would just add that --
21 again, Amanda Stein, staff counsel, that we can't opine
22 on general categories. Each project has to be
23 individually analyzed under CEQA. Thank you.

24 MS. BARONAS: Thank you very much Amanda and
25 Jim.

1 Any other comments or questions in the room on
2 this topic?

3 MR. STAPLES: Thank you.

4 MS. BARONAS: Go ahead, Steve.

5 MR. ECKHARDT: I think it's been discussed
6 before that CEQA oftentimes is processed by the local
7 municipality. Oftentimes, those local municipalities
8 won't do anything until it's a project, which means you
9 have funding, everything's been sorted out.

10 So, to say that CEQA designation is required
11 prior to funding in some localities would be an issue.
12 In some localities, it may not. Every locality is going
13 to consider it differently, though.

14 So, to the extent that significant hurdles are
15 in place for CEQA up front, it may just eliminate some
16 localities that will say I'm not looking at this until
17 you file all the papers for permitting and everything.

18 MR. MC KINNEY: And so Jim McKinney. Yeah,
19 thanks for adding that and I welcome other station
20 developers to add their experience in, as well.

21 We're not looking for completed CEQA
22 documentation at the point of proposal, so sorry if
23 there was miscommunication on that. But we are looking
24 at evidence that that discussion has been started with
25 the appropriate local lead agency.

1 Again, because when it -- when nothing happens
2 until the point of a NOPA or even an executed agreement,
3 we lose a lot of time in getting these things up and
4 running and going to construction.

5 MS. BARONAS: Yeah, thank you, Steve, for that.
6 I think the bullets one and two, under the letter from
7 CEQA lead agency there might have not led you right
8 there. But documentation should reflect advanced
9 discussion with the lead agency, not necessarily their
10 final, their final, final.

11 MR. ECKHARDT: Really, the governments will not
12 give an indication of anything. They will only give you
13 a formal declaration when you follow all the rules.
14 They won't give you an indication of, yeah, I think it's
15 exempt. Because then they've put themselves in a
16 position of where if they don't exempt you, you know,
17 they could be in trouble.

18 So, oftentimes you get one response from them,
19 whether it's for a permit or for anything, a city will
20 typically just give you one response, and that's the
21 final response.

22 MS. BARONAS: Thank you for your input. So, I
23 just want to, if Dr. Brown can bring his laptop up,
24 during the break he found, he showed me one of his
25 charts from last week's presentation on kind of a, lack

1 of a better term, triage effect on the concepts of
2 clusters, and connectors, and destination.

3 And so could you show us that table you
4 presented last week? I think it's kind of an
5 interesting way to kind of close this session. We do
6 need public comment period, too.

7 Can you bring it up here?

8 DR. BROWN: I may be able to.

9 MS. BARONAS: Possibly.

10 Okay, while we're waiting for the hookup,
11 please, Bill, give us some comments on project
12 readiness.

13 MR. ELRICK: Okay, a few things. One, I think
14 CEQA's a good example of even with the best intentions
15 not everything can be done up front. And I would turn
16 it around and say this is a point where CEC, or any
17 funding agency, my advice would be you're going to have
18 to bird dog them.

19 Whether this be the comment, earlier, about
20 possibly having milestones or different ways to keep
21 things moving, it is my opinion that to make these
22 stations go faster, to open, you're going to have to
23 call them constantly and ask where they are. Don't wait
24 for the station developer to come to you where they are
25 in a permitting process at CEQA.

1 Looking at the history of all the different
2 stations, the ones that were the fastest to opening day
3 where ones where someone literally bird dogged everyone,
4 every minute they needed to be and were on the phone
5 constantly.

6 MS. BARONAS: Bird dog? Bug?

7 MR. ELRICK: Bug.

8 MS. BARONAS: Okay, bug.

9 MR. ELRICK: Be a pain in the --

10 MS. BARONAS: Okay, who are you saying should
11 bug who?

12 MR. ELRICK: I think in this case I think it
13 would be most valuable is the CEC, as you fund stations,
14 to be bugging the proposals, the winning proposals on a
15 very constant basis, where are you, why haven't you gone
16 faster, what's holding --

17 MS. BARONAS: The proposals, they're paper.

18 MR. ELRICK: Well, the bidders, the winning
19 bidders.

20 MS. BARONAS: Okay.

21 MR. ELRICK: It's just something we've seen
22 historically through stations, the ones that go the
23 fastest were the ones that had, essentially, a project
24 manager from, we'll call it the funding side, bugging
25 everyone down the line to make sure it was done on time.

1 Because I know everybody has, we'll say, many
2 other day jobs, and many other programs, and projects,
3 but that's probably what history is teaching us is
4 bugging more people.

5 MS. BARONAS: So noted.

6 MR. ELRICK: The other two comments I had, one
7 of them was as far as having a street address, I think
8 it's very important to have as much concrete information
9 as you can.

10 But something to consider is any number of
11 factors could cause that address to go haywire. And
12 we've seen this in the past and I'm wondering about a
13 ability to have some flexibility. If CEQA failed or
14 something happened to where, instead of seeing a project
15 go away and worst case scenario, the money disappears,
16 could they try to renegotiate across the street or
17 within a reasonable location proximity to get what was
18 expected, which is a station in that proximity demand
19 location, even if it does mean that exact address isn't
20 the one that it turns out to be.

21 Just a consideration for the future PON.

22 MR. MC KINNEY: Bill, can I respond to that?
23 yeah, I think that's a good point, Jim McKinney, again.

24 And, you know, after the point of award our
25 grant process does allow for that. So, if there is some

1 need to switch sites -- I'm looking to Amanda, she's not
2 shaking her head no. Okay.

3 So, it's comparable to, say, switching out a
4 subcontractor, something like that, there is that
5 flexibility in the process.

6 And again, I think especially for that scenario
7 that you just laid out.

8 What we're trying to get away from are those
9 situations where we've got, you know, maybe some
10 proposals that are less well developed than others, so
11 that's what we're --

12 MR. ELRICK: You want as much concrete up front,
13 I agree.

14 MR. MC KINNEY: Yeah.

15 MR. ELRICK: So the last comment I wanted to
16 make was the emergency response officials, just want to
17 make a little plug. The Fuel Cell Partnership, for
18 years, has been doing emergency response outreach. We
19 have a very well-established program that we've been
20 going out to most all the locations that are currently
21 on this priority list and we'll continue to do that,
22 that's part of our work.

23 But we -- I raise that so that there's awareness
24 out there that we'll continue that and we want to work
25 with all the potential bidders and proposers that we're

1 always trying to educate the ER and the emergency
2 response folks so that they are ready, and the
3 permittees are ready as much as they can be. So that
4 the first time they see a proposal, or they see a
5 vehicle, or a station, they were a little more aware
6 than waiting until the first day it appears.

7 MS. BARONAS: Should the -- this is Jean Baronas
8 from the Energy Commission. Should the future
9 solicitation possibly include text requiring some kind
10 of proof that there has been communication with first
11 responders and that there's publicly available
12 information about how to respond?

13 MR. ELRICK: I don't know if that's necessary as
14 much as, obviously, it would help everyone if they've
15 done that. We're trying to do that, regardless. We're
16 needing to grease the wheels to make sure everybody's
17 ready and that's something we think we can do to help
18 the industry across the board. I don't know if it needs
19 to be a PON requirement, but it might be -- not only
20 behoove the situation, but show that they've done more
21 legwork, kind of like reaching out for CEQA information,
22 if they can get it.

23 MS. BARONAS: Okay, thank you. Yes, Bob?

24 MR. BOYD: Sorry, Bob Boyd. Yes, I just wanted
25 to reiterate what you were saying about reaching out to

1 the local authorities who have to permit the station.
2 And, yes, you should put some requirement in the PON to
3 make sure that people are reaching out to the local fire
4 authorities and communicating closely with them.

5 MS. BARONAS: Thank you very much for your
6 input.

7 And Garrett, please?

8 MR. POPPE: In dealing with these companies,
9 trying to get the CEQA approved, I'm going to have to
10 agree with Mr. Eckhardt that it's -- they don't want to
11 approve anything right away, and they don't want a say
12 in it.

13 So, I mean a clear discussion with them in the
14 beginning would be great, but maybe there should be some
15 period of time afterwards that you have to have your
16 CEQA done by, or after you're awarded your money.

17 But in regards to that, it's very difficult to
18 get it before you actually have your project done and
19 permitted.

20 MS. BARONAS: Okay, thank you.

21 MR. ECKHARDT: This is Steve Eckhardt from
22 Linde. With respect to the other points that were on
23 there, in terms of letters from station owners, for
24 example, that to me seems very reasonable, especially if
25 you get into -- or especially if you do leave open the

1 option for changing the location down the road.

2 And I say it for two reasons; one, you should
3 have reasonable confidence that you've got a station
4 owner that is interested, and wants to do this, and has
5 signed something that says, yeah, he intends to do it.

6 And, secondly, you don't want to encourage
7 people throwing a site out knowing full well that the
8 site won't work, just figuring they'll figure out
9 another site later, which is obviously not a -- not
10 something you want to incentivize at all.

11 But it's not that hard to get station owners to
12 proceed, necessarily, so getting those letters is not
13 over the top.

14 MS. BARONAS: Okay, thank you very much for your
15 input.

16 Okay, so Dr. Brown has graciously given us his
17 slide, which he did show last week, too.

18 During lunch I went up to my desk and I put
19 Post-It notes around clusters, and then connector,
20 destination, and I said to myself how many times do I
21 repeat that, where, what's the benefit? I don't know.

22 But Tim has done this work already and so what
23 we're looking at is, I guess, a very orderly way to plan
24 a network and --

25 DR. BROWN: This is Tim, if I can just walk

1 through this.

2 MS. BARONAS: Please, go ahead.

3 DR. BROWN: I would have liked to have seen the
4 Post-It notes, that would have been --

5 MS. BARONAS: No, that's okay, they're in draft
6 form but --

7 DR. BROWN: So, I can take some credit for the
8 68 number, I certainly helped contribute to that. But
9 for the rollout to get to 68, that primarily came from
10 automaker surveys, we helped prod them a little bit to
11 get to that number.

12 But you can see here we list, in the very first
13 column, existing stations prior to any CEC involvement
14 in hydrogen.

15 The next column includes the CEC stations that
16 were funded in 2010. I show seven here, and CEC funded
17 more than seven stations, but there are seven new sites.
18 The other ones were upgrades.

19 And you can see that those sites were all in the
20 top three areas there, which are the main cluster areas.

21 So, if you look at this table, the top five
22 locations, the first five rows are the main cluster
23 areas, Santa Monica, Torrance, OC, the Bay Area, and
24 Berkeley.

25 Below that, the next sort of section of cities

1 or areas are what we're thinking of as new clusters,
2 bridging the network into new clusters.

3 And then the bottom segment are the sort of true
4 destination or connector stations.

5 So, you can see what's this third column,
6 proposed phase one, as I called it here, would be sort
7 of the automakers first -- next 12 stations they would
8 like to see.

9 You can see there's a heavy concentration in the
10 cluster areas, but they also begin to bridge into these
11 new markets.

12 As you see, Pasadena, San Fernando Valley, San
13 Diego and San Francisco.

14 And then the proposed phase two would be the
15 next round of, I think, yeah, 15 stations will be the
16 next on the list of priority.

17 And here you see that there's actually -- it
18 begins to bring into play the true destination and
19 connector stations, the Lake Tahoe, Palms Springs,
20 Kettleman City to bridge between North and South
21 California.

22 And then proposed phase three is another 22
23 stations across the board, in various areas.

24 I think it should be noted that the 22 number is
25 more vague, it depends on what comes first. Each of

1 these phases sort of rely on what comes previously.

2 But I think if you look at the phase one and
3 phase two as a total of 27 stations, that somewhat
4 aligns with the \$30 million or so that's available.
5 Certainly wouldn't be able to fund all of those
6 stations, but it would certainly be a good start.

7 So, I think from the information that I have
8 from automakers and our own research, the phase one,
9 those 12 stations, those would be the highest priority
10 for the next round of funding, followed by the phase
11 two, the next 15.

12 MR. KEROS: Yeah, this is Alex with GM, Alex
13 Keros. And thanks, Tim. Just to one highway, for the
14 record, is that this is an automaker's sort of exercise
15 that we went through.

16 I think walking through it we would want to -- I
17 know even right now that some information has changed,
18 right, so we might have to adjust that based on some
19 changes that happened even in the last couple of weeks
20 with different stations.

21 But I also, just a caution, let's not use this
22 table as sort of the planning effort for the next 68
23 stations, but I think it can help prioritize the near
24 term and that maybe we would want to do this type of
25 exercise again down the road.

1 MS. BARONAS: So this is Jean from the
2 California Energy Commission. Alex, just so I
3 understand, when you say exercise, you mean some kind of
4 aggregated discussion, an output into a table that has
5 more current data; is that correct?

6 MR. KEROS: Yeah, I mean that's exactly what
7 you're looking at right now, Jean, is the OEMs sort of
8 took it upon themselves to go through that exercise
9 which was, you know, how would you -- you know, phase
10 one, if you will, what's the next priorities, and that's
11 what you're seeing right now.

12 So, yeah, I would say I think we would want to
13 do that each time we revisit, you know, any type of
14 proposals.

15 And, too, I think we also -- I think, and
16 correct me if I'm wrong, Tim, I think there's some new
17 information. For example, we know the Bay Area has lost
18 a station, right, or at least a very specific address,
19 so we might have to reconsider that in sort of the
20 updated version.

21 MS. BARONAS: Okay, thank you for that. Any
22 other comments or --

23 MR. FORREST: One additional comment?

24 MS. BARONAS: Yes, please, go ahead. Identify
25 yourself.

1 MR. FORREST: Yeah, this is Matt Forrest, with
2 Mercedes Benz and I want to add to what Alex is saying.
3 And that is to identify the -- that the 68 stations was
4 targeted at the beginning of 2016. And as we get closer
5 to that date we don't have time to do three phases
6 anymore, and so these phases are beginning to run
7 together.

8 I would assume, personally, that phase one and
9 phase two need to merge in order to stay on a timeline.

10 And so, again, with what Alex said, this is --
11 this table needs to be updated. That's my comment,
12 thank you.

13 MS. BARONAS: So noted, okay.

14 Yes, Garrett, did you --

15 MR. POPPE: Thank you, no, I don't, the comments
16 were said already. Thanks.

17 MS. BARONAS: Okay.

18 MR. POPPE: I was going to say the same thing,
19 that those phases are shrinking together.

20 MS. BARONAS: Okay, thank you.

21 Okay, so --

22 MR. STAPLES: I have one comment.

23 MS. BARONAS: Just a second, we've got a person
24 who raised his hand in person, so sorry, Paul.

25 Go ahead, Bill.

1 MR. STAPLES: Okay.

2 MR. ELRICK: This is Bill and I may reiterate,
3 just to say it another way, is that this -- as one piece
4 in the puzzle shifts, obviously then we have to
5 reassess. And I think what the goal of this is to do is
6 to try to figure out where in the PON you want to focus
7 the first effort, knowing that if -- and again, this is
8 a static moment in time right now, this table, and it
9 gives you where at this point the focus should be in the
10 phase one. You get as many as you can there, you might
11 not get all of them.

12 And you get what you can into phase two with
13 whatever money remains, knowing that once that happens
14 then you have to do a reset and say, okay, what is the
15 first priority now?

16 And it may be you pick up the first phase ones
17 that didn't happen or it may change, some of those may
18 drop further down, or some of the phase three may work
19 up. Each time you have to start with what's existing.

20 And what was referenced now is there might have
21 been a station or two in that first, existing column
22 that has changed and, therefore, it has a reverb effect
23 into the system and you have to do a reset.

24 MS. BARONAS: Okay, thank you. That's good
25 input and we note that.

1 So, at this time I'd like to call for public
2 comments, slide 09.

3 Oh, so sorry, while we're transitioning, Paul,
4 please go ahead with your comments on the chart we
5 displayed.

6 MR. STAPLES: Well, on the chart that we
7 displayed, that was displayed, I do have concerns that
8 you're limiting just to that one area there. I think
9 that along the coast, between Santa Monica and, say, the
10 South Bay, I think it would be good to expand that area
11 right down through there because that's a very good
12 strip there.

13 However, I did want to comment on the CEQA
14 thing, one last thing real quick, and it was in response
15 to the bird-dogging comments. Yes, you definitely
16 should bird-dog the developers, but you really need to
17 get on to the agencies.

18 You guys can exercise your clout with these
19 agencies, you and ARB, to get their determinations in.
20 You don't have to influence them to go one way or the
21 other, but you need to get on them to get their
22 determinations in because you have a time frame on this
23 that you're trying to achieve, as well, and you could
24 use your State clout in order to do that.

25 So that's just my two comments on that, so thank

1 you very much.

2 MS. BARONAS: Okay, thank you, Paul, appreciate
3 your input.

4 So, now, please pull up slide 09. At this time
5 I'd like to call for public comments.

6 If there's any individual who would like to give
7 us a comment from the public, please come forward.

8 Anyone on WebEx?

9 MR. PROVENZANO: Hi, good afternoon.

10 MS. BARONAS: Yes, please give us your --

11 MR. PROVENZANO: This is James Provenzano, I'm
12 President of Clean Air Now. Clean Air Now is one of the
13 State's oldest air quality public advocacy
14 organizations.

15 And, first, just a big picture comment, I think
16 we can all agree that we are marching towards an economy
17 that utilizes carbon-free energy carriers, and at least
18 the test cases sector on land and sea is free of
19 combustion technologies.

20 This is going to afford us the ability to
21 protect the public's health from the detrimental impacts
22 of toxic air contaminants.

23 Renewably generated hydrogen used in fuel cells
24 is the gold standard that allows us to meet those noble
25 goals.

1 We should all -- we all should continually
2 strive toward that end. The sooner we get there,
3 obviously, the better. If we have that mindset, we will
4 naturally do the right things.

5 And I want to thank the Energy Commission, and
6 the California Air Resources Board, and the South Coast
7 Air Quality Management District, and all the automakers
8 that are working on fuel cell technology for doing the
9 right thing.

10 This is very exciting. And, now, I actually
11 want to make -- I have one question at the end and I'd
12 like to make one additional comment. This is from my
13 personal -- these are personal comments and coming from
14 my experience as an actual paying customer, who has
15 incorporated hydrogen-powered fuel cell electric
16 vehicles into my life.

17 And I have to say that Steve Ellis has listened
18 very carefully to his customers. And Bill Elrick
19 accurately conveys the needs of the industry.

20 And I know you will, I just hope you take their
21 comments seriously and consider them closely.

22 I also appreciate Dr. Brown's and Dr. Ogden's,
23 UC Davis's and UCI's contribution to today's discussion.

24 I know this has been said in several different
25 ways today, but I want to stress the need, even in the

1 early stages, to install connector stations and
2 destination stations. As a customer, and from talking
3 to scores of potential other customers, there is great
4 value to us in just knowing that if we choose this
5 technology for our transportation needs, we will not be
6 limited -- it will not limit our current behavior.

7 Even if a station doesn't get used that much in
8 the early stages of getting these vehicles out, just the
9 perception of ubiquity will go far into expediting the
10 market penetration of these vehicles. That's key.

11 And I'm not a marketing person, but I would
12 think that the marketing groups of all the OEMs, I think
13 they -- my guess is they would agree with that.

14 And maybe the -- and my last comment is actually
15 a question. And maybe, I think this question is for
16 Joan and Tim.

17 What is the impact of the delivery pressure on
18 the cost of hydrogen to the customer? In other words,
19 if I choose to purchase a Clarity over a -- you know,
20 the other manufacturers that are using 700 BAR, because
21 I know my hydrogen is going to be less expensive, that's
22 a decision the customer's making and that's going to
23 impact what the OEMs are doing.

24 So, first of all, what is the impact of the
25 higher pressure and the cost of the blue bred hydrogen?

1 And, also, I'd like to put forth that I know
2 things are set for probably the first go-around here,
3 but can we -- can we pick 500 BAR and call it a day, and
4 everyone uses the same pressure and -- and so I just
5 wanted to get some feedback on what you guys think about
6 that, if we could go to a -- maybe not 750 BAR, but go
7 to some compromise between 700 and 350. Thank you.

8 DR. BROWN: This is Tim. Just to address your
9 question, I agree, it would be great if we could go 500
10 BAR, but I think that train left the station a long time
11 ago and we've come to the conclusion that these other
12 two pressures are standardized.

13 And there's good reason for it, the longer range
14 for the 700 BAR.

15 As far as cost, it's easy to calculate the
16 incremental amount of electricity used. For example,
17 for compression from 350 up to 700 BAR is actually quite
18 small. The electricity cause to go the additional
19 pressure is not high.

20 I think the real cost would be on the equipment
21 side for the station and I'm not prepared to address
22 that. Perhaps somebody, an equipment supplier could
23 address that side of things.

24 MS. BARONAS: Thank you, Mr. Brown.

25 MR. STAPLES: I could do that.

1 MS. BARONAS: Okay, so at this time I'd like to
2 turn it over -- oh, so sorry. Another person for public
3 comment period, please identify yourself.

4 MR. HARRIS: My name's Aaron Harris, I'm from
5 Sandia National Labs. And I just wanted to comment on
6 the inclusion of data collection from the stations that
7 get awarded for this.

8 I would like to highlight the fact that the
9 conversation that we've had today, which has been great,
10 has been facilitated by the data that was collected
11 previously. And so, if we expect to have positive
12 results going forward, collecting good data from these
13 stations, from safety to reliability, and both
14 qualitative and quantitative data, the more quantitative
15 the better, but qualitative is especially relevant.

16 And in fact, null data, particularly from a
17 safety stand point, is extremely important,
18 understanding that there have been no failures in X
19 number of refueling is an important data point to
20 characterize how safe the systems have been.

21 And so I think making sure that data collection
22 is part of that PON I think will be important.

23 MS. BARONAS: So noted and thank you for your
24 comment. So at this --

25 MR. STAPLES: I have an answer for that

1 question, the previous question, Paul Staples.

2 MS. BARONAS: Okay, Paul, go ahead, please.

3 MR. STAPLES: So, yes, yes, the question was
4 about the actual cost of the system. The cost of the
5 system is anywhere between 100 percent more to 300
6 percent more for the compressor, 100 percent to 300
7 percent for the dispenser, and about 100 percent for the
8 storage, for doing 10,700 BAR dispensing.

9 The actual generator is not affected at all.
10 But the actual dispensing, and the storage, and the
11 compression is significantly more, almost doubling the
12 cost.

13 I could have a system in for under a million
14 dollars right now, that could meet 100 kilograms, if I
15 did not have to comply with the 700 BAR. But because of
16 that my costs are right around \$1.3 to \$1.5 million per
17 system. And that's something I can confirm with exact
18 data and quotes. So, that should answer your question,
19 thank you.

20 MS. BARONAS: Thank you for your input.

21 Steve Eckhardt?

22 MR. POWARS: May I make a comment?

23 MR. ECKHARDT: This is Steve Eckhardt, Linde, I
24 can only comment for our company. I don't have facts
25 right now, I have them somewhere. I know they're not

1 anywhere close to what was just stated in terms of what
2 we can do for 700 BAR. On an incremental cost over 350
3 it's not nearly that great. But I don't have anything
4 directly here in front of me to comment on that.

5 I think another thing that does need to be
6 considered in the whole thing is what is the cost of the
7 station as the total percentage of ultimately what that
8 delivered hydrogen price is? That's something that
9 needs to be considered as well, and what's the ultimate
10 benefit to the customer?

11 No doubt, 700 BAR's more expensive, but what's
12 the added value for it, and that's important to consider
13 that.

14 MS. BARONAS: Thank you for your input.

15 So, the open comment, public comment period is
16 now closed.

17 MR. ACHELNIK: I think we may have someone on
18 WebEx.

19 Oh, thank you, Gerhard. Please identify
20 yourself, a commenter on WebEx?

21 MR. POWARS: Oh, this is Charles Powars, may I
22 make a comment?

23 MS. BARONAS: Yes, of course.

24 MR. POWARS: Okay, Powars, P-o-w-a-r-s. I'm
25 with St. Croix Research. And I'd like to just

1 underscore the point made by the gentleman from Sandia.
2 I was about to make the same point, so I'll be very
3 brief.

4 I think it's very important, as I think most of
5 staff knows, to include very specific and very
6 quantitative requirements for reporting performance data
7 in the solicitations, not only in a final report, but
8 also on progress reports.

9 That data is necessary, for example, as most of
10 you noticed, the AB 118 EMNB Program, it's going to be
11 useful for UCD and UCI to kind of calibrate their models
12 with real world data.

13 I think it will support some of ARB's planning.
14 And it may seem obvious for that, but as some of you are
15 aware, for prior stations that are ostensibly a lot
16 simpler than hydrogen stations, the quantitative data on
17 amount dispensed versus amount delivered, so you can do
18 simple math balances, have not always been forthcoming.

19 So, I would place a strong emphasis on that
20 requirement. Thank you.

21 MS. BARONAS: Thank you for your input.

22 And we have one more commenter here, in the
23 room.

24 MR. ELRICK: I'll make this real quick, Bill
25 Elrick. Just upon that, you might want to reference the

1 national labs, NREL, specifically, has done data
2 collection through the Tech Val Program and has quite
3 the experience and the templates developed. And I'm not
4 sure if you've looked at them before, but you might not
5 have to reinvent the wheel and the consistency of
6 understanding -- both understanding the data and getting
7 what they've learned into the system, as well as their
8 ability to aggregate and scrub so that proprietary stuff
9 isn't there, yet, you can share this publicly, is just
10 something to consider.

11 MS. BARONAS: Great. Okay, so Jim, I'd like to
12 turn it over to you for some closing comments, please.

13 MR. MC KINNEY: Yeah, so Jim McKinney. So,
14 again, just on behalf of the Commission and all of our
15 staff here today, we just want to thank the
16 stakeholders.

17 I know we're asking a lot of you to sit,
18 basically, you know, allocate three business days in
19 just a little over three weeks to this series of
20 workshops.

21 We really appreciate your dedication and the
22 technical expertise, the business expertise, academic
23 expertise that you all are bringing to the table, so
24 thank you very much to everybody.

25 A couple of things that I wanted to just

1 highlight from today; I thought we had a really strong
2 discussion on station performance and technical
3 standards. We had a really good status report from
4 CDFA, Division of Weights and Measures, on their
5 progress to date in retail standards.

6 And I think we had a lot of good input on work
7 being done at the national level, elsewhere in North
8 America, and then in Europe and Asia, too, so I think
9 that's something we need to continue to get up to speed
10 on at the staff level.

11 One item from my notes, that I see that we
12 didn't follow up on was that I think it's the J2601
13 standard and the potential for some proprietary issues
14 around that. Do I have that right?

15 Okay, thank you. So, I'd like to flag that for
16 an agenda item on the July 10 workshop.

17 Very good discussion on station sizing and
18 costs, and these ideas around variable minimum --
19 variable minimums for technical standards and size
20 conforming to the station function.

21 So, again, kind of core cluster, destination,
22 connector, building out the network. So we think our
23 staff has a lot of work to do to try and figure out how
24 to operationalize that, if I can use that kind of clumsy
25 word there. But that will be fun to work on.

1 Great presentations on renewable hydrogen so,
2 again, thanks to Dr. Brown, Professor Ogden, and the Air
3 Resources Board. That was a great lesson there, so we
4 also have some work to do on that one.

5 And looking forward to the Diamond Bar workshop
6 on July 10, our intent is to try to pull in some of the
7 local station owners, so CIOMA members, perhaps the
8 Partnership can help identify some of those folks.

9 I think that was a great set of comments from
10 the first workshop is, you know, we can't do this
11 without the local station owners, so I think that will
12 be a good chance to get them involved, get them on the
13 record, see what the world looks like from their
14 perspective.

15 We also plan to dig more deeply into our current
16 scoring criteria. I see a lot of work ahead for us to
17 modify those to meet some of this evolving information.
18 you know, as the market evolves, and the technologies
19 evolves, the business climate evolves, revamping some of
20 those scoring criteria, so that will play a big part in
21 the next workshop.

22 Is there anything else we had queued up, Jean or
23 Toby, for July 10?

24 MS. BARONAS: Yes, I think we're considering
25 talking about the economic considerations of stations,

1 their through-put versus their cost. Looking at the
2 potential for sustainable -- sustainability from a
3 business-centric point of view is another topic.

4 And then general topics will be funding and
5 possible incentives.

6 MR. MC KINNEY: Yeah, great, thanks for adding
7 that, that's exactly right.

8 So I think, in closing, we have not -- sorry?

9 MS. BARONAS: Sorry, I'm feeling happy.

10 MR. MC KINNEY: You're happy because we're done,
11 yes.

12 I really want to acknowledge Jonah, and Andre
13 for manning the WebEx, and I think Charles has been
14 helping, too.

15 It's been a tremendous effort on the part of our
16 staff here, at the Commission, to pull these workshops
17 together. We've got one more to do.

18 So, again, thanks Tobias, Charles, Amanda, and
19 Jonah, Eric, and James has been hanging out all day as
20 well.

21 And especially to Jean for moderating and
22 increasingly getting up to speed on this complex topic
23 area.

24 So with that, again, thanks very much and we
25 hope to see many of you in Los Angeles on July 10.

1 (Thereupon, the Workshop was adjourned at
2 3:47 p.m.)

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