DOCKETED

Docket Number:	17-IEPR-03
Project Title:	Electricity and Natural Gas Demand Forecast
TN #:	215931
Document Title:	Transcript of the 01/24/17 Workshop Re: Biographies for the California's Economic and Demographic Outlook
Description:	N/A
Filer:	Cody Goldthrite
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	2/13/2017 9:46:14 AM
Docketed Date:	2/13/2017

CALIFORNIA ENERGY COMMISSION

IEPR LEAD COMMISSIONER WORKSHOP

In the Matter of:	) Docket No.) 17-IEPR-03)
Electricity and Natural Gas Demand Forecast	) WORKSHOP Re: Biographies) for the California's) Economic and Demographic) Outlook)

CALIFORNIA ENERGY COMMISSION

THE WARREN-ALQUIST STATE ENERGY BUILDING

FIRST FLOOR, ART ROSENFELD HEARING ROOM

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

TUESDAY, JANUARY 24, 2017

9:30 A.M.

Reported By: Kent Odell

APPEARANCES

Commissioners Present

Robert Weisenmiller, Chair
David Hochschild, Commissioner
Andrew McAllister, Commissioner
Janea Scott, Commissioner

Staff Present

Heather Raitt, IEPR Program Manager
Chris Kavalec,

Panel Presenters (* Via telephone and/or WebEx)

Jeffrey Michael, University of the Pacific
Jim Diffley, IHS Global Insight
Marisa Di Natale, Moody's Analytics
Jon Haveman, Marin Economic Consulting
Jerry Nickelsburg, UCLA Anderson Forecast
Walter Schwarm, California Department of Finance
Frank Wen, Southern California Association of Governments
Gordon Schremp, California Energy Commission
*Severin Borenstein, UC Berkeley's Haas School of Business
*David Green, University of Tennessee
*David Hackett, Petroleum Market Advisory Committee Member/Stillwater Associates
*Chris Lafakis, Moody's Analytics
*James Preciado, U.S. Energy Information Administration, EIA
*Mindi Farber-DeAnda, U.S. EIAn
Marc Melaina, National Renewable Energy Laboratory
Randall Winston, Strategic Growth Council
Dorothy Rothrock, California Manufacturers & Technology Association
Silvio Ferrari, California Building Industry Association
Tyson Eckerle, California Governor's Office of Business and Economic Development
Betty Jo Toccoli, California Small Business Association
*Wallace Walrod, Orange County Business Council
Karen Mills, California Farm Bureau
Tim McRae, Silicon Valley Leadership Group
Jeff Bellisario, Bay Area Council

I N D E X

I N D E X (Cont.)

I N D E X (Cont.)

P R O C E E D I N G S

January 24, 2017 1:05 p.m.

MS. RAITT: Thank you. Please be aware that the meeting today is being broadcast over our WebEx conferencing system and so it is being recorded. We'll post an audio recording in a couple of days and we'll also have a written transcript that will be posted in a few weeks.

At the end of the workshop today we will be taking public comments and we are limiting public comments to three minutes each. If you're interested in making public comments, please see our Public Adviser in the back of the room. And fill out a blue card with your information and when the time comes we'll call you to the center podium.

And if you're on the WebEx, please raise your hand to tell our WebEx Coordinator, using the chat function to tell our WebEx Coordinator, that you'd like to make a comment at the end of the day.

Materials for the meeting are at the entrance to the hearing room. And the notice for this meeting provides information for how to submit written comments, which are welcome and due on February 7th.

With that, I'll turn it over to the Commissioners for opening remarks.

CHAIR WEISENMILLER: Thank you.

I'd like to thank everyone for being here today. Unfortunately, we scheduled the same time as State of the State, but we'll catch up on the State of the State later I'm sure. So anyway, we want to thank folks for being here.

One of the more important things the Energy Commission does is we adopt a Demand Forecast, which is used by other state agencies in planning, so this is really a key role. And one of the key inputs in the Demand Forecast is the state's economy, which seems to me just swings between this sort of H2B Section and some of the highs and lows. So anyway, it's important for us to focus on the economy. And at the same time, obviously, there are different parts of the state, as our forecasts are getting more and more granular.

Certainly, it's important to know the difference between how the state's doing in say, the Bay Area versus the Central Valley as you do this analysis. So we really appreciate your helping us to get a better understanding on the econ/demo through the state and particularly how it varies throughout the state. So again yeah.

COMMISSIONER MCALLISTER: So yeah just I don't want to add too much here, but this is really a bedrock for the Forecast. And I think the Governor will be talking, as we're talking here, about what he thinks the economy is going to do and how much is going to be available to do different things with.

But just long term this is really key input to figuring out what the trajectory of energy consumption is, even though I mean part of the underlying long-term trend is that the economy is less and less energy intensive. The linkage that once upon a time everyone thought was there isn't actually there. Particularly in California, where we're de-carbonizing and we're focused on efficiency.

So anyway this, the IEPR Forecast cycle starts, like it begins again. And this is going to be a big year for the forecast, not only in its output, sort of hard output, but also in the methodology that we're working through in parallel with the full forecast. And as we sort of put the pieces in place for 2019 and for implementation of SB 350.

So a lot going on in this IEPR cycle and I'm happy to get it going in earnest today. So thanks Heather and staff for setting us up and getting everybody on board. Thank you.

COMMISSIONER SCOTT: Nothing to add.

COMMISSIONER HOCHSCHILD: Nothing to add, thanks.

MS. RAITT: Okay, thank you.

Our first speaker today is Chris Kavalec from the

Energy Commission staff. He's our Moderator for the first panel, actually.

MR. KAVALEC: Good morning, I'm Chris Kavalec. I coordinate the Electricity and Natural Gas Demand Forecast for the Energy Commission. And I wanted to motivate our discussion a little bit today by talking about the importance of the economy and demographics in determining energy consumption and our energy forecasts.

So economic growth has -- since we've doing this, the Energy Commission has been doing forecasting since back in the '70s -- our key drivers have always been economic along with population and number of households when you're talking about the residential sector. Because we're refining our forecast to provide more and more geographic disaggregation to make the forecast as useful as possible for resource planning, it's also important for us to understand and predict demographic shifts within the state and regional differences in economic growth. So we're interested in the economy both at the macro level for the state and national, especially with a new Administration coming in. And at a more micro level from both the economists and demographers as well as the perspective of the business community.

And today for the first time since we've been doing these econ/demo workshops we're going to have a panel talking about transportation, fuels, markets and prices. And, of course, prices are a key driver for our forecasts for gasoline and diesel and thus for estimating the amount of greenhouse gases in the state. But also they're important for determining the number of electric vehicles and other alternative fuel vehicles that are on the road. And EVs are becoming a more and more important part of our forecast.

A couple of graphs showing the relationship, simple relationship, between the economy and electricity consumption. First off, the dark blue line shows electricity consumption in gigawatt hours, using the left-hand side scale. And total employment is shown in red, using the right-hand scale. And you see how these series move together, looking at the --

COMMISSIONER HOCHSCHILD: Sorry. Would it possible to have the images loaded on the screen, Heather, whoever is -- on our screens? Yeah, you know how they're usually on our screens, Heather? Thanks.

(Pause to load presentation on screens.)

MR. KAVALEC: So you can see how the two series move together, looking at the recession in the early '80s, the recession in the early '90s, the boom years of the late '90s all the way to the recent Great Recession.

And this graph shows the same thing for per capita income versus electricity consumption; again, in dark blue.

And one thing I wanted to mention about these graphs, you'll notice in the last two, three years, there looking at electricity consumption that we've sort of flattened out, at least temporarily, while the economy has been growing. And we like to think or we hope that this is due to our tremendous efforts at promoting energy efficiency in the state. Although it's probably too early to say we've had a shift in paradigm just looking at these, just a couple of years here. So it'll be interesting to see what happens in the next two, three years to electricity consumption.

But in any case, that doesn't mean the economy is not important, because had the economy not been growing the way it was, we would have likely seen a drop in electricity consumption.

COMMISSIONER MCALLISTER: And So Chris, my earlier comment wasn't that they are completely de-linked. Obviously, I think it's really an interesting topic of study. I think outside of the forecast I'd like to dig in to that a little bit to just see what those metrics look like in terms of energy intensity. And as we build our data resources going forward, I think we'll be able to have a lot more insight on that in a much more geographically specific way. So I'm very excited about digging into that linkage in more detail.

MR. KAVALEC: It looks promising anyway.

And because we're going to be talking about regional differences in the economy I thought I'd show a table here that gives the unemployment rates by county in California. On the left-hand side we have the 12 counties with the lowest unemployment rate. And on the right-hand side we have the counties with the highest unemployment rates. And you will notice that the counties with the lowest unemployment rates tend to be on the Coast or near the Coast, while those with the highest rates tend to be in the Sacramento and San Joaquin Valley, all the way down to Imperial.

Now some of this difference will be due to seasonal employment for agriculture. However, that doesn't explain all the difference. So hopefully in our discussion today we will illuminate a little bit why this difference continues between Inland and coastal California. And should we expect it to continue into the near future?

Okay, with that I'd like to introduce the moderator for our first panel, "California Economy Now and in the Future." We have Dr. Jeffrey Michael, who is Executive Director of the Center for Business and Policy Research and Professor of Public Policy at the University of the Pacific. He holds a joint appointment in the Eberhardt School of Business and the Public Policy Program at McGeorge School of Law, and is based at Pacific's Sacramento Campus.

Jeff's areas of expertise include regional economic forecasting and environmental economics including work on water resources, the Endangered Species Act, climate change and regulation on land use, property values and employment growth.

Jeff received his Ph.D. from North Carolina State University, his masters from the University of Maine, and a B.A. from Hamilton College.

So Jeff, thank you for being here today. I'm assuming he's here.

DR. MICHAEL: Thank you for the introduction.

I'm going to start by introducing our panelists. Two of them will be coming in shortly, but I'll introduce the ones that are here now. And we've got the key people here now for my first question.

So to my right we have Jim Diffley from IHS Economics. Jim is Senior Director of IHS Economics' Consulting and Industry Services. From '98 to 2013 he was Chief Economist of IHS Global Insight's U.S. Regional Services, so with a responsibility for all the regional forecasts including California.

He regularly makes presentations of his economic forecasts, has done a lot of interesting consulting projects ranging from projections of cigarette consumption, analysis of the impact of changing oil prices on local economies and a variety of other things. He's on the Board of Directors for the National Association of Business Economics. And has a great educational background and graduate training from the State University of New York at Stony Brook. So thank you Jim for being here with us today.

Next to Jim we have Marisa Di Natale from Moody's Analytics. She's been with Moody's for a little over a decade now where she oversees alternative macroeconomic scenario designs at the regional level and model development. Among her consulting work, something that caught my eye was doing "what if" analysis of the impacts of natural disasters on state and national economies, I think that's something that's particularly interesting.

Before coming to Moody's she worked for some time with the U.S. Bureau of Labor Statistics where she actually wrote the famous monthly Employment Situation release that we're all at the edge of our seats waiting for each month, and won the Lawrence Klein Award for her research on the labor force experience of Generation X women. And has her master's Degree from Johns Hopkins University in applied economics.

And thank you, Marisa, for being here.

We'll introduce Jon Haveman in a moment, who's not here yet.

Jerry Nickelsburg from the UCLA Anderson Forecast, I don't have Jerry's bio, but Jerry needs no introduction to people in California or in Sacramento. He's been leading the UCLA's Anderson Forecast for California for almost a decade now, I believe, and had a long --

MR. NICKELSBURG: A little more than that.

DR. MICHAEL: A little more than a decade, all right. I've been here almost a decade working in California and Jerry's been here the whole time. I've been learning a lot from him through the years. And before that a distinguished career at University of Southern California as well as a lot of consulting experience. So Jerry is certainly well known to all of us and we're happy that he's here.

And next to Jerry is Walter Schwarm with the California Department of Finance, where he has been working in the Demographic Research Unit for some time and as well as the State Data Center. And he was the lead for the state Population Projections. Walter assumed management of the Estimates Program in the Department of Finance in 2015.

Prior to coming to the Department of Finance, he oversaw Population Projections at West Virginia University and has his Ph.D. in Economics from Colorado State. And as a consumer of Walter's work, I don't get to speak to him as much as I'd like, but I do appreciate his efforts. And I have noticed and liked some of the work that's been coming out of DOF in recent years.

So with those introductions, while we're waiting for a few of the other panelists I'm going to ask three of our panelists specifically to start by just giving us a three-minute synopsis of your latest forecast for the California economy. And we'll start with Jim Diffley.

MR. DIFFLEY: Sure, thank you.

Well, the high-tech economy led us out of the Great Recession and the Bay Area continues to be its epicenter. That tech dominance itself shows no signs of slowing. But the consequent cost pressures on labor, on housing, etcetera, that you've all heard about will limit future rates of increase. So we expect moderating rates of growth in employment and population in the Bay Area as well as California due to migration, especially in the Bay Area as I said.

But statewide, unemployment is down. In fact, today BLS came in at 5.2 percent in December, surprisingly low. That will limit growth in a full-employment economy everywhere. It won't limit prosperity as measured by incomes, but it will limit rates of further expansion, which we project slowing to U.S. rates. California has out-performed the U.S. over the last -- for most of this decade, at least in the near term.

We see GDP growth, GDP for the State of California above the U.S. average. But with a narrower, say, 0.2 percent difference than the gap that's been enjoyed since 2012, which has been roughly a full percentage point per year over U.S. GDP growth. So in 2017, for instance, we have gross state product -- or now called gross domestic product by state -- of 2.4 percent for California, 2.6 percent in 2018.

Population growth will remain under 1 percent, but will average about 0.8 percent over the next decade, through 2026, if I calculate it that way.

Unemployment growth, which has been very strong, we project to slow a bit from 2 percent -- over 2 percent this year to 1.7 percent in 2017. Again, as I said in a full employment, relatively full-employment economy, to 1.3 percent in 2018 down to 1.0 percent by 2020.

(Music drowns out speaker over WebEx.)

For those of you on the WebEx, that is not me. (Laughter.) I can't do that.

The unemployment rate, now that it is down to 5.2

percent, will be stable. As I said, we think that's pretty much the natural full rate of unemployment for this state. A little lower in the U.S. for demographic reasons, by the way and I think that's the answer to the Central Valley question, largely, that was brought up earlier.

Housing starts, which have been much lower than normal as you no doubt know, will rise to 150,000 by the next decade. And importantly, multifamily starts we project will be fully half of that, in fact slightly more than half on an ongoing basis. It's been that way this decade and it will continue that way as we move forward.

Wage growth will average 4 percent, on average, wages per worker. Personal income growth, 5.4 percent for the state in 2017 and 2018.

And I guess I'll leave it at that as a synopsis.

DR. MICHAEL: All right. Thank you, Jim.

Let's go to Marisa Di Natale for your synopsis of your California forecasts.

MS. DI NATALE: Okay, Jeff. Thank you.

I'm not going to give you a lot of numbers. Instead, I'm going to describe the narrative of our forecast and the contours of the forecast.

We have actually changed our baseline forecast a bit in the past couple of months given the new, incoming Administration. We expect slightly faster growth over the next year to 18 months, because we are assuming that we're going to get some fiscal stimulus in the form of tax cuts and maybe some infrastructure spending. So we have revised up a little bit for 2017 and the first half of '18, our forecast for the U.S., and as a result, all of the states. So California looks a little bit faster through the end of this year.

On the other hand, we have revised down the forecast in the out years -- three, four years out, where we have growth slowing quite a bit. I think for California it kind of all adds up to a graceful slowdown. We're already seeing that. Jim mentioned this.

It's mostly being led by slowing in the Bay Area, particularly the San Francisco Metro Division, where last year job growth in San Francisco was growing at 5 percent. Now it's down to about half that at 2 1/2 percent already, so we're already seeing some of the slowdown and that is mostly because of labor constraints. It's because the labor market is extremely tight as we saw.

The unemployment rates by county up there, we're looking at unemployment rates that are -- earlier this year for San Francisco dipped below 3 percent, so about as low as we've seen since 2000. So it's not as if anything bad is going on per se, it's just a somewhat overheated economy with a very tight labor market, very high costs, very high housing costs. But we are, as I said, starting to see some job growth moderation. The labor force is still growing very, very quickly, so the unemployment rate may actually rise a little bit through the middle of this year as the labor force grows.

We are starting to see some moderation even in house prices in San Francisco, particularly as multifamily housing building has been quite strong. There's still a big gap between household formations, demand and supply, but growth has ratcheted down a notch. And that's the main catalyst for slowing, statewide. Most of it is coming from the Bay Area.

I think when we start talking about the different regions of the state we'll see that actually a lot of those regions with high unemployment rates in the Central Valley and Inland, in many respects, are still in a recovery. So we may actually expect faster job growth from them as they continue to rebound over the next couple of years. At the same time, we'll expect some of the coastal metro areas and counties to start slowing a bit.

But we're talking about a slowdown that's moderate and graceful. We're not expecting any sort of bust or collapse in home prices or tech or anything like that, so I think for the next couple months here, and particularly through the middle of 2017 we may actually see growth accelerate a little bit, particularly if we get a little bit of stimulus from the federal government. And then I think 2019, 2020, we start to slow.

And I know this is -- Jeff, it's going to be one of the questions you ask -- although we're not explicitly forecasting a recession I think if there were going to be one, that may be around the time that we could see that happen.

DR. MICHAEL: Okay. Thank you, Marisa.

I will now ask Jerry Nickelsburg from UCLA to give us a synopsis of the State Forecast.

MR. NICKELSBURG: Sure, so and let me start just very briefly talking about the numbers. And I don't think we have a lot of disagreement on the numbers. Our forecast maybe has just sort of marginally higher employment growth, lower growth in residential construction.

And one of the reasons for the lower growth in residential construction is that this has been very heavily weighted towards multifamily housing. I do a survey, a commercial real estate survey twice a year, surveying developers in markets throughout California. And in the multifamily space, which you kind of wouldn't expect, but for the last year developers have become very pessimistic.

And the rationale for that, because you'd say, "Well, we don't have enough housing in California. Housing is very expensive," is that they've been building for the mid to high-luxury market. And that market's pretty much tapped out. And they have not yet figured out how to build profitably for the lower end and so we expect residential construction not to hit 150,000, but about 120. So a slower growth in residential construction for that reason.

COMMISSIONER MCALLISTER: And is that -- that's multifamily and -- that's single family or that's multifamily and single family?

MR. NICKELSBURG: That's total number of units.

COMMISSIONER MCALLISTER: Total units.

MR. NICKELSBURG: Of which our best guess is about 60 percent multifamily and 40 percent single family. Although when you see some of the building that's going on in the periphery of the Coast, such as in Southern Riverside County, that may switch back to about 50/50.

So let me talk instead about the numbers. Because as I say I don't think we have much -- I mean, they're just sort of marginal disagreements or differences on the numbers. And say what's probably obvious, but worth saying, we have a lot more uncertainty in our forecast today than we had six months ago, even though the forecasts look much the same.

With respect to stimulus, so there's two elements of stimulus that look like they may be coming down the pike

-- three actually -- one is tax cuts, which will stimulate retail sales. That looks like that's going to happen, so that's personal income tax cuts.

The second is a buildup in military spending and that buildup in military spending is going to be for defense durables. So that's something that California is going to benefit from disproportionately. But there are real capacity constraints there. For example, one of the buildups is in the U.S. Navy to add 150 warships. Today we are building 10 per year. We just don't have the capacity to really ramp that up.

Where this is going to affect California primarily is in the aerospace industry in Los Angeles, Orange County, in the defense industry in San Diego, and in sophisticated equipment and software in the Bay Area. So that'll be a disproportionate impact. If we start pulling troops out of Asia they may well come back to California and that would be an expansion of the population at our military bases.

Some other wild cards, we've heard lots of pronouncements about trade. And the President has removed us from negotiation on TPP and is talking about bilateral trade agreements and has been rather bellicose with respect to China. China, or if you take China plus Hong Kong, you have California's second or third largest trading partner.

Were there to be serious interruption in trade between China and the United States it would affect the U.S. economy, as a whole, because of supply chains. It'll affect California's ports and logistics industry. So that's a risk that we've got to keep our eye on, because that could generate some near-term changes to the forecast.

The other stimulus, the third stimulus, which ought to generate more jobs in California, is on infrastructure. But that's very slow to get going and you have a Congress that is at least beginning to look at the potential for ballooning deficits. So I kind of wouldn't count that in as being a very big impact, either here in California, or in the nation as a whole.

So lots of risks, lots of things to keep our eyes on. If those risks don't come to pass then we're looking at a similar 5.2 percent unemployment, growth rates slightly higher than the U.S., but not by much in employment, and income and GDP growth rates higher than the U.S.

DR. MICHAEL: Before I get to follow-up questions on your forecast synopses, I just wanted to introduce two additional panelists.

(Radio plays over WebEx. Pause to handle audio.)

DR. MICHAEL: So we're happy to have Jon Haveman join our panel, with Marin Consulting. Jon's got a tremendous amount of experience. And throughout California he's been in -- before Marin Economic Consulting -- he has been Chief Economist with the Bay Area Council Economic Institute, was a founding principal at Beacon Economics, and was Director of the Economy Program at the Public Policy Institute of California.

He's been not just in California, but he in the past was a senior economist with the President's Council of Economic Advisors. Has his Ph.D. from the University of Michigan in Economics and we're happy that he's here. We're going to come back and ask Jon a direct question here in a moment.

Frank Wen has also joined us. He's the Acting Director of Land Use and Environmental Planning with the Southern California Association of Governments, or SCAG. He's been with them since 1988 and was their Senior Economist from 1993 to 2005. He collaborates with the universities and planning agencies. He's produced SCAG's Region Growth Forecast, looked at the implications of growth and demographic transfer policy implications, so clearly a great addition to our panel. And he received his Ph.D. in Applied Economics from the University of Minnesota.

So I'm going to ask Frank and Jon some direct questions, as we move to the regional discussion.

But before that just a quick follow-up on the California forecasts for Jim and Marisa and Jerry. I think listening to your synopses; it's fair to say that none of you are projecting a recession in the next one to two years. It didn't seem to be in any of your forecasts; is that correct?

MR. NICKELSBURG: That's correct for our forecast. And the reason is that if you look at past recessions you get kind of three potential causes, three things that drive you into the recession. One is overbuilding of housing. We certainly don't have that.

Another is dramatic cutbacks in military spending, as we saw at the end of the Korean War. Well, we certainly don't have that.

And the third is what we saw in 2001, which was overbuilding of equipment and software. And, you know, if you talk to the folks in Silicon Valley or Silicon Beach in L.A. they don't think we're there. But this is something that we really do not have good data on, so amongst the three historical drivers we don't really see any of those generating approximate recession.

DR. MICHAEL: Great.

And Jim and Marisa, over the next 18 months do you see recession risks?

MR. DIFFLEY: We don't project a recession, that's for sure, and for the reasons that Marisa mentioned and Jerry mentioned. Although they'll argue there's more causes for recessions than one could imagine, but I'll also reiterate something Jerry said about the heightened uncertainty around the forecast now. That we really don't know what scope the Trump polices will take here.

And So if you think about all the things that can happen, stuff happens. And bad policy moves could potentially -- I would argue there's a risk of a recession based on bad policy moves, for instance -- but we don't project it.

DR MICHAEL: Okay. And then just to follow up on that, it sounds from your comments that you see even more uncertainty out in the two-to-four-year time horizon.

So maybe I'll turn to Marisa, if you can expand a little bit on that sort of medium term, two-to-three-year outlook?

MS. DI NATALE: Sure. So we also are not predicting a recession in the next couple of years. You know, we don't see asset bubbles, really, anywhere. We don't see overheating in the national economy to the point that has precipitated other recessions in the past, so that is not in our forecast.

Of course the uncertainty is very high, because policies of the new Administration are not fully fleshed out yet. We don't know exactly what Congress will go along with in terms of, as Jerry said, with infrastructure spending. There's a lot of resistance to that among a lot of House and Senate Republicans, so that is likely to be much smaller and take a lot longer than some people think.

Tax cuts are very likely. We don't know how big they'll be or what the scale of them will be, so we are expecting some amount of stimulus. And that is baked into our forecasts, but certainly there is a lot of uncertainty there.

There's a lot of uncertainty on trade policy and exactly what that will shape up to mean. I mean, it could go a couple of different ways. It could be very bad. And it could be something that could precipitate a recession if trade wars are started with China and Mexico or it could be a lot of talk that shapes up to not be much.

So I think we can all concur that there is a lot of uncertainty in the forecast now over the next few years.

MR. NICKELSBURG: Let me follow on that, because Jim is exactly right. There are other causes of a recession if -- and I was speaking of post-World War II recessions.

So if you go back further, when the economy was a bit different and we weren't as globalized, still we see trade wars, prohibitive tariffs causing recessions or certainly contributing to them. If we get a significant repeal of financial regulation then the bond market is at risk. So there are a lot of things that we need to keep our eyes on that could generate recessions, but they're not kind of there at the present time.

DR. MICHAEL: Yeah, so just and any panelist can weigh in on this. A lot of the discussion --

CHAIR WEISENMILLER: I just have one question on the uncertainty?

DR MICHAEL: Sure.

CHAIR WEISENMILLER: I would like to get a sense of what the magnitude or the uncertainty is. And it sounds more like there's not a lot of upside, but more downside in the near term; is that correct in terms of the economy?

MR. NICKELSBURG: I would agree with that. That since we -- being not just California, but the U.S. -- is pretty much at full employment then it's hard to have upside. What you'd like to do is have that kind of continue on pace, but you can't –- you know the claim, "So we're going to get employment growth up to 4 or 5 percent," in a full-employment economy seems to stretch credibility a bit. So I think the risks are on the downside.

When we talk about uncertainty, we're talking about the kinds of policy changes that my colleagues have talked about. And so there, to try and get some magnitude, you have predict what the Administration is going to do.

COMMISSIONER MCALLISTER: I guess I wanted to follow up, just maybe is there a rule of thumb?

Let's say, I don't know, trade wars seems like a little sensationalist but hopefully it doesn't actually turn into that. But just sort of a move towards protectionism of some sort, border tariffs or sort of that what -- I guess, I think Marisa, you said it could be rhetoric or it could be actual action. What's the timeframe, typically? If that does happen what's the timeframe in which that would play out to cool the economy? I mean, is that two years? Is it five years? Is it longer structurally? I mean, can you put some bounds on that?

MS. DI NATALE: I think that's difficult, as well. They've already gotten going on looking at the TPP, which was mostly a symbolic Executive Order to begin with, because Congress hadn't ratified it to begin with. But they're talking about looking at NAFTA again, meeting with Mexican and Canadian leaders soon.

I think all of this stuff would take a while, I would think, to unwind. I mean I'm not really sure, but I can't see it happening in the next six months. But there could be consequences by the end of the year, I would think. It just depends on how quickly and how much this is prioritized over other policy actions.

MR. DIFFLEY: I think though the question was more of, "If we have very adverse trade policies, how long does it take before we get the negative economic reaction?" And we learn from experience in economics. We have no experience with this, with the country suddenly pulling up the -- don't want to say walls -- but walls on trade in the way that one might imagine the Trump Administration would do.

MR. NICKELSBURG: Right. And --

CHAIR WEISENMILLER: Do you have a sense of --

MR. NICKELSBURG: -- with respect to NAFTA, my best guess is that there'll be some changes in country-of-origin requirements, which kind of everyone could agree to and then declare victory and go home. That kind of change is not going to lead to a recession. And it'll be sort of a gradual transition to a new allocation of resources.

Getting into a "my tariff is bigger than your tariff," kind of tit-for-tat with a major trading partner like China or Mexico. We don't know how rapidly that would be disruptive. The economists who have studied trade look at this and look at the propensity to import and propensity to export. And it kind of really matters, which one is affected most. And so it's really hard to tell just how fast that would unwind.

DR. MICHAEL: And while we're on the topic of a recession risk and getting into a discussion of trade, this might be a good opportunity for some of our panelists -- to pull them into the discussion -- so Jon, I know you've got a lot of experience in these issues. What do you think?

MR. HAVEMAN: If I may? I don't think that the trade issue is so much the nuts and bolts of whatever renegotiation happens. More it's the perception that while we're going to have lots of renegotiations and that countries like China might not be very happy with the direction that we're taking.

So I want to disagree with a little bit about something Marisa said about no asset bubbles. I look at the stock market and I see an asset bubble. Anytime I see a 10 percent increase in the several days following an election, that looks to me like trouble. And I thought we were in trouble before we got there.

So it strikes me that the combination of dramatic changes in a trade policy stance along with perhaps, an asset bubble in the stock market, that suggests to me that we could have a much more rapid effect of trade going awry than just the effect that comes through reduced exports and higher priced imports.

So it could come about much more quickly than we might think.

DR. MICHAEL: So just to follow up on that, do you see some risk then in the say, 18-month-type time horizon?

MR. HAVEMAN: I see a lot of risk in the 18-month time horizon.

(Radio plays over WebEx briefly.)

DR. MICHAEL: So Frank, I want to give you the opportunity to weigh in while we're on that topic of trade and recession risks.

MR. WEN: I'm not sure about the trade and recession risk, but many in Congress talk about uncertainty with this new Administration, and the countries around the world, particularly China, how they respond. And I would like to offer a piece of certainty, primarily from a demographics perspective.

For example, the demographic dividends the nation and then many countries around the world enjoyed in the last 30 years are no longer there anymore. You can see the DOF Chief Demographer's projection, what we experience right now, a very slow population growth. And then a very low unemployment rate that Jerry mentioned, of how can we grow additional jobs without the live bodies?

And then all of this affects the immigration policies, certain industries, for example, in the rural areas in particular.

And then what we call this "aging baby boomers."

I think they all peaked actually in the most productive age (indiscernible) between 35 and 54 in the year 2000, and then starting in 2010, every 10,000 are moving towards 65 and above.

And then we look at the future growth of a population. The growth is very, very slow compared with the historical perspective from the '80s, all above 2.5 percent, California or Southern California, 1.5 percent actually a point higher than the U.S. average.

And then moving to the future, the next 20-25 years, it's very certain that the next 30 years' population growth, two-thirds of them will be either 65 or above or 15 and under.

So this demographic's structure shift poses a tremendous pressure in terms of healthcare, retirement and then all government levels of finances, and then that poses a tremendous hindrance to the economy. I think that that alone probably will reduce the world trade by a 1 percent point.

And then most important, this is not just a California or a U.S. situation, it's happening globally for most or (indiscernible) economy. And then more developing countries like with China, India, South Asian countries, I think that certainly everyone grows one year older each year. And then it's from the demographics of 40-50 years ago.

And then currently how the millennial react also plays a huge impact in terms of the economic performance outcome. Particularly, for example, right now after the recession all the jobs that were lost have to be recovered. And now the construction jobs, why is that? Because of the demand, because of millennials or boomers, what's their housing choices?

So I would like to offer the consideration about the demographics' impact on the economy.

DR. MICHAEL: Thanks. That's a great segue for me to pull Walter into the discussion.

Walter, according to the Department of Finance estimates, California's population growth is at its lowest level in many, many decades; still below 1 percent. Do you expect a statewide population growth to remain below 1 percent over the next two to three years and over the next decade in going forward?

MR. SCHWARM: Yeah. No, I think we see, for a number of reasons, the population slowing down.

First of all we are a much larger state than we were in the '80s, right? If we grew at that 2 1/2 percent in the '80s we'd have over 50 million people now. So it seems reasonable that we would slow down, that happens with everything.

I think we see that we do indeed still grow a little bit faster than the United States. Because fundamentally -- and we'll get eventually I'm sure, to your question about migration. But migration has actually been pretty -- it hasn't been stable -- but it's been about the same for say the last five to six years.

What's really changed is number of births. And the overall level of -- we end up right now with lower birth rates. The headline that maybe we (indiscernible) but, you know, we end up with this lowest birth rate basically since in the modern times currently, in California's accrued birthrate.

Behind that are lower fertility rates across the board for women. Sure, 30-year-olds are -- that age-specific fertility rate is increasing -- but the thing that happens, of course, is if you're 30, 35 having your first child, you don't have too many more. You have one, you have two maybe.

Particularly then, thinking about the millennials and their current choices of where to live and where they can afford to live, if you build multifamily homes not too many of them have four bedrooms. Most of them maybe two, at the most and you might stop at one, unless you choose to move. And that's another question, this where do we see the multifamily growth? I don't know that it's going to continue.

I would say I don't see it continuing quite at the same strength, because once again there are some suggestions here that millennials have really enjoyed living in the city for a little while. But we don't really know what they're going to do when they turn around 30 and 35. Are they going to go back out to the suburbs? And we see a bit of that, you know? Your later question about migration out of the Bay Area, some of that is indeed housing costs and some of this is indeed just a choice of, "I want to be able to have more than one kid. And I want some of the stuff that the suburbs give me."

But really over the next ten years? I don't think we see births recovering much: 490, 485, somewhere around that is a pretty much consistent projection forward of the total number of births. This is 50,000 less than 2010. It's 55,000 less than 2008. We used to think somewhere around 535, 540,000 births was a pretty low number. These are pretty low numbers.

And as Frank pointed out, baby boomers are not getting any younger. That first cohort of baby boomer is, Frank, 1946? They turn 70 this year. And as they continue to move forward we see the death rate up by 18,000 people this year in California. The death rate moved up. Now, we didn't talk much about it, because it's not a huge movement. But we're reserving our right to talk about it, probably next -- or maybe next year or maybe the year after that, because it will go up as well. And so natural increase is really what is tamping the economy down.

Now, migration would take care of that, but this comes from the uncertainties that we have in the economy right now or the uncertainties that come with political consideration.

DR. MICHAEL: Are birth rates, have they stabilized with the recovery or are we continuing to decrease?

MR. SCHWARM: No, they continue to go down. I mean, that's the thing. We always thought, "Oh, this is just people delaying, because of the economic hardships and various other things." But no, this is individuals who traditionally might have had children -- say we'll ignore the 15 through 19-year-olds, because there, there are other issues -- maybe ACA, (phonetic) maybe access to contraception and various other pieces.

But if we look at 20 to 24 and 25 to 29, 20 to 24 is education. We have, in California, about 53 percent of all individuals within that cohort right now have at least had some college. That's more than nationwide, it's about 40 percent nationwide. So really many more individuals are pursuing higher education, not having children.

Well, they get out of higher education. And with their degree most of them don't immediately go and start a family, because they would like to go ahead and utilize these skills that they've managed to get. And because they've been out of the labor force essentially, or they've been out of earning potential for that time period, they need some time in order to be able to afford someplace to have a child. And So those are down as well.

DR. MICHAEL: So your population projection does not grow back up to 1 percent or above in the next decade or so?

MR. SCHWARM: It gets very close. I think we come up to about .94 under the current one, the B13, which is being replaced as we speak. In other words, there'll be a new projection out probably by the end of the month, maybe the first week of February.

In the latest one no, and that's largely because when we get to maybe .96, I think around 2027 -- because we assume at that particular point and time we do get a bit of a fertility increase from those millennials -- the ones that are the largest cohort millennials are 25. They will then enter the point of prime fertility and hopefully we'll have some growth in babies that year.

Let's hope that the baby boomers turn out to be healthier. As healthy as we expect them to be, so we don't have an offsetting number of deaths.

DR. MICHAEL: Right, I'm going to ask any of the -- I know most of the panelists have their own population forecasts. Does anybody see faster population than Walter is projecting, perhaps getting back up over 1 percent again?

MR. DIFFLEY: I'll make two points, if I can. One, we're actually lower: 0.8 to 0.9 percent and I don't know where we differ. Obviously, I have to look at the components, but by the way I'll add I'm a great fan of the Department of Finance's work on demographic projections. It's excellent.

And one thing about the birth rates, this is not simply a California phenomenon, right? This is a U.S. phenomenon. And U.S. population growth rates in our forecasts have been revised down as well, for similar reasons.

MR. NICKELSBURG: Yeah. I would add that it's worldwide that education, wealth, income, cost of housing, all negatively correlated with birth rates. And so I would not go higher than your forecast, absent more immigration. And I don't think that's very likely, at least not in the next four years.

DR. MICHAEL: Right, so that's an important topic, actually an important component of the population forecast is international migration. It's always been important to California's population growth. We saw it decrease in the recession years and it sort of is creeping back to a slightly higher level in recent years. Where does it go from here? I'll start with Walter.

MR. SCHWARM: If there's any piece, I mean obviously on the demography is destiny side over here that Frank is doing right, I mean there are some things that are set. I mean, if some things change tomorrow we won't get radically great changes in the overall level of the population, except for in migration. And unfortunately, this is the piece that is currently -- who knows what's going to happen.

We rely very heavily on H1B in California. We receive approximately 27 percent of all H1B visas that are of the 100,000 or so. Well, that's a bit of a combination number, but of that 100,000 or So H1B visas that are given by the U.S. government every year, 27, 28 percent of those come to California or are in California.

We receive lots of H2B. And also H4 visas, these are individuals with essentially family reunification, but technical family reunification numbers, that adds to those things. We have a lot of students. And that has really been the change that has happened over the last couple of years. We used to not worry too much about foreign students that were a number around 4 or 5,000. They're a churning number that generally is somewhere around the 13 to 14,000 dot mark at this particular point and has just grown, year after year.

Now, immigration policy, I don't know. If we get particularly harsh on that then the attractiveness of U.S. institutions for education might go down. You might choose someplace else. Trump has mentioned some things about not enjoying the one H1B Program and feeling that it had problems. That would be a big blow, because net positive migration growth in California comes from international.

We're a mature state, a majority of us are native Californians. And the feature of a mature state is we out-migrate, to a certain extent. We're no longer purely an in-migration state domestically. We don't draw hundreds of thousands of people every year from all the other states. Our golden opportunity land in terms of that is over. The cheap housing, the opportunity -- we're more mature. People move for various reasons. And so therefore, it's really international migration that keeps that part of the balancing equation going. It's not domestic.

Domestic's not bad. We average net somewhere, losing about 30 to 40,000 domestically on average every year. And that's a drop in the bucket if you think about California being 9.4 million people.

DR. MICHAEL: I'm going to give the other panelists an opportunity to comment on international migration, but just also add a question to it about the composition of countries where we're seeing migration from, and any changing trends in the patterns of international migration and how these policy --

MR. SCHWARM: That's where the greatest uncertainty lies.

I mean, we traditionally had -- at least, traditionally -- say, in 2005 the majority of our migration, the largest piece was Central America and of that, Mexico. Ever since 2005 or 2004 or so the proportion of individuals immigrating here from Southeast Asia has been increasing. And at this point the top five nations that have individuals coming to California are China, India, Pakistan, Mexico and the rest of Central America.

China is a huge one, undoubtedly. It represents at this -- there was a period of time here, it's a little bit lower right now -- but there was a period of time in 2013, 2014 that China and India represented 81 percent of all immigration into California. So our relationship with China and how we choose to treat that is a big deal, because that represents a large proportion of those individuals who are coming to California and looking to take advantage of some the opportunities we have here.

Would it be replaced by Mexico or someplace else? Who knows? Once again, that depends on border policy and that's a question.

DR. MICHAEL: Frank?

MR. WEN: I would like to echo that. But however international immigration particularly on the H1B Visa, the internationals, I think given the growth is a worldwide phenomenon. So we can expect there will be a global competition about human resources at all levels, because the growth is all going down significantly.

So particularly in the higher-educated students coming here to work, you will see a higher and higher competition in their mother countries competing for those talents. And then because of the economy development, the standard of living, and particularly in terms of the achievements, those students can gain their (indiscernible) in their countries. You will see even on the competition side, it's even more and more difficult to keep for the U.S., keep those students.

My personal experience, for example. When I came to the University of Minnesota in the early '80s there were many Japanese students and then suddenly no Japanese students anymore over there. And then following with the students from Taiwan, from South Korea, they're all gone, because they graduated and went back. And now you see many

Chinese students. And I think they are in a turning point that many of the Chinese students will also go back to China, because they present much better opportunities, in accomplishments and opportunities over there.

MR. NICKELSBURG: So let me comment on the part of migration that we haven't discussed and that's deportations. So if the current Administration is serious about mass deportations, and they've given no indication that they're not, where do you find the people? There just aren't enough bad hombres, all right? So you look where there are concentrations, high concentrations of undocumented.

And this kind of speaks to a part of the state, Jeff, that you know very well. It's in the agricultural workers. And so were that to occur -- and it's very hard for it to occur, the system is already completely choked -- but were it to occur that would be an out-migration of families from California. And what would be the magnitude, I don't think anyone really knows.

DR. MICHAEL: You're right. I mean, if that were to occur, certainly there could be some big effects in the Central Valley. Are there other -- some urban economies you think could be disproportionally affected by increased deportations?

MR. WEN: San Diego, Imperial County, and even

Ventura County. A lot of Mexicans in San Diego counties and then they estimate the risks to their economy and their labor force are tremendous. And also the agricultural business in the Ventura County, Imperial County will also be greatly affected.

MR. NICKELSBURG: Yeah, the estimates that I saw, and I don't speak to the veracity of them, but they were the 65 percent of all harvest workers in Ventura County are undocumented. So that would be if you want to get big numbers in deportations, that's a concentration that you could go after, but would certainly have a big effect on the population in Ventura County. And in agriculture and nondurable goods manufacturing.

DR. MICHAEL: Yeah. I'm going to turn to just one more question about migration and domestic migration. There seems to be sort of an entrenched pattern for out-migration domestically for recent years. That for recent years, does anybody see anything that could shift that pattern going forward to more out-migration or perhaps a move back to a more balanced domestic migration?

MR. DIFFLEY: If I may, I was just going to comment on Walter's characterization of California as a mature economy. True, no doubt, but California remains an attractive place to come to. I live in the Northeast right, I love California.

The reason there's out-migration is maturity, but costs -- a very high cost of living -- a very, very high cost of living, etcetera. That's really the issue with advanced domestic out-migration and that's not going to change.

MR. SCHWARM: Yeah. I would point out if we look at who actually -- the differential between in-migrants versus out-migrants, in-migrants have college educations, they work in tech sectors or various other places. Most of the out-migrants have less, a high-school diploma or less, and they tend to be to a certain extent in say, the lower or the bottom two Kintons in income.

And that just reflects housing costs. I mean, that reflects the inability of those individuals to connect into the California economy in a meaningful way that would allow them to stay. And they choose to leave and go someplace where they find, hopefully, an opportunity to make a better life with the skills that they have.

It's just unfortunate the way that's working right now. Until California becomes a less costly place to live, I don't know that that will change, because that seems to be that's been the trend for ten years now.

MR. NICKELSBURG: Yeah, there's a fair amount of economic research on this topic. And just to summarize, places that are really nice places to live that have a large amount of amenities, natural and cultural amenities, become expensive. And if you look at the latest demographia cities around the world that are the most expensive, they're the most attractive places to live.

And so, the economic research on this topic says that you get a sorting, a sorting that was just described, of very productive people who can command the income to live there and people who have lesser skills move elsewhere. So, we've seen that in California for a while. Now we're seeing it in Seattle, seeing it in Portland, in Austin. As the California of the '60s where you could come out, like Jim Rockford and bring your trailer on the beach at Paradise Cove, that's gone with -- this state has filled up, in that sense.

So I don't expect that to change. That sorting I think is still going to continue into the future. And all of the research that economists, urban economists have done on this topic would indicate so.

DR. MICHAEL: Great.

I want to direct a question to Jon now, because I think this domestic migration could transition to some of the regional discussions. I mean, I asked Jon about the Bay Area economy. One thing I noticed while consuming Walter's DOF Forecast as I've been waiting for the -- it's been interesting to see population growth in the Bay Area above the statewide average while its economy has been performing so long. And I've been sort of waiting for when's the the out-migration going to hit due to costs and other constraints. And I think the latest estimates show that 2016 sort of being a noticeable increase in Bay Area out-migration.

So I'd like to maybe start with that and then follow up with some other questions about the Bay Area economy.

MR. HAVEMAN: About the out-migration?

DR. MICHAEL: Yeah.

MR. HAVEMAN: Yeah. Yeah, no I think it's becoming evident that yeah, the tide has changed in the Bay Area. 2016 was the first year that we did see out-migration, domestic out-migration, since about 2010 sort of returning the Bay Area to its almost natural posture of being a place where people tend to leave on average more than they come.

And the two eras during the dotcom bubble in the late '90s, we had big in-migration. I mean, over the course in the last five years lots of in-migration and mostly because the economy was just on fire during those years. And anybody with any technology inclination looking for a job, they thought first about coming to the Bay Area, during both those periods.

COMMISSIONER MCALLISTER: Could you describe what your definition of the Bay Area is?

MR. HAVEMAN: I generally talk about the nine-county region, all of the counties that touch the Bay Area.

COMMISSIONER MCALLISTER: Okay.

MR. HAVEMAN: Yeah. Often my numbers will include San Benito County as well, which I hope there's nobody from San Benito County here. It's of relatively little consequence than in the broader scheme of things.

COMMISSIONER MCALLISTER: Yeah, okay. I guess I meant kind of within the Bay Area. I mean, it's a big area. And I guess, it seems like there's also a lot of migration within different places between San Francisco, East Bay, South Bay --

MR. HAVEMAN: Oh, then I --

COMMISSIONER MCALLISTER: -- and I don't know if that's economically important, but if it is I'd like to hear about it.

MR. HAVEMAN: There certainly is and I guess I can't really speak to within the Bay Area, but there's been a lot of movement of people to the periphery counties of the Bay Area, to Stanislaus, to San Joaquin, even Sacramento County. And we see that in commute patterns. It's not that they're moving to those counties for jobs in those counties, they're moving to those counties, because they can't afford to live closer to work.

They did a study on mega-commuters in the Bay Area not long ago. Mega-commuters are those people with one-way commutes in excess of 90 minutes, 9-0 minutes and that's for everybody working in the Bay Area. That includes people who live in Sacramento, Stanislaus, San Joaquin counties. And that number in the last four or five years has jumped up from about 3 percent to over 5 percent. People who live and work within the Bay Area, it's gone from 2 percent to 4 percent, so mega-commuters are becoming a much bigger phenomenon.

In fact, we have more mega-commuters in the Bay Area now than Los Angeles has.

DR. MICHAEL: So, just your general economic outlook for the Bay Area, I think some of the earlier comments from panelists described cooling. Is that what you're seeing as well in what your outlook is for the Bay Area?

MR. HAVEMAN: Yeah. I mean, absolutely there's a cooling going on in the Bay Area. I mean, the Bay Area has been a primary driver of employment growth in California for most of the last five years.

And gross regional product has been growing really quickly too. So if we look over the last five years, gross regional product in the Bay Area grew by about

22 percent. In the SACOG region and the SCAG regions there was about 11 and 12 percent.

In the last year, it's slowed down a little bit relative to other regions. So gross state product grew between 2014 and '15 at about 5.8 percent; whereas down in SACOG and SCAG, 3.6 and 3.8 percent, respectively. So the differential rate of growth in local GDP is shrinking.

And turning to the metric that everybody always looks at, or more commonly looks at and is more recent, is employment. And we also see a slowdown in employment. Now, over the last five years the Bay Area, depending on when you stopped counting, the Bay Area has been growing at about a 4 percent clip, 4-percent-per-year growth rate. And the state's growing more at about 2.8 percent and the nation, as a whole, growing about 1.9 percent.

That's starting to decline in the Bay Area. If we look at just the last year through the entire year of December, we had employment growth in the Bay Area of about 2.6 percent, year over year, which is a significant decline.

And the growth was really led by the information sector. If we look over the last five years the information sector in the Bay Area grew by about 38 percent. If you looked nationwide, it grew by 2.4 percent, so really anomalous growth in the Bay Area in information.

Professional, scientific and technical services grew by about 37 percent or about 7.5 percent a year over the last five years; nationwide that was about 16.6 percent.

Other sectors that really caused the growth in employment were healthcare, administrative support, a lot of outsourcing of administrative work from within larger companies to companies that specialize in that sort of thing.

Over the course of the last year, we see the slowdown in employment almost everywhere throughout the economy. The information sector, its five-year-average growth was about 8.9 percent. Last year it grew by 2.7 percent, so a massive slowdown there. And that was particularly acute in San Francisco. Silicon Valley still had significant growth there.

Professional, scientific and technical services also down from 6.8 percent down to about 5.7 percent. Manufacturing is down from 1.7 percent annual growth to about 0 in 2016. So it's really widespread throughout the economy. The only sectors that didn't sort of decline were administrative and support services and real estate.

Going forward, it wouldn't surprise me at all if we see a slower rate of growth in the Bay Area to continue at 2.6, 2.7 to 3.7 to 3 percent. I'll be surprised with a rate of growth much higher than that, partly because there's a more general slowdown in California and partly because the Bay Area is kind of full.

I think there was a discussion of building and there's been more building in the Bay Area than in most places in California. But it's still far too slow to accommodate the kind of growth that we've been experiencing. It's still far too slow to make up for the just enormous backlog of demand for housing. So the Bay Area, it's kind of full. And it's getting more expensive to locate businesses there as well as locate people. So, I would expect just a slower rate. It's going to be really, really pretty solid growth, 2.6 to 3 percent, you can't argue that that's not good. But it's just going to be much slower than we've been experiencing.

DR. MICHAEL: So, it sounds like you -- and Marisa -- I liked your adjective, you described a graceful slowdown. It sounds like you agree with it. And actually, 2.6, 3 percent doesn't sound like much of a -- barely a slowdown.

MR. HAVEMAN: Well, when you've been growing at 3.8 or 4, trust me it's a little bit of a shock the system. Reporters are all up in arms over, "What's happening?"

DR. MICHAEL: Does anybody for -- I mean, a graceful slowdown sort of driven by labor constraints --

does anybody see a risk of a more abrupt slowdown in the Bay Area economy?

MR. HAVEMAN: Well, I think Ted Egan may well. He's the Chief Economist for the city of San Francisco. He may not anymore. This was almost a year ago that he and I had a bet and he was betting that within two years there would be actual declines in employment in San Francisco. And I suggested that I didn't think that that would be the case. And I don't think that we're headed in that direction.

DR. MICHAEL: Anybody want to channel Ted and see a scenario that would see a quicker decline?

MR. DIFFLEY: No, we're pretty well in agreement with a slow decline in the Bay Area. But I will point out that, for instance, at the end of the 1990s we were surprised by the rapid deterioration in the Bay Area. So we've had some cycles there that perhaps should give us pause about being so bullish.

Let me go summarize the migration discussion a little and put some of the things together. It seems to, in our longer-term outlook for California, internally we have two big migration flows that sort of drive the forecast: from the Bay Area into towards Sacramento and the Central Valley, etcetera and in Los Angeles towards Riverside, San Bernardino, the Inland Empire. And those drive our increases or our relative greater rates of employment growth and population growth in Riverside and San Bernardino, who is number one metro in our forecast. But some of the Central Valley counties are up there, well above the Bay Area, and certainly well above Los Angeles and the Southern California coastal communities.

DR. MICHAEL: Right. I'm going to turn to Southern California on the regional outlook in a moment, but one more question about the Bay Area.

I saw an article recently describe San Francisco becoming a one-industry city. I don't know if that's a -- it simply might be a bit of an exaggeration or maybe not too much. But I just wanted to question, is there anything to watch in sort of the non-tech economy in the Bay Area industries we should be paying attention to in addition to the tech headlines?

MR. HAVEMAN: You know, I think most of the rest of the Bay Area has been doing just fine. I know the tourism sector is doing fine. Healthcare has been a really solid source of growth in the Bay Area. You know, manufacturing is starting to slow down and match the pace of everybody else, except for things like computer systems design manufacturing. So in terms of trouble spots I haven't yet identified them. Construction has been going gangbusters. It's starting to slow and come back down to earth, but sort of everything is starting to come back down to earth in the Bay Area. Nothing is really standing out in my eyes as, "Uh-oh. That looks like a trouble spot."

DR. MICHAEL: All right.

MR. NICKELSBURG: There's one aspect that I think we need to keep our eyes on and that is the Bay Area ports. So the Port of Oakland, Port of Stockton -- or particularly the Port of Oakland, which is much larger -- they're export-oriented ports as opposed to the Southern California ports. And where are they exporting? Well, they're exporting a lot of food and raw materials to China, so we need to really keep our eyes on what happens with trade and retaliatory tariffs and how that might impact that sector in the Bay Area.

DR. MICHAEL: Yeah, I think that's a good point. And the issue of trade in ports is a good transition to also talk about the Southern California economy. I know even in the statewide forecasts people are always talking about the Bay Area, because of this phenomenon in recent years. But Southern California is where the majority of the state's population and economic activity is.

So, I want to ask, Frank, on your outlook for growth for the Southern California economy in the next couple of years and some of the industries that could be leading or lagging behind that growth.

MR. WEN: Let me do a quick introduction about SCAG region. We are six counties in Southern California, except the San Diego County. SCAG is the MPO like the SACOG in this area, like the MTC-ABAG and the SANDAG in San Diego County.

SCAG's primary function is to do a long-term growth forecast, so we collaborate with --

(Radio interference over WebEx.)

-- (indiscernible) DOF a lot regarding the long-term social economic growth forecast, primarily for the Regional Transportation Plan, Air Quality Management Plan.

I echo Jon's comment about the growth. I think that in the last couple of years I would say the Bay Area is actually, in terms of migration or economy growth, maybe in an anomaly kind of situation. Because the domestic part is always negative, just like the SCAG region, but in the last five years it is positive in the Bay Area. Just recently in 2016, I think it turned negative. I think it turned back to a normal.

Just to use my own experience, I have five kids. Suddenly, in 2015 three of them moved to San Francisco to find a job there. Not only that, my eldest daughter brings two of her friends from kindergarten all through the years to the high school, and three additional college friends, all moved to San Francisco.

So I think in the last five years there's the millennial kind of overlap of years with San Francisco. And also the job opportunities, of course, that's the basis.

And Southern California I think, replaced the industries, the growth industries, particularly international trade related: transportation, logistics, warehousing and then also the motion picture industries.

And then by 2015 all SCAG region recovered all their loss of jobs, but not in terms of the construction. We think that's related to the housing demand from millennials. All millennials, most of them compared with the previous generations, they are still staying with their parents. They are not forming households, not getting married, not having children. That's why we have another baby bust and then a very low birth rate.

SCAG, in the most recent long-term growth forecast, we forecast between 2015 to 2035. We actually put that regional population growth between around 0.75, 0.8 percent annually for the next 25, 30 years. We don't see a rebound, which we are very likely to see. Many demographers think that the depressed level of the birth rate is a common phenomenon, because of the Great Recession, because of the millennials' student debt burden, the job performance outlook. They also have a historical low in terms of labor-force participation rate, albeit they are historically the highest education attainment generations.

So, we think that the boomers' retirement fundamentally put a damper in terms of the job growth and economic growth opportunities for the millennials. I think in the last five years the SCAG region and also the San Francisco and then across the region in the nation will have a healthy job growth. SCAG regions are between higher than California and then suddenly about 1 percent each to 1.5 percent point slower than the Bay Area.

But if you put in the historical perspective, you look at the SCAG region of California job growth rate, between the 1960s to 2000 to 2010, I think that is compounded about 2.5 percent each point.

And then currently in the last five years I think on a historical perspective we are slower. And then we think that's all because of some of negative impact in head winds, (phonetic) from the demographics' perspective.

So based on the available population growth, labor force participation and the labor force growth in the longer term, in the next 20, 35 years of SCAG region employment growth, we also forecast that at under 1 percent each point compared with a historic average year that 2, 2.5 percent each point.

On top of that we see in terms of the changing terms of the consumption for the retirees. And then we very much hope the millennials -- to see them finally growing up, go out from the parents' house -- I think as of Kent 3 all the millennials are in the adulthood, basically, between 18 and 35.

So in terms of we think the region distribution allocation, we heard the previous comment about the migration in the Bay Area from the coastal counties moved to the Inland and then in the SCAG region, the huge growth in the Inland, particularly in Riverside County. We think in the next five to ten years that migration trend will increase, because we think all the millennials have been saturated in the urban core.

They reach 35, and in their 40s they eventually will get married and have some kids. That will be still low in the historical perspective or in the standard. They will move to the places where they can raise their children, where to raise their kids.

For example, in Downtown L.A. we have more adults. We don't see any children. We don't think that that's a place -- you can't stay there forever -- you can only maintain a certain lifestyle. And then we don't see any city planners trying to build a school district or create some open spaces to keep people there. So when millennials are aging we will that migration trend to the east or north continuously.

And then we think this will pose tremendous challenges in terms of the regional transportation system. Because the primary difference is not only just the job abundance in the coastal counties, but of the wage paid over there are primary drivers for the residents living in the Inland part who then travel back, sometimes in 90 minutes, 2 hours.

And then there are uncertainties, particularly in the international trade, which are key industries to Southern California. The twin ports, Port of L.A., Port of Long Beach handle over 30 percent of the continuous traffic from the Asian countries. And then half of them, 60 percent of them, are just using the port and then move in to the rest of the nation. Or have the -- stay local shortly for reassembling, value added, and then transport to other parts of the country.

So we think the risk in terms of the trade, particularly on the logistics industry on the ports, seaports, airports, will be a huge potential negative for the SCAG region economy in the next one or two years.

DR. MICHAEL: So, I want to follow up on the ports issue. I know when I've been at forums like this in recent years a topic that comes up a lot, actually has been the Panama Canal expansion and the impacts on ports. Now, we have a lot of discussions about changes in trade policy that could have impacts on that, on the ports.

So I know maybe Jerry has some thoughts on these issues.

MR. NICKELSBURG: Okay, so let's start with Panama Canal. I'm glad I'm not a bondholder for the Panama Canal expansion, so why do I say that?

I think all of you know about the Hanjin bankruptcy and the other combinations that are going on in shipping. And that's occurred, because there's been over-capacity in shipping. And one of the ways in which you compete in this market is with very large container ships, Triple E Class container ships. The ports of Los Angeles and Long Beach can handle them. The Panama Canal cannot. And they dropped shipping costs by 25 percent. In a market like this, I think at least in the near-term, Panama Canal is not really an issue for California.

The logistics industry is really large in Southern California as we know. One of the interesting things that's happened is in the last couple of years the importance of the ports -- and they're still extremely important for the logistics industry -- but the importance of the ports has diminished in the logistics industry relative to online shopping. And so, they use the economies of scale that have been achieved in the Inland Empire. And logistics has made that a pretty big growth industry and it's been growing much faster than trade through Southern California ports.

One further comment, and that is if indeed the stimulus that comes from the Administration's policies raises incomes, even if it raises incomes not in California, that's so close to full employment as much as in other states it means more imported goods, because consumer goods are manufactured abroad. And so, that's a positive for California's logistics industry.

And so, I think you see even if we don't get this population growth you will see a change in the kinds of jobs that our people are doing in the Inland Empire to higher wage jobs in logistics.

DR. MICHAEL: Marisa, I don't want to pick on you, but I haven't heard from you in awhile. I'm just curious what Moody's has seen in Southern California?

MS. DI NATALE: So, certainly if we talk about the outlook, we've spent a lot of time talking about the Bay Area and how it's leading the state. Certainly, growth is slower if you look at the greater Los Angeles economy.

Also, one thing we look at is the quality of jobs. So, we divide jobs into high-wage, mid-wage and low-wage jobs based on their annual earnings. And we look at very detailed industries by NAICS code. And you definitely see in general, lower quality jobs say in the greater Los Angeles area, than you do in very tech centric areas like the Bay Area and even to a lesser extent, San Diego.

I think for the outlook, I think there's a bit of upside particularly for San Diego. Jerry touched on this earlier, talking about increased defense spending that could be coming down the pike. And that would bode quite well for San Diego. Already San Diego has a lot of ingrained tech around aerospace to some extent, pharmaceuticals and biotech. And another Trump Administration proclamation has been fast-tracking things through the FDA, making things go quicker on that approval line. So that also could benefit San Diego quite a bit, I think.

So I think there's quite a bit of upside potential to the forecast there.

DR. MICHAEL: One of the observations I've made just looking at the data on employment growth and maybe just starting to look more at some Inland areas in Northern California. In recent years we've had much faster employment growth in the Coastal economies than in the Inland economies. And I don't study the Southern California economy, but I have noticed that some of the Inland Empire economies have been adding employment growth back more rapidly than say L.A.

So the first part of my question is what is driving that? I know in Northern California I've been somewhat involved in efforts of trying to get some industries to locate closer to their workforce. And get some Bay Area companies interested in areas like the North San Joaquin Valley and even Sacramento. And there's some sort of individual instances of that, but certainly not a trend at all at this point.

Have we seen any of that in Southern California of industry shifts regionally or how is that Inland and coastal economy relationship working out?

MR. NICKELSBURG: So, for the Inland Empire that's not been the big driver. There have been two drivers: One is the high cost of housing along the Coast. And so, we see residential construction in commuter communities in the Inland Empire. And then all of what that entails in terms of the multiplier effect on those communities and the aforementioned growth in logistics.

As you move away from the San Diego, Orange County, Los Angeles border or even the Los Angeles Basin going up into the high desert, you don't see that. So, you get some, but it really is much more associated with proximity to the coastal economies.

I don't know, Frank, if you agree with that?

MR. WEN: Riverside and San Bernardino 2016 employment grew at about 2.6 percent. It slowed down from previous three or four years recorded at over 4.5 percent, so that's a huge, impressive growth, even higher than the Bay Area.

As you recall the famous (indiscernible) basically labeled as the economics of the cheap dirt and its proximity to the coastal counties. And then provided a lot of cheap housing and then logistic-related industries; those warehouses popped up over 1 million square feet, and then really drove the economy and the job growth over there.

MR. NICKELSBURG: Yeah, and the one that occurs to me -- I've been trying to think of who's moved sort of Inland -- is the new University of California Riverside Medical Campus in Riverside. And that certainly has generated jobs and growth kind of further into the Inland Empire.

DR. MICHAEL: And that's interesting, so I'm going to, on the regional discussion, maybe pull more into Inland areas including the Central Valley and Sacramento here. And talking about the hospital, it just --

CHAIR WEISENMILLER: Could I just --

DR. MICHAEL: Go ahead, yeah.

CHAIR WEISENMILLER: -- ask a question about the role of goods movement in the Southern California economy? What percentage of the Southern California economy do you think is related to the goods movement?

MR. WEN: Southern California economies right now have about 7.5, 8 million jobs. SCAG estimates the jobs in the logistics industries is about 1 million to 1.2 million.

COMMISSIONER MCALLISTER: So we talked about the big Bay Area and L.A. I guess I'm wondering was there any -- we've mentioned San Diego here and there -- I'm wondering would the story be largely similar in San Diego to the L.A. region? Or is there some -- I mean, SANDAG, it's a smaller area, a smaller population along the borders, so it has obviously some big differences.

But I guess I'm wondering about sort of the division of the economy and they have their own high-tech stuff, they have a lot of biotech. And I'm kind of wondering about -- and they obviously have the navy, which we've discussed a little bit. But I guess I'm wondering if the picture there is radically different from either L.A. or the Bay Area or if anybody has particular expertise about that region?

MR. NICKELSBURG: Well, amongst the Southern California counties San Diego has been growing the most rapidly. And the tech industry, particularly in North County has been a big driver of that. So, as you look at the San Diego economy it's the tech industry. There's been movement of military with base consolidations into the San Diego area. And of course, there's an aerospace industry and aerospace has been doing relatively well of late. So I think those are -- that makes San Diego, and you're right in the proximity to the border -- makes San Diego quite a bit different than the northern counties in Southern California.

COMMISSIONER MCALLISTER: Uh-huh. Yeah. Okay. I think anybody who has specific data, I think it's an interesting place to think about alongside. It's the third largest metropolitan region, so we've got to keep that in mind as well.

And the other question I had -- so, go ahead.

MR. NICKELSBURG: Just one other comment on that -- and this relates to the questions that we were kind of leaving open on trade -- when you think about as an economist, San Diego, you have to think about the metropolitan area. And that means San Diego-Tijuana metropolitan area. So to the extent that you get a separation of those two points of the metropolitan area that disruption will definitely have a negative effect on what happens in San Diego.

COMMISSIONER MCALLISTER: Yeah, okay. I was going to go to that. Having worked a lot in the maquiladoras there that linkage is just incredibly close, so hopefully the metropolitan region can fare well.

I guess I'm also wondering on the San Bernardino and Riverside kind of migration, what's the prospect? And it just sort of flips out of the Chair's question just now. And I think, Frank, you mentioned all the logistical underpinning in the economy there.

What's the prospect of building -- and I mean, I think we're familiar with San Bernardino and some of the sort of the social trauma that they're going through in that part of the world -- are they prepared to sort raise the level of their economy and bring in more specialty industries, just like the medical center? I mean, do they have basis for a more highly professionalized economy or are they really destined to be more of a logistical support for the big urban centers on the coast?

MR. WEN: We normally put the Riverside, San Bernardo as a Riverside/San Bernardino metropolitan statistical area. But if you really pull those two counties separate, those two counties, you can see -- I would say in my own analysis you see the growth. If you're putting a positive growth versus a negative growth between the two you will know that most good growth, positive growth, is happening in Riverside County.

But why a kind of more negative growth is happening in San Bernardino? For example, logistics industry is important in San Bernardino, but it causes a lot of congestion, pollution, accidents.

On the other hand for example, Riverside with the University, UC Riverside Medical School, they're trying to develop the healthcare industries. Coachella Valley, you know, is a premiere. Healthcare facilities in several of the Coachella Valley cities and also it's a premiere tourist destination over there.

So, I think currently the local jurisdiction, the San Bernardo Association of Governments works very hard. In addition to building their bases in terms of the logistics industries, which provide a ladder of the upward movement for many of the undereducated labor force near. But however they are looking at the type of the industry base and then casters, so we will continue to work with them. And then to elevate and then promote the industry base and then look into the high-pay wage industry casters.

DR. MICHAEL: Okay. So, I'm going to shift the regional discussion back towards the Central Valley and Sacramento area. That's an area where I specifically work in my forecast, so I'll make a few comments about that and ask some of the other panelists their view.

So the panelists earlier were talking about it, this region lagging a little bit behind in the recovery and being pretty optimistic about it. I'm actually shifting down to my forecast for the Central Valley and Inland California and there's been a few things driving that.

One thing everybody's -- in the Central Valley that agriculture industry is huge -- and certainly it's nice to see these rains and sort of the relief of the drought. Economically though, the drought wasn't as big a story as some people thought. The ag economy was quite fortunate that it hit at a time when a lot of the market forces were shifting in a positive direction.

And so prices were very high, incomes were very high. 2013, 2014 we were seeing record high revenue in profits in the agricultural sector. And that helped it get through the drought, which sort of had big impacts in some locations and less impacts in other areas that were better positioned to cope with the water supply.

So the rains are back now, but some of the other pressures in the agricultural industry -- we're actually seeing a trend towards declining incomes. We've seen crop prices decreasing. Even in the national data, you see that food price inflation is down at the low level. We're seeing it at the farm level with prices have declined for milk and for nuts. And so we've seen some decrease in farm income as a result even as they're getting some relief in the weather.

And some of the bigger challenges are even looming in the mirror. I think there's huge changes that are going on in the labor force and the agricultural area and policy changes could accelerate that. Some of them are positive. We're seeing rising wages in amongst the agricultural workers; some of the lowest paid workers in the economy. We've seen that a little bit due to labor shortages, even before getting a policy push from increasing minimum wage.

And so, that's been putting more income into the pockets of the workers in the Valle, which is a positive. But it's been pushing the -- the actual agricultural producers are coming from record profits a few years ago, even during the drought -- to seeing declining prices and their other costs items really moving upwards.

And so, there's some challenges ahead of the uncertainty in the export markets. A lot of changes occurring in the labor markets that are going to have mixed effects in the Valley.

Another big driver in the Inland economy, one that we've seen here in Sacramento, but in other parts of the Central Valley, has been the healthcare sector. Some of it is due to natural changes. We see the health systems investing and putting resources in hospitals closer to those population centers like you see at Riverside. We see that in Sacramento, it's been Sacramento's biggest industry. Sacramento has been able to attract some management from the regional healthcare systems here. So we've seen Sutter Health and some of the others sort of consolidating administrative functions in this region that serve other parts of this state. And that's been a positive and a growth of the health insurance core.

But so some of that is a natural progression, but some of it's been a policy shifted, as well. So the Affordable Care Act really increased healthcare spending in the Central Valley, put a lot of dollars into the economy. And has helped drive employment growth and economic growth there, so we don't know exactly how that's going to play out. But as you look out towards that sort of two-year outlook to policy change and where a decline in healthcare spending could really hit the California economy, I would be concerned. Particularly in some of these Inland areas and the effect on the healthcare economy, which has been one of their drivers.

So I think those areas aren't as positive as they've been recently. I'm not initially predicting a recession, but a bit of a slowdown in the Central Valley. I don't know if other panelists want to weigh in on the Sacramento or Central Valley economies, and some things they've seen in the Inland areas.

MR. DIFFLEY: Well, maybe I can give the quick forecast here. And I mentioned in our ten-year forecast earlier the Inland Empire was number one metro area, but I've got Sacramento, two; Madera, three; Merced, four.

But I will say that one thing the housing boom-and-bust illustrated to me though, was the fragility of the Central Valley as the Inland areas as desirable places to locate in California, right? What looked to be a no-brainer in -- well, not no-brainer -- but a very attractive place, because of its relative proximity to the Bay Area proved not to be so robust.

DR. MICHAEL: Yeah, so we've seen some come back in the north, in San Joaquin, Stanislaus County. For instance, the North San Joaquin Valley had net in-migration from the Bay Area, 15,000 or so a year, just into San Joaquin County early 2000s. It went negative during the recession that hit the area so deeply. And now it's back positive the past couple of years, but it may be a third of what it was during the big housing boom.

And so, we have that inflow again. But at least in the North San Joaquin Valley, I think things are picking up a little bit in the Sacramento area, it's not at the levels that we saw prior to the recession even though the housing price differentials are actually larger than they were at that time.

So I think talking regionally on these demographic issues, I think Jim mentioned some of the areas where he sees the top growth in the state. Where else have are we, Walter? What regions do you see as growing the fastest over the next decade?

MR. SCHWARM: Well, I think they're relatively similar. I mean, I see San Jose within the Bay Area is still growing to a certain extent, rather than just these kinds of counties that are next to the Bay Area.

I agree with Riverside. But I am a bit pessimistic about San Bernardino. I do have to say that. I think they have a lot of work to do. And in terms of creating communities that are more -- it's just that people want to really live in to, and it's not just price that are driving them there, I think Riverside does a better job doing that and has done a better job of doing that.

And we see that, because housing construction in Riverside is actually, I wouldn't say robust again, but it's fairly good. Housing production or housing completions in San Bernardino are horrible, still. Nothing like they were at all. And so we do see that there is at least some sorting going on there in terms of individuals choosing a location of where to live.

I still hold up Kern as being a potential place that would have some growth. It needs transportation corridors, but then that's not a two-to-five-year thing, it's a little bit longer thing. But it has all the advantages that San Bernardino would normally have and some fewer of the disadvantages, except for travel to it. I mean, it's a question of that.

Let's see, San Joaquin, Sacramento, I mean, those clearly. I mean, in terms of really weird ones I think we're kind of tracking -- not that it really matters any, right? Because this is very small amounts, this is percentile on growth -- but I think we see Lake Mendocino and sort of certain in Nevada and El Dorado -- managed to capture some of those baby boomers who are leaving the Bay Area and looking for a retirement home in California.

That's the biggest issue right now, to a certain extent, is we don't know what the baby boomers are doing. There was this presumption that many of them, particularly in these -- you know, Palo Alto and then in various West Bay communities -- would sell their homes and move someplace else. But no, we don't see that happening. We see a lot of these people aging in place or trying to age in place in the same community -- sometimes by getting their 30-to-34-year-old children to live in their homes and essentially cohabitating like this. That works really nice on a tax perspective, on all kinds of perspectives. There's some nice gains to that.

Now, we see that in Marin, we see that in Palo Alto, we see that in these very kind of exclusive areas. Now, whether this applies to just a random assortment of everybody else across of the Bay Area in some of these other places? There's a good question. But it doesn't take much: Lake Mendocino, El Dorado. These are relatively small counties. They've got 5-600 people move in them and they have significant growth, but we'll see.

DR. MICHAEL: But you raised a question about housing that is interesting to me and something I've been hearing about in our region. And you had talked about adult children moving in and multi-generational households increasing.

Another thing that I've been hearing, particularly, in some of these mega-commuter areas, which was a surprising place for -- talking to some people in the local real estate -- is an increase in households with unrelated individuals living together. So we just sort of decrease household formation and three or four unrelated individuals living in a single-family home and commuting to different places.

Is that -- that's just anecdotal for me, but have you seen any data?

MR. SCHWARM: Right, I mean the problem that comes in there -- and it is anecdotal -- I mean, if you try to look for it in say the ACS or something like that the problematic thing with that is we do have a much higher rate of cohabitation. The number of individuals who are actually married has been going down for quite -- we're now at historic lows, to a certain extent, on that. But they're not individuals that are not living together in housings, but of course they show up in the surveys as unrelated individuals.

And so okay, it becomes difficult to choose. Are these actually partners? Is this actually what would be considered a traditional household? Or is this one of these new amorphous, extended roommate situations that is caused either by high housing prices, millennials' somewhat willingness to engage in these types of kind of communal living environments, because they afford an opportunity to live closer to the amenities that they really are enjoying?

And then there's the commuting issue. I mean, I don't know why you would do that and still commute 90 minutes, but maybe it's what's required in order to make things work. If it's up here it could be that Google and everybody else has provided such lovely amenities at work that in reality you're rarely back out at your actual house. Only on the weekends or only some other time, and you're spending actually most of the time at the office in one of the office sleeping areas and etcetera that they have produced to try and engender higher work productivity.

But yeah, that doesn't explain everything else when it comes to that.

DR. MICHAEL: Right, so as we see trends towards the increasing household size there could be multiple drivers to that.

We just have a couple of minutes remaining. There was a question I was going to lead the panel with, but didn't. And so I'll end with it now, and give everybody a very brief opportunity to mention a topic that -- not just in our discussion here today, but sort of in the general discussions -- is there a topic you think is either getting too little discussion, too little play, or one that you think is being overblown or too much discussion?

And I'll start with Jim, and we've got to keep it to 30 seconds or so.

MR. DIFFLEY: I'll keep it short. You did give us this question beforehand and I was ready with an answer, but I will say that both Frank and Walter sort of co-opted it a little.

Everybody's talked a lot about the importance of millennial choice particularly in terms of housing: you know, household size, multifamily versus single family, ownership versus rental, etcetera. That's a big issue, I agree. But we've talked less of what you guys both mentioned, and I'm a baby boomer, what baby boomers will do as they age? Do they go to urban living? Do they go to multifamily? What do they do with their assets, etcetera? That's the issue I was going to put out on the table.

DR. MICHAEL: Marisa?

MS. DI NATALE: Okay. I just thought of something else as you were talking, but I know I have to keep this short. So getting too much attention, I think we all are well aware of the high costs in the Bay Area and we've talked a lot about that. So I kind of would like to move away from that a bit.

I think what doesn't get enough attention, particularly regionally in the state, is the Central Valley and agriculture. I feel like it's kind of the forgotten part of the state that rarely comes up in conversation. And as you were talking, I realized there's so many complex issues going on there with potential changes to immigration policy, what's going on with commodity prices. It's a relatively small proportion of California's overall GDP, but for that region of the state it's quite large. And I don't think we talk about it enough.

DR. MICHAEL: Great, thanks.

Jon.

MR. HAVEMAN: Okay, so I'll try to be quick, but

I really wanted to go with inequality and poverty, because that's getting too a little discussion and it's really, really important for economic growth. But what I really wanted to talk more about is autonomous vehicles.

I think over the course of the next five years and maybe faster than that, autonomous vehicles are going to be having an enormous impact, especially on coastal Bay Area economies as they -- enormous employment dislocation will result. And the implications for housing preferences are going to be enormously different with autonomous vehicles. So I want to put that out there as something that's getting too little attention, the economic impacts of autonomous vehicles.

DR. MICHAEL: Jerry?

MR. NICKELSBURG: So, for my 30 seconds I want to talk about taxes.

DR. MICHAEL: Okay.

MR. NICKELSBURG: And simply to say that we're in a period of time where revenues to the state are up. And the state is not in the fiscal crisis that has so characterized it. And there is a thought that Prop 30 and Prop 55 have actually fixed this problem and that is false. The volatility in state revenues has not gone down, because of those propositions, it has gone up.

And we will have another recession at some point in time and when we do, we've doubled down on the thing that made state revenues volatile and gave us the big deficits under two previous governors. So I think we need to keep that in mind.

DR. MICHAEL: Walter?

MR. SCHWARM: All right, I guess I would say mine would be we pay attention to millennials for a good reason, but we pay perhaps too much attention to them.

I would almost argue that whatever we're going to be calling the next generation after that -- the Alphas, Generation Z, or something like that -- because they are a much smaller cohort they will actually have opportunities that millennials didn't have. I.e., their schools will be less crowded. They'll have more of the things that -- but on the other hand -- they will be much smaller. They will come into the labor force. Obviously, we've got about eight years before the first ones of them fall into -- get above 24 and kind of enter the post-college labor force. But they're different, again.

And it'll be really interesting to see what -- they grew up during -- as much as we talk about millennials being shaped by the Great Recession, this really got shaped by the Great Recession. They actually did see it as children and various other things. And if you talk to them and look at the research that starts dealing with them, they're early, but they're different again. And it will be really interesting to see what they do, because they might not go to college. Who knows? We assume this is this constant college rate. Well, maybe not. Maybe they'll choose to find something else that they'll enjoy.

DR. MICHAEL: Well, Frank, you get the last word.

MR. WEN: Well, here today the California Energy Commission will have a talk about energy. I think I saw one line here on climate policy? I think we should consider California currently trying to implement the AB 32, SB 32, and then also several Governors' Executive Orders.

Currently ARB is developing their Scoping Plan, trying to reduce the greenhouse gas emissions 40 percent below 1990 levels. And then basically move from a fossil fuel-based economy in this state, to renewable energy, to a electricity-based economy. And I think particularly the divergences of the policies between the state, and then the nation, and how this will affect the economy and then affect the energy in the state of California -- I think we should discuss more in the future.

DR. MICHAEL: I think we're out of time for this panel. So please, thank me and all of them for their insightful comments.

COMMISSIONER MCALLISTER: My pleasure.

COMMISSIONER SCOTT: Thank you.

CHAIR WEISENMILLER: Yeah, it was a good panel. I certainly want to thank you for moderating and thank you, everyone, for your participation. It was really helpful. Thanks.

MS. RAITT: If I can invite everybody on the panel to go ahead and take seats in the audience. And we'll then look at our next panel up. Thank you very much.

(Brief pause while next panel sets up.)

MR. KAVALEC: Okay. For our next panel on "Transportation and Fuel Prices," as moderator we have our good friend Gordon Schremp, who's a recognized expert in his own right on all things related to fuels and fuel infrastructure in California. And who's been acquiring and applying knowledge to the benefit of the Energy Commission and the state for 25 years.

So Gordon?

MR. SCHREMP: Thank you, Chris.

Good morning everybody, and welcome to Panel 2 Session. This will be a lively -- almost a fast round in the gameshow -- since we have 60 minutes or 55 minutes. So I just wanted to lay out some context for the panel members that are either here in person, or joining us online via Webinar.

Something for you to think about when you respond to some of the questions, either that we've sent to you ahead of time, some of the higher-level questions, or some of the questions I'll pose to either the group as a whole or a specific panel member. So think about from our perspective, as we conduct these proceedings with a primary goal of obtaining information to put into the record, to inform us and others in regard to specific areas of interest that will be pulling together, in our policy document in the IEPR.

So think about from that perspective we do this every two years, so what's the sort of a little bit here and now or near-term in the next two to five years. And then think about what the Energy Commission should pay attention to in this policy document development. Issues, in this particular panel that we're most interested in for today's proceeding, transportation and fuel prices and sort of the factors that drive those. But I'll be delving into other aspects of transportation and fuels that we know, issues that are very important: lower carbon fuel standards, both federal and state; availability of said fuels and want to also touch on consumer preferences for vehicles, not only alternative fuel vehicles, but also either light-duty or passenger vehicles and how that's changing.

So those are sort of what we'd like to get out of the panel members' participation for the next hour. And I'd like to ask everybody just to introduce themselves and say a couple of quick things about themselves to help others online. And so we'll start in the room here, with Marc.

MR. MELAINA: Great. Hi, everybody. My name's Marc Melaina. I work at the National Renewable Energy Laboratory. I'm the Team Lead for Systems Analysis in our Transportation Center. I work mostly on electricity, hydrogen for advanced vehicles.

MR. SCHREMP: Thank you.

Severin, online if you could introduce yourself, please?

MR. BORNSTEIN: I'm Severin Bornstein, I'm a Professor at UC Berkeley's Haas School of Business. And a Researcher at the Energy Institute at Haas where I was Director for 20 years. I work on both oil and natural gas and electricity markets.

MR. SCHREMP: Thank you, Severin.

David Green, are you with us?

MR. GREEN: Yes, hi. This is David Green. I'm a Senior Fellow at the Howard Baker Center at the University of Tennessee, retired after six years from Oak Ridge National Laboratory. My areas focus on energy efficiency, greenhouse gas mitigation, also dabble in the world oil market.

MR. SCHREMP: Great, thanks David.

Dave Hackett?

MR. HACKETT: Good morning, Gordon. I'm the President of Stillwater Associates. Stillwater is a transportation and energy consulting company. We describe that as operating at the intersection of the logistics and engineering markets and regulations for the downstream petroleum business. And I'm a member of the California Petroleum Market Advisory Committee.

MR. SCHREMP: Thanks, Dave.

Chris from Moody's?

MR. LAFAKIS: Hi, yes my name is Chris Lafakis. I am a Director at Moody's Analytics. I've been here for about 10 years and I cover macroeconomics and energy and I'm responsible for our energy forecast.

MR. SCHREMP: Okay. Great.

And now, from EIA, Mindi and James?

MS. FARBER-DEANDA: Hi, Gordon. This is Mindi Farber-DeAnda, I'm the Team Lead for Biofuels and Emerging Technologies within the Office of Petroleum, Natural Gas, and Biofuels Analysis.

MR. PRECIADO: And I'm James Preciado. I'm the Team Lead for Liquid Fuels Markets. We mostly do refining modeling and liquid fuels market filing for the Short-Term

Energy Outlook and the Annual Energy Outlook.

MR. SCHREMP: Great, so I think that covers everybody who's both here and online.

So I know we sent out some high-level questions ahead of time. I'm not going to follow those exactly. My intention is start with crude oil and natural gas, and then work into the transportation and fuels market starting with prices. And then talking about some of the standards and margins and things like that.

And then we'll talk about infrastructure for transportation and fuels. And especially that for hydrogen and the outlook in hydrogen, which I know California is putting a lot of effort into, to get that more of an emerging market going and assist in the retail arena.

So without further ado, I'll go ahead and start out with oil prices. Clearly oil prices have been heading up just a little bit. But the big news is OPEC made a decision to curtail production along with non-OPEC members. So the proof will be in the pudding first quarter of 2017, but there's been a very strong imbalance in the market. So I'll just ask, start with EIA and their outlook, because we used your Annual Energy Outlook for guidance with regard to crude oil pricing moving forward and how that to relates to retail fuel pricing.

So if you can sort of, I guess Mindi and James, sort of talk about your perspective on where oil prices are going to go. And in light of how the shale revolution in the United States has changed the dynamics and drill rigs are back now up over 100 drill rigs deployed since the low point and their ability to bring unfracked wells operational. Is that going to have the counter-veiling force on OPEC cuts or do you see the OPEC cuts being meaningful in balancing the market and getting us a strong price signal for oil:

What do you think, EIA?

MR. PRECIADO: Sure, this is James talking. I can take care of that.

At least our Short-Term Energy Outlook for January, we're right now forecasting Brent to be $53 per barrel in 2017 and forecasting it to be $56 per barrel in 2018 with WTI at about a $1 per barrel discount to Brent through the forecast period.

We do not -- probably the most important aspect of that is that we do not have oil prices going above $60 per barrel in the next few years. And that largely gets to the second part of your question, which was about the responsiveness of U.S. producers. We're seeing that U.S. crude oil production has been pretty price-responsive over the last couple of years. And we expect that to continue going forward. And really any kind of rally in prices or an increase in crude oil prices is going to be limited by extra U.S. production coming online.

In our Annual Energy Outlook we have the price of Brent getting to about $109 per barrel in 2015 dollars, in 2040. And we have the prices kind of increasing moderately until about 2020. And that sort of gets into that in the next couple of years as you have demand that comes in and overhang, the inventory builds stop or decline, then you've got prices increasing.

And then after 2020 you still have prices increasing, but it's a little bit more muted or a little bit of a softer increase going forward. So that's kind of an overview of our price forecast.

And at least when it comes to U.S. production is that has really changed how the market can operate in the last few years. In that you're seeing that the drill bid on completed wells, some of that production when you have an increase in price, can come online in as little as two months -- on the two-to-four month range.

And new productions and new wells being drilled, you can see that come on within six months. And that's pretty fast and that's a real change from what you see in oil markets and how prices respond in the past.

As far as the OPEC cuts, as their decisions go, you actually see a lot of the Gulf Coast countries: Saudi

Arabia, United Arab Emirates, really cutting down their production. And I think that, at least in the short-term, those seem to be coming off. We'd have to wait and see exactly how much that production comes off, and some of the other countries that have agreed to participate in the cuts as well, seeing if they actually stick with them or not.

But at least for now we're forecasting the oil market will be roughly in balance by the end of 2018.

MR. SCHREMP: Okay. Thanks, Dave. And I guess for clarification, the uncompleted well information, that's the statistics you guys now publish -- drilled but uncompleted wells or ducts -- that you have online for both natural gas and oil; is that correct?

MR. PRECIADO: Yes, that's correct. Those are the drills of uncompleted wells, and we have data on that in our Monthly Drilling Productivity Report.

MR. SCHREMP: And I personally thank you for having that information out there, so that's good.

So let's shift to David Green. You've looked at oil markets for quite awhile, anything to add to that or some different perspective or issues you'd like to raise?

MR. GREEN: Yeah, I think a slightly different perspective, I think the comments on fracking and its role are very important, because that has changed the way the market operates.

The question is to what extent, because let me just comment on the Short-Term Energy Outlook. The EIS projections are sort of the expected values, which are not much different from what we see today. That sort of fits with Professor Hamilton of UCSD's observation that the oil prices seem to be a random walk, statistically speaking. But the error bounds or the 95 confidence percent intervals for that same short-term energy outlook through 2019, let's say, range from about $30 a barrel to well over $100 a barrel.

And I think we should not lose sight of the fact that historically this market has been very volatile. That transportation fuel prices are driven primarily by the price of oil. This even includes biofuel prices are highly correlated with the price of oil in transportation markets. And the exceptions being electricity and since the onset of fracking, natural gas is largely decoupled from the price of oil for transportation purposes.

So I think we still have a market, which has a very in-elastic supply and demand in the short run. And we still have a market in which OPEC has a very substantial market share of over 40 percent. And especially with the help of countries like Russia or something, if they cooperate, can have an impact on the market. So I think we should not rule out, and indeed the Short-Term Energy

Outlook does not rule out volatility in oil prices in the coming years.

MR. SCHREMP: Thank you, David. Just sort of a follow-up on that, so some of this uncertainty that could lead to say most important to consumers, a price escalation, what are some examples?

I mean, I know that the global spare production capacity mostly residing in Saudi Arabia has gotten down to a very small number relatively speaking, you know less than say 3 million barrels a day. So are there some geopolitical developments that you think could really increase prices rapidly over the short term? You know, getting at your uncertainty comment, and what might those be?

MR. GREEN: Well, I mean the previous panel mentioned the Trump Administration and its policy uncertainty as a source of key uncertainty. I think that's certainly the case here, what will the Trump Administration do. They have made certain assertions about the Middle East, about eradicating Isis, about whatever. And exactly how will that play out, what will they do? These kinds of things could certainly have some serious implications for oil markets. I don't know what they're going to do, so I'm not going to pretend that I do.

I think that we should also keep in mind that yes, the U.S. oil production from fracking is pretty nimble, but it (indiscernible) all the way through 2015, even with much lower oil prices. And only decreased in 2016.

And I think that it's not exactly clear how the top oil producers will interpret -- there seems to be a lot of background noise -- not sure what it is.

COMMISSIONER MCALLISTER: We're not hearing it on this end.

MS. GREEN: Oh, okay. Sorry.

So I think that it's not clear also how the titled producers in the U.S. will interpret the willingness of OPEC to tolerate low prices for awhile, which is obviously a problem for them. So I think there are some significant sources of uncertainty going forward.

Certainly what the U.S. does, I mean oil demand in the U.S., oil demand in the OECD countries is growing, oil demand in the developing countries are growing even faster. What happens if we change our policies towards fuel economy and greenhouse gas standards. It's hard to imagine why that would be done, but it's not hard to imagine that it might be done. Some examples.

MR. SCHREMP: Okay. Thank you, David.

Any other panel members who have some additional points that you feel need to be raised about this subject?

MR. BORENSTEIN: This is Severin, I --

MR. LAFAKIS: Sure, this is --

MR. BORENSTEIN: No, go ahead.

MR. LAFAKIS: No, go ahead.

MR. BORENSTEIN: My primary contribution, David stole, with is I think the uncertainty in this market is immense. But I think from a policy point of view what we should take away from that is that planning for a given price in oil is really incomplete planning. So we really need to be planning for robustness to response to a large variety of outcomes in oil prices.

And just to emphasize the AEO's estimates for even the end of 2018, have a 95 percent uncertainty range that is over $60 a barrel range. So I think that as you go out to 2030, 2040, 2050 I think pretending that we have any idea what the price of oil is going to be is likely to lead us astray. And we really need to be just trying to make plans that are robust to a wide variety of outcomes.

MR. SCHREMP: Okay. Thank you.

Did you --

MR. LAFAKIS: And this is Chris Lafakis, just to chime in on that point. I think one of the things that the Commission does is having these discussions every two years, because we know that we're not going to have one panel settle everything for the next four years, so that's wise.

And really to your window, there's not a lot of long-term structural changes that can happen to the market to really drive some of these oil demand and supply and equilibrium figures. Things like hydrogen or electric vehicles, those are really long-term factors. So really when you're talking about the next two years, you're talking about primarily two things, which is OPEC compliance. And we need to continue to monitor OPEC compliance, because that's crucial to the supply demand balance in the oil market.

And also the response of U.S. producers. I agree with the points that have been made earlier that the oil market is now much more nimble than it has been in the past with the arrival of the U.S. shale producer. This has really become the price setter if you will, in the absence of OPEC. And now it's going to be interesting to observe sort of the interaction with OPEC decisions.

So the preliminary indications are that there is a good degree of compliance, those are sort of the statements of OPEC ministers as of now. We don't have the data, because the agreement was on December 10 and we only have production data for December. So over the next few months we'll actually get the data to see whether or not compliance is occurring, but the statements generally on compliance right now are very positive.

And if you look at the supply overhang, total oil supply in Q4 -- and there's a little bit of a seasonal element here, so you have to be careful with quarter comparisons. But with 98.7 million barrels per day and demand was 97.3 million barrels per day, so that's an overhang of about 1.4 million barrels per day.

The initial indications are that around 1.5 million barrels per day has already come out of the market. That's what the Saudi Energy Minister has said. If that is true, and we'll have to monitor the data over the next few months to see if it is, then we would basically in balance now. But, of course, if U.S. producers responded to higher prices by boosting production, which we have early indications that they will then that development could sort of elevate supply relative to demand by the end of the year.

So the Moody's Outlook is for oil prices to rise up to $60 per barrel by the end of this year. That assumes OPEC compliance however, and we'll have to monitor data over the next few months to ascertain whether or not that is actually happening.

MR. SCHREMP: Okay. Thank you, Chris.

Well, if there are no other new points to raise I'd like to shift gears and talk about natural gas in the

United States, because this is certainly a fuel that we see is growing in utilization for heavy long-haul transport either in the form of compressed natural gas or liquefied natural gas. We know there's lots of liquefied natural gas exporting facilities, Cheniere down in Louisiana, there are others coming online, and there are multiple trains coming online and new applications being approved. So there is a growing LNG export market, because of the shale revolution for natural gas.

So the question is associated with natural gas, are those sub-$3 per million Btu prices in our rearview mirror, mean for the near-term, because prices have risen up into a band of 3 to 4. So are those a thing of the past now or is there going to be a response in the shale plays for natural gas that will counterbalance these growing demands for natural gas?

I'll open it up to anybody who would like to chime in.

MS. FARBER-DEANDA: This is Mindi, I'll chime in first from EIA.

So one thing to keep in mind with what's going on with natural gas is we're starting to see this bifurcation in prices, much like we saw many years back between Brent and WTI. But for us it's what's going on in the Marcellus and the Henry Hub marker. And we currently have a situation where the prices in the Marcellus, where you're seeing most of the fracked plays there, are roughly half as much as much as the price coming out of Henry Hub. And depending on how this plays out in the future and whether that gas finds a destination and is adequately monetized, we could see that for a long time.

So again, it depends what marker, what price marker you're using. And I'll turn it back over to you, Gordon.

MR. SCHREMP: Thank you, Mindi. And isn't part of the price dynamic and differential developing throughout the United States has almost everything to do with pipeline takeaway capability. Is that part of the issue that's currently causing some of these differentials?

MS. FARBER-DEANDA: That's one part of it. The other is the reversals and the other things that we're seeing, that need to happen plus the exportability of the product.

But one of the places if people want to track that stuff is we do put out a weekly called -- it's our "Weekly Natural Gas Update" that's available. And in there they'll see a lot of what we're seeing on a weekly basis with gas: the prices, the volumes and we'll have articles that'll be pertinent to a variety of these topics.

MR. SCHREMP: So just another follow-up on sort of the relationship with the prices, is this decoupling of natural gas from say crude oil something that's going to now sort of recouple going forward say within the next five years?

I mean, what --

MS. FARBER-DEANDA: Not that I've seen.

MR. SCHREMP: So a continued decoupling and so that means is one potential takeaway the economics of changing out long-haul freight to say natural gas still makes sense in many cases? Or is that going to be a diminished case?

MS. FARBER-DEANDA: I'm going to default to some of the others who know the transportation markets better. I've been looking at this primarily as gas to liquids in some of the emerging technologies. So we've been looking at the oil to gas ratio and what it means for certain technologies that may or may not see the light of day.

And we're just seeing it's a coupling that's going to continue and probably these ratios are going to grow for better or for worse. And we just don't see movement in the natural gas prices over the long-term.

MR. SCHREMP: Okay. Thank you.

Anybody else like to weigh in about the market for CNG and LNG for transportation fuels?

Don't be shy.

MR. LAFAKIS: So this is Chris Lafakis from Moody's. I would agree with that point on decoupling. I think that the fuels have become less substitutable for a good reason. And oil has been mostly confined to transportation fuel, because it doesn't make sense to use it in power generation.

In terms of using natural gas for transportation you have sort of this chicken and egg problem. The auto manufacturers don't want to build engines, because there isn't the infrastructure -- specifically the refueling stations nationwide. And then the refueling station companies wouldn't want to build out, because there's not a vehicle fleet. So in the past whenever this chicken and egg problem has existed the federal government has stepped in and provided infrastructure or provided a clear direction for the marketplace. That's not really the case here and I don't really expect that to occur in the future.

So I think that the next technology in terms of transportation vehicles in not going to be natural gas, but is instead going to be electric vehicles. And you've already seen the market respond very aggressively. Tesla has really unleashed an arms race with the investments that it's done. Now, all the other automakers whether it's mass-market ones like Ford or GM or other ones like BMW, are looking at producing electric vehicles as well as high-performance sedans that have that fast acceleration in some cases, with respect to BMW.

So I mean we really don't see the price differential narrowing and we really don't see natural gas becoming a major transportation fuel.

MR. MELAINA: This is Marc Melaina.

MR. GREEN: Hi, this is David.

MR. MELAINA: Go ahead, David.

MR. GREEN: No, it's okay, Marc. Marc, you go ahead please.

MR. MELAINA: Okay, thanks. I'll agree with Chris on the chicken and egg issue. I think for medium, heavy-duty fleets it's a little bit lessened, because they can out-central depos that are structured to the business.

Also, a lot of countries have tried to push natural gas for light-duty vehicles and their policies have not succeeded, even with pretty strong policies. So he's right on the sort of federal level push, it's a really big lift to get to the light-duty vehicle fleet. But for medium and heavy-duty, it's a little bit of a different story. So I'd say the vehicle availability maybe even be a bigger barrier.

MR. SCHREMP: So, Marc, just a follow-up now, so if you have more of a regional perspective and you're doing more miles obviously in your pulls or your transit and even hauling heavier weights, you can look at that sort of central fuel fleet LNG, CNG -- it's your own fleet you're doing. I mean, a lot of the announcements I read are just that, it's private companies investing in this.

And it doesn't appear to be any federal monies assisting, so that's telling me implicitly that there must be some sort of economic incentive that continues to pay out on the bottom line for these companies or otherwise that would not continue. So is that sort of your experience from what you're seeing?

MR. MELAINA: I wouldn't say it's my experience, but on paper there's a motivation there to get pretty big savings for the private companies. I think on the auto side the motivation's not as strong.

MR. SCHREMP: Okay. Thank you.

I think online, someone else was going to make a comment on natural gas?

MR. GREEN: This is David, and I agree with what's been said by Marc. And I would like to add however that following up on Severin's point, a fuel that is not volatile like electricity and natural gas, and is a lower cost fuel, the lack of volatility, the decoupling from petroleum price is an advantage and it helps. That's not to say that the chicken or egg problem will go away, the chicken or egg problem is there. But the decoupling is definitely a benefit for natural gas as a transportation fuel.

MR. SCHREMP: Okay. Thank you.

Anyone else online want to add to what's already been state about decoupling or coupling natural gas prices?

MR. BORENSTEIN: This is Severin, if I can? I'm not sure I would say that natural gas is necessarily less volatile than oil. The volatility is different, but if you look back over the last 20 years we've certainly seen some steep increases and plunges.

I think that the decoupling between oil and natural gas, if we're only talking about U.S. uses, it would be hard to see any pull for them to really recouple. But as we start to talk about internationalizing the gas market, there is more substitution between them in some areas that could start to pull the prices somewhat closer together. But I think that that is probably a pretty minor effect over the next decade, compared to the fact that the vast majority of gas and oil uses in the United States are really not substitutable.

MR. SCHREMP: Okay. Thank you.

No other comments, we'll move on to discussing what's near and dear to all consumers' heart: retail prices, especially at the pump. So I want to talk about retail prices in a couple of different contexts.

Certainly, we've seen the California prices are perennially higher than that of the average price in the United States. I'll read some of those, what the differences average.

Between 2009 and 2014 the difference was being 35 cents a gallon. In 2015, a bit of an unusual refinery operation year, that difference was 74 cents a gallon average for the entire year. It dropped down to 60 cents in 2016, and finally now a year to date -- a small period of time so far, three weeks -- it's 45 cents a gallon.

So taxes are a part of that. You know, taxes are higher, the tax burden has been higher in California for a gallon of gasoline relative to the U.S. average, but that too has been changing. And this is an important consideration when we talk in just a minute about other environmental fees.

So in January 2014, the difference was 21 cents a gallon between taxes in California and in the U.S. -- a significant difference. In 2015, down to 15 1/2 cents a gallon and in January 2016 down to 11 cents a gallon, and now 7.1, so what is going on? You might have to say, "Yeah, we decided to forgo taxes, because we just don't really need them."

That's not the case, there's been a change in the formula and how it's used to calculate taxes in California at retail for both use on gasoline that has effectively resulted in a decline over time. So much so that I believe there is legislation looking at significantly increasing gasoline and diesel taxes to get more money for transportation projects.

But that's not a subject for today, but it's only stated to let you know that yes the differential is now fairly small relative to the U.S. on average. But there could be some changes during this next IEPR cycle whereby retail taxes get a little bit higher in gas and diesel.

So I think I want to start with Severin if we can? You've looked at these differentials a lot. And I'd like you to sort of weigh in about the differentials and about retail margins. And then go to Dave Hackett, if we could.

So Severin?

MR. BORENSTEIN: Sure. So if you look back from the 1996 changeover to California's special blend of gasoline, to the beginning of 2015, it was pretty clear that while there were pressures up and down if you account for the price of CARB Spec gasoline at 10 or 13 cents a gallon -- in that range -- that California on average had stayed different from the U.S. by the price of CARB Spec plus the tax differential plus more recently Cap and Trade and the LCFS costs.

That all changed in February '15 with the

Torrance Refinery fire and we had a huge increase that was not at all related to the things I just mentioned: taxes, Cap and Trade costs, LCFS or the additional costs of CARB gasoline. That remained in 2016, softening slightly. It has remained today, we are well at least 15 cents above what would be justified by production cost of CARB, plus taxes, LCFS and Cap and Trade.

So there is still a substantial differential. One might think this is associated with California being a net importer of gasoline, which would mean the price of gasoline -- the price of any commodity -- is set by the marginal supplier. And if the marginal supply is coming in from imports you have to add in that additional cost of importing the gasoline, which is generally thought to be 10 or 15 cents a gasoline.

That still doesn't really get us to the differential now, although it gets us pretty close. It clearly isn't enough to explain the differential over the almost two years in 2015 and '16. I'm Chair of the Petroleum Market Advisory Committee, and we have spent a lot of time looking into this.

There are basically two hypotheses: one is that there are a lot of logistical problems that are deterring this market from equilibrating with more imports including problems at ports, and problems with shipping and so forth.

And the other is that there is something more nefarious going on, that firms are actually restricting their output in order to drive prices up.

My view is the PMAC has been unable to distinguish between those two hypotheses and that it's going to take a much deeper, better resourced, and more powerful organization to actually get the sorts of contributions and testimony and data needed to sort those out. But California still clearly has a significant problem with the refining and retail aspect of this industry that has been lessened lately, but has not gone away.

MR. SCHREMP: And Severin, could you -- any opinion on retail margins? Certainly, that's something that we use in our forecasts to retail prices in California. So do you see these margins as they are currently, not the difference in price between California and say the U.S., but sort of the dealer margins at retail? Are they going to stay where they are, or you see significant change there?

MR. BORENSTEIN: We don't really know what they are, because it's very hard to distinguish the retail margins from the refinery margins when so much of the gasoline is sold by refineries in dealer tank wagon arrangements where the refineries essentially can track very locally, the markets and charge different DTW prices. So I think that trying to break it out as retail margins versus refinery margins is extremely difficult given the way gasoline is priced in California.

If you try to break it out as sort of the generic rack price for gasoline versus retail margins, I think we've seen some periods of that differential going up. And that is clearly downstream from refineries. And staying high for longer periods than I would have expected, given the history of retail margins that I've studied certainly since the '70s and '80s.

But it's unclear how much of that is actually coming from retailers and how much of it is coming from this quasi-control of retail prices from refineries, by selling through DTW prices.

MR. SCHREMP: Okay. Thank you, Severin.

And Dave Hackett, you've looked at this market for a long time, anything to add on these points of retail margins and price differentials?

MR. HACKETT: I would say that I agree with Severin's analysis of this. The margins are high and they're higher than you can explain from the factors that normally contribute to the difference between California and the rest of the U.S. And I do agree that this needs to be looked into some more.

One aspect of this that I wonder about is how we're measuring all this? We measure the retail prices, average retail price, in the California versus the U.S. And Mindi and I guess probably James are responsible for that kind of an analysis, but that's a simple average kind of a thing instead of a weighted average.

And what I've observed is that -- and I think many of us in California have observed this -- there's large differences between the price at traditional retailers and at the big boxes. And so one aspect of this is that the big boxes are selling five times the gas that a traditional retailer is selling. But the numbers aren't volume weighted.

And we've talked about this and we've worked with staff, but I think that's an aspect, but only kind of a minor one. Really, kind of a larger measure is that the traditional stations are well above stations really anywhere else in the country. And despite the work of PMAC we weren't able to dig into the why of that.

MR. SCHREMP: So, Dave, just a follow-up on the hypermarts, the big box stores, do you see this as a continued growing trend in California? A greater penetration by hypermarts, and if so is that something that's going to help consumers keeping prices relatively low, because of their presence and their low margins?

MR. HACKETT: Well, I don't know anything about the strategy of the firms, but I know that many of the stations that I see around me pretty much run at capacity. That is to say, the only way they could sell more gas is to get bigger, put in more pumps and the like. And so to some degree or another, an explanation for why margins haven't been dragged back down could be, because the big boxes are running at capacity and they can't sell anymore gas if they wanted to.

MR. SCHREMP: Okay. Thank you.

Any other input on this topic before I shift gears into the Low-Carbon Fuel Standard and the RFS?

(No audible response.)

Okay. Hearing none, the Low-Carbon Fuel Standard is with us, so we're into I don't know, about the fourth or the fifth year of the program I think. And we're starting to see some manifestation of the regulation in the form of retail prices being a little bit higher. You know, for the Low-Carbon Fuel Standard, I think it's very modest now. This year in January it's gone up to about 5 cents a gallon for gasoline. And for Fuels Under the Cap, which is part of AB 32 Cap and Trade Program for Transportation Fuels it's been pretty consistent at about 10 cents a gallon. So you put those together, so it's about say 15, 16 cents a gallon.

So my question is on the Low-Carbon Fuel Standard, is there an expectation of sort of steady values or is the price expected for the credit markets to rise, because of the nature of the Low-Carbon Fuel Standards?

So I guess, Dave Hackett, you've looked at this quite a bit haven't you?

MR. HACKETT: Yes, I have Gordon. And so what has been happening over the last few years is that there's been more carbon intensity reduction created than needed. And so the bank of credits has continued to grow. But as the program goes forward year by year, the requirements ratchet up. And so we think that the bank of credits will probably reach its peak in 2018. And then the market's likely to be satisfied by drawing down those credits.

That is to say that renewable fuels producers and the other folks that are coming up with low-carbon transportation fuels will essentially run out of capacity. And so it'll be the bank that is drawn on to meet the demand from the Air Resources Board. So in that timeframe you would expect prices to start to increase.

MR. SCHREMP: And is there sort of an upper limit? Isn't there some sort of safety valve or ceiling in the regulation that the price increase is going to be limited, and if so what is that?

MR. HACKETT: Well, there is a price ceiling of

$200 a ton. That's roughly twice where the price is today, but I'll confess I don't understand it well enough. And I would think that if folks need to follow regulations in order to get their carbon-intensity reduction they're likely to pay up to do that.

MR. SCHREMP: Okay.

Severin, anything to add to that?

MR. BORENSTEIN: No, I think that that's it. I think there is a lot of uncertainty in this market, because while there is a price ceiling right now, if we got all the way to that price ceiling for a protracted period of time I suspect we would have some political pushback on that. But the transition to greater use of second-generation biofuels has not occurred nearly as quickly as people had hoped. And so we are more likely to see some constraints in the out years.

MR. SCHREMP: Okay. And good segue, Severin, to the renewable fuels.

Certainly, there's been I guess a tremendous development in renewable diesel by Neste internationally, and by Diamond Green Diesel in the United States here. And you're right, cellulosic biofuel production doesn't seem to be progressing as rapidly as once envisioned under the Renewable Fuel Standard when it was developed.

But so I guess, Mindi and James, if you can sort of weigh in on is there lots of additional say renewable and cellulosic coming online in say the next three to five years. Or is that going to be maybe have limitations due to either economics or feedstock availability? I mean, so what are you guys seeing in that arena?

MS. FARBER-DEANDA: Well, this is Mindi. And it's definitely not feedstock availability, but we're not seeing the growth that we had hoped. You know, we're tracking it much more in a year at a time sort of along the lines of what happens with the RFS.

Our Outlooks are limited by what is in play with regulations and legislations today or at the time when the Outlooks' projections are produced. So when you look at our Outlooks you're not going to see something that's glowing or optimistic at all.

In addition, with certain fuels we don't have a good way of surveying them. And so right now I'm struggling, because while you may see some information on refinery production of renewable diesel you won't see it from the independent standalone facilities. You'll see the imports in our dataset, but you're not going to see everything you need to see.

So our struggle is if we don't currently include it as a question in our survey, to get it added requires OMB clearance and we're on a three-year cycle. So it's become very frustrating and we're trying to do some things offline, but it's tough because of FOIA requests and other things that we've (indiscernible) people to. So that's where we are at EIA.

MR. SCHREMP: Okay. Thank you.

And I'll like to sort of shift gears here. I think we have a couple of slides I wanted to pull up. I think Heather's seeing to that.

Everyone's heard the phrase, "You are what you eat," and I think we are what we buy in regards to the vehicle stock for passenger vehicles, light-duty trucks. So the first chart I'm throwing up here is showing the relative numbers of light-duty trucks and passenger vehicles over time, going back to 2007. And we see sort of an interplay, they kind of balance from one month to the next. And then we start to see a divergence that has become significant, so we'll shift to the next slide please?

And the blue bars on this slide, for those who are looking at it, are the percent of new vehicle sales for that month that are in the passenger car category. And it's declined to the lowest point ever over this data series going back to 2007.

So I guess my question is, clearly consumers are saying, "I want my big truck and I don't want my passenger vehicle," and we know they have different corporate average fuel economy, current standards, and projected goals moving forward. So I guess my question is, is this something that can have an impact on fuel demand forecasts both in the United States and in California.

So EIA, I mean you certainly take into consideration fuel economy standards. But this preference, this big change in preference, do you see that as just a temporary blip and it'll go back to where it was or a meaningful divergence?

MR. PRECIADO: Well, I think -- and I'm not -- this is James talking -- and this isn't exactly my area of expertise, but I feel like the relationship that you have on here between price and the passenger car sales is a very valid one. And I would probably say that the lower percentage of total sales being for passenger cars is going to persist for about as long as prices are low. And so your outlook for crude oil prices and gasoline prices, then becomes a very large factor in that.

MR. SCHREMP: And James, have -- I know the Annual Energy Outlook comes out once a year, but is this something that you folks may be reexamining as a particular, I guess sensitivity if you will, to see how much of a change and is that meaningful?

MR. PRECIADO: I'd have to consult with our transportation experts and get back to you on that.

MR. SCHREMP: Okay. Thank you.

MS. FARBER-DEANDA: Gordon, this is Mindi. Just keep in mind the most recent Annual Energy Outlook that we just put out was a, what we call like a shorter year. So we definitely didn't get into some of the deeper dives that we have done in years past.

So I don't know that this will be adequately addressed in that AEO.

MR. SCHREMP: Okay. Thank you, Mindi.

MR. GREEN: Hi, this is David. Could I add a comment?

MR. SCHREMP: Yes, David Green, please do.

MR. GREEN: Yeah, sure. It's interesting that your data doesn't really correspond to the EPA's data on the subject. And I think some of it may have to do with what's a car and what's a truck. And as you know, the EPA now has a category they call "Car SUVs." So these are the crossover vehicles. So these definitions keep changing, but if you look at the EPA's data, you see that where you start in 2007 they have cars as 52.9 percent declining to 51.4 percent in 2016. They have a plus car SUV, actually increasing slightly over that period.

So I think some of this has to do with what the definitions of car and truck is. And since I don't know your data I can't resolve that, but I think that aspect of it is certainly worth looking at. Personally with respect to how the fuel economy may affect it, because if it's classified as a car by EPA it comes under the car fuel economy footprint curves.

MR. BORENSTEIN: This is Severin, if I can just quickly? I think that what we care about is not whether they're cars or SUVs, but what the fuel economy is. And U.S. fuel economy of all passenger vehicles hit a high, according the University of Michigan Transportation Research Center, in August 2014. And it's been falling since then. That's not coincidental that that was a couple of months after the price of oil crashed. And my view is that we're going to continue to see fuel economy fall, despite the CAFE Standards as long as prices are this low.

MR. LAFAKIS: This is Chris, and I just wanted to speak about sort of the cyclical aspect of this data. You can very clearly see the divergence between light truck and passenger cars, coinciding with the oil price decline. So there's that element of lower gas prices pushing people more towards less efficient light trucks and SUVs.

There's also an element of the housing market corresponding with this as well. So we have seen home building trend up. And you show only data through back to 2007, but if you go back further than that light truck sales were rising very strongly in earlier parts of the millennium when the U.S. housing market was on fire. So I would expect that once we have fully cyclically recovered in terms of homebuilding, that that would take a little bit of the steam off of light vehicles.

But I would concur with what has been said, that the oil price is important in determining this. But those CAFE Standards, I mean you know, the efficiency of passenger cars is going to continue to increase. And especially when you start thinking about electric vehicles and the efficiency that they bring to the market. And the potential for them to gain a greater share of the market over the next five to ten years.

MR. SCHREMP: Okay. Thank you.

MR. GREEN: Let me agree with that. That if we stick with the fuel economy centers there's no doubt that fuel economy will increase considerably despite any shift in the shares of cars and trucks, which do shift. There's no question, they do shift in response to gasoline crisis. But the standards for both of those are going up so significantly that it's not possible really for a shift to within the vehicle categories to erase the effect of the fuel economy standards.

MR. SCHREMP: Okay. Thank you, Dave.

MR. BORENSTEIN: I would like just to clarify, I was not arguing that the companies would actually violate the CAFE Standards. I think the CAFE Standards, despite the Obama Administration's actions in the closing days are under real potential attack and likely to be rolled down.

MR. GREEN: I would agree with that. I think that's a serious threat at this point.

MR. SCHREMP: Well, I think time is very tight here, but I didn't want to conclude our session without delving into a more recently emerging, continuing to emerge marketplace, and that is for hydrogen. So hydrogen has aspects of vehicle costs, but we've seen plug-in hybrid electric and electric vehicles that are quite expensive, some of them over $100,000. But hydrogen has an infrastructure commitment and requirement.

And so I wanted to sort of toss that out there to have. And see if Marc wants to start off here with some comments about hydrogen and where he sees things going. And sort of what might be needed to help improve the situation.

MR. MELAINA: Sure. I think one thing to keep in mind is that the price that we see at the pump is not the same as the price that consumers are actually experiencing, because most of the automakers are sort of setting their own prices, which is essentially zero currently. And I think that that's not an accident. That's not something that we couldn't have anticipated.

And I think what we can anticipate is that high price at the pump coming down over time. And the price that consumers experience increasing over time. But what that depends upon is really the scale of the number of vehicles on the road and the size of the infrastructure.

So as scale increases both of those will converge together in some way.

MR. SCHREMP: So what you're saying is that if I have a fuel cell vehicle I have an arrangement where I can go pick up my fuel and I'm not actually transacting that as part of my lease or purchase agreement with that vehicle?

MR. MELAINA: When you purchased your vehicle, most of the deals are that you are purchasing the fuel at the same time or it's a bonus. And that's why the price of the pump is not really influencing the market as much as at a consumer-decision level as you might think.

MR. SCHREMP: So Marc, is there I mean like every emerging technology there continues to be improvement in lessons learned, learning curve, you bring down production costs, you can bring down operational costs. Are you seeing a similar pattern here for hydrogen at retail and do you see a lot more room to reduce those costs moving forward over say the next five years?

MR. MELAINA: Yeah, that's definitely room. So we've estimated that room in long-term trends of the technology costs over time. So we know there's a lot of room there, but I think the dynamics of how that plays out are going to be fairly complicated.

Right now, the policy structure I think is fairly robust in California, to make that happen. But the difference between the types of players that come into the retail market, their relationship with the autos, that is a pretty mixed bag. It's not a unified front on the companies involved. So how that mix plays out could be beneficial or detrimental to different companies.

MR. SCHREMP: Okay. Thank you.

I guess any points anyone would like to make before we close out here, that haven't been made? Something you feel strongly about, something the Commission should pay attention to? Nothing?

CHAIRMAN WEISENMILLER: Let me ask one question. The Legislature's directed us to have a workshop later this year on renewable natural gas. And certainly if any of the speakers have any comments on price or availability of renewable natural gas, that would be helpful either now or in writing or again coming up when we do that event.

MR. MELAINA: We just published a report for renewable natural gas is Southern California, so we can forward that.

CHAIRMAN WEISENMILLER: That'd be great.

MS. FARBER-DEANDA: I would be interested. This is Mindi, but I'm also curious, are you doing a gas liquids from renewable sources or only the gas?

MR. MELAINA: We didn't do gas liquids in our analysis. It was just synthetic natural gas from renewables.

MR. SCHREMP: Any other questions from the dais? I guess we --

CHAIRMAN WEISENMILLER: Well, again we would like to thank you for moderating. We'd like to thank the panel for participating. Certainly once more thank Severin and David for their participation in PMAC, which is huge. And I thank our colleges and (indiscernible) to be here in person.

PANEL MEMBERS: Thank you, echo that.

MR. SCHREMP: All right, thank you everybody.

MS. RAITT: So we'll go ahead and break and come back at 1:30? Okay, back at 1:30 please.

(Off the record at 12:37 p.m.)

(Back on the record at 1:33 p.m.)

CHAIRMAN WEISENMILLER: Welcome to our afternoon session. Again, I want to thank everyone for their participation. Heather, if there's any announcements or do we just kick it off to Randall?

MS. RAITT: Sure, I think Chris Kavalec wanted to introduce the panel.

MR. KAVALEC: Welcome back. Our next panel will be discussing "Regional Economic Prospects for Business and Industry." And as a moderator we are lucky enough to have Randall Winston, who is the Executive Director of The California Strategic Growth Council, which is a state agency that brings together multiple agencies and departments to support sustainable communities emphasizing strong economies, social equity and environmental stewardship.

Randall previously worked in Governor Jerry Brown's office, helping to lead efforts to implement executive orders on green buildings and zero emission vehicles, as well as international climate policy. And Randall has a B.A. in Government from Harvard and a Master's of Architecture degree from the University of Virginia.

So thank you for being here, Randall.

MR. WINSTON: Thank you. And now we're going to just continue down the way with introductions of the panel.

MS. ROTHROCK: Dorothy Rothrock, California Manufacturers and Technology Association.

MR. FERRARI: And Silvio Ferrari, here on behalf of the California Building Industry Association.

MR. ECKERLE: And Tyson Eckerle with the Governor's Office of Business and Economic Development

MS. TOCCOLI: Betty Jo Toccoli, California Small Business Association.

MR. WINSTON: Fantastic. All right and good afternoon everyone. Thank you again for coming together here for this discussion.

I think we might just dive into some of the questions that we're going to discuss, so I'll start off with a number of questions. And of course leave it to the Commissioners on the dais also to ask questions, as well. So thank you again.

Maybe, just by starting off, if you could identify what are the major trends in your industry that you expect to see over the next ten years. And will there be significant regional differences in those trends? And we'll just begin here to my right with Dorothy.

MS. ROTHROCK: Thank you and thanks for having us here. I appreciate the opportunity, so I represent manufacturers in California. And in answer to the first question, one of the things we'll be seeing over the next ten years of course is, I believe, an increase in automation, robotics. I see electricity use demand going up for that purpose.

I think we'll also be seeing a shift in

manufacturing, perhaps to more one word is "advanced," but perhaps some other words are "manufacturing 3.0 or 4.0" that includes a lot of operational improvements as well as the automation. Some systems for lien and other streamline supply chain type functions.

It gets somewhat intangible, but I think that the idea of being faster in response to customer demand is going to be increasingly valuable for manufacturers. And that ties somewhat back to the automation, but it goes into also the use of data in the cloud and other kinds of technologies for monitoring and systems management.

So I'll end there for now.

MR. WINSTON: Silvio?

MR. FERRARI: Yeah. Thank you. I've got a couple of slides. We also brought several handouts, so the first one is this housing production chart hopefully you guys have in front of you. And I, to be honest I know the Commissioners have seen this chart many, many times over the years as we continually update it and Bob Raymer puts it before you, so happy to sit in on his behalf today.

I think no matter how many times you look at this chart it continues to kind of take your breath away, because it shows you just how deep of a recession this was. And I know you asked me about trends and I promise I will get there. But what you can see is the last time we really produced at a level that HCD, Department of Housing and Community Development, has said is necessary to keep up with population demand was 2005.

And then we just had this tremendous freefall down to 2009, when we produced 36,000 housing units just over. And what's interesting about that number is annually we lose about 30,000 homes a year to natural disaster or other things. So that really was a year we brought online very few housing.

And now, we've had a seven-year uptick, but it is a small, it's a minor uptick. And this has been probably the deepest and longest recession we've even seen.

But in regards to trends, the first one I would point out that you can see visually in this chart is in 2011. And that was when we flipped from being predominantly single family to multifamily. And to be honest, a couple of years ago when I came and sat here and talked about this, I think we had a five and ten-year outlook that thought that we actually going to see that sort of flip back. And at this day and age, we don't actually see that occurring any time soon. We actually see that multifamily spread between multifamily and single family will actually probably grow more in the future. So the first trend is what we will continue to see multifamily moving forward for the next five and likely ten years.

Additionally, the single family that is being built, 80 plus percent of it is continued to be very high density in nature, two to three stories at minimum. But again as we'll talk about later in questions, that in itself proposes some design challenges that we have ahead of us as well.

Then we get into the trends of sort of multi-generational housing. We have a lot of baby boomers who are now beginning to move back in with families. And there have been a number of builders across the state and nationally that have really recognized that as these baby boomers are moving in with their family, they don't want just a bedroom, they want actually a space that feels like they are still sort of in some way self-sustaining. And so that multi-generational housing has really exploded over the last 12 and 18 month and we believe that's going to continue.

But staying on sort of that 55 plus range, 55 plus communities are also highly desirable right now and we believe that's going to continue. I think one big reason is that 55 plus community folks are really kind of society's -- they've got the majority of society's wealth right now. And so they've got the ability to kind of get in and downsize, as far as a house, but upsize when it comes to the amenities that they can walk to and bike to and drive their golf cart to and whatever it might be. But they are finding ways to get into those communities.

We also believe that a trend, and it's by honestly a lot of the good work that's being done here, but we're also seeing it becoming a market competition thing, but we're going to continue to get greener. And that's a good thing.

I mean we are seeing people adopt things and we see it in one community versus a community right next door where they are trying to outpace each other as who's got the next technology to incorporate whether it's smart technology or something on the roof for generation or battery storage. A lot of those things are becoming `competition and driving each other forward.

With that though, and not solely because of the greening features, but we're also going to see a trend where homes are going to continue to rise as far as expense. And again, that has to do with things far beyond just what we're talking about today. But they have to do with affordable housing and fees at the local level, labor costs that have risen 300 percent since 2011, lots of local add-ons that get piled on. So as we continue to sort of get to those next level of energy efficiency for other reasons as well, we're going to continue to see rise in home prices as well.

And then I think if we can jump to the next slide what you'll see here is that 2016 out through 2020, we believe the trend will be really flat, as far as production and supply. You know, we aren't seeing that we're going to see a huge increase. We believe that we might actually begin to see a downtick in 2020 as far as what our folks are talking about.

But producing at these levels, again far beyond what HCD has said that we needed to produce, so we're going to be in a range of about 60 percent of what the need is. And that's again very, very troubling as we talk about how we're going to change the supply demand.

And last thing I'll mention is that a trend we are seeing, and it is because builders are trying to find more and more ways to stay well capitalized, so that they can do projects. But we are seeing the acquisition and the gobbling up of one builder to another builder.

I mean in the last 18 to 24 months, we have seen Standard Pacific and Ryland form CalAtlantic. We've seen Pardee and TRI Pointe merge into TRI Pointe. We've seen Shapell and Toll Brothers merge. And so we are -- overall we're actually seeing a decrease in the number of builders that are out there. But they're becoming bigger. They're becoming more well capitalized, so that they believe internally that they can take on additional risk that they have in the industry that they're in.

So I'll stop there.

MR. WINSTON: And let me interject one quick question just to add on, if you could add a little more specificity, Silvio, on regional differences with housing? So we know that the regions have their regional housing needs be to meet. Maybe give a bit of a difference in some of the growth, Central Valley, Bay Area, Southern California, Inland Empire, if you could speak to that a bit, just some of the regional differences.

MR. FERRARI: Yeah. You know and I'm sorry. I wish I actually had the numbers with us, but in the house of CBI, they actually run something called the CIRB. It's the Construction Industry Research Board and they have these kinds of regional numbers. But the reality is, and I think we talked about this at large, which is we are just seeing a tremendous divide between Coast and Inland. And it is almost -- it's beyond a two to one at this point.

And unfortunately, some of -- really I mean when you talk about some of the most poor regions in the state, they are the ones that are seeing the greatest divide and the greatest undersupply of housing.

So to answer you with like absolute specificity, it would be much easier if I actually had the data with me, so that I could show you. But just know that when we talk about that divide, it is absolutely the truth. And we will see kind of the nine Bay Area county region, L.A., San Diego, parts of Orange County. We will see those continue to uptick faster than the Central Valley folks are going to for quite some time. I mean they have rebound and will continue at a greater uptick then their Inland counter parts.

MR. WINSTON: Thank you.

COMMISSIONER MCALLISTER: Can I ask a quick question? So how much of that is due to just the oversupply, that sort of boom-bust where they were -- is there still a residual housing kind of being dealt with in the marketplace or is it really talking about all new construction now? I mean is it like in a place -- like San Bernardino -- is the foreclosure stock, has that been worked through yet or not?

MR. FERRARI: Yeah, you know when we talk about this it's probably been about 18 to 24 months since we've really had a discussion about, "Okay, here's how many foreclosure products we have on the market." And that is preventing essentially, because of the depressed cost of those housing, keeping people from going into new construction.

As far as we know, that foreclosed stock is essentially completely absorbed. And we don't think that there is some huge glut out there of foreclosed properties that are still waiting for buyers to come in and purchase. I mean we do have parts -- again Bay Area, L.A., San Diego and other regions that do actually have long lists of folks trying to get on a list to get into communities. And that has come back in the last 12 to 16 months.

COMMISSIONER MCALLISTER: I guess we heard about the economic and demographic issues earlier this morning, the first panel. And a lot of it was the same, similar analogous message with the Coast and Inland -- in places like Inland, Southern California, for example, San Bernardino, and places like that, foreclosure crisis hit really hard. Even those places are pretty much worked through?

MR. FERRARI: That's our understanding, yeah.

MR. ECKERLE: Tyson or I -- thank you, Randall -- so again Tyson Eckerle. So I run our Zero Emission Vehicle Program in the Governor's Office of Business and Economic Development, or Go-BIZ, and so I'm going to focus on that area. And we're hoping we're going to have enough housing, so that people don't have to live in their ZEVs. Is after that -- but that's a terrible joke I don't know why --

COMMISSIONER MCALLISTER: ZERVs, Zero Emissions RVs.

MR. ECKERLE: Yeah, I tried. That's right.

So but there's a lot to be optimistic about. And ZEVs, I mean ZEVs are a growing part of our economy. We're seeing battery prices fall at a much faster clip than was expected. We have 265,000 plug-in electric vehicles on the road in California. That represents about close to half of the market in the U.S. There are about 12,000 public charging points for plug-in electric vehicles. Fuel cell electric vehicles are in the marketplace as well. Back in July of 2016, the Air Resources Board published their annual AB 8 Report and they projected, based on automotive surveys, that we'd have about 331 fuel cell vehicles on the road in 2016. And we ended up with 1,000, which is really a great signal there.

So we have 25 open retail stations that enable travel from San Diego all the way up into the Bay Area, Lake Tahoe, so we have a connector in I-5, there's a station in Santa Barbara.

From stepping back, just the automotive industry in general in California between 2011 and 2015, grew 20 percent, so we have a number of automakers here. In fact, our largest manufacturing employer is an automaker, making ZEVs.

And so really in ten years, what is it going to look like? If we meet our numbers and targets, which I think we will, seeing a ZEV on the road will be more common than seeing a hybrid today. So we have about a million hybrids on the road right now. In 2027, we should have well over 1.5 million, if we meet the Governor's targets.

And if you look at kind of dividing the pie, I think it's really interesting from an electricity and energy demand standpoint. So if you take up fuel cell vehicles, for example, and look at the automotive surveys from that 2016 AB 8 Report, and kind of project that out just using the last couple years of growth and putting out in a linear fashion, so it's a little bit conservative on the growth.

But we might have about 100,000 fuel cell vehicles on the road there. And if 20 percent of those vehicles get hydrogen from -- hydrogen produced by via electrolysis, using water and electricity, ideally excess renewables. You know, that's probably a gigawatt of energy that we're talking about -- gigawatt hour of energy in a day -- essentially if you look at the normal energy demand from a fuel cell vehicle. So that's a big signal. It doesn't mean it has to be a gigawatt itself, as far as the band width going in, but a gigawatt hour throughout the day.

On the plug-in side, for let's just do some back of the envelope predict or math and definitely want to double check it, just to make sure. But we're looking at maybe 17 gigawatt hours of energy. And so on a daily basis that's a pretty substantial place where we can drop a lot of renewable electricity.

Just a few other points, you know, is I saw a presentation by Bloomberg New Energy Finance. And they were saying that by 2022, they were expecting the price of a batter-electric vehicle and batteries to equal that of an internal combustion and then start going lower. And so that's just around the corner here and that's really kind of that marketplace turning point. So between now and 2027 we're really going to be seeing a different market.

The other unknown that's coming up is how autonomous vehicles are going to factor in. And so autonomous vehicles, assuming we do move forward and make sure that most of those are ZEV or all of those are ZEV, they have a potential to add more zero emission vehicles to the fleet sooner, because they have a higher turnover rate. Instead of a 12,000 annual VMT, Vehicle Miles Traveled per vehicle, you're looking at maybe 20,000. And that creates higher turnover, higher throughput of the -- or faster turnover for the fleet.

And then finally just in terms of regional differences, I think we're seeing the build-out mirror the adoption of hybrids. So there's a lot of adoption in the Bay Area, Los Angeles, Orange County, San Diego. And we're really working hard to bring that into the Valley and other underrepresented areas. And so, but really the Achilles Heel on this all is infrastructure. And can we get the infrastructure there to support that? And so there's lots of programs, I think, is where we'll see the IOU programs and the POU programs playing in a very increasingly important role in building out that infrastructure, in places where the early private investment might not be able to carry the burden given that there might be low throughput at the start.

And so that's kind of just an overview. I'd be happy to go into more detail.

MR. WINSTON: Great, thank you.

Go ahead, Betty, it's all right.

MS. TOCCOLI: Thank you.

Well, the small business community in California has probably undergone more changes since this last recession than in any period of time in history. Let me give you an example of that. We've always been known, in the small business world, as the job creators. We've also been known as America's dream. As you know, there is more interpretations of America's dream today than just small business. But let's talk about how small business has changed.

Big business used to say to me on a regular basis

-- and I do come from the big business community originally -- but my passion is in the small business community and has been for years. They used today to me, keep training our future managers, because we get our future managers from the small business world. Nobody has said that to me in probably five years from big business, so that tells me there has been a shift in the role that small business plays. Not only in California, but throughout the United States.

If we aren't the job creators -- and we aren't like we used to be -- and here's the example. These are SBA statistics. In 2007 there was 1.1 million small businesses in California with employees. Now it was, you know, millions without employees. In 2013, which is the last year they have broken it out, in California there were 638,000 small businesses with employees.

It is not hard for me to see that we have quit being the job producers. And that is a great concern.

Let me give you another statistic that I think you'll enjoy. This one, I believe it was the Wharton School, I'm not quite sure on the school, but this came from the Small Business Council of the U.S. Chamber of Commerce. They asked the community college presidents how well they fill the needs of job requirements in workforce skills for small business. And 96 percent of the community college presidents -- or they said 96 percent, they filled the bill. They asked the small business owners, and they said 11 percent. So there's a big disconnect between the small business community and those providing the things we need.

And I take responsibility on the small business side. We have to be more involved. We have to help with the solutions. And we have got to be proactive instead of reactive.

There's a great deal of frustration right now. Part of it is workforce skills. Even if they have a job, and I hear this an almost every part of the state, "I need welders. I pay $80 an hour. I'll train them and I can't find anybody to apply."

So we need to start thinking for the future that not everybody is college bound. And I was fortunate enough last Friday to attend a meeting by the California Department of Education that was addressing this issue. So I think we're on the horizon of doing so good things in this direction.

We also have to look at regulations. A small business needs advance notice so they can plan, but they don't always do it. So we have to figure out how to reach them with messages so they'll take action and it won't just destroy them and have them be frustrated.

Are there regional differences in small business owners from throughout the state? They think so. But I will tell you I have the opportunity of doing Small Business Advisory Council in district offices of the legislators throughout the state -- did 93 of 120 last year. And they say the same thing, they need Workers' Comp reform, they're concerned about energy, environment and water, they're concerned about regulations. But they also are the people that promote our local communities and that doesn't vary. It doesn't matter whether it's San Francisco. It doesn't matter whether it's L.A., or whether it's Oakdale, California.

Small business needs to do their share. But we do have our problems and we need your help.

CHAIRMAN WEISENMILLER: Thank you. Actually, just for clarification how do you define small business?

MS. TOCCOLI: Well, that's an interesting question today. If we could have -- we define it -- and we represent 68 small business organizations in our group. We use the SBA definition of under 500 employees and then by industry there's different gross revenues.

Probably the one that is the most used in California is the one the Department of General Services uses, which is under 100 employees and under $14 million. It doesn't have different breakouts for different industries.

There is a move afoot right now to try and change that definition to under 20 employees. I think there should be a micro-business definition. Believe me I do. But if you changed it to 20 or fewer employees, we would lose all of the people that were capable of doing work for small business. And being able to afford to come to Sacramento to even come to a meeting.

COMMISSIONER SCOTT: Yeah, a follow-up on to that definition, so you mentioned small businesses without employees. So does that mean self-employed? A person that's kind of running their own business on their own or?

MS. TOCCOLI: Yes, and today, you know, it's kind of the new industry that they probably have an online business versus being a consultant in that direction. And a couple of areas that we need help on are definitions on independent contractor and part-time jobs.

MR. WINSTON: Any questions from the Commissioners?

(No audible response.)

Okay. We'll move on then to the second question here. And actually I'll start with you, Betty, since you're speaking about this, I think, at the end or your remarks of the first question. What impact could California's environmental regulations have on the economy and on small businesses in particular?

MS. TOCCOLI: Well, the number -- they impact us greatly. And I think that while we can't predict oil and gas prices -- and we're not smart enough to do that and it takes many economists probably with much more power -- energy independence is absolutely vital for the small business owner.

But knowing what's coming down the pike and not after it happens, but so they can plan for it is ,extremely important. So when they go to the pump and they fill up their delivery truck and it costs them a dollar more, that is a tremendous problem to the majority of California small business owners.

MR. WINSTON: Thank you.

Tyson, we'll move to you.

MR. ECKERLE: You're talking about regulations?

MR. WINSTON: Yeah, so and I'll repeat the question.

MR. ECKERLE: I'm sorry.

MR. WINSTON: And I apologize, what you see is the impact of California's environmental regulations on the economy and on your sector in particular, so on ZEVs more broadly.

MR. ECKERLE: So ZEVs are in an interesting position right, with the regulations that are really driving a lot of the investment and change there, so in regulations, especially in tail pipe emissions.

We are very mindful I think in the small business community and we do work at GO-Biz on sustainable freight. And it's not my area, but how do we actually push those regulations forward or push the targets forward while protecting small business interests with retraining and all that type of stuff? So that's definitely something that's high on our mind, and so it's nice having you sit there as a reminder.

But from a particularly ZEV perspective, there's an interesting case that just came up with Nikola Motors, for example there, looking at hydrogen-powered Class 8 trucks. And their original business plan was to go with natural gas, but they decided that the environmental compliance costs, going from across 50 states, would be too high. And so that kicked them into the hydrogen and fuel cell and battery electric position. And so for them the environmental regulations, environmental compliances, is actually what has spurred them to make the investments into the zero emission vehicle space and actually made their product more competitive.

I think also we mentioned autonomous vehicles earlier. And I think there's a strong rational for making autonomous vehicles be zero emission vehicles. And if that were the case, it could definitely increase like I said earlier, how fast zero emission vehicles make it into our economy. And that I think has a very positive impact. And so really from here, it's that environmental regulation I think is a big benefit from the zero emission vehicle perspective just because it's not a whole lot of compliance to do with it.

MR. FERRARI: Boy, no problems. You know, clearly from the land development, home building side, I mean the number of environmental regulations that we deal with from the city and county, and the regional to state, to federal we've become very, very sophisticated over the years and now to navigate this world. So there's not nearly enough time for me to talk about all of these things.

So two that I'll focus on and I guarantee the first one I will regret mentioning, but it is CEQA. And I will say this, and I'll say it briefly, CEQA is a very complex regulation, a very complex law. There is no doubt it is a reason that entitlements in California take a long time and that they are costly.

And being with CBIA for eight years it has never been my experience that folks within our organization have said that we are opposed to CEQA, because of the environmental benefits. It has always been -- and it is has primarily been because it continues to be, from our perspective -- a tool to chip away at projects, to make them smaller, to delay them. And in many cases ultimately make them go away if you can delay them for long enough.

And that has been really our concern. And we've seen over the last 12, 18, 24 months, a number of really good studies that have come out to say that CEQA used in that context is actually really stifling projects in exactly the areas where California's policy is trying to push them: high dens, affordable housing, infill projects for senior citizens, for all kinds of other business as well.

So we know it's got problems, hopefully that there will be a convergence in some point in the future. Will there be the political will and the ability to make some positive reforms, but keep all of really the environmental benefits to it intact.

And seeing as we're sitting at the Energy Commission, I think I should definitely mention the Energy Standards as well. Three areas I think that we pay a lot of attention to are marketability, design and financing.

In marketability, and I think you guys have heard us say this before, but as we begin to get to higher and higher levels of energy efficiency, explaining to potential homebuyers what their getting for that is becoming more complex as well. So when you have a sales agent who has to explain "Well, hey. That home built 24 months ago around the corner in a different development is very efficient. But you want this hot off the press house that is very, very, very efficient." It's a difficult concept for people to grasp and understand.

And honestly, we're seeing home buyers that are becoming much smarter and much more sophisticated at following these types of things. So they're asking questions and they are paying more attention to, "Well okay, so you're telling me the cost is this. And what am I going to save on the back end?" I mean these are the kinds of questions that we get regularly now.

And to be completely honest if that first PG&E or Edison or bill comes and it is not what they expected, we are hearing from them. So it is something that we also have to be on our game to explain as we get there.

And from a design perspective, as we all work toward being at the goal of being zero net energy by 2020, we have design challenges. There is no doubt. I referenced earlier that everything is getting two and three-stories for both multifamily and single family. Well, we're losing roof space every time we do an upgrade to the Codes. That's a problem.

We're also seeing that 40 to 50 percent of the design of a lot of our communities don't have optimal positioning to capture all the benefits that solar has to offer. So as we talk about some of those challenges, we need to make sure we're also talking about some solutions that have to do with really offsite solar and making that a viable option. Also making sure the future of net energy metering is strong and bright.

And we also talk about plug-load here quite a bit, and all the unregulated loads. And how people operate the homes and how to really drive down the energy use from just how we all sort of turn on lights and forget to turn them on [sic]. Our computers and phones and all those things are plugged in, and Appliance Efficiency Standards, so all of those things. You know, there's definitely low-hanging fruit that we want to help you guys. And as we design moving forward to kind of drive some of the additional low-hanging fruit that's out there.

And then the last thing that is really important is that we need both lending institutions as well as the appraisal community fully onboard and willing to actually give credit for what the true cost of doing these upgrades are. And we have seen policy pushed forward in the last couple of years that is trying to do that, trying to get there, but then actually getting these folks trained to fully understand. I mean it is hard to know what is behind the walls when you can't see it. And it is hard to understand prior to actual use of it, how it's going to perform.

So I think I'll stop there and happy to answer any questions.

COMMISSIONER MCALLISTER: I want to just comment quickly. We work obviously very closely with the CBIA and many, many stakeholders, but obviously a principal is CBIA on the Building Standards.

And I just want to point out, which I seem to do increasingly frequently the closer 2020 gets, that this is a policy goal -- ZNE is a policy goal -- it's not a statutory goal. And so there are good reasons why we have cost effectiveness requirements about how we design the packages that get put forth and adopted in the Title 24 update.

And whenever we do ZNE in a given place or whatever, it needs to be cost effective. And so that conversation I want to just highlight that that is ongoing for 2019. It will be going into effect in 2020. And certainly all of the issues you brought up are right front and center in all that. The uncertainty around net metering being maybe the most prominent one, but there are some others.

And again if we have to do cost -- statutorily we have do what's cost effective. And working through that conversation with the building community and all the stakeholders, is actually a critical part of the process. And so I am really thankful that we have in this state a group of stakeholders that are informed that come to the table in good faith, and that really are willing to roll their sleeves up and get together.

And we do -- the staff and the trade allies do off sites and really go though the numbers and really dig in. And they come up with something that at the end of the day we can agree puts us in the right -- is sending us down the right direction, but is doable. Build ability is a big deal. CBIA's members and trade allies obviously know what the details look like and we listen to that.

So I'm actually confident that we have a process that can move us forward in a way that is reaching our environmental goals, but also not disrupting the market much, if at all. So the overall economy and the price of housing and all that obviously those are huge, huge barriers to where we need to be. But I want to just thank you and Bob and the other folks at CBIA for your engagement on the process. Because I think we really have an exemplary way we go about it at this point. And I think going forward, we're going to be highlighting how functional it is, as opposed to dysfunctional we spend more time in D.C. because I think the contrast is pretty palpable.

So anyway, I wanted to just inject that little bit. Thanks.

MR. WINSTON: Dorothy, thank you.

MS. ROTHROCK: Yes. I'm going to interpret the question as being related mostly with energy related environmental regulations. And here I'm seeing heads nodding, because there's plenty of other environmental regulations that manufacturers are subjected to. And we work on them all with the philosophy that we support reasonable science-based regulations that manufactures can comply with. And remain competitive in California, versus the folks that they compete with in other states and other countries, because we want to keep our companies in California using the clean energy here and not moving somewhere else and using the dirty energy elsewhere.

So the two, probably the biggest two environmental energy regulations are of course climate change and then the RPS, which actually started before the climate change, but has now been embraced as part of that policy.

I quickly want to just echo and agree with Silvio's comments on CEQA and for manufacturing. The key elements there for manufacturing is how long it takes to get a permit, even if you're taking all the steps you need to take to become environmentally compliant. Sometimes it's just, the uncertainty of the litigation and the time it takes, is enough to keep somebody from even starting to think about putting a plant in California. So that's a big issue that applies there as well.

But back to climate change and RPS, two pieces. One, is it's really crucial on the climate change front for the technology to be available and to be cost effective for companies to embrace before you impose a burden or a regulation that they need to comply with.

We are always arguing for fixes to the climate change policy, particularly Cap and Trade. And with the potential for direct regulations on companies we are asking that policy makers be very cognizant of how expensive it can be to adopt technologies. Sometimes it's not even available. And all we are doing is perhaps making it impossible for the company to price their products in a way that will remain competitive, so we're basically putting them of out of business.

The second piece of that, the RPS is -- and I want to pull up the slide on electricity rates -- I know this isn't a follow-up question, but it's really key here. We are seeing the electricity premium that industry pays in California rise over time. In 2010, the premium that manufacturers in California paid, versus their competitors in other states, was 44 percent above the national average. But since 2010, that differential has risen to 79 percent more expensive in 2015.

Now, that may be because of all sorts of reasons, but I know a piece of it's related to the transformation of the system into a more clean, renewable base. Now, if we are going forward with this policy and now we're going to 50 percent by 2030, a trend we definitely see is that that price premium is likely to continue unless there's some other policy decisions that are made by the PUC or others to improve and lessen that cost premium that industry must pay.

And I think that there's a piece of this that is directly related to the RPS.

Back to climate change briefly, I don't have a slide for it, but one of the key elements there is that the Cap and Trade Program, as currently designed, will impose new significant costs on large manufacturers in the third compliance period and potentially beyond unless there are changes made in the program. That's a severe reduction in industry assistance that will apply.

Now those are costs that are going to go on to manufacturers that are already operating efficiently, according to the benchmarking that's done by ARB. So we think it's an unjustified new cost. It's over and above what's necessary to encourage cost effective energy efficiency. And we think it's a policy that violates the premise of keeping manufacturing competitive and located here, rather than pushing it out of the state.

That's all for now. Thank you.

COMMISSIONER MCALLISTER: Can I ask -- actually Silvio you made this point as well in your final point about finance -- I guess I think it's going to be increasingly critical to look for ways to express the long term benefits in present dollars. And figure out a way to finance this stuff, taking into account the energy savings in a new home over time or like the FHA Energy Efficient Mortgage, for example, which could be better and more usable, and therefore popular.

I guess is there maybe -- and I guess I'm asking each of you and Dorothy -- in the industrial context or the manufacturing context do you have any sort of mechanisms to mitigate these short-term investment costs in a way that would be good public policy? I mean do you have sort of any ideas about that?

MS. ROTHROCK: I've heard two things when companies are talking to me, that I hear. One is they're competing with other locations, other plants, in other states. And the Chicago headquarters, in New York, or London, or wherever the company is making decisions, are looking at the rate of return and return on equity from various capital investments around the country. And they expect paybacks in a pretty short timeframe. Three years is really kind of what they're looking for, which is significantly short. And if you can make your money back quicker somewhere else, that's where you put your capital. So that's one thing.

I think -- and I forgot the second -- Silvio, why don't you take it and if I remember, I'll grab it back.

MR. FERRARI: You know, I think my response is similar to what I said originally. I mean we really need to kind of have a more full discussion about how to get the financial lending institutions and the appraisers onboard.

We've seen the state -- I think just last year, San Diego Assemblywoman Shirley Weber, brought forward a bill to try to -- for appraisers that are getting their license for the first time or renewing it try to give them some additional education around green features and green technologies. But it's got a lag time. I think we would have liked to have seen sort of a more immediate infuse of people being trained, but that had its political push backs and costs associated as well.

But then we still need to get the financial lending institutions really also educated in-house and studied up in-house to understand that when they see these types of things on a set of plans, when they come to their desk, this is what they mean. This is how they're implemented. And this is what all of the best energy says is going to be the output on the back side.

So I mean I think our answer will consistently be that we need better and better education for the folks who are engaging in pricing these products.

CHAIRMAN WEISENMILLER: I was going to make a point and then a question. In terms of the point, I can remember when I went with the Governor on his trade mission to China. At the tag on at the end, there was a very small group of us and he was interviewed by the press. And someone asked him about CEQA. And he assured them that he would sign any bill that got to him that reformed CEQA.

So there's certainly -- I have to say there's sort of a general feeling of frustration on that. But that was a pretty direct quote. I think actually the interview's still up on the website, on the *L.A. Times.*

In terms of -- one of the questions, again thinking back to China -- it was interesting meeting with companies there. It was clear particularly in the automotive side, they were thinking of basically a three-part deal. You know, that you'd being doing basically manufacturing in China. You'd be doing design in Germany and you'd be doing the software, the autonomous vehicle side in San Jose.

And so part of the question is how do we -- what can we do as a state to really encourage that autonomous vehicle development in California, not Detroit, not Shanghai, not Stuttgart.

So again, certainly encouraging, I don't know, if either Dorothy or you have comments on that part?

MS. ROTHROCK: Yes, it'd be wonderful to encourage those companies to site and develop the products in California. There's a lot of competitive challenges in California: just the general cost of doing business, beyond energy, worker's comp, taxes are relatively high, housing costs are high. Perhaps the wages you need to pay workers is higher, because of the higher cost of housing. There's a lot of costs that stack up and make it difficult for California to compete. CEQA does seem to be a key kind of initial barrier. I know that Tesla looked to be in California, but that permitting issue was what kept them from being there.

So there's a lot of challenges. And just reflecting back onto China, how sad is it that manufacturing needs to happen in China where there's coal-fired electricity. And the emissions that will happen there are so much greater than that same company located in California.

It's not something that our current climate policy accounts for. There's a very short phrase in AB 32 that we reiterate again, again and again, "Is we must minimize leakage." Because that's what that's all about, but there isn't a great formal way for us to minimize leakage.

And the earlier industry assistance issue, I think, goes right to the heart of we've got to do a better job, making sure that to the extent our climate policy is built, we're not encouraging people to keep building in China. But in fact we are getting those jobs here.

CHAIRMAN WEISENMILLER: In terms of advanced manufacturing, again that's --

MS. ROTHROCK: You know, advanced manufacturing, it's interesting and it goes back to what I remembered I wanted to say about investment too. Is that manufacturing is turning over quicker. And it's much more automated. The product cycles are shorter, everything's happening faster.

And so the competition for capital, for projects, is not just energy projects, what are we going to do? But energy products, product development, machinery, other kinds of capital needs. And the capital is scarce and is not unlimited.

So you're deciding "What do I do? Do I design and build my next product cycle or do I spend $100 million doing some energy efficiency work. What do I really need to do as a manufacturer and where can I do it?" So I fear that in those global decisions that are made, that may be a reason why it's more difficult to get those projects done in California. Because, "Well, we've got to get this new product out there and we can't afford to do both. We can't afford to do that as well as this other investment."

Did I answer your question enough?

CHAIRMAN WEISENMILLER: Tyson, do you have any ideas on how we can move on the autonomous? And is this -- maybe GO-Biz -- I mean how can we work together on that?

CHAIRMAN WEISENMILLER: Yeah.

MR. ECKERLE: Yeah, I think part of it is getting the state's story in order and getting an alignment. I mean, we've had -- the regulations haven't been that promulgated from the Department of Motor Vehicles. And so you saw that issue with Uber taking their vehicles into Arizona and some of them have come back. And I think really it's just getting the story in order.

And I know there's a lot of talk about that. In fact, our Innovation and Entrepreneurship Group is kind of heading up the GO-Biz effort for autonomous vehicles. And so if anything, I think it's just like I said it's getting the regulatory framework, being open to trying things out in different communities. I know there's different cities that are very open. And I believe we just got two cities approved to do testing. I have to go back and look at my notes of where those were.

But I think if anything it's just getting our stories straight and being open.

MR. WINSTON: Great. Thank you.

I'm going to jump ahead here, but in some of the questions, because a lot of the issues I think have been touched upon in some of the responses. So aside from the high tech industry, what advantages do you think California has over the rest of the country, when it comes to the creation of new companies? As sort of a follow-up I think to one of the questions from the Chair, but maybe digging a bit further.

Betty, and we'll start with you.

MS. TOCCOLI: That's a tough one, because I think we're smarter here in California. But I think other parts of the country -- and I guess I'm going to refer to a call I had yesterday -- a former California Small Business owner called me that's now an Alaska small business owner and talking about that they had talked to a couple of legislators about regulations in California.

I think that we have not done a good job. We have a program called Buy California Small Business First. I think I would agree with Tyson that we need a message that sends the real California out there, not the perceived image, and so that would be my recommendation.

MR. WINSTON: Thank you.

Tyson?

MR. ECKERLE: Again, can you repeat the question? I'm so sorry, I got engrossed in (indiscernible) --

MR. WINSTON: Yeah, no problem.

So aside from the high tech industry, what advantage do you think California has over the rest of the country when it comes to the creation of new companies?

MR. ECKERLE: So I think it's in California, we are the market leader for market leader for zero emission vehicles. We have about 50 percent of the market. I think really that's it. Where we have a strong regulatory commitment, which comes from all branches of government: you know, you have the agencies, you have the Governor's Office, you have the Legislature. So that in and of itself has attracted a lot of business in investment. It's interesting though hearing from the manufacturing side as well as if there are other challenges, so a lot of this may be happening in spite of those challenges.

But I think it's really that the other piece that I think is key is our workforce, right? Especially in those key areas where the people want to set up shop in the Silicon Valley or in Silicon Beach or in San Diego for a lot of those reasons. We have a great university system, our community colleges, and I think there's a lot more that can be done to help connect those dots. And I think you're seeing that come up in a lot of the different policies issued from the ZEV Action Plan and Sustainable Freight. And how we connect those pieces and make sure that that story really is strong. That California is the place to come to do it.

But like I said with the vehicle thing, we've grown as quickly or more quickly than any other place in the country in the last five years on the vehicle side. And so I think there's a lot of good indicators.

MR. WINSTON: Okay?

MR. FERRARI: And thank you. From the home building, land development side, I think the thing that we have going for us is what we all know, which is we're California. And location, location,

location. Even in this recession, we have folks who have come here. We have seen our population increase. We continue to have household formations. We continue to have families that are looking to expand. They are looking to move up.

But when the question is directly about the creation of new companies, unfortunately the companies are just for virtue of lots of reasons, some we have already discussed, have not been able to keep up with that population growth.

So we are not bringing housing on at the level we need to. We're not increasing the supply at the level we need to. And again I think partly it's because we are continuing to see, like I mentioned earlier, the gobbling up of one company to another. So while we're not seeing the formation of new companies we do have bigger companies coming online.

MS. ROTHROCK: Yeah, and let me start my answer for this by pointing to two slides that I brought. Every year I need to share with you the latest information on rates of investments. Because that's really where manufacturers are making their decisions about whether to create jobs or not is where they're putting their money.

And so California has -- we have two charts now. One, go back to the investment chart for a minute. In 2015, you'll see that red line over to the far right. California was able to attract only 1.5 percent of U.S. manufacturing investments in that year.

And I don't have the chart, but since the year 2000, we never did get higher in any year above 3 percent. We have about 10 or 11 percent of the manufacturing in the U.S., so this shows that our rate of investment is far, far lower than our base. And so we're kind of losing our muscle, I guess, so far as manufacture is concerned.

On the Reshoring slide, which is a new one for us -- this came from a report -- it was not done by us, but it was done by Reshoring Institute. And if I got that slide wrong, I apologize, I believe it's on the slide. But we weren't able between those years, 2010 and 2015, to attract more than just 1.1 percent of the jobs that have been categorized as reshored away from overseas back to the U.S.

So it's indication that the answer to seven is if we do have advantages, and I do believe we do, it doesn't seem at this point, to be enough to be attracting the capital that we need. The investments that we need in manufacturing to keep our base healthy.

The advantages that we do have that are attracting some of the companies that are here, and that are growing, is its unbelievable innovation across all the manufacturing companies. I mean, ability of companies to remake and reformat their systems in order to remain competitive is really quite startling and impressive.

Also, California has got huge markets. We've got the ports, we've got import/export opportunities. On the skilled workforce also, we have -- that has been a competitive advantage for years and years and years. We're actually seeing that somewhat weakened not directly necessarily, but in comparison with other states. We're seeing other states step up in many ways to improve their workforce development skills.

Particularly with the new kind of manufacturing employee that's increasingly required and demanded, which is somebody who can start right out of the gate on the first day of the job with relatively high skills, a certificate, kind of a two-year type degree with technical skills.

We don't have the lowest levels of employment in manufacturing as much as we used to. That may or may not be true for the smallest manufacturers. But the larger companies, they're really in these global markets. They need people really able and willing to come in at a pretty sophisticated level to be productive right out of the gate.

COMMISSIONER SCOTT: I have a question about the reshoring of jobs, and is this a one-to-one kind of comparison? So it's a job that was manufacturing a solar panel in California that became a job manufacturing a solar panel in China. And then when it reshores is it manufacturing the solar panel in California or is it just jobs that left versus jobs that came back?

MS. ROTHROCK: I do not know the direct answer to that question.

COMMISSIONER SCOTT: Okay.

MS. ROTHROCK: I do have a sheet that I will provide to you about how this was developed, because we inquired. We got the information. We said, "We need to really understand how you did this." I just don't have it in front of me, so let me make a note to get it to you.

COMMISSIONER SCOTT: Okay. No problem, thank you.

MR. WINSTON: So I think we're nearing the end of our panel here, in terms of time, but did want to see if there are any additional questions from the Commissioners.

COMMISSIONER SCOTT: I had one more actually, from a couple -- Silvio, you had mentioned it. It was your chart about the year 2016 to 2020 and still being at about 60 percent of the needed housing stock. And you mentioned one reason for that might be that the builders are consolidating, so we don't have as many builders as we used to. They're consolidating and becoming bigger companies and that could be one reason.

But are there other reasons why the forecast stays flat, even though the need for the housing is so strong?

MR. FERRARI: I didn't mean to interpret that the 60 percent or something in that range, would remain flat, because of a lack of ability to find builders to bring the supply online. If that's how it came out, my apologies.

But the reality is if there was a need and ability to get these homes off the ground, the demand would be met. There's no doubt in my mind that with the sophistication of California's home building community, there's no doubt that we would be able to get that done.

I think the forecasts are going to remain flat, because we just don't have the ability for one, to access land. I mean land is continuing to be a hot commodity. It's becoming -- it definitely has a strangle hold on it. And finding certainly in areas where the state has deemed are appropriate places to be building, rezoning, local land approvals are all very, very difficult to come by.

So I mean, when you look at these numbers, a great deal of it is local issues that work in and are in play here that are going to continue to constrain the overall supply. But these forecasts, I think, mirror what we've seen come out from the Department of Finance and others over the next five to ten years.

COMMISSIONER SCOTT: Thanks.

COMMISSIONER MCALLISTER: So I wanted to ask just one final question or sort of observation and question.

So you mentioned the -- we need offsite solar. We need the ability to essentially be more flexible and do better accounting so that we don't have to have PV on every single roof, because that's not always possible. In fact, maybe to the majority it's not. So I totally agree. I guess I'm very open to ideas about what that conversation looks like, because we focus -- Title 24 and our role in it, the Building Energy and Efficiency Standards -- focuses on the property and the building. And you've got to get permission to occupy that building and the local government is doing that for that building and maybe for that development.

The entitlement really is a local government. It's got other agencies involved. That whole process is not really in our bailiwick.

And so if we're going to put together a system to say, "Okay. Those three kilowatts of PV are credited to that house." How does that express its self in a transaction? You know, how does that get accounted for? How does that get enforced? How does that persist over the 30-year lifetime that we use in Title 24 say of that building?

There are a lot of details that is not obvious how we convene a conversation to work that out. And I'm sure there's a role for the Legislature. I suspect there is, but I think it goes beyond that.

And so I'd appreciate any creative thinking about what that regime would look like in some kind of an entitlements process. Or a mitigation process ala Carl Moyer, which is what the Air Quality folks do. I don't know, but I think there's a lot of potential there. But the details really matter. So I'd invite a conversation about that.

MR. FERRARI: Is it okay to comment? Well, I completely agree with everything you said. And hopefully the Legislature in this coming year or this session, this two-year session, will be a place where that conversation will continue to germinate and come to the forefront.

And I think I would probably actually like to even take that conversation around offsite solar beyond just residential. I mean, I think that there's a great need for this in the commercial, industrial, light retail aspect. There are billions of square feet of incredibly useable commercial manufacturing that would benefit from some kind of offsite solar.

I mean we have lots of industrial buildings that themselves have very low energy usage, but they have high energy users right around them. So I think as we've seen this conversation in the last years, when you talk about interested stakeholders, utilities are going to have to be sitting right at the table. And are going to have to want to participate in a healthy conversation and figure out how to come to a solution.

But I certainly think we are going to see in the very near future that discussion heat up again in the building.

CHAIRMAN WEISENMILLER: Yeah, I was just going ask Betty, just in terms of what would be the top three things California government should do to help small businesses?

MS. TOCCOLI: Oh, boy. Can I give you my laundry list?

CHAIRMAN WEISENMILLER: Well, you can give it to me in writing later, but anyway --

(Laughter.)

COMMISSIONER MCALLISTER: Think amongst yourselves.

MS. TOCCOLI: I have to give you my personal wish first. Small business needs something really positive to recharge them, because they're so down and they have kind of quit trying. So we need a really positive campaign, number one. Part of that would be in the area of regulations and most of the regulations have an impact on them negatively. They don't have the attorneys and the accountants to implement things. And I say this to GO-Biz, so I'll say it here. You know, they can't go after the money from California Competes, because they don't have the staff to do that. And they don't have the time to do that.

So second, I would say let's figure out a way to make it easier for them to achieve, so that we can achieve. Because one goes hand-in-hand with the other.

Third, I guess I would say to you I think there's a misconception about how small business feels about energy, environment, and water. They want to participate, but they don't have time. So they react negatively, because we haven't included them soon enough to get their buy-in. And that's true with most government things.

We need better understanding between government agencies and the constituency, which in this instance is small business. So if I could have three wishes, that's what I'd wish for.

CHAIRMAN WEISENMILLER: Okay. Thank you.

Well again, we like to thank all of you for your participation today. And certainly Randall for moderating this, although you don't get to leave yet. There's part two coming.

MR. WINSTON: Thank you, Chair.

And thank you all.

(Break to set up next panel.)

MR. WINSTON: All right and if the Commissioners are ready, we can dive in here to the second portion of this discussion with folks here representing our regional panel. And I'll just go around and ask individuals to say who they are and a bit about themselves. I believe we have one individual on WebEx.

So Wallace, we'll leave you some time to introduce yourself after we have some introductions here. And we'll start with you.

MR. WALROD: Okay. Thank you, Randall

MR. WINSTON: Thank you.

MS. MILLS: Karen Mills for the California Farm Bureau Federation.

MR. BELLISARIO: Jeff Bellisario with the Bay Area Council Economic Institute.

MR. MCRAE: Tim McRae with the Silicon Valley Leadership Group.

MR. WINSTON: And Wallace, go ahead.

MR. WALROD: Thank you. Wallace Walrod, I'm the Chief Economic Advisor at the Orange County Business Council. And I also, at the Southern California Association of Governments, SGAG, I lead a team of independent economists that studies the region.

And I apologize for not being there. I had totally planed on it, but I had a knee injury over the weekend that precluded me from coming up today, so I apologize for that.

MR. WINSTON: No worries, Wallace. I hope you're feeling better.

MR. WALROD: Thank you.

MR. WINSTON: So we're going to dive right in here to questions, similar to what we did in our previous panel, kind of on the state. I think we have this one individual with slides. That's Karen. Is that correct?

MS. MILLS: Correct, that's me.

MR. WINSTON: And we'll maybe as you're responding to the first question, we'll give you some time to walk through the slides.

MS. MILLS: Sure.

MR. WINSTON: So with that, if you could take a moment to describe what major trends in your industry do you expect over the next ten years? And maybe digging a little bit deeper into the area of differences amongst the regions, across California.

So we'll start with you, Karen.

MS. MILLS: Well, anyway thank you very much for the opportunity.

A little bit more literal about the IEPR, because of course my expertise with the Farm Bureau is on energy and electricity issues. Specifically, and of course a really important part of what the IEPR does that we see translated to the PUC, is the forecasting and demand in sales, especially for the agricultural class. And it's become a really important issue for the ag parties at the PUC.

So that the impacts that we're seeing and what happens in trying to predict that, we can look back and see what's happening and predict what might occur in the future too. All that forecasting begins with the CEC. Just next slide real quick, please?

So I always like to just start with an overview of what the Farm Bureau is and California Agricultural Farm Bureau is a bit distinct from other ag organizations, because if its grass roots nature and then the broad range of issues that's covered.

But I always like to not miss an opportunity to highlight the bounty of California agriculture, which responds to some of the other questions what's unique about California. Other places for agriculture, it's the mix of climate, really good soils, and water availability most of the times that we just don’t see anyplace else in the United States and in many cases in the world. Next slide, please.

In terms of predicting demand from the ag sector for electricity use and how you can predict it over the next years, one of the very important pieces of information always is water availability. And because agricultural usage, water pumping usage, I know when the Energy Commission looks at the Agricultural Forecast, it conjoins it in with water pumping in general, which encompasses some of the water agencies.

But for agricultural purposes, the water availability is a key part. We use PG&E as an example, because that's a large part of the ag energy use in the state. It's probably about 60-65 percent, versus some of the other IOUs and the publicly owned utilities. And there's a lot of variability, relative to water availability, so the data's really informative.

But this chart shows generally what happens to ag sales when there are droughts. So you can see, during the period 2006 to 2010, how the usage spikes and then of course after 2012. And that kind of variability isn't seen in other customer groups at the PUC. The next slide, please?

And so we've learned that it's not just the rainfall that's the indicator of demand. But just as important, or more importantly, are the surface water allocations. And as you saw the previous charts a spike in sales, in 2008 to 2009 you can see that there's low allocations here from DWR, is the State Water Project. The correlation, as I said, is most significant for PG&E and less so for Edison. And not so much SDG&E, because they rely on surface water for agricultural uses. Next slide, please.

And so this chart ties the sales and allocations together. It pulls together the Central Valley Project, which is the fed, and the State Water Project's allocations together and puts them in buckets.

But I think particularly clear is in 2014, for the low bucket allocation. They're yellow dots on the water allocations, so they're kind of hard to see, but it's way down low. And then you can see, in contrast, the sales are quite high.

So as you're trying to predict what the demand is for the agricultural sector, water allocations are very important. Of course it's really difficult to forecast that when those allocations are set from year to year and sometimes they change from month to month. But they're a really important predictor of what the demand is. Next slide, please.

So these are some comments from our president, Paul Wenger, he made recently. And water storage of course is a high priority for agriculture in the state, because of the water availability connected with it. You can see, from the previous discussion then, the surface water availability has a big impact on what the electricity demand is for the electric usage by the ag sector. And if there is more storage, it would have an impact on demand as we see it.

And finally the final slide, just as a expectation about what's going happen in the years ahead. And some of the impacts that we'll see on demand is changing time-of-use periods will impact our usage. I mean ag was one of the -- embraced early on -- adjusting their schedules to off-peak periods and whether they're going to be able to do that in the same way with the new structure and the time-of-use rates, we're not so sure.

Sustainable Groundwater Management Act of 2014 is in the process of being eliminated, but certainly its focus is on impacting the groundwater usage in the state. And that's a lot of what drives the demand for the ag sector.

Onsite generation has been increasing significantly with the ag sector with a net energy metering aggregation allowance, where they are able to offset multiple accounts against a single generation facility.

And finally a demand that's unknown for the future is what will happen with marijuana legalization. And how that changes the electricity demand.

So just by way of introduction, thanks.

MR. WINSTON: Do you have any -- on that last point we've sort of been looking for an opportunity to ask some panels about this. But we think this could potentially be a very big new electricity demand. And I guess do you have any preliminary idea of what the scale of this is likely to be?

MS. MILLS: No, I don't. You know, I don't have any figures. I know some of the utilities are looking into it, because as it comes out of the shadows and they do hook up to the Grid, it will change it.

Interestingly, in talking to some of our county farm bureaus, where there's so much grown currently indoors, the question arises, "Well, will they be able to grow outdoors now? Will they be allowed to and will there be more freedom to do that?" And some of their costs won't be as high, because part of apparently what drives the cost so much is because of how it being done indoors and the lights requirements.

But I don't have a scale for it. I know that it's come up in energy efficiency discussions too.

MR. WINSTON: Okay, thanks, great.

So Jeff, the same question to you. Major trends that you're seeing in your industry, throughout the Bay Area over the next ten years, with a little bit of focus on that region. And do feel free to maybe provide some framing remarks first if that would be helpful.

MR. BELLISARIO: Great. And thank you for the opportunity to be here.

Just as background, the Bay Area Council represents about 275 large and small employers in the nine-county Bay Area. We focus on all things from transportation to housing to workforce to water. My group, the Economic Institute, is the nerdy think tank of the Council, so we do a lot of economic projections and thinking about the data and research that goes behind those policy and issues that the council has.

So let me tell you about the three things that we're focused on at the Institute and at the Council. First, as I'm sure you know, the Bay Area economy was and is extremely hot. We led California out of the recession. We led the U.S. out of the recession. The Bay Area, the nine counties grew twice as fast in terms of GDP, since 2010, compared to San Diego, Seattle, L.A. and New York, kind of our peer group.

And San Jose, in San Jose, Santa Clara County, San Mateo, they're the big winners. They've grown their GDP around 9 percent in 2015. That's faster than China, so I kind of want to put that out there as contexts. The Bay Area is growing extremely quickly and we're very happy about that. But I would say our growth is slowing and we knew this would happen.

In January, 2016 month-over-month job growth was 3.7 percent for the nine counties; just announced the other day, December 2016, 2.4. So we're still growing faster than in the U.S. in terms of jobs, faster than California, but I don't think anyone expected us to continue that super-rapid growth.

So my first point the economy is hot, but I would also say it's cooling. That's something to keep in mind. We're not projecting a recession by any means. Fundamentals remain strong, but I think if you look at the cycles something is due over the next ten years. If we're talking about a ten-year forecast I think we've got a through the "R" word in there.

Number two, and I heard this in the last panel, housing affordability, a couple of numbers behind that. In the Bay Area, the nine counties, the cost of living over the last 15 years has gone up 78 percent. Household income has gone up 42 percent. So that 36 percent gap really pushing families further away from job centers, looking for cheaper housing. And also affecting employer groups, they've got to raise wages or they're not able to even attract employees. We've heard that from hospitals. We've heard that from high tech companies. We've heard that from everyone in the employment spectrum.

My third point, while we're the Bay Area Council, we're increasingly thinking about the mega region, which includes where we're sitting right here today in Sacramento. We're seeing 200,000 commuters move between the mega region. We define it as 21 counties with Sacramento and the northern San Joaquin Valley. That's adding the congestion on the roads. But we also see a tremendous opportunity for both the state and the Bay Area to continue to grow into the mega region.

Sacramento is a prime place for more jobs in tech. Northern San Joaquin Valley is growing its warehousing and logistics and transportation industries. So we want to see that Bay Area growth continue to move out to the broader Northern California region. Thank you.

MR. WINSTON: Thank you, Jeff.

Tim.

MR. MCRAE: Hi, so again from the Silicon Valley Leadership Group, I'll just give a brief overview of who we are and whom we represent and how that informs our views on these things.

The Silicon Valley Leadership Group represents roughly 400 tech employers, including clean tech, high tech and biotech. And clean tech representation has increased to about 20 percent of our membership within the past five years.

Silicon Valley Leadership Group was originally called, when we were formed, in 1978, the Santa Clara County Manufacturing Group. And we're no longer just Santa Clara County and we're no longer manufacturing. We don't do as much manufacturing in Silicon Valley. Silicon Valley is now defined to include Santa Clara, San Mateo and San Francisco Counties.

I'll base my remarks on a report that I shared with you. I handed you a copy of the report and I know that there's some extra copies for some other folks at the CEC if they want them. The is the Silicon Valley Competitiveness and Innovation Project, which we update every year, and it compared Silicon Valley as defined by those three counties with five other tech hubs over across the country from Seattle, Austin, Boston, New York City and Southern California.

And broadly, Silicon Valley is doing well. You've heard Bay Area job numbers earlier today and also from Jeff. Very specifically, Santa Clara County job growth in 2016 was 3.5 percent. And that was 37 percent of all Bay Area job growth, so Santa Clara County remains quite strong, within the Bay Area.

Now we have a high concentration of tech jobs in what we call in the Report, innovation industries. Now, that includes industries such as software, internet, biotech, aerospace and information and communication services. And these concentrations are significant higher than competing regions. You'll see a graph at the top of page 10, which describes just highly concentrated our job base is in what we call STEM jobs, science, technology, engineering and math majors working on innovation industry jobs.

And very specifically, over the next ten years, we feel like tech jobs will continue to develop and we'll likely be just as dependent on tech jobs as we have been. And the technologies that we consider sort of hot include robotics, which includes autonomous vehicles and drones; artificial intelligence, which includes a whole array of voice-activated technology; and connected devices and the Internet of Things.

I'll stop there and thank you very much again for having us.

MR. WINSTON: Thank you.

COMMISSIONER MCALLISTER: You know, can I ask a quick question? So I'm looking here at the map here on page 10 and it looks like there are sort of a few competing clusters here. And I'm a little surprised that the number in Southern California is actually higher than the number in Silicon Valley. And I'm sort of wondering what are your thoughts on that? I assume they're kind of different structurally, but I don't really know.

MR. MCRAE: So I think that has to do with overall -- so you're looking at the map -- the chart at the bottom?

COMMISSIONER MCALLISTER: At total innovation jobs, yeah.

MR. MCRAE: Yeah, so at the bottom of page ten, there are total innovation jobs throughout the Southern California region. And the Southern California region is a larger base than the numbers in Silicon Valley.

COMMISSIONER MCALLISTER: I've got you, okay. Thanks.

MR. MCRAE: And I was actually referring to the one at the top of page ten. But just for your information.

COMMISSIONER MCALLISTER: Yeah, thanks for the clarification.

MR. MCRAE: Sure.

COMMISSIONER SCOTT: Just a quick note, we gave copies of the report to both our Public Adviser's Office and our IEPR team to make sure it gets into the docket, so people will be able to see it.

COMMISSIONER MCALLISTER: Actually, if you could provide a link to it, or if it's not already here maybe that'd be even easier to put in the docket instead of scanning and -- so.

MR. MCRAE: The 25 SVICP Report, (phonetic) understood. Ken, we can send that along.

MR. WINSTON: Fantastic, thank you and thank you, Tim.

So we'll move to WebEx. Walsh, if you're still there maybe you can also, in answering the question -- and I'll repeat it -- fill out a bit of

Commissioner McAllister's question with regard to what is happening in Southern California.

And so the question, just to repeat again, major trends in Southern California and industries in Southern California that you expect over the next ten years.

MR. WALROD: Thank you, Randall, I appreciate that. I'm going to have a little bit of a different story. It's a little bit more of a good news, bad news story.

As my colleague from SCAG said earlier, Frank Wen, while Southern California has recovered from the great recession, the peak we were at 12 percent unemployment and we had over a million unemployed workers down there, it's down to 4.7 percent now and we're less than 500,000 unemployed, But we still have a significant number of unemployed seeking work. And Imperial County is a bit of an outlier on the unemployment rate. Their unemployment rate is about 19 percent.

We've recently turned our attention not to just the recovery in terms of the sheer number of jobs, but recovery to the kind of jobs or the quality of jobs. And the truth is that primarily in Southern California, although there are pockets of better-paying jobs, we have been primarily growing lower-paying service sector jobs. And that has had some quite notable startling impacts on our poverty rate that got exacerbated during the Great Recession.

So right now, still, we have about 15 or 16 percent of Southern California residents living in poverty, according to the official federal definition. And then if you include -- Stanford and PPIC have done some good work on the higher cost of living here in California -- in a place like Orange County, we look pretty good, about 10 percent in poverty. But if you take that Stanford PPIC number, it's closer to 20 percent, so almost double. And so we haven't -- we've recovered in terms of number of jobs, but not in terms of the prosperity that we lost during the Great Recession.

And you layer on top of that the likelihood, in a place like Southern California, that the new economy is not only going to create jobs, but it will eliminate some jobs too in the form of the factors that were just mentioned: automation, robotics, artificial intelligence and machine learning.

And if you haven't seen McKinsey,

Brookings, some researchers at Oxford and Stanford, have done some really good work on that. And McKinsey's the one on top of mind, that in the next decades with existing technology -- not with any new technology -- that 45 percent or so of jobs are automatable, whether they will be automated or not is the question. So in terms of Southern California, we want to make sure that the region isn't left behind from the rest of the state.

And we do face some unique challenges compared to the Bay Area. For example, on income, Bay Area is 42 percent higher than the SCAG region, that's the nine-county Bay Area region.

And in terms of education, in the Bay Area it's about 45.2 percent of a bachelors or higher, SCAG region is 29.6 percent. The converse in the Bay Area, high school or below is about 29 percent, and in the SCAG region it's over 42 percent.

So we do face these unique challenges and for that lower educated workforce, we've been focusing on five clusters: construction, logistics and goods movement, finance, insurance, real estate, manufacturing and health care.

And it's a concern to us that some of the state policies are limiting growth in that area, especially in Southern California, so Southern California is still emerging from that recession. And we still have a ways to go in the region in order to get back to a good place.

So I could go into individual counties if you'd like now or later, but that's sort of the story and the picture from down here in Southern California.

MR. WINSTON: Commissioners, any questions?

CHAIRMAN WEISENMILLER: Yeah, I've certainly been down there. Again, I think the question in part would be obviously -- I was going to say most of Californians are below the Wilshire Boulevard and has been this great migration out to the Inland Empire Area. But yeah, every time I've been there it's been pretty clear it's very hard hit.

And so part of the question again is sort of what are the top three things the state could do to help in those areas?

MR. WALROD: Sure, I think it all starts with education. We do have a skilled workforce, but we're concerned that -- specially the good-paying jobs are going to require higher and higher levels of education. And on that metric the Bay Area is not only ahead of us, but continues to grow. So we spend a lot of time on education in workforce issues.

And these next two are some -- actually all three of these are somewhat interrelated. We think that we need to apply much more in the innovation economy that the Bay Area is a world leader in. So that sort of entrepreneurial innovative part of our region, which starts at the University of California and other large research institutions, needs to be continued to be supported.

And then the one thing that we do have in common is housing affordability, is just as big an issue if not a bigger issue here in Southern California. It leads to some of those folks that you talked about moving from L.A. and Orange County, out to the Inland Empire. But the issue that we're facing, specifically here in Orange County, and L.A. County is facing some of this as well, is it's one thing for those folks to move there and commute back in for jobs here. But we're increasing seeing a lot of our millennial population moving outside of the state.

And housing plays a very, very large role in there, and having more housing options, a greater supply of housing would go a long way to fixing that exodus of we educate and train them here. And then unfortunately they look elsewhere to where they're going to start their careers and start their families.

So those are the three biggest issues in the areas we need support on.

MR. WINSTON: Thank you for that, Wallace.

And I'll -- maybe since you have the floor, start here with you with the next question and move to the rest of the panel, because you started to touch on it. What impact could California's environmental regulations have on Southern California's economy and the business and industries that you described?

MR. WALROD: Sure, I think at a very high level I think what the business community -- and this is not just large corporations, but entrepreneurancy -- is some level of certainty. And that's traditionally been in the state of having reliable, affordable power.

And I was struck by -- and I'll take this in a context primarily about fuel and energy -- seeing Dorothy's numbers of the higher rates in California for industrial, commercial and residential. It wasn't just the absolute amount of the divergence, but it was the trend and that seemed to be inflecting up. And that does send messages to companies that are in the state about competitiveness.

But it also sends those messages to companies out of state. And to entrepreneurs who are thinking about moving here.

So to the extent that your business in several of these sectors that I mentioned that are key sectors for us -- specifically manufacturing, and logistics and goods movement. Our manufacturing, a major consumer of electricity and goods movement, obviously in the transpiration industry, major consumer of fuel, so to the extent that we can do a better job of making power and fuel costs more reliable, more affordable and not subject to spikes, that would go a long way to making the state more competitive.

In specifically, Southern California.

MR. WINSTON: Thank you.

Tim, Silicon Valley, the impact of potential environmental regulations?

MR. MCRAE: Sure. So we represent a lot of clean tech companies who's bottom lines benefit when there is environmental regulation. And so we often have the opportunity to applaud those regulations. But we also represent companies that are impacted by regulation, such as computer displays and monitors.

There was a Computer Display and Monitor Standard that the CEC just promulgated recently, and we work very closely with colleagues at the Information Technology Industry Council -- who participated in a technical group with the CEC staff and we were very happy to see that they were able to come to an agreement that we were able to support.

And I understand that there's still an issue with test procedure for automatic brightness control testing, just to note that. But assuming that those conversations continue to go well, we are happy to participate and have our industries play the role that they are willing to play, if appropriately balanced.

MR. WINSTON: Thank you.

COMMISSIONER MCALLISTER: I want to just highlight also, so I want to thank Silicon Valley Leadership Group for your support and your nice Op-Ed beforehand.

And also just again point out the real constructive process we have to engage stakeholders and just note that that's a real priority for us. And in the case of ITI's participation, it was critical to have them on board. And to have everybody from their individual members all the way over to NRDC, sort of engaged in a transparent process that really got us to a place where we were sharing. We all understood what the facts were and we were able to have a conversation based on those facts to get to a point that was really in everybody's best interest.

And the effort from industry and the rest of the stakeholders was really key to get that done.

Again, I think it's just a good process that we have in California that we need to do everything we can to keep going in that way and to help others replicate to the extent we can. So thanks for that.

I guess I did lead up to a question that though, actually. I wanted to kind of talk about the -- yeah, well so and then on the test procedure -- yeah, you brought that up. So that's absolutely we made a point of committing to working that through and that certainly will happen. If it doesn't then I'd like to know then how I can help make sure it does.

I guess one maybe nuance, I'm not sure, about this environmental regulation question. Is, you know when you're got a high tech economy and you have a lot of innovation going on, to a certain extent it can be good for industry. Because it allows cultivating of a brand, that sort of the California brand.

And I guess I'm wondering, you see a lot of play about that in the media and, you know, I'd like that there's something to that. I'm wondering from the business community -- from my perspective both as a consumer and sort of person in this industry I think there's a beauty to some of these products that they perform well. They're better products. If we're talking about LEDs or we're talking about computers that no longer have fans and are smaller and have a great form factor and have lots of battery autonomy. Those functionality aspects make them into better products.

So I guess I'm wondering how much credence to give, you think we should give that kind of California brand, in terms of what we're driving is good for, can be good for, is good for consumers, good for the environment and also can be good for business. You know how much reality is there to that?

MR. MCRAE: So I haven't done research to try to figure out to figure, okay is the California brand the one that sells? We definitely do have companies that are proud to be located in California, proud to be promoting their products that meet the California standards that are often the most aggressive standards and the most ambitious standards.

But I think that in that sense, people would see this as a test market and sort of like it worked here, okay we can sell that elsewhere. But I don't know that necessarily they would say, "We just have to be in California to be the California brand."

I mean there's an extent to that, but I would say more that they just want to say that they're cutting edge. And to the extent that California's the cutting edge, yes.

MR. WINSTON: Yes.

Jeff, same question and maybe filling out a little bit of Commissioner McAllister's follow on question.

MR. BELLISARIO: I would echo Tim's comments. I think the high tech industry, when we think about Santa Clara County, San Mateo County, San Francisco, those companies are able to absorb any regulation that adds cost and potentially higher prices for their products, right? And even if they can't they're such high margin businesses that to them it doesn't necessarily matter.

But I would point to manufacturing, to logistics, even health care to a certain extent. And these are the industries that we see in Alameda County and Contra Costa County, San Joaquin County, where those are much lower margin businesses, dependent on volume. So potentially percentage point margin businesses and where those regulations may add cost in those industries, that's where I think we see business decisions and business dynamics changing where a company will say, "I'm not going to locate in California. I'm going to chose Oregon or Nevada or Texas, because of some of the regulations that are placed on top of me."

But if the question is about high tech, I think I have to agree that the California brand and as a millennial, sadly me, I think that does have value across the country to a certain extent.

MS. MILLS: So the regulatory regulations, of an environmental ilk covers a wide range of topics. And so I've been sitting and thinking what do I focus on, because there's so many that impact agriculture.

One key point to keep in mind, as I'm listening to passing on costs, of course agriculture is a pin ne of a price taker. We can't pass on our costs. Our markets are all commodity-based and set on a worldwide market. So when our costs go up, we have to figure out how to be creative or cut costs in other ways to do things.

I want to get to Commissioner McAllister's point before I move on to other things. And with respect to the California brand, it should matter. We wish it would matter more, because California brand, food grown in California is the safest, most regulated food product that there is in the world. And should be seen as the preferred choice across the country and everywhere. And I think that's becoming more and more important to folks.

And keep in mind that there's a very high percentage, over 80 percent, of the farms and ranches in California, are family owned. And so when the environmental regulations increase it's a big burden on these small businesses.

The paperwork burden is huge. I think one of the hardest parts about compliance is the amount of paperwork the they have to do, the time that's spent, the complexity associated with it. And in some rural areas the challenges faced with having to everything online.

And the impacts of that is in some cases are that they've got to spend all their time doing that. It doesn't leave them time to do innovative things, whether you're talking about using technologies to manage their irrigation load or something like that. It just pulls away from the ability to do some of those things.

One of the key environmental regulations that was put in legislation last year, 1383, that impacts the dairies. The dairies are looking at significant environmental regulations over the next few years. Of course, there's going to be some real focus on trying to help dairies figure out a way to meet the requirements related to methane.

But that's certainly going to be a key focus for the agricultural community over the next few years. So the dairies are looking hard at how they can remain viable and to meet all those costs and regulations.

COMMISSIONER MCALLISTER: So I think we,

you know, optimally we like to hear well-baked ideas for how to overcome some of these barriers.

I guess to the extent that these are the environmental regs are -- or really any reg in California -- I think there's a pretty straightforward process at least there often is just to understand these as in society's benefit. So there are reasons why we think the state overall is better off with X regulation.

So then it becomes how do we optimally implement that regulation? And in the last panel we talked about financing. You know how do we sort of help businesses comply with the regulations in ways that either don't disrupt or minimize the disruption of their businesses?

And any ideas you have about that kind of thing and what kind of support. Okay, hammer regulation, more cost, you know you have to deal with that with your customers. But how can there be some kind of a partnership to help your members to adapt to new regulations in ways that actually make it easier. Or help in some other way like branding or like compliance systems or something like that?

You know, you don't have to answer now, but just think about that. It'd be good to -- I think that's a conversation increasingly we're going to have as we move towards our long-term goals. How can we sort of hold hands on making sure that there's a cost neutrality to some of this stuff? And that we utilize the state's resources in kind of creating new partnerships, bringing private capital and that kind of thing.

So just kind of a big thought, but I think it's going to be more important.

MR. WINSTON: And if there are any responses to that feel free to weigh in, or we can move on.

MS. MILLS: Just real quick, and some of the obvious things are just time to address changes, making sure that there's a fairly long glide path in order to do it. Flexibility, figuring out how to address the regulations. And to the extent that there is funding available that people need to change their operations in order to adapt, that there is funding for programs and that you identify ways that people are going to adapt to those before you implement them.

And I'm thinking in part of the change in time-of-use periods that particularly impact work that I'm doing. And I'm looking at our members who have just spent 20-30 years adapting to a certain structure. And then how do they respond to new periods and how much time do they have to deal with it? So time and flexibility are important.

MR. MCRAE: I'll mention briefly --

MR. WALROD: This is Wallace.

MR. WINSTON: Go ahead Wallace.

MR. WALROD: Sorry go ahead. No, no, go ahead.

MR. MCRAE: So, Tim McRae. One thing that we thought about for financing, there are energy financing programs at the CEC, at the Clean Center of the Infrastructure and Economic Development Bank and at the Treasurer's Office, which we feel could be better coordinated and better promoted.

And if there was a single office that had that as their goal, and we think that would be best housed in GO-Biz, we think that that would be a really positive step forward.

And it could be a place that private financers could go and learn what's going on at these programs and advance those conversations. So that private sector understands what's going on with these plans and learns from what the state's doing. So that's one thing that we'd like to see. And we'd be happy to talk about it with you offline, if you'd like to learn more.

MR. WALROD: One idea, this is Wallace, one idea I had -- and this is maybe on a little bit different level and a little bit more all encompassing -- is I was thinking maybe some regional. Because the story is somewhat different down here in Southern California than some other parts of the state, that maybe some regional workshops down here might pay a lot of benefits, a lot of dividends.

In that setting and whether you did one at the regional level or one in some of our counties, a few in some of our counties, you would get a chance to hear directly from some of our business owners who don't always make it up to Sacramento. And they would have an opportunity to hear you guys and your very refreshing perspective. And I do appreciate your perspective on trying to balance these somewhat complex issues.

So that's just an idea I had of that some regional workshops down here, I think, would be a fantastic idea. And we'd be totally onboard to help you guys or support in any way we can.

CHAIRMAN WEISENMILLER: No, that'd be good.

I know Fran Newman, (phonetic) have been on a couple of tours through the business community in Southern California over the years. And again it's probably getting time to do another one, and basically Inland Empire.

MR. WALROD: Yeah, thank you.

CHAIRMAN WEISENMILLER: I mean typically Fran and I hit four or five places in Southern California.

MR. WALROD: Yeah, we've got a lot of stuff see down here.

MR. WINSTON: Great.

So maybe pivoting here to another line of questioning, as it were. On energy efficiency, so is the state's energy efficiency policy having a significant impact on businesses in your region; and if so, how?

We'll start with Karen.

MS. MILLS: So energy efficiency for the ag sector, I've been trying to spend a little bit more time focusing on it the last year or two. It's a complex process to delve into. It's very challenging for the ag sector because it's so diverse and there is no -- you can't just switch out a bunch of light bulbs or improve the HVAC system for it -- so it's been a challenge.

And I think as we look to new and improved ways of doing energy efficiency and increasing what the requirements are for energy efficiency, we need to look at delivering the results. And what kind of products you're looking, at a little bit differently in terms of energy efficiency and processes. And how to fund those and what's appropriate. And in looking at what the savings are that's delivered.

In the ag sector, there's been particular examples that the ag community is very supportive of. And then it's sort of been pushed off to the side and it's like the one item that everybody can deliver on. So I think that there needs to be a new examination for it.

There's been some real successes in the past. But as we learn more and more about some of the processes, we need to be a little bit more open and flexible about what we consider energy efficiency tools and what producers can receive funding for.

There's a lot of technologies out there for example that help marry energy and water efficiencies and applications for those, but it's not a thing. It's a software-deliverable that is a funding service, so things like that need to be changed. But it's an important piece and we need to continue developing that.

COMMISSIONER MCALLISTER: A couple of questions, I'll ask them both right now. Does the agricultural industry find sort of industry-specific research? Is there a research entity that everybody contributes to and they focus on some of these issues or something? It's big enough one would think that would be a -- yeah, maybe that's at the universities, but --

MS. MILLS: Right, so in terms of specifically for water and irrigation and that focus, there's one at Fresno and there's Cal Poly and Chico. And, of course, Davis has some programs too that are funded, but they're funded at those levels rather than individually.

COMMISSIONER MCALLISTER: Yeah. Okay, and there are industry partnerships that sort of fund some of those efforts I would imagine. And so I mean (indiscernible) individuals --

CHAIRMAN WEISENMILLER: The Farm Extension service always has had a good deal of activity trying to --

COMMISSIONER MCALLISTER: Oh, sure. Yeah.

MS. MILLS: Right, through the outreach, yeah. The Extension Service is the outreach to the individuals, sight.

COMMISSIONER MCALLISTER: So I'm sort of applying other models to this area that I don't know much about. But it seems like given the massive part of our economy that that is, it would be fertile to sort of help getting industry focused on cutting edge technologies and funding development of those. And if they need state participation in that conversation, I imagine there's a way to do that.

I guess, the second thing I wanted to ask was, "Does your group include the processing sort of agricultural produce processing, food processing?

MS. MILLS: No, I mean they do and that's certainly there are members, but our focus is on production agriculture.

COMMISSIONER MCALLISTER: Production agriculture, okay. I guess I'm trying to ask about natural gas savings and process loads and stuff like that, which I think are a big source.

MS. MILLS: Right, California League of Food Processors focuses on that law.

COMMISSIONER MCALLISTER: Okay.

MS. MILLS: There are some on-farm

processing, if you want to call it that. It's not really processing per se, but it is applications that's required in order to deliver the product like walnut hullers, almond hullers, rice driers, that type of thing. And there's been a lot of innovations with those. And that's an important part of the load these days.

COMMISSIONER MCALLISTER: Okay.

MS. MILLS: And there's a lot of technology that's been incorporated into those facilities over the years in order to streamline and make them more efficient.

COMMISSIONER MCALLISTER: Yeah, yeah. I'm thinking of refrigeration and heating, you know, sort of natural gasses.

MS. MILLS: Yeah, packing sheds. Packing sheds do and a lot of times those are on-farm too, are the packing facilities and a --

COMMISSIONER MCALLISTER: Okay.

MR. WINSTON: Great, thank you.

Jeff?

MR. BELLISARIO: I have kind of two different answers to this question. And I would say that a lot of our Silicon Valley-based members that have very, very large data centers, that are huge users of electricity. And they're always looking at energy efficiency as a way to drive costs out of their cost structure.

I'd also say again that the high margin, innovative tech businesses that we have, they see this as an opportunity. Whenever energy efficiency rules come down, there's a way to make money for many of those tech companies that have the patents, or the inventions, or the ideas behind that.

The second part of my answer totally different is on housing and looking at energy efficiency and new building developments. We do represent a lot of developers in the Bay Area. And again, as I mentioned in my opening comments, housing affordability is a key issue with the lack of supply. And as we talk to developers, a lot of that has to do with the cost to build. And it's not just energy efficiency by any means, but every penny or dollar that gets added makes that housing development equation stretched a little bit more.

So one of the ideas we have is looking at developments around transit-oriented developments that are supposed to be low energy or low impact by nature. People are taking buses and trains instead of cars.

Maybe there's some flexibility added in those developments to allow those buildings to be slightly less efficient. We agree that energy efficiency is important. But if there's a way to drive costs out of those buildings and get them built quicker, more cheaply, we see that as a potential opportunity.

COMMISSIONER MCALLISTER: Well, so in the last panel we heard about how the development community -- CBIA was saying, "Okay, boy. Builders are getting bigger and bigger, because they need to be bigger to have more capital and decrease risk overall and with more diverse portfolio," etcetera. And I think your builder members are going to be looking at developments that are significant with capital intensive, in the new construction arena.

I guess part of our policy, a key part or our energy policy in the state, has to do with our existing buildings and how to improve their performance. And this is one area that keeps me up at night.

And I guess I'm wondering do you have ideas about how we can engage the contractor community and the local governments. And kind of you know it's a different ecosystem that touches our existing buildings, but how do we get that done? Because there are actually more energy savings in the existing buildings potentially, than -- and you know and they already exist and they're already using energy. They're not in construction.

So we need creative thought there and I think you'd be a great partner to think some of that through.

MR. BELLISARIO: And I wish I had a great answer for you, but we deal mostly with the developers and less with the contractors. I would say though, that there's a huge opportunity in adding more workforce in the construction arena. I think, as we talk to developers they always say, "Our labor costs are so high, because there's so few groups to go to the build these buildings."

And I don't know if it's training or some type of new regulation that comes down that makes this an opportunity. And makes people think, "Hey, I want to go into energy retrofits."

I don't have the answer, but I totally agree that looking at existing buildings is key and could be a good source of new jobs. Especially if we're thinking about recession sometime down the road, I think there are a lot of people especially in the middle skill to lower skill spectrum, where construction jobs might make sense. And energy jobs can sense there as well.

MR. WINSTON: Great. Thank you, Jeff.

Tim?

MR. MCRAE: So Jeff covered largely what I would have to say about Silicon Valley and the Silicon Valley Leadership Group. We represent a lot of folks who have large corporate campuses and run large data centers and CEC programs have helped those businesses. I'll highlight three just briefly.

Lighting Efficiency Incentives, people have taken a lot of advantage of those. Retro commissioning programs such as the Existing Building Reparations and Maintenance, or EBAM, when you talk about existing buildings. I know, of several of our members that have taken advantage of those and were fans.

And then the Self-Generation Incentive Program has been able to promote a variety of self-generation technologies, which can make it so that people don't have to rely as much on the overall grid. And as we don't have the builders, that is not as much our emphasis. So we look at these and we see lots of positives.

MR. WINSTON: Great, thank you.

And Wallace, on WebEx, if you would like to chime in as well?

MR. WALROD: Yeah, very briefly. I think there has, in Southern California, been a significant amount of investment activity in the energy efficiency space. And part of that is because we've had to because of the closing of San Onofre and other capacity issues.

But in my opinion, efficiency is such low-hanging fruit that I think we're just scratching the surface. And I would echo existing buildings, but also the emerging areas of the Internet of Things. And the sort of data analytics allows us to do much more sophisticated energy efficiency that's somewhat, not just reactive, but somewhat proactive or dynamic in terms of the energy efficiency possibilities that I think it's a huge area, very fruitful.

So you have willing listeners down here.

CHAIRMAN WEISENMILLER: Well, certainly UC Irvine is trying a lot of interesting things on the Internet of Things. That's better connected.

MR. WALROD: They sure are. Yeah, G.P. Li and some other people there for sure. We're very lucky at UC Irvine, I'm glad you brought that up, with the Advanced Power and Energy Program, with the Internet of Things. And with the new smart Grid development in the faculty housing at UCI, there's a lot of very exciting things going on at UCI in this space.

CHAIRMAN WEISENMILLER: Yeah, basically one of the things I wanted to at least kick off, although given the time it's probably better for longer conversations with folks with Andrew later. But I know talking to the Chairman Nichols, she's always concerned about -- obviously, a lot of our energy efficiency programs are focused on buildings: new buildings, existing buildings, appliances -- and so trying to encourage us to think more broadly: ag, industry, process uses.

And that's certainly something that Commissioner McAllister is interested in diving into. But again it's sort of getting the time or the form for those conversations.

COMMISSIONER MCALLISTER: And so I totally agree with that. And partly it's just figuring out how to fit it into all of the workflows. And having a spent a big chunk of my career doing industrial energy efficiency, it is very contextually specific. You know, every plant's a little bit different and finding the right partner is always difficult. And as Dorothy said, in the previous panel, the payback expectations tend to be pretty short.

Down on the Border, I mean those maquiladoras, those guys are here today, gone tomorrow and they're volatile. And it's a global marketplace out there, so but all that said I think we have a huge economy. And we have a lot of these people and we have industry organizations that are responsible. And I think we need to engage on ag, and on manufacturing, and try to push the ball forward. There's a lot to work with. Then there's a huge amount of energy potential.

And also, I would encourage people to think about natural gas. In an industry and certainly the post processing of agricultural production we focus a lot of the Grid. That's because we feel like we know about that than this building maybe, but we need to get the carbon savings better associated with natural gas. And that's particularly challenging, because gas is cheap.

So any ideas anybody has about that and who good partners would be to work through those issues, begin a conversation, that would be great.

MR. WINSTON: Great, and we have just a few minutes left here. I wanted to see Chair Weisenmiller, Commissioner McAllister, any final questions that you might have for the panelists?

CHAIRMAN WEISENMILLER: We both try and I think we just now have teed up sort of what I would call our questions going forward.

I think certainly part of the messaging is figuring out ways to engage better with the business community and the agricultural community throughout the state, in trying to find the right forums or means to have those conversations.

Obviously, we talked about energy efficiency. Obviously, Silicon Valley is ground zero in a lot of respects for workplace charging. You know, I mean when I've been there I've been amazed at the amount of workplace charging. And certainly we lost -- (indiscernible) scheduling Tyson and Janea, but so it's near and dear to their hearts. So trying to figure out how to move in that direction will be good. So I think that's another thing, thinking about going forward, how to make progress there.

But and certainly again I think

encouraging people to figure out where the issues are, how we can move the needle. Obviously we're sort of at the two year, so anyway trying to figure out things we can do in that period of time that can make an impact.

COMMISSIONER MCALLISTER: Yeah, and I pretty much have gotten my comments out. I don't know that I need to wrap up too much here, because as we've gone along we've gotten a lot of rich conversations sort of started.

I guess, just backing up a little bit, a 50,000-foot perspective, going forward in the traditional program regime with the Self-Generation Incentive Program, the California Solar Initiative and the ratepayer incentives for this or that energy efficiency, those are all great. I mean, those are bread and butter programs for the state that have I think represented really executed well public-private partnerships, good policy, iterative improvement. We now have a lot of skills in doing those kinds of programs and that's all for the good.

Going forward, I think mostly well really up to now mostly it's been private capital, but we've been very proactive with sort of like okay here's where we're going and we're going to throw some money at this.

You know I think I'm increasingly encouraged at the level of broad engagement, sort of civic engagement, and stakeholder engagement in a lot of these processes. And you know, the capital requirements are going to go up and not down, to sort of get to our long-term goals in 2030/2050. And yet we have a big economy. There's a lot of private capital.

So I feel like the challenge before us is we have to continue to get the policy right. We have to optimize. But we also have to figure out how to create these spaces. We've talked about it in a couple of different contexts, but create these spaces for stakeholders to get together to be proactive. And try to move the ball and attract capital and condition marketplaces to actually want the things that we're developing and trying to sell.

That's certainly the case of energy efficiency. I think it's the case in EVs where there's a lot of success on the horizon, but long-term I think that has to be a solution, otherwise we're not going to get the scale. It has to be private capital in some combination of policy and profit motive to get us long-term to get the technology we need that's clean.

And so I look forward to -- we're in the IEPR, we're talking about the basis for the forecasts for the next ten years -- but really I think these conversations are important for much broader reasons than specifically to the forecast. That's really how our economy is going to develop going forward and decrease its carbon intensity over a longer period of time now.

CHAIRMAN WEISENMILLER: Yeah, I guess I should also mention the question of international, because as you know, California's like 1 percent of the world's greenhouse gas emissions. So we're pushing the needle, but basically, unless we can connect to say China and India it's game over.

And so certainly the Governor's done the historic trade mission to China. We're trying to, GO-Biz and I have been sort of focused on trying to help companies connect to China, particularly the clean technology folks. We did a trade mission last fall that did seven cities in ten days.

So basically again trying to figure out how to connect on some of the global markets. So maybe Mexico's another one where the Governor's done a trade mission there. Obviously, when we did the trade mission to China, most of the delegates if I remember right, Randall, were from ag.

MR. WINSTON: Yes, yeah.

CHAIRMAN WEISENMILLER: So anyway, it's sort of again we really need to be pushing our technology more on a global scale. Certainly that helps to grow California businesses, but at the same time can to address climate issues on an international basis.

And as I said that's one of the things that certainly GO-Biz is more on point on that, but I've worked pretty closely with them on it. So ideas there too, help.

MR. WINSTON: Great, well thank you Chair and Commissioner McAllister.

I think we are at time here, so I also want to thank our panelists: Wallace on WebEx and Karen and Jeff and Tim for taking your time, sharing your thoughts, expertise and your comments. So I thank you all. And thank you again.

CHAIRMAN WEISENMILLER: Yeah, again I would like to thank you for Chairing these panels. I'd like to thank the participants. You've given us a lot of food for thought.

I don't think -- I was going to at least ask if there's any public comments? My understanding is we don't have any blue cards, but certainly if there are any public comments either in the room or on the line, this would be the time.

MS. RAITT: And I'll just add for folks on WebEx, if you could use the chat function to let our Coordinator know that you have a comment then we can take your comment.

CHAIRMAN WEISENMILLER: Oh, yeah. Heather, are there any others?

COMMISSIONER MCALLISTER: Is there a deadline for written comments, are we expecting written comments?

MS. RAITT: Yes, so requesting written comments by February 7th and the notice gives all the information for how to submit comments.

CHAIRMAN WEISENMILLER: Okay, this meeting is adjourned.

MS. RAITT: Thank you.

(Adjourned at 3:40 P.M.)

REPORTER'S CERTIFICATE

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

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

IN WITNESS WHEREOF, I have hereunto set my hand this 13th day of February, 2017.

Kent Odell
CER**00548

TRANSCRIBER'S CERTIFICATE

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

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

IN WITNESS WHEREOF, I have hereunto set my hand this 13th day of February, 2017.

Myra Severtson
Certified Transcriber
AAERT No. CET**D-852