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CALIFORNIA ENERGY COMMISSION

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Preparation of the)
2012 Integrated Energy Policy)
Report Update (2012 IEPR Update))

Lead Commissioner Workshop on 2012-2022 Revised Staff Electricity and Natural Gas Demand Forecasts

CALIFORNIA ENERGY COMMISSION
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THURSDAY, FEBRUARY 23, 2012
10:00 A.M.

Reported by:
Michael Connolly

COMMISSIONERS PRESENT:

Carla Peterman, IEPR Lead Commissioner
Chair Robert B. Weisenmiller, Energy Commission
Jim Bartridge, Advisor to Commissioner Peterman

STAFF

Suzanne Korosec, IEPR Lead
Chris Kavalec, Demand Analysis Office
Nick Fugate, Demand Analysis Office
Asish Gautum, Demand Analysis Office
Ken Rider, Appliances and Process Energy Office

ALSO PRESENT (* Via telephone)

Analisa Bevan, California Air Resources Board
Hillard Huntington, Stanford University
Tim Vonder, San Diego Gas & Electric
Dina Mackin, CPUC
Herb Emmrich Southern California Gas Company
Sharim Chaudhury, Southern California Edison
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P R O C E E D I N G S

FEBRUARY 23, 2012 10:07 A.M.

MS. KOROSEC: Okay, we are going to get started. Good morning, everyone. I'm Suzanne Korosec. I manage the Energy Commission's Integrated Energy Policy Report Unit. Welcome to the today's workshop on the Energy Commission Staff Revised Electricity and Natural Gas Demand Forecast for 2012 to 2022.

I will just cover a quick housekeeping items before we get started. The restrooms are out in the atrium through the double doors and to your left. We have a snack room on the second floor at the top of the stairs under the white awning. And if there is an emergency and we need to evacuate the building please follow the staff out of the building to the park that is kitty-corner to the building.

Today's workshop is being broadcast through our WebEx conferencing system and parties need to be aware that you are being recorded. We will make an audio recording available on our website in a couple of days after the workshop and we will make a written transcript available in about two weeks. Chris is going to go over today's agenda in a moment but I do want to mention that we plan to take lunch around noon. And after all the afternoon presentations are completed we will have an opportunity for

more general public comment.

During the public comment period we will take comments first from those of you in the room followed by those participating via WebEx. When making comments or when asking questions any time during the workshop today please come up to the center podium and use the microphone so that we can make sure that the people on WebEx can hear you and that your comments are reflected in the transcript. It's also helpful when you come up to speak if you can give our court reporter a business card so that we make sure your name and affiliation are correct. For WebEx participants, you can either use the chat or "raise hand" functions to let our WebEx coordinator know that you would like to make a comment or ask a question and we will either relay your question or we will open your line at the appropriate time. We are also accepting written comments on today's topics until close of business March 1st. And the notice for today's workshop, which is available on the table in the foyer and also on our website, explains the process for submitting comments to the IEPR docket.

So with that I will turn it over to the dais for opening remarks.

COMMISSIONER PETERMAN: Good morning and welcome to everyone here and on the phone to the Electricity and Natural Gas Demand IEPR Workshop. We are happy to have you

all here and appreciate your assistance in helping the Energy Commission continue to develop and improve its electricity and demand forecasts to help us better plan what energy supply we will need going forward. And indeed a number of our state policies can make demand uncertain and as we look forward to better understand expected energy efficiency, electric vehicles and just economic conditions we appreciate your input.

And with that I will turn it over to our Chairman.

CHAIR WEISENMILLER: Again I would like to certainly thank the parties for their participation. This is one of the more important things the Energy Commission does in the IEPR, is to adopt a demand forecast to be used by the other state agencies. And certainly in this one I think we are struggling with probably a greater amount of uncertainty than we have faced historically. As Commissioner Peterman has mentioned, certainly all of us see the econ-demo as being a very critical variable and certainly affecting the forecast. At the same time the state has very vigorous energy efficiency programs and also a very vigorous program now on electric vehicles and also for self-generation. So we are trying to see how all this fits together and to come up with an expected case and then a high and a low case is something we both take very seriously.

And so again certainly I would appreciate your input

on all these factors. Thanks.

MR. KAVALEC: Good morning. I am Chris Kavalec from our Demand Analysis Office. I would like to take a second before we get started to acknowledge the contributions of Tom Gorin. He has recently retired, although he has come back as an annuitant. He couldn't be here today but this is probably the first demand-related forecasting workshop he has missed in 30 years. So, thank you, Tom.

Our report was recently posted. I apologize for the lateness of that posting. It was only a couple of days ago and in our next forecast schedule I will build in more of a cushion there.

Okay, our agenda today, I'm first going to talk about statewide results for electricity and natural gas, including a little bit about the methods we used to do the forecast. Within that presentation I want to work in some comments from our expert panel. We've brought in an expert panel to give a high level assessment of our methodology and steps we might take to change our improve our forecasting methods. We are going to delve a little bit more than we typically do into our electric vehicle forecast. In this forecast we include electric vehicle scenarios developed by the Plug-In Vehicle Collaborative. However, those scenarios may already be a little bit dated, especially since the Air Resources Board has recently revised the zero emission

vehicle mandates.

So Analisa Bevan from the Air Resources Board is here to provide us a scenario she has developed that is consistent with the new ZEV mandates. In other words, assuming the ZEV mandates are met, here is what our vehicle population may look like in the future in terms of the number of plug-in hybrid vehicles, dedicated electric vehicles as well as fuel cell vehicles. And the idea being that we could incorporate this scenario into the final version of our forecast, which will be done in the Spring. Incidentally, this is our revised forecast but we still have room to incorporate comments, make a few changes before the final adopted version of the forecast in the Spring. And we call this California Energy Demand or CED 2011 Revised Forecast.

After the electric vehicle forecast discussion we will have a presentation on conservation and efficiency that goes into the forecast followed by self-generation. And then in the afternoon we will present results for the five major planning areas. And here are the eight planning areas that are included in our forecast, the first five of which we will discuss further this afternoon. And for natural gas we have the three main planning areas and then everything else in the state combined into “other.

So when we produce a forecast what we are producing

are projections for electricity and natural gas; electricity sales and net energy load, meaning we are taking into account transmission and distribution losses; peak demand; energy savings from codes and standards, utility efficiency programs as well as price and other market effects; and self-generation.

To do this forecast here are some of our key inputs. We use survey data to feed our end use models and that means data for appliance saturations as well as average energy consumption in a given year by appliances or end uses. Very critical are our economic-demographic projections that go into the forecast, energy prices, QFER sales data – that's the billing data that we get from the utilities quarterly – and whatever program data is available at the time for efficiency and self-generation.

Now, when we forecast we have individual sector models for the sectors listed here. The residential and commercial models are full end use models, meaning they are bottom-up models. So we are starting from appliance saturations and average annual energy consumption and building up from there. Our industrial model is sort of a hybrid end use econometric model. We have an econometric agricultural model and then the remaining sectors we do with a trend analysis. And the results are aggregated in our summary and peak models. Also for those first three sectors

there we have estimated econometric models and I will talk about how the econometric estimates and results are integrated into the forecast in a minute.

So here is what the overall structure looks like. I couldn't fit in the street lighting and TCU sectors so pretend it's over there on the right. So the residential model is actually made up of two models, a model that predicts the number of homes by type as well as the energy portion of the model. For commercial, we have a model that predicts commercial floor space additions and then the energy model. Results from these sector models are sent to our summary model, where weather adjustments are made. We do some post-processing for utility efficiency programs and we calibrate the results to actual historical data. And then results at the end use level are sent to our peak model, where load shapes are employed and we develop an annual peak for each year. And this chart is so darn impressive that no one dares question our forecast.

(Laughter)

As I mentioned we have integrated econometric models into our forecasting process for the three major sectors as well as peak. We have a predictive model for residential photovoltaics and solar water heating that Asish will talk about a little bit later when we talk about self-generation. This is for the residential sector. For the other sectors

and technologies we use a simple trend analysis, although we are attempting to develop a predictive model for the commercial sector, too. Our forecast incorporates climate change using temperature scenarios developed by the Scripps Institute, more about that in a minute.

Relative to the 2009 forecast, our last adopted forecast, we have included additional efficiency initiatives listed here. We typically make the distinction in our forecast between committed and uncommitted efficiency, committed efficiency being efficiency savings from initiatives that have been finalized, have firm funding and a specific program plan associated with them. In our baseline forecast, which is what we are talking about today, we include only committed efficiency impacts. There are in addition reasonably expected to occur efficiency savings from future programs and codes and standards and so on. Those are not included and we call those uncommitted. But we will be doing additional analysis for uncommitted efficiency later in the year.

In 2009 we spent all our time on refining our electricity efficiency estimates and no time on the natural gas stuff. Well, since then we've updated our natural gas efficiency program estimates out through the year 2012 to the last year of the current IOU program cycles.

We integrate our econometric model results into our

forecast with the end use models in various ways, including using price elasticities estimated in the econometric models. We change the weather adjustment that we make in the commercial end use model to be consistent with what we estimated in our econometric model. We found in our econometric analysis that labor productivity, or the amount of output per unit of labor, has a very significant impact on energy usage in the manufacturing sector. So we incorporated that in our end use industrial model.

Results from our peak model HELM, hourly electric load model, were adjusted using the econometric model to incorporate climate change scenarios that I will talk about in a minute. And we got some funny results for our mining and construction sectors out of the end use model. The results didn't seem to jive with the inputs going in. So we decided to use the econometric results rather than the end use results in these two subsectors.

So, as I said, to adjust for climate change we are using the results from an econometric peak model. In these scenarios developed by Scripps and others what you find is that minimum daily temperatures tend to rise faster than maximum daily temperatures. You know, in our preliminary forecast that we released last summer we also had an adjustment for climate change but that was determined by using the maximum of annual daily maximum temperatures,

okay? Or the annual maximum of daily maximum temperatures, if you can follow that. However, to incorporate rising minimum temperatures we re-estimated this model and included for temperature the annual maximum of daily average temperatures, okay, to incorporate both minimums and maximums. So that gave us a much more significant coefficient and the ultimate result was that we have roughly twice as much in terms of climate change effects in the revised forecast versus the preliminary forecast.

These temperature scenarios were provided by Scripps. We chose one at the high end to use for our high demand scenario and one in the middle for our mid scenario. And our low demand case included no climate change adjustment. Because in these scenarios there is temperature volatility from year to year, as there is in real life, in order to guard against, you know, a temporary drop off in average temperatures in the year 2022, for example, we used a long-term trend for the scenarios from 1990 to 2020 in order to sort of weather-normalize the temperature scenarios so you didn't have dips up and down during the forecast period.

So the variable we used, as I said, was annual maximum daily average temperature. It's listed there as "average631". That means we use 60 percent of today's temperature, 30 percent of yesterday's temperature and 10

percent of the temperature two days previous in order to incorporate heat build-up effects. As in the preliminary forecast, we did three demand scenarios, a high, a mid and a low case. The high case, we have higher economic and demographic growth, brought to us by Global Insight through their optimistic scenario, combined with lower electricity rates, lower efficiency program impacts and self-generation impacts. At the low case, we have basically the opposite of that, lower economic-demographic growth.

In the preliminary forecast we used Economy.com's protracted slump scenario. The problem with that was that in this scenario the levels for the major economic indicators by the end of the forecast period almost reach what they are in the mid scenario, so you don't get much of a spread between the mid scenario and the low scenario. So what we did this time was to combine the protracted slump scenario with lower long-term growth – another scenario of theirs – in order to get more of a spread among the scenarios by the end of the forecast period. And in the mid case we have levels in between the two and that's driven by Economy.com's base case economic forecast.

As I mentioned, we developed a preliminary forecast back in August and since then for this forecast we have updated the economic-demographic projections that we are using. We are now using these two companies, Global Insight

and Economy.com, and they update their forecasts monthly. So we are now using their forecast developed in October of last year. In the preliminary forecast we were using April's forecast. In addition, because of the 2010 census the Department of Finance has revised their estimates of California down significantly for the historical years 2000 to 2010. The census found that there were a lot less people in California than we had thought.

In the preliminary forecast for our population we used for the historic numbers DOF and for population projections we used the growth rates projected by Economy.com in their population forecast, because DOF has not yet updated their long-term forecast since the 2010 census. In other words, what I'm saying is our historic population estimates that go into the model are significantly lower from 2000 to 2010 than they were in the preliminary forecast. However, that really doesn't affect the forecast because we are still using basically the same population growth rates in the forecast period. It does however affect levels of per capita consumption and per capita peak, which I will show in a minute.

All of our econometric models were re-estimated, not just the peak model. As I said, our new climate change formulation using annual maximum of average daily temperatures led to higher impacts on peak, and I will show

that later. We are using a different electric vehicle forecast. In the preliminary forecast we used a forecast coming from our Fuels Office. These new scenarios that we've incorporated that we will talk about later lead to a lower electric vehicle forecast. And we have incorporated the television standards implemented in 2011. Nick will talk about that more in a minute but the bottom line is that savings from these standards are estimated to be around 2600 gigawatt-hours by 2022 statewide.

Finally, on to the summary of results. What I'm going to do is compare our revised forecast, CED 2011 revised, with our 2009 forecast, showing all our new scenarios versus the 2009 forecast, and then compare the mid case for the preliminary forecast, the mid case for our revised forecast, and the 2009 forecast, to get all three forecasts in there. And that comparison makes the most sense in the latter case because all those scenarios, the two mid cases and the 2009 forecast, are using Economy.com's baseline forecast at the time. So they are the best point of comparison.

Relative to the 2009 forecast, not surprisingly we have a lower starting point for consumption because the recession was worse than had been anticipated. And in addition 2010 and 2011 were relatively cool weather years, which reduced demand, and slightly lower growth from 2011 to

2020 in our mid scenario versus 2009. And this comes from the additional savings that are included in our forecast this time from Huffman Lighting coded through our Title XX regulations, television standards, as well as a lower electric vehicle forecast. And versus our preliminary 2011 forecast, we have lower consumption in all three of the scenarios, the high, the mid and the low, because of the TV standards and the lower electric vehicle forecast, as I mentioned, as well as very slight lower income growth in the mid case. For the high case, income growth projected by Global Insight has really come down a lot so they are more pessimistic on California's future output/income growth.

In the case of peak demand, we have higher growth versus the 2009 forecast because of climate change impacts. However, the preliminary 2011 forecast, the peak starts off at a lower point. In the preliminary forecast we were estimating 2011 peaks, for the revised forecast we had the actual peak data. When we estimated the peaks using the actual data we found that the peaks were lower than we had anticipated when we did our preliminary forecast. So we have a lower starting point for peak. However, because of additional climate change impacts we have a higher growth rate and with peak basically in the mid cases reaching an identical level in the preliminary and revised forecasts by the end of the forecast period.

A picture of statewide electricity consumption, 2009 versus or three new forecasts, you can see that in the high case we reach the 2009 level by 2019, even though we are starting off at a significantly lower point. In the mid case we reach the 2009 level by the end of the forecast period, 2022. Comparing the three forecasts, the two mid cases, preliminary and revised, and the 2009 forecast, we have similar growth rates in all three of these cases, slightly lower in our newer forecast, the revised mid case, because of the additional savings included.

And if we subtract off self-generation we get to electricity sales, which we are all interested in these days because of renewable requirements, it looks similar to consumption. The growth is a little bit lower because of a higher amount of projected self-generation compared to the 2009 forecast. And in our high case we reach the 2009 level by 2020 instead of 2019. Comparing the three forecasts again, a little bit more of a spread between the preliminary and the revised forecasts because a little bit higher self-generation in the revised forecast versus the preliminary, which Asish will talk about.

Our statewide peak or non-coincident peak – non-coincident means that we are simply adding up the peaks of all the individual planning areas, so it’s not the actual peak for the state as a whole. So we have faster growth in

the mid and the high cases versus the 2009 forecast again because of incorporated climate change effects, which were not included at all in the 2009 forecast, I should mention. Note that in that historical series there, the black line, the very last point is 2011 weather-adjusted or weather-normalized number. Weather-normalized basically means that you are estimating what the peak would have been in a – quote – average weather year. The actual peak in 2011 is lower than the weather-adjusted, it's below the black line there. And that's because 2011 was a relatively cool year.

Comparing the three forecasts again, for our newest forecast in the mid case we have a lower starting point, as I mentioned, but a higher growth rate. So we basically end up where we were in the preliminary forecast by 2022. And in California we always like to show off about our low per capita electricity consumption. And if you look at the overall series there from 1990 on, it's relatively flat. And that's what we predict basically going out into the forecast period, although at the very end in the mid and the low cases we have a slight increase and that comes from the addition of electric vehicles driving up per capita consumption; whereas in the high case we have enough growth, especially in the industrial sector, to push per capita consumption up throughout the forecast period.

Comparing the per capita electricity consumption for

the two mid cases and the 2009 forecast, because of the population adjustment you will note there the dark blue line above the green line – the dark blue line being our newest forecast, the green line being the preliminary forecast – that's the impact that the downward adjustment in population had on per capita consumption, okay? Lower number of people, same amount of energy use, you have a higher per capita consumption. So that amounted to an increase of almost 300 KWh, starting in 2011. We are still well below the national average, which the last time I looked was over 10,000 KWh a year. So we can still be smug about our per capita consumption, maybe just not quite as smug as before.

As I mentioned, we build up our forecast from individual sector models and we find that we have the fastest growth in the residential sector fueled by electric vehicles, most of which are assigned to the residential sector. And of the three main economic sectors, second would be commercial and third industrial, which is relatively flat. Except in the high scenario - Global Insight is very optimistic about industrial growth – so in the high scenario the fastest growth is in the industrial sector.

Comparing the three forecasts again, the two mid cases and the 2009 forecast, residential growth is down from what it was before because of the additional savings from

the television standards and a lower electric vehicle forecast. For the commercial the two mid cases and the 2009 forecast basically have the same growth rates for the preliminary and revised forecasts in the commercial sector, a little bit lower because TV standards do impact the commercial sector, too. Both are higher than the 2009 forecast because employment growth is higher than was projected in 2009. Employment growth is what determines in large part commercial floor space, which determines energy use in the commercial sector.

For the industrial sector, growth rates from 2011 to 2020 are similar in the preliminary and revised mid cases, a little bit lower in our revised case and that's because the price elasticity we estimated in the industrial sector with our econometric models is slightly higher than it was for the preliminary forecast. And both are lower than the 2009 forecast and that's because of lower projected manufacturing growth in the industrial sector. And our other sectors grow roughly at the same rate as population, a little bit below that. So their growth rates over the forecast period are a little bit less than one percent.

A couple of slides about our natural gas forecast. As I say, we do this by planning area, the three major planning areas and other. This is an end user natural gas forecast so it does not include natural gas used for

electricity generation. The forecast is produced with the same end use models we use to produce the electricity forecast. We have not yet estimated econometric models for natural gas to go along with those but we will be doing that. And, as I mentioned before, we have updated the natural gas efficiency program impacts for this forecast.

So here is statewide natural gas consumption. We actually end up with the mid case being higher for the high case for natural gas and that's because Global Insight, which we use for the high case, as I said, their projections for resource extraction are very pessimistic, it declines very quickly. And resource extraction is a very heavy natural gas user. So the result of that is that the high case actually ends up below the mid case, where the projections for resource extraction like oil are not as pessimistic. So all three scenarios are basically above the 2009 forecast because of a higher starting point, more natural gas consumed in 2011 than was anticipated in the 2009 forecast. And again comparing the two mid cases and the 2009 forecast, we are very close.

One point to make about natural gas consumption, growth rates are lower than in the electricity sector for various reasons. But a key reason for that is the impact that the natural gas standards have had or our codes and standards have had on natural gas consumption. Relative to

total consumption they have had more of an impact than they have had for electricity. And that's because with natural gas you can focus on a few key end uses and you're going to get almost all the natural gas consumption, like heating for example. Whereas with electricity you have a more wide variety of end uses and you have new toys using electricity being developed all the time. So you don't get as much as a reduction in electricity demand from the standards as you do with natural gas.

Overall you can see historically we are flat or declining and in the forecast it begins to increase a little bit and that's because we don't incorporate uncommitted standards. So we only have standards going through 2012. Had we incorporated expected impacts of standards not yet implemented we would be a lot more flat in the forecast period, like it looks like history.

A couple of key inputs. You see what happened with the population adjustment. In 2011 basically we are starting out with a population 1.6 million lower than in the preliminary forecast. That's again because of the historical downward adjustment made by the Department of Finance based on the 2010 census. State household total income is rising at a faster rate in the mid and high cases versus 2009. I don't show the preliminary here but in the mid case it would look almost identical, just a tiny bit

higher in terms of growth. The high case, as I mentioned, has come down quite a bit. So you can see in this graph here it is very close to the mid case, whereas in the preliminary forecast it was much higher than the mid case. And for the low case, since we combined the protracted slump in the short-term case with lower long-term growth, we have more of a spread between the mid and the low case than we had in the preliminary forecast.

Another key input, total employment, which drives our commercial floor space projections. We have a lower starting point because the recession was worse than anticipated but faster growth in the mid and high cases versus the 2009 forecast. And you can see that by 2020 in the high case we are almost at the employment level projected in the 2009 forecast with the mid case being a little bit below.

Climate change impacts that I mentioned earlier, this shows the impacts on peak demand for each of the five major planning areas as well as the state total. Down at the bottom, for the mid scenario we have almost a thousand megawatts or two power plants additional impact on peak from climate change, and around 1300 megawatts in the high case. And this is roughly twice as much as we had in the preliminary forecast so that produces higher growth in peak. By the way, PG&E has done something similar for their

forecast, a little bit more sophisticated, they use a lot more scenarios. And I believe in their last forecast the amount of climate change impacts tracks very close to ours, if I remember. So that is a good sign, that we are getting the same answer, or it could just mean that we are both going to be wrong by the same amount.

I also compare our CED 2011 revised forecast done mainly with the end use models with what I'm calling our pure econometric forecast. And that means the results for the commercial, residential and industrial sectors are replaced with the results that come from the econometric models. The same for peak. Peak from the end use model is replaced by the econometric peak model results. And at a statewide level the econometric forecasts give us a slightly higher projection. And the differences – one obvious difference is there are two different approaches, one is aggregate and one is more disaggregate. So you would expect to get some difference.

] Another cause for the difference is the way that efficiency is accounted for. In our end use models we explicitly account for efficiency, whereas with an econometric model unless you have an explicit variable for efficiency, what happens is that your efficiency gets picked up through the trend, either from one of the other explanatory variables or through your time trend variable.

In other words, it's basically projecting the existing trend and efficiency out to the end of the forecast period because you don't have a variable in there for efficiency.

So determining what that trend is or how much efficiency is really incorporated in the econometric forecast is sort of subjective because the effects are carried into all the other variables. Our goal is to be able to explicitly account for efficiency in an econometric model through work being done here as well as the work being done at the CPUC through their macroconsumption metric work. So if we can do this that will give us a much more clear comparison between the end use results and the econometric results.

So consumption is about one percent higher in 2022, peak a little bit more of a difference, around two percent. Although if you took any reasonable confidence interval around these econometric results the end use results would be in the confidence interval. So one reason that we did these econometric models was to be able to compare and see how reasonable our end use forecasts seem, or vice versa. However, these econometric forecasts could be used as additional scenarios if we wanted to. For example, in the high case the econometric results are little bit higher as well. So if we wanted to we could substitute in the high case the econometric results and thereby increase the spread

between the high and low cases. So that's something to think about.

Okay, I'm going to stop temporarily here before I get to electric vehicles and ask if there are any questions or comments.

CHAIR WEISENMILLER: Sure. Thanks, Chris, for the information. I had a couple of questions. One, I will start with more of an announcement, is that part of the IEPR in April we are going to have a workshop looking at the peer research impacts on climate change on the electricity system, or at least the energy system. And so from that we may be able to bring more insight back into how you've done the modeling here for climate change. And, again, that date is not quite set but we are getting pretty close on that. I think certainly it's good this has been incorporated. I think we will quibble somewhat on the no impact in the low case. I assume a more reasonable assumption would be that the impacts are different, although there would be climate change of some sort. So climate change is one of the key variables.

The other one in my mind that I know we are trying to focus on is the econometrics. And you mentioned that they do monthly updates. Without rerunning anything, I was just curious in terms of the more recent forecast how different they are from the October values you used, if you

know.

MR. KAVALEC: They are not very different. Income growth is roughly the same, employment growth is a little bit faster, they are a little bit more optimistic about employment now.

CHAIR WEISENMILLER: Okay. That's good. I'm trying to understand how those are changing. I think one of the other questions was in terms of in the gas model did we look at natural gas for transportation?

MR. KAVALEC: No. That is another loose end that we can tie up for the final version of this forecast. The Fuels Office has a natural gas vehicle forecast that they provided us but not in time to incorporate in this forecast. But it can be included in the final version. Although it's not clear to me whether this is their final version of their natural gas vehicle forecast or not but I will have to check with them.

CHAIR WEISENMILLER: Okay. And I think my final conclusion is certainly the notion of getting a better spread between the low and high cases is great. I think we all realize there is a fair amount of uncertainty and the more we're actually reflecting that I think the more helpful it is for decision makers to understand better some of the uncertainties.

MR. KAVALEC: Okay, before we get to the electric

vehicles, as I mentioned we have employed an expert panel to make an assessment of our modeling methodology and maybe steps we can take going forward. And I would like to ask Hill Huntington, who heads our expert panel, to come up and provide a few brief comments on their initial assessment of our methodology. And, Hill, if you would list the other members of the panel.

MR. HUNTINGTON: Thank you. I'm Hill Huntington with the Energy Modeling Forum at Stanford University. And I've been on this expert panel review. And I should list the other members on it. We have Mark Jaccard from Simon Fraser University in British Columbia; Jim McMahon, who is a private consultant but formerly with the Lawrence Berkeley Laboratories; Alan Sanstad, who is from Lawrence Berkeley Labs; and Carl Linvill, who has been consulting.

Now, as you know, the Commission has a fairly detailed set of end use processes within their model. And we've been looking at that model and we've been looking at the forecast process itself. And, while our review and evaluations at this point are still in progress, I thought I would share with you a few initial perspectives on what we think is happening here.

First, what can we say about the demand forecasts themselves? There is no evidence that we've seen that the end use approach will consistently overpredict or

consistently underpredict the future load growths. There will be times when the model overpredicts it and certain times when it underpredicts it but these are often due to assumptions being made. And I should say these are inherently uncertain assumptions that people always have to make when they put in the forecast. But they don't seem to be due – these variations in the projections don't seem to be due to the type of model being used for this process.

Second, do the forecasts themselves really differ a lot from what the utilities are using? Well, yes, in some cases they do, in some of the more detailed subsectors, but overall there seems to be a certain common element in both the projections coming out the utilities and out of the Commission. Again, we are going to be looking more into that type of issue but for the first cut it seems on some very important issues it doesn't seem to be dramatically different.

The third point both commissioners have already mentioned the key role of the uncertainty in the projections. And we noticed that in some of the earlier runs there was a tendency for perhaps that maybe this process was understating some of the uncertainty. And that's not just the uncertainty that has to do with how effective different energy efficiency programs will be but it has to do with the state of the economy and demographics

and other kinds of technology surprises that you might actually have in the projections.

Fourthly, can something more be done to improve this process of the IEPR? Yes, I suspect, particularly as you go out over time and I suspect that the answer is yes, probably there are elements to do this. I will note that I think the Commission has already been actively promoting some very useful steps. And one of them is kind of this open process where you actually get an open discussion about what's going on behind the different scenarios. And I particularly want to mention the Demand Analysis Working Group, the DAWG as everybody seems to know it. I think that should continue and perhaps we might even want to try to institutionalize that a bit. Because I'm always worried when – right now it seems to be people are spending the time they would because they force themselves to do it. But maybe you might want to try to actually formalize that process a little more, just make sure that it continues on.

And then fifthly, can the models be improved over time? I think again the answer is yes. And I think the energy modeling community has generally gone to a technique called the hybrid modeling, which is combining statistical and end use approaches. And I think there is really a unique opportunity for the Commission to take all the expertise they have on the end use approach and put that

kind of knowledge into a hybrid type of approach that will pick up some of the statistical work. And again, the Commission seems to be moving – they are working quite a bit with econometric and statistical approaches and so I think that lends itself to that approach.

So those are kind of some of the issues that we are really trying to address, particularly as we go forth. And we are going to be exploring them in greater depth in the coming months. And I just want to sort of kind of wrap up my initial comments here to say that we are really encouraging feedback from all workshop participants, particularly on technical matters on how to make this – not only how to improve the forecasts themselves but how to make the whole process of the forecast more of an open exchange of ideas. Because that's after all the real benefit of a modeling point of view, is to open up the discussion. And so I encourage you to make your comments as we go forth. Thanks very much. Are there questions on your part?

CHAIR WEISENMILLER: Yeah, I think again certainly we would like to thank the panel for its involvement in the process and for giving your expertise and your willingness and ability to really dig in and sort of work through the modeling exercise. I guess one of the questions in terms of scope, obviously we've talked today about the sort of sales forecast and peak forecast and also electricity and natural

gas. I'm not sure, you know, how much you've dealt with all pieces of the components or how much you've focused, say, on just sales.

MR. HUNTINGTON: Well, I mean, I will say myself personally, I've been spending a little more time on the electricity than on the natural gas, trying to understand that.

CHAIR WEISENMILLER: Okay.

MR. HUNTINGTON: Just because I just kind of think that way. But I do think the gas is extremely important, particularly given what we are seeing happening in the gas markets continent-wide. I think it's very important to look at those issues.

CHAIR WEISENMILLER: Yeah.

MR. HUNTINGTON: Is that the –

CHAIR WEISENMILLER: That's the major thing. I would certainly encourage you over time to look not just at electricity sales but peak model.

MR. HUNTINGTON: Oh, yeah, yeah.

CHAIR WEISENMILLER: And also between electricity and natural gas to cover obviously all those quadrants.

MR. HUNTINGTON: Good, yeah, excellent.

CHAIR WEISENMILLER: I think the other thing you can help us with over the next couple of years is certainly we have more and more questions from the governor's office and

others about geographical areas. And certainly from a policy perspective one of the key challenges we are looking at is the South Coast. And so over time we have to figure out not just disaggregating the models statewide into the specific utility service territories but trying to really fine tune them some for geographical areas. And so that would be another thing to help us think through in the next couple of years.

MR. HUNTINGTON: Okay.

MR. KAVALEC: Okay, thank you, Hill.

As I mentioned, we want to look a little bit more closely at our electric vehicle forecast. We have one included in this revised forecast right now but as I mentioned we may be revising that forecast for the final adopted version of this forecast. What we included now was scenarios developed by the Plug-in Electric Vehicle Collaborative, which assumes roughly 500,000 electric vehicles on the road, including both plug-in hybrid vehicles and dedicated electric vehicles, by 2020 in their low case and a million in their high case.

So we needed a case out to 2022 so we extrapolated these results out two years and then we distributed the results to our eight planning areas based on Department of Motor Vehicles data. And then we developed our mid case, which is an average of the high and the low. The ultimate

result is that in the mid case relative to 2009 and the preliminary forecast, which basically used the same EV forecast developed by our Fuels Office, were around 1600 gigawatt-hours lower than we were in previous forecasts by 2022.

And here's what it looks like, where most of the growth is happening in the last two or three years of the forecast period. In the mid case we are approaching 4000 gigawatt-hours, whereas in the mid case in the previous forecast we were almost a couple of thousand gigawatt-hours above that.

Okay, so we will now hear from Analisa Bevan, who has graciously agreed to share a scenario she has developed to be consistent with the revised ZEV mandates. And afterwards, after the workshop, we will talk more about incorporating this into our final forecast. So, Analisa?

MS. BEVAN: Good morning. Thank you for this opportunity to share our latest revisions to the Zero Emission Vehicle Program, which are part of a much larger set of changes to our motor vehicle regulations which were adopted by our board in January, just last month. They included the low emission vehicle smog emissions, LEV III, which reduces emissions from criteria pollutants NOx and ROG, our new standards for greenhouse gas emissions and finally major revisions to the Zero Emission Vehicle

Program. So I will go very briefly through the other two parts because they sort of impact ZEV and are really the mother of the whole program.

So the low emission vehicle standards for smog emissions, LEV III, the third time we've come at this, bringing down emissions from the passenger vehicle fleet and light trucks, further reducing their emissions by 70 percent. They are already pretty good but we're taking it down even lower. This reduces smog-forming emissions and particulate emissions. The greenhouse gas emission standards, this is our second run at controlling greenhouse gas emissions from passenger cars. And we've done this in coordination with the federal EPA and the National Highway Traffic Safety Administration, NHTSA. And these standards are now in line with the standards that are proposed by the federal government with an expectation that the federal government will adopt later this summer and we will come back and bring to our board the determination that they are consistent and deemed compliant with the federal standard, adequate for compliance with California standards.

It's important to note in terms of how we look at this for projection of plug-in vehicles that these standards as they are adopted to affect vehicles from 2018 to 2025, it's not assumed that manufacturers need to use plug-in vehicles, either plug-in hybrids or electric vehicles or

even fuel cells to comply with these standards. But the federal program does include some special incentives that make it very attractive to do that. For example, they don't count the upstream emissions associated with electric vehicle use in determining an electric vehicle's compliance toward the standards. So that ends up making that vehicle much more attractive for use in the fleet average.

So now turning to the zero emission vehicle side of things, in 2009 our board asked us to come to them with a report on how we would proceed with the zero emission vehicle regulation beyond its previous flatline point of 2018 with an eye towards how zero emission vehicles could impact or make a big difference in our reaching the 2050 goals of 80 percent reduction in greenhouse gas emissions from passenger cars and light trucks. We did some modeling around what the vehicle fleet would have to look like and how quickly it would need to turnover to meet the reductions.

And this chart, this stack of wedges, shows the mix of vehicles over time, the dark blue area being advanced gasoline vehicles, and then topped with that conventional hybrids, plug-in hybrid, battery electric vehicles and then the yellow part being hydrogen fuel cells. This is a scenario, this is one way to get there. And it was built through a combination of assumptions about vehicle costs,

vehicle performance in terms of greenhouse gas emissions, and projections being made by car companies. It's a very aggressive future scenario. And it indicates that we need to be very seriously commercializing zero emission technologies, hydrogen fuel cells and battery electrics with a strong presence of plug-in hybrids by the 2025 and 2030 time frame. They need to be real options for consumers at that point and very attractive options. Because we need almost a hundred percent sale of these kinds of technologies, electric drive technologies, in the 2050 time frame.

So we took a look at the ZEV regulation with that in mind and have developed a set of standards or set of requirements that get us on that path or get us close to being on that path to commercializing these technologies so that we can see significant transformation of the vehicle fleet by 2050. And the good news is there are lots of ZEVs that have been announced by manufacturers. This is just a snapshot of some of the vehicles that have been announced that are either already on the road or projected to be, or announced to be commercial by 2015, plug-in hybrids, fuel cells, battery electric vehicles, quite a variety.

So when staff came back to the board in January with changes to the zero emission vehicle regulation it was with the following goals in mind: increasing the ZEV requirement

from a relatively low but significant requirement in the 2018 time frame, increasing to 15.4 percent of new cars projected to be zero emission or part of the zero emission vehicle program by 2025. We included more manufacturers initially. It really only required the largest six manufacturers to produce zero emission cars, now it's many more, dipping down into what were previously intermediate volume manufacturers. So the requirement now applies to any car manufacturer selling more than 20,000 vehicles in California per year.

We amended the regulatory credit structure to make it more simple. I won't say that it is simple but it's more simple. We used to offer a one day course on how the ZEV regulation worked; I think we can squeeze that down to maybe two hours now. And we added some flexibility around various aspects of the regulation.

So this slide is sort of the overall projection of the number of vehicles that we expect to see as a result of the regulation and we developed this projection through some assumptions about the kinds of cars manufacturers will make and sort of average a few things. The requirement is actually to product vehicles which are in credit and the requirement is a credit requirement. Some manufacturers, for example, will have a requirement to produce vehicles that earn credits equal to, say, 12 percent of their sales.

And a long range fuel cell vehicle might earn four credits and a short range battery electric vehicle may earn one credit and a credit is calculated on a linear equation between one and four for those zero emission vehicles based on range.

So we have taken the requirement for credits, made some assumptions about the mix of vehicles, assigned an average credit value to the zero emission vehicles that are used, assigned an average credit to the plug-in hybrid vehicles that are used, and from there projected this scenario of the number of vehicles that we will see in California. As I mentioned, it grows from a relatively low and steady number in the early years up to 15.4 percent of annual sales in 2025. And the dashed lines below in the green part of this graph show what the requirement would have looked like if we had not made any changes to the requirement in this last round in January.

So I have broken this down into the different technologies, the different sectors of vehicle types that we expect to see used to comply with the regulation. The red portion of this graph on the top is the plug-in hybrids, which can be used to meet a portion of the regulation. I will back up and get a little complicated for a moment. Of the credit requirement a certain amount – generally about half or more – must be zero emission, pure zero emission

technologies, battery electrics or fuel cells. The remainder can be met with plug-in hybrid vehicles or internal combustion engine vehicles if we want to get very specific. But nobody is really talking about that technology anymore. It's still an option, though.

So a manufacturer has a choice. They can comply with all battery electrics or they can comply with some battery electrics and a whole bunch of plug-in hybrid. So in this chart again we have made assumptions about assuming that manufacturers will take maximum advantage of the plug-in hybrid option and so that's the red portion of the graph. Battery electrics are making up the middle wedge and fuel cells are a very slow but growing population of this compliance strategy.

Just to show you how we split the battery electrics and the fuel cell vehicles in our scenario, I included this graph which shows the percentage split of the wedges that make up the pure zero emission requirement. The blue portion is made of BEVs and the green portion of fuel cell vehicles. The reason the fuel cell vehicles take a dip around 2018, this has more to do with the compliance complexities, advantages of using fuel cells versus battery electrics, as opposed to reality. There are some advantages in the early years between 2012 and 2018 to use fuel cells to comply. It's all a very small number because they earn

more credit in those early years as we are trying to encourage manufacturers to bring out that technology. Then they sort of even out, they start to even out in 2018, the difference between a fuel cell and a battery electric decreases. And so in our assumption in terms of what is advantageous for a manufacturer to use for compliance we assume more battery electrics than fuel cells. But this is the time frame in which we expect manufacturers to commercialize fuel cell vehicles. So to some degree there may be more fuel cells in reality in this time frame.

Since I know you are particularly interested in how many of these cars are going to plug in and use electricity I split this out just to look at the electric vehicles and plug-in hybrid vehicles. And so we've got the growing population of plug-in hybrids and the blue portion at the bottom of battery electrics. In terms of how this compares to what's in the IEPR today, we are calculating about 339,000 cumulative plug-in vehicles by 2020 and 1.4 million by 2025.

Just to back up a little bit, the reason we're driving this regulation to these numbers in particular is to try and get the production volumes up to a point where we start to see savings or dropping in cost of the components that are used to make these cars. When you increase production volume you decrease production cost. And what

we're attempting to do is bring all of the manufacturers to a point where they've got enough vehicles in production that we can see more cost effective application of the technologies, costs come down for consumers and we can consider these technologies commercial enough to then base our next version of the low emission vehicle program, LEV IV, on these technologies and assume that they are necessary for compliance.

So to summarize, the advanced clean car program is reducing urban air pollution and that's our primary focus, secondarily reducing greenhouse gas emissions, an equal but also important goal for CARB. We are really working hard to commercialize these technologies so that our next round of low emission vehicle regulations can rely upon them, we won't need a ZEV regulation we can just use a performance standard to continue to drive down emissions of criteria pollutants and greenhouse gases from passenger cars.

There is another element to this package which included our Clean Fuels Outlet Regulation and that will help improve our future forecasts of vehicle types as we take projections from car companies and ensure that alternative fuel stations are available and our modeling of the cost to consumers and impact to the economy are all positive in terms of the overall package. I want to point out, too, that the Board did not receive significant

opposite from the automakers on any of these three regulatory packages. And this was a fundamental turnaround from past experience. They all agree, as the slide that showed all of the different cars that have been announced, that these technologies are ready to come to market.

The area that they are concerned about, and that we honestly are concerned about too, is consumer uptake. So we see these requirements as a minimum. Clearly car companies are engaged and enthusiastic and excited about putting these cars into market. Many of their forecasts are very aggressive and positive in terms of the number of cars that will come to California and to other parts of the country. But it comes down to how fast consumers will pick them up, how fast will they adopt this technology? If past uptake of advanced technology vehicles is anything to go by, we are doubling, tripling that acceptance rate compared to, say, the Toyota Prius or hybrids in general. And so this is something that we have to watch carefully.

The ZEV regulation is seen as a minimum case. This is the minimum number of ZEVs we will get. The fluctuation between plug-in hybrids, battery electrics and fuel cells is still a little bit squishy but we will get a minimum number. We see that some car companies will blow this away, the ZEV regulation is no longer relevant to them, and we see other car companies with little or no product plan in this area

and they've got some catching up to do. So our goal by 2025 is that everybody is on this playing field with product and it's commercial and consumers can readily take that choice and that they are taking that choice so that we can meet our 2050 GHG goals.

That concludes my presentation.

CHAIR WEISENMILLER: Thank you very much. This has been helpful. I guess I have a couple of questions on follow-up. One of them is, as you heard from Chris earlier, we try to develop a base case then a low case and a high case. And we've been struggling to try to get a reasonable dispersion among those cases. And so I'm trying to understand in terms of your case – I mean, my presumption that that's more of a base case, but then trying to understand how do we construct reasonable low cases and reasonable high cases. But again I think we are all quite happy to have the plug-in hybrid numbers but obviously we're concerned that we just weren't reflecting the new standards.

MS. BEVAN: I think this case could be seen as a conservative low case in some respects. The exception would be if manufacturers really saw all of the infrastructure they needed for hydrogen fuel cells and suddenly went in that direction, that could take away from the battery electric and the plug-in hybrid case or battery electric and plug-in hybrid compliance path. But in the time frame that

we are talking about I don't see that happening. We are working very aggressively to put in hydrogen infrastructure but to see that kind of commercialization eat into these numbers is unlikely.

But we do see manufacturers with many product announcements and a fair amount of excitement around that, which could outpace these requirements. And so I think this could be considered a low to middle case, but a higher case would somehow be developed through projections of these automakers. And we have some of that information from our Clean Fuels Outlet surveys for the next couple of years. How realistic those end up being in terms of – some of the car companies are kind of new to this market and I would like to see them get some product on the road before I put much stock in whether they are right on with their projections.

CHAIR WEISENMILLER: Well certainly any follow-up you can give us on sort of the low, high – you know, again that's -

MS. BEVAN: Yes.

CHAIR WEISENMILLER: The other thing that we need to do is disaggregate these geographically.

MS. BEVAN: Sure.

CHAIR WEISENMILLER: And again we are looking more at utility service territories.

MS. BEVAN: Right.

CHAIR WEISENMILLER: But again I don't know if the Air Board has thought much about, say, the distinction between how much the penetration will be in some place like the South Coast as opposed to, say, the Bay Area as we go forward.

MS. BEVAN: We do think about that. We are heavily lobbied by those areas of the state with the worst air quality to ensure that the ZEV regulation is adopted maybe faster than other parts of the state, and especially in the South Coast, as well as localized incentives and infrastructure development can also drive the directionality of where vehicles are place. Car companies for the most part with the plug-in hybrids especially and the electric vehicles as well have been very open-minded about their placement and marketing for electric vehicles. On the hydrogen side of things it's a little bit different because they are trying to focus infrastructure development.

But that is something that we try to get at in our Clean Fuels Outlet Regulation as well, is where are the cars going and what infrastructure do they need to be marketable?

CHAIR WEISENMILLER: Okay. And obviously the CNG option does not play very high in your plans, is that correct?

MS. BEVAN: Correct. They are not excluded.

Starting in 2018 they won't be a zero emission vehicle compliance path. Up until 2018 they do count as advanced technology partial ZEVs. But we only have one car company taking advantage of that and we haven't been getting significant projections from anybody in our Clean Fuels Outlet Program that they have plans to expand that. I mean, the car companies in general.

CHAIR WEISENMILLER: Okay.

MS. BEVAN: I'm not making any statements about the one company that does have one.

CHAIR WEISENMILLER: Okay.

COMMISSIONER PETERMAN: Thank you very much for being here. And I also found this very useful. So what's the assumed level of compliance with the ZEV mandate that's assumed with this scenario?

MS. BEVAN: The scenario assumes a hundred percent compliance. And our experience in the past is better than a hundred percent in reality. So nobody is out of compliance, everybody has some level of extra credit banked up in our ZEV bank. And, as I mentioned, we've got some car companies who see this regulation as irrelevant, they are far outstripping it and will continue to bank those credits. And other companies are kind of struggling to figure that out. Credit trading is allowed in this regulation so if so if somebody is a laggard they can buy credits from somebody

else.

COMMISSIONER PETERMAN: Okay, thank you. I think that's useful feedback for me as following from the Chair's point about considering what our low case would be.

MS. BEVAN: Yeah, right.

COMMISSIONER PETERMAN: Thank you.

MS. KOROSEC: All right, next we will have Nick Fugate from the Energy Commission's Demand Analysis Office to talk about efficiency considerations in the forecast.

MR. FUGATE: Thank you. I'm Nick Fugate with the Demand Analysis Office. My presentation is not quite as ambitious as the title slide suggests, I'm only talking about efficiency and conservation. Asish will be up next with the self-generation.

So Chris mentioned in his presentation earlier that we consider sort of two flavors of energy efficiency savings, committed and uncommitted. The committed savings come from initiatives that have firm funding in place as well as implementation strategies so we can incorporate those in our forecast. Uncommitted savings are those that, you know, have not been finalized yet or funded and so those are not included in the 2011 revised forecast.

Examples of committed savings are the standards, IOU programs, utility programs that have been approved. So for the IOUs that would be up through 2012 and for the public

owned utilities that's up through 2011. Also we consider price impacts as committed savings as well. And I will be talking about all three of these different types of committed savings.

The building standards we model by adjusting inputs to our models. So in the residential sector that's adjustments to the energy consumption by end use. In the commercial sector it's energy intensity by square foot by end use. Throughout the forecast period as older appliances and buildings decay they are replaced by more efficient appliances and buildings with higher levels of efficiency that meet the standards that are in place. So for each set of standards we have a separate set of adjustments that we make to the UECs and that allows us to estimate the savings from each set of standards by backing them out and then rerunning our models and the different in the level of consumption is our estimate of savings.

We also model the utility program impacts. So we have three scenarios of committed utility program impacts. And we begin with the utility projected savings impacts. So we take those are our high case and then for the low case we apply realization rates that are informed by the CPUC's 2006 to 2009 EM&V results. And for the mid case we apply a separate set of realization rates that splits the difference between the two. We do decay our savings estimates based on

the useful life of measures by end use. And for the IOUs we only decay – for savings that were implemented after 2006 we only decay 50 percent of the savings and that's in keeping with CPUC's decision.

We do something similar for the publicly owned utilities. Our program impacts are modeled in the same way except that we only use first year savings estimates out to 2011. And that just has to do with program funding. So the POUs tend to plan a year ahead whereas the CPUC has a three year planning cycle. So for the IOUs we tend to have a longer committed period for the utility program impacts. And for the POUs we used a similar set of realization rates that was informed by the CPUC's EM&V efforts.

So we also model price and market effects. It's mostly the changes to consumption that come about as rates go up or down. For the 2011 revised forecast we actually did some work updating our elasticities in the model. And so the residential sector model, which had in previous forecasts a fairly low price elasticity, that was increased to eight percent to agree with results that came out of the econometric model that Chris discussed earlier. So that increased the price response in the residential sector.

So here is a graph of the committed consumption savings. And this includes savings from all committed sources: programs, price effects and standards. The high

demand scenario has the lowest amount of program and price effect savings. In 2010 the committed savings represent over 22 percent of consumption and by 2022 the mid case savings are roughly 29 percent of projected consumption.

So here is a similar graph but for peak savings. In the mid case we are looking at about 24 percent reduction to peak demand in 2022. You will notice there is very little difference in the savings scenarios and that's because residential consumption savings totals are – there are sort of two different counteractive effects here. So as rates go up in, you know, the high scenario over the low scenario that increases consumer adoption of efficient measures but also it drives down – the price effect drives down consumption as well. So it brings the scenarios pretty close together.

So Chris mentioned earlier that in addition to standards and rate impacts that we already included in our natural gas forecast, this time around we've developed estimates of utility program impacts as well. And we use a very similar methodology to what we used for the electricity forecast and also included, you know, savings going back to 2006.

Here is a graph of those savings estimates. Again, this includes savings from all committed sources: programs, price effects and standards. The sharp increase in 2009

comes from a similarly sharp increase in natural gas prices. And in the mid case savings here represent nearly 31 percent of projected consumption by 2022.

This table just shows the efficiency savings as a percent of consumption and peak. And you can see that the percentages are higher for natural gas consumption and that reflects something that Chris talked about earlier. You know, in the natural gas forecast there are a few key end uses that are covered by standards and so you have a greater impact of standards.

So television standards are a new revision to our revised forecast. Here I have a list of assumptions that were used to develop our savings estimates, including 2.5 televisions on average per household. And household usage we are estimating at seven hours per day in the residential sector. Commercial usage is 12 hours per day. We also assume that going forward there will not be a continuing market for cathode ray tube televisions. We assumed that screen size remains constant by technology but that said, you know, as old CRTs are being replaced with LCDs, you know, the LCDs generally have much larger screen sizes than older TVs. And so the overall screen size in the existing stock will be increasing over the forecast period. So we also assume that the CRTs will be, you know, the first technology to be replaced by the TVs that meet the standards

followed by, you know, decay of the plasma and pre-standard LCDs.

I just wanted to mention a little bit about where our estimates came from. The seven hours per day per household was originally an estimate that was informed by our Residential Appliance Saturation Survey and then reaffirmed by the EIA's Residential Energy Consumption Survey. That same survey, the EIA survey, also informed our estimate of 2.5 televisions per household on average. And the commercial saturation estimates came out of the 2004 CEUS. And then we adjusted those estimates to, you know, trend with growth in forecasted energy demand.

So here's a table that shows the consumption and peak impacts of the television standard estimated using the assumptions I just talked about. So total savings combining residential and commercial sectors is nearly 2600 gigawatt-hours by 2022.

And with that I will turn to the dais.

CHAIR WEISENMILLER: A couple of questions. In terms of the 2.5, was there a similar number in the RASS survey for the number of TVs per household or was it only EIA?

MR. FUGATE: Well, the number of TVs per household, I believe, came out of the EIA.

CHAIR WEISENMILLER: Right.

MR. FUGATE: The RASS survey has estimates of –

CHAIR WEISENMILLER: Viewing hours. So I'm trying to understand if there is a specific – also a number for number of TVs per household.

MR. FUGATE: I'm not sure. Well, I –

CHAIR WEISENMILLER: That's fine, you can double-check that.

MR. FUGATE: I believe that there is because the RASS survey has viewing hours by, I think, primary, secondary and tertiary TV.

CHAIR WEISENMILLER: Okay.

MR. FUGATE: So, yeah, we would have those estimates.

CHAIR WEISENMILLER: Okay. And have we asked for someone from the appliance group to be here to compare these with the assumptions that we used in adopting the standards? Do we have someone here?

(Affirmative response from audience.)

Great. Would you introduce yourself, please?

MR. RIDER: Hello. My name is Ken Rider. I will give you a business card. In terms of the number of TVs per household, it's not very different than what we used in our rulemaking proceeding. However, the hours of use is fairly significantly different than what we used in estimating savings in the appliance efficiency rulemaking. We used a

Consumer Electronics Association-commissioned study in 2007 as the basis for our hours of use. And instead of, I believe it was, seven hours for the entire household we used a number more along the lines of five hours per television, a little bit more than five hours per television. Given 2.5 televisions per household that yields a significantly higher number of hours of use in a house. So that's one main difference.

And just speaking to the screen size increasing, a recent study was released that shows about one inch per year, the average screen size in the household is growing pretty significantly.

CHAIR WEISENMILLER: So could you provide both the CEA study and that recent survey to the Demand Office?

MR. RIDER: Yes.

CHAIR WEISENMILLER: And actually to submit them to the record would be good, the record of this proceeding.

MR. RIDER: Yes.

CHAIR WEISENMILLER: And do you have any data on what the impacts of the standards have been so far?

MR. RIDER: The standards just took effect at the beginning of last year so we don't have any type of measurement other than that we do have a large database full of compliant TVs. So manufacturers have certified a large number so we know that they are complying with the

standards.

CHAIR WEISENMILLER: Okay. Is there a Tier I and Tier 2 approach on those standards?

MR. RIDER: That's right. So at the beginning of 2013 Tier 2 will take effect. So the Tier 1 took effect January 1, 2011 and Tier 2 will take effect on January 1, 2013.

CHAIR WEISENMILLER: And on the compliance do you see any signals of whether people are moving towards Tier 2 early or not?

MR. RIDER: There are still a significant number of televisions certified to the Energy Commission that do not comply with the Tier 2 standards. The last time I looked I think it was about 75 percent are qualifying for Tier 2 today and 25 percent are still – that's a rough figure – still not complying with Tier 2. And in terms of sales, I have no idea what the sales are for any of these models.

CHAIR WEISENMILLER: Right, sure. Okay. Thank you.

MR. RIDER: Okay.

CHAIR WEISENMILLER: Thanks again.

MR. FUGATE: Thank you.

MS. KOROSEC: Before we move on to our next –- oh, okay.

MR. KAVALEC: About the TV standards, I just wanted to mention that there are a variety of studies out there

that derive hours of daily operation. And what I've seen, we are sort of at the lower end with seven hours and the standards folks are sort of at the high end. What gave us confidence in our number is that we found basically the same number in our RASS as we did with the EIA survey and the EIA is the most recent survey. But that said, we are happy to sit down with the standards folks and talk about this some more and see if we can agree on a number between the both of us to use and we can adjust our forecast results if we need to.

CHAIR WEISENMILLER: That would be great. I'm certainly encouraged the staffs will work together on this in getting a resolution. That would be great. Thanks, Chris.

MS. KOROSEC: Before we move on, we did have a question on one of the phone lines for our last presenter, I believe that was for Analisa. Is our line open? Okay, can you go ahead and ask your question?

(Caller on phone line is barely audible.)

Okay, we're not hearing you. Are you on the phone?

(No response.)

All right, I'm sorry. We are not able to hear you. So we're going to go ahead and move on and maybe you can try again after lunch. Our next presenter is Asish Gautum from our Demand Analysis Office to talk about self-generation in

the forecast.

MR. GAUTUM: Good morning, everyone. My name is Asish Gautum and I will be going over the self-generation forecast.

First, I would like to go over the different data sources we used to build up the private supply forecast. First, we look at all the incentive program data that's out there. This includes the Commission's ERP program, the New Solar Homes Program, the CSI, and these three programs fund the photovoltaics. We also track data from the SGIP program and similar programs offered by POUs, mainly focusing on photovoltaics. We also look at our QFER database for large industrial and commercial users reporting to us. The reporting size threshold for QFER is one megawatt so the reports under QFER tend to be primarily in the large industrial mining and refinery sectors. Finally, the peak and energy impacts are estimated based on program evaluation reports of the CSI and SGIP programs.

Some of the changes between the preliminary and revised forecasts, we corrected for some data entry errors in the QFER reporting, updated program data for the CSI, New Solar Homes Program, the new Solar Hot Water Program and new data from the POUs. We also updated our capacity and peak factors from the CSI and SGIP evaluation reports. These two reports were done after the preliminary forecast so we

weren't able to incorporate them.

Next I would like to go over some of how the forecast is actually conducted. For the residential we have a new predictive model for photovoltaic and solar hot water. It's based on work done by NREL from the solar DS deployment model. Photovoltaic system costs and performance data come from EIA. Solar hot water system cost and performance come from a study undertaken by the PUC when they were establishing the Solar Hot Water Program.

The residential model works mainly through calculating payback periods and applying it to a diffusion model. So we have different results by the demand cases because of differences in fuel rates, the number of homes.

For the non-residential sector we weren't able to complete a predictive model and so we are using a trend analysis, which is similar to what we did in the last report. One difference between the 2009 and the revised forecast is that in the 2009 forecast we tried to calculate the average rate of additions and in the preliminary and revised forecasts, because we have a little bit longer historic data, we calculated growth rates and grew installed capacity as of 2010 by these growth rates and then applied capacity and peak factors from CSI and SGIP evaluation reports to get the energy and peak impacts.

For the rest of my slides I will be focusing on the

installed PV capacity and we will be going over the non-PV and PV energy and peak impacts in the main presentation for each of the planning areas.

This graph is the statewide PV capacity as compiled for the different program data. The 2009 report is slightly above all three cases in their early part because we had higher growth rates relying on the earlier part of the program and during the early 2009 report. The low case is above the 2009 forecast by 2016 and then the mid case is above the 2009 report after 2018, as well as the high case. In 2022 the statewide PV capacity was estimated to be just over 3100 megawatts in the low demand case. In the mid demand case it was estimated to be about 2800 megawatts and just under 2600 megawatts in the high demand case.

Next we have a similar graph for PG&E. The 2009 report has higher stock in the early part of the forecast due to the higher growth rates in the early part of the program when we finished the 2009 report. The growth rates were the residential housing counts and so residential housing counts and electricity prices. In the low demand we have higher prices and so we have higher adoption. And the high case has lower prices and so we have lower adoption. By 2022 for PG&E we expect just about 1400 megawatts in the low case and just under 1300 megawatts in the mid case and just under 1200 megawatts in the high case. And all three

cases are above the 2009 report by 2020.

For Edison, again all three cases are above the 2009 report. This has to do with revisions and updates to the CSI data. By 2022 we are expecting 1400 megawatts in the low case and just under 1300 megawatts in the mid and 1180 megawatts in the high demand case.

For SDG&E, just like Edison, all three cases are above the 2009 report and it has to do with the higher rate of growth during the update. In the mid case we expect 300 megawatts, the low case has just under 350 megawatts and the high case just about 275 megawatts.

Similar for SMUD, all three cases are above the 2009 report. One of the reasons has to do with better reporting from each of the POUs to the Commission. The reporting didn't start until after the 2009 forecast was done so the 2009 forecast was based off a much lower rate of growth that we have seen historically. By 2022 we expect just over 80 megawatts in the low demand case and just about under 70 megawatts for the other two cases.

Next for LADWP, while we were reviewing the 2009 forecast we discovered some data entry errors and so correcting for that all three cases are below the 2009 report, just under 150 megawatts. The residential sector doesn't respond as much because residential electricity rates are pretty close to each other and the housing stock

is not that different from one another.

I was trying to look at why the PG&E growth rates were higher in the 2009 report and at least one of the reasons we found was that there has been a higher rate of cancellation in PG&E than the other two utilities. So I think that kind of explains why PG&E had a higher growth in the 2009 report than in what we have today.

As far as next steps, we want to finish work on the non-residential sector predictive models. We had a workshop last week on CHP and one of the challenges has been to get a good idea of the installed capacity of CHP and we have a much better database from the ICF report and we were trying to align our data with what ICF has managed to report regarding CHP capacity. Other developments would be to monitor for progress toward the goals in CHP procurement per the CHP settlement and also the SGIP program, which has now allowed combustion-based technologies to receive funding. And so we will be monitoring for activity in that program as well as monitoring programs for certification to the Commission for the AB 1613 feed-in tariff for CHP.

And that is my presentation so if there are any questions.

COMMISSIONER PETERMAN: Thank you very much for that presentation. I think those are good next steps and particularly the ones pertaining to CHP. It was a very good

workshop and it started to lay the groundwork for what we are going to be doing over the next year or two in terms of further refining and understanding the potential for CHP in the state.

I did have one question about the forecast for PV adoption. So if we continue to see PV prices decline over time and at the same time we see an increase in revenue requirements and retail rates for the utilities there could be the opportunity for this tipping point where you will see a much greater adoption of PV as it becomes more economic for homeowners. And so in the assumptions for each utility in terms of PV adoption, is that potential embedded in that? Is that going to change the adoption rate?

MR. GAUTUM: Yes. We do have some scenarios on PV installed costs. For this forecast we used the mid case from EIA but we could do other cases and we did have the scenarios on the electricity rates. So in general, yeah, the higher the rates, the more the savings and the lower costs tend to result in higher adoption.

COMMISSIONER PETERMAN: Well, I would appreciate when the utilities comment on their forecast if they can comment in particular on that issue, potential for that tipping point in the next five to ten years and whether they think these forecasts appropriately reflect that. Thank you.

MR. GAUTUM: Thank you.

MS. KOROSEC: All right, we have come to our lunch break. So we will reconvene at one o'clock and talk about the individual utility forecasts. Thank you.

(Lunch recess at 12:00 p.m. until 1:00 p.m.)

A F T E R N O O N S E S S I O N

1:06 P.M.

MS. KOROSEC: All right, we're going to go ahead and get started again. We are starting off this afternoon with Chris Kavalec to talk about staff forecast results for SDG&E planning area.

MR. KAVALEC: Okay, we are starting out with the San Diego Gas and Electric electricity forecast. And we find that in general growth in electricity demand and peak is highest in the San Diego area among the five major planning areas we are going to talk about today. There are three main reasons for that. We have higher population growth in San Diego versus the other five planning areas. Economy.com is telling us that there is very low out-migration in San Diego County with very health in-migration. Employment is strong, especially for skilled employees in San Diego and manufacturing growth is relatively strong, especially in construction and food and beverage sectors in San Diego.

Some adders and subtractors to the forecast listed in the next two bullets, climate change, photovoltaic, TV standards and EVs. And percentagewise the biggest impact comes from PV adoption and its impact on peak, three to four percent.

Here are the three scenarios versus the 2009 forecast. And we see the high scenario going above the 2009

forecast by 2015, even though it's starting at a lower point, and the mid case scenario matches the 2009 forecast by 2018. Now, comparing the three forecasts, the two mid cases and the 2009 forecast, we end up basically in the same place by 2020 for all three forecasts, higher growth in the preliminary and the revised forecasts versus 2009.

Roughly the same story for electricity sales, a little bit lower growth rate because of the increase in self-generation. The three forecasts again, a little bit lower than the 2009 forecast because we have more self-generation versus the 2009 forecast. The revised forecast is a little bit above the mid by the end of the forecast period. The revised forecast a little above the preliminary mid by the end of the forecast period because of lightly more self-generation.

For peak demand we are starting at a lower point versus the 2009 forecast but we have faster growth in the mid and high cases because of climate change and relatively high residential growth. Since residential growth or residential use is peak year, when you have an increase in residential growth it has more than a disproportionate effect – more than proportionate effect on peak demand. And comparing the mid cases again, the latest mid case is well above the two previous forecasts by 2020 and that's because of increase in climate change effects that I talked about

this morning and also because we made some modifications, some corrections to the way our residential model develops new versus existing housing. And the upshot of all of that – I won't go into the technical details – but you end up with more residential consumption. If any of the forecasters are interested I can provide you details of that change.

We use the idea of a load factor to examine whether our load is getting peak year overall. So a low load factor means that the peak is rising relative to average hourly usage. So in general a low load factor is not good because it means less efficient use of resources. For San Diego you will note the general downward trend, occurring mainly because of migration to inland in San Diego County, thus more air conditioning. The revised forecast continues that trend basically out until the very end, when you have more and more electric vehicles that increase the load factor. And the reason for that is that electric vehicles have an impact on consumption/sales but based on our assumptions not much impact on peak. So therefore the load factor goes up.

Per capita consumption, the new forecast versus the 2009 forecast. Again we see the electric vehicles pushing up the per capita consumption towards the end of the forecast period and remaining or continuing in an increasing trend in the high case because of all the industrial growth.

Again here you see the adjustment we make, or the impact that the adjustment we made on population has on per capita consumption. We're basically in 2011 increasing per capita consumption by around 300 kilowatt-hours per year.

In terms of the individual sectors, the fastest growth – as I alluded to earlier – is in the residential sector followed by commercial and industrial among the three major sectors. Each of these growth rates is highest among the five planning areas for these sectors. Residential consumption growth is faster compared to previous forecasts, as I mentioned, with the adjustment we made to the residential end use model and the increased climate change impacts. And that has a more than proportionate effect on peak growth. Very high growth in the industrial sector as in the other planning areas in the high demand case, which is a key reason why the high is above the mid, comes from the industrial growth. And as in the statewide case, average annual growth for agricultural and TCU/streetlighting sectors is a little bit less than one percent.

A couple of key inputs. Household population, because of the adjustment based on the 2010 census, we lose about 170,000 people in SDG&E's planning area in 2011. But, again, the growth rates are roughly the same between the preliminary and revised forecasts and a little bit higher

than the 2009 forecast. Income per household, roughly the same growth rates in the mid and the high cases versus the 2009 forecast. On the other hand, commercial floor space for all three scenarios is growing at a faster rate versus the 2009 forecast and this is due to the impact of fast growth in employment projected for San Diego County.

Now, comparing it to the econometric forecast, by 2022 for sales – again, the econometric forecast means the commercial, residential and industrial end use model results are replaced by the econometric results – unlike other planning areas, the econometric forecast ends up a little bit lower than the end use forecast for San Diego, almost two percent in 2022. For peak it's a lot closer, a little bit less than one percent by 2022. For efficiency impacts, we are projecting additional gigawatt-hour savings of around 2500 between 2011 and 2022 from codes and standards, efficiency programs and price and market effects.

Self-generation peak impacts, Asish gave you the projected PV capacities for San Diego and that contributes to the total self-generation peak impacts to the tune of about 100 megawatts between 2011 and 2022. You see the sort of dip there after 2016 or the flattening after 2016 and that's happening because of the expiration of the federal tax credit for self-generation.

And finally, electric vehicles, I show the three

scenarios from the revised forecast here, high, mid and low. And also shown there is the mid case from the preliminary forecast, which came from the Fuels Office. So you will see that between the two mid cases, the preliminary and the mid, we are losing about 120 gigawatt-hours or so for electric vehicles.

So before I ask San Diego if they have any comments I will ask the commissioners if they have any questions or comments.

CHAIR WEISENMILLER: Yes. Chris, I just wanted to ask in terms of how did you go about disaggregating the EV numbers across the service territories?

MR. KAVALEC: That was just taking the DMV numbers

CHAIR WEISENMILLER: Okay.

MR. KAVALEC: For total vehicles by planning area.

CHAIR WEISENMILLER: Okay. Obviously, SDG&E is trying to do a lot in the EV space so it would be interesting to see if they have suggestions on how to capture that.

MR. KAVALEC: Yeah, and I agree we need to do something a little bit more sophisticated in terms of distributing the electric vehicles among the planning areas.

Okay, so San Diego, do you guys have any comments?

MR. VONDER: Thank you, Chris and commissioners. I am Tim Vonder with San Diego Gas and Electric in our

forecasting area. And my compadre from the gas side, Herb Emmrich, is with me today. I'm going to comment on electric and Herb might comment on gas.

This has been a very good and worthwhile forecasting effort. In short, we really find nothing in staff's forecast of our service territory that gives us major problems. We really have no negative criticisms about the forecast. It seems to be very reasonable. But there are a few areas that I would like to comment on that could use some tuning up or improvements, either between now and the final forecast or maybe as we get ready for the next IEPR cycle. Just three areas.

First is the EV load. I think, as we know, Chris has revised from the preliminary the EV load and actually brought it down a little and then also slowed down the acceptance and the implementation of electric vehicles in the state and in our service territory. But we did, you know, include EVs in our forecast when we filed our forecast in April of last year. And at that time 2011 was a forecast. And as it turns out we recognize now that we were very optimistic about EVs in our service territory. We are kind of a proud service territory, especially when it comes to new technologies. And so when Chris decided to lower his forecast we felt, you know, comfortable with that.

But in taking a look at some anecdotal evidence that

will turn into factual and published evidence in a while, we noticed that in 2011 the rate of purchasing electric vehicles in San Diego County is higher than what is currently assumed in staff's forecast. In looking at their forecast detail for electric vehicles we find that when Chris worked with the information that he had at hand and did the very best he could he allocated 10 percent of the total EV load to our service territory, like he said, following the number of cars that are in San Diego County.

Well, this anecdotal evidence that we see now states that the number of rebates that people receive for purchasing an electric vehicle in the State of California from the State of California, 20 percent of those rebates for 2011 went to San Diego County. So if 10 percent of the load in Chris' allocation of EV load went to our service territory but yet it looks like 20 percent of the rebates are going to San Diego County, then it kind of gives us an indication that maybe the acceptance rate and implementation rate in San Diego is a little higher than what's in the forecast. So, I mean, we don't have any really hard evidence yet to help improve the forecast but it's just kind of an observation at this time, that it could use some tuning up and we would be happy to help if we can.

The other thing that I wanted to comment on is climate change. San Diego is kind of unique. We are a

coastal town. And as staff as recognized, the weather in San Diego County when they looked at it over the recent history and compared it to the long-term history actually the overall weather in San Diego County is getting cooler rather than warmer. And Chris tells me that they didn't make an upward adjustment in our forecast in the energy portion to reflect climate change because we are getting cooler but in the demand section of the forecast there is an increase. And I'm not going to say that that wasn't justified or isn't correct because it very well may be correct.

But it does point out that we have to work a little harder to try to understand how climate change can affect peak days because, you know, peak days only happen once a year and there may be different weather conditions historically around peak days that tell a different story than just overall annual weather. So we can see that, you know, it's quite possible for us to be getting cooler generally speaking but maybe on peak days there is a climate effect. And I think that between now and the next IEPR cycle we should probably take a more careful look at that to see if there is something going on there that we haven't noticed or understand.

The last comment I would like to make has to do with how to deal with the concept of uncommitted energy

efficiency. Uncommitted energy efficiency is not included in staff's forecast and I can well understand why. But yet it is something that when we get to the long-term resource planning phase it does become relevant and it does become important. And I guess one way of pointing that out would be to take a look at his graphs 16 and 17, I think, that has to do with comparing the econometric model to the end use model for our service territory.

And you would notice there that the end use model projects a higher consumption and a higher peak than the econometric model. Well, I don't know if this is a hundred percent correct but I'm sure it's buried in there someplace that, in the end use model you have no uncommitted energy efficiency but in the econometric it's buried in the history someplace, as Chris pointed out. So in the projection, you know, all of energy efficiency is included. So if energy is included in the projection from the econometric model in those out years from 2013 and beyond you would get a lower forecast. Whereas the end use model doesn't include it and you would probably have a higher forecast.

So I can't say that that entire difference is due to something of that nature but it's in there someplace. And as we go to the LTPP process we need to have a good understanding of what that uncommitted energy efficiency savings really are. So I would like to suggest that as part

of the IEPR demand forecasting process that we at least make an attempt to identify the portion of uncommitted energy efficiency that can be considered in the long-term planning process. And that would be really that portion of the uncommitted that could be seen as being economic, feasible and reliable, which suggests that as they are developing uncommitted energy efficiency goals and targets there is some subset of that amount, that total amount, in the goal and target that would be considered economic, feasible and reliable. And if that amount could be separated out and then maybe not added to the end use forecast but at least displayed in the table as going forward together with the forecast to the next stage of the process I think that would help a lot.

CHAIR WEISENMILLER: I don't know. I think your hypothesis on the difference between the two models is probably wrong, but it's something we need to dig into. My understanding from the PUC is they are seeing progressively less benefits from energy efficiency. Actually, that was what Big Bold was supposed to deal with. But certainly the Navigant study is again echoing this notion that we are getting to declining returns from the conservation programs. And so that certainly influences the role of energy efficiency. But if that's true, that we're getting less bang for our buck, then presumably that would not support

the econometric picking up that, impressive amounts.

MR. VONDER: Right. Except that it's in the history.

CHAIR WEISENMILLER: Well, but if the history is much bigger savings, say, in 2005 than 2010 then I would think that, you know, again you are not going to be capturing those effects. Or if you are you are going to be fooling yourself.

(Another participant asks to be recognized.)

Go ahead.

THE REPORTER: You will need to speak into the microphone.

CHAIR WEISENMILLER: Come up to the microphone, sure.

MS. MACKIN: Hi. My name is Dina Mackin and I am with the Energy Division at CPUC. I have been the manager of the potential study process that is due to complete in the next couple of weeks.

And I wanted to clarify the point about what we're seeing in the incremental market potential, which is that while we have seen the above-code program potential to be decreasing, a lot of these decreases are attributed to the fact that a significant portion of the energy efficiency savings has been adopted by code. So when you look at the combination of codes and standards with above-code IOU

program market potential it actually is continuing to increase. So just to clarify that point and to also say that this data set will be imminently available for us to review and consider for the incremental uncommitted.

CHAIR WEISENMILLER: That's great. Thanks for the clarification and certainly we would welcome the submittal of that in our record so we would try to build that into the forecast.

MS. MACKIN: Great.

CHAIR WEISENMILLER: Thanks.

Herb?

MR. EMMRICH: Commissioners, thank you very much for giving us the opportunity to present our views. We have reviewed the forecast by staff. It's a very good and extensive effort. We appreciate the fact that we were able to participate.

Generally the forecast for SoCal Gas and San Diego are good forecasts, especially in the long term. But as in every year when you come out with the forecast we believe that you underestimate the energy efficiency savings. And I think it's because the staff assumes only the three year program cycle that is actually approved. And we continue to assume that the funding for energy efficiency will not go away and I think the PUC will confirm that. This is not a program that ends after three years, it will go on forever

and ever and ever.

The other item, the long-term gas price forecast, we are okay with that. We do believe in the short term that events have overtaken the forecast. The gas prices are two-fifty, two-sixty a million BTU at the California border. The staff report has much higher prices for 2011, 2012 and 2013. They may look at that to revise that. We are in the process of developing the California gas support for all of California with PG&E, Edison, San Diego, Southwest Gas and Long Beach. So we will have a new forecast out on gas demand for the state by July 1st.

The one issue I brought up several meetings ago is the IEUS survey, which is still stuck on dead center. It's more than two or three years late now and we have no movement. So whatever you can do to help that process along and we can actually go out there and find out what kind of devices are out there that can maybe be used to reduce energy demand. And if we have a good survey with good information we can target our energy efficiency programs better. Thank you.

CHAIR WEISENMILLER: Thank you. I guess the one question I have for you as well as for Edison, obviously the South Coast is talking about basically pushing combustion out of the basin. And, you know, I assume that could affect gas sales and also at the same time flip electric sales.

Now, that's obviously I'd say more in the next decade But how do you consider that in your forecast?

MR. EMMRICH: We look at that. But all the measures that they are advocating are not cost effective by a large stretch of the imagination. For instance, residential water heating, to turn that into electric would be like a million dollars a ton of CO2 and NOx. That's not cost effective. So my personal belief is that will not happen. You know, there will be tighter energy efficiency standards by the Commission and the stationary sources are a very small portion of the problem, it's mainly the mobile sources that have to be controlled. And I think California is moving in that direction.

CHAIR WEISENMILLER: And I guess, Chris, I'm just assuming our baseline forecast doesn't consider the sort of South Coast push at all?

MR. KAVALEC: No.

CHAIR WEISENMILLER: Okay.

MR. KAVALEC: It's just the end user side.

CHAIR WEISENMILLER: Yeah, just to get it on the record.

And do you have a CNG forecast on the transportation sector?

MR. EMMRICH: Yes, we do.

CHAIR WEISENMILLER: I don't know if that's been

submitted to the record here.

MR. KAVALEC: When you filed your forms did you submit the vehicle forecast with that?

MR. EMMRICH: I assume so. But I can check to make sure.

CHAIR WEISENMILLER: Yes

MR. EMMRICH: Because it comes from a different group, they actually do their own forecast, the ones that do the marketing for NGVs.

CHAIR WEISENMILLER: Sure. And if there is a recent one that would be good to get that in the record.

MR. EMMRICH: All right.

CHAIR WEISENMILLER: Thanks.

MR. EMMRICH: Thank you very much.

MR. KAVALEC: Just a couple of quick responses to the issues Tim raised. In terms of the amount of electric vehicles currently in San Diego, I agree that the method I used was sort of a blunt instrument, to base it on the total number of vehicles in San Diego. But I believe the DMV records actually break out by fuel type. So what we could do is within the planning areas we could start out with the actual number of electric vehicles registered in each planning area so that we are at least starting at the right point.

You made a good point about the climate change-

induced energy increases versus peak. What we have typically done is to increase the number of cooling degree days during the forecast period by the ratio of cooling degree days, average cooling degree days in the last 12 years versus the last 30 years. So if cooling degree days have been increasing in the last 12 years then you have an increase in energy from climate change. However, for San Diego it's actually been decreasing, as Tim mentioned. So there was no adjustment to energy for climate change.

However, in the future what I think would be better to do would be to use the econometric model directly then include degree days as an explanatory variable, estimate changes in degree days in the scenarios provided by Scripps, and then estimate energy effects using the econometric modeling instead of the way that we're doing it now.

In terms of what is being captured in the econometric forecast, as Commissioner Weisenmiller alluded to, it's really picking up whatever current trend you have. So it's going to miss – if there's going to be a sharp increase in efficiency impacts in the future it's not going to capture that or if there is going to be a sharp drop off in the future it's not going to capture that.

Okay, we will now move on to our friends at Southern California Edison. In general we are sort of the opposite of San Diego, we have the lowest projected rate of growth

between 2011 and 2022 for consumption, sales and peak. And that's happening because of relatively low manufacturing and agricultural growth, the lowest employment and therefore commercial floor space growth among the three IOUs, and the peak growth is higher than sales or consumption growth because of relatively high residential growth, which increases the peak more than proportionately. Adders and subtractors, again the largest percentage effect again being the PV adoption and its impact on the peak, 170 to 210 megawatts by the end of the forecast period.

The three new forecasts versus the 2009 forecast, in our high case we are just about reaching the 2009 forecast by 2020, although we're starting at a significantly lower point, as you can see. Comparing the two mid cases and the 2009 forecast, we are lower than in the 2009 forecast and the rate of growth is slightly lower because of the increased savings incorporated into the forecast.

Lower rates of growth for sales relative to consumption because of the increase in self-generation versus the 2009 forecast. Same situation for the three forecasts as we saw for consumption, although the spread between the preliminary and the revised forecast is a little bit bigger because for the revised forecast we have more self-generation for Southern California Edison.

Peak demand is growing faster than the 2009 forecast

in the high and mid scenarios and the high scenario basically reaching the 2009 forecast by 2020. Unlike consumption and sales, we have peak demand growing at a faster rate in the preliminary forecast versus the revised forecast and that's because of the additional climate change impacts.

Load factors, like we saw in San Diego, basically in decline as we've had more growth inland in the Edison service territory and that trend continues in all three of these forecasts. You can see that in 2011 there how the dark blue line is above the other two and that's because 2011 was a relatively cool year so we had a relatively high load factor for that year. But it quickly goes back down to the long-term trend, although at the very end in the preliminary and revised forecasts there is a leveling off or a little bit of an increase because of the impact of electric vehicles.

Per capita consumption, the little nudge we get from electric vehicles towards the end of the forecast period in the mid and the low cases. Again the impact of downward adjustment in population, around 300 kilowatt-hours higher in terms of per capita consumption in 2011 versus the previous two forecasts.

And the individual sector forecasts, highest growth again in the residential sector followed by commercial – and

this is the mid case for the revised forecast – and basically flat growth in the industrial sector. I mentioned earlier, relatively high residential consumption growth so you get relatively high peak versus consumption growth. The manufacturing sector is growing at the lowest rate among the three IOUs and so total energy use in the manufacturing sector is actually declining so that's contributing to lower growth in the mid and the low cases versus the other planning areas. In the agricultural sector, unlike the San Diego forecast, the growth in agricultural energy use is expected to be relatively flat with the other sectors growing at around the rate of population.

The population adjustment means we subtract around 600,000 folks in 2011 from the Edison service territory but, again, the same rate of growth is in the preliminary forecast for household population. By the way, I should probably explain that. It's household population rather than total population because it does not include the group quarters institutionalized population, it's people that are living in households.

Income growth is higher than in the 2009 forecast and you can see Global Insight brought their income projections down to the point in the high case where it's basically equal to the mid case by the end of the forecast period.

Unlike San Diego, the rate of growth for commercial floor space fueled by employment is lower in all three scenarios versus the 2009 forecast, which is why we have lower commercial energy forecast compared to San Diego and the other planning areas.

Now, when we get to our comparison with econometric we see that the econometric is almost three percent higher in 2022, although in the peak case we are much closer. So this may be a little bit of a cause for concern. It's a relatively high spread so, you know, it's possible we may want to use the econometric version of the Edison mid case, that's a possibility and we can talk about that, if we want to be risk averse in our forecast. But I should say, you know, that we as staff recommend using the end use results because we like the ability to model our assumptions explicitly within the model for efficiency and self-generation. But I think the econometric forecasts are equally good and valid forecasts.

Efficiency impacts increasing from 9.5 to 10.5 thousand gigawatt-hours between 2011 and 2022 from our codes and standards programs and price and market effects. Peak impacts from self-generation fueled by an increase from photovoltaic adoption by 300 to 450 megawatts, depending on the scenario, between 2011 and 2022. Much higher peak impacts you will notice than in 2009.

And here is the electric vehicle forecast. And again I've put in the red there the mid case for the preliminary forecast so there is a drop off of around 700 gigawatt-hours for Edison because of a lower electric vehicle forecast versus the preliminary.

With that I will ask for questions and comments.

CHAIR WEISENMILLER: And again I'm assuming the EV forecast was just per capita so it would be interesting to see if Edison has better data on that.

MR. KAVALEC: I'm sorry, it was –

CHAIR WEISENMILLER: Again you've talked about how you just did a proportionate allocation –

MR. KAVALEC: Oh, right.

CHAIR WEISENMILLER: - of the EV forecast. And I would be sort of interested if Edison has any better data on that. But it does seem like part of what is driving it – and I assume the econ-demo is worse there than in San Diego. So again that would be another question for Edison.

MR. KAVALEC: Yes. Okay, then I will ask Edison, Sharim, to tell us how strongly he agrees with our forecast.

MR. CHAUDHURY: My name is Sharim Chaudhury and I am with Southern California Edison. Thank you, commissioners, and thanks, Chris, for the opportunity to provide comments on your forecast.

Earlier it was pointed out that the Direct Access

Working Group, or DAWG, the importance of that, and I cannot emphasize enough how useful it has been as a collaborative process for us to understand sort of unaligned (ph) assumptions in our forecasts. Now, with that I have a few comments that I would like to make on this forecast.

Starting with, let's talk about sort of the plug-in PEV electric vehicle forecast. So our experts basically think that the revised forecast is fairly low. If you look at the sort of mid case number versus the red line, which is their preliminary forecast, by 2017 the revised forecast is down by over 80 percent. And we think that the ramp-up rate, Edison believes, is kind of unrealistic from 2017 to get to 2020, that high level. So what Edison thinks is that at a minimum - apparently CARB has model that is called emission factors model. It includes some numbers about number of miles traveled per year, you know, by these vehicles and also total numbers of cars and trucks. So at a minimum maybe CEC can look into that, whether that could be an alternative.

Also underlying the revised forecast the assumption is that plug-in electric hybrid vehicles will drive only 36 percent of the miles with the electricity taken from the grid. And Edison believes that's a pretty low number. Recently Chevy came out with their Volt customers, they are saying that they drive 67 percent of their vehicle miles are

driven by electricity from the grid. So at least we can use that number as opposed to 36 percent. And also the ramp-up, you know, currently CEC revised forecast assumes two percent. I think if you could look into that. Edison assumes about twice as much, the ramp rate.

MR. KAVALEC: I'm sorry, Sharim. What ramp rate are you referring to?

MR. CHAUDHURY: The electric vehicle penetration.

MR. KAVALEC: Is two percent in your forecast?

MR. CHAUDHURY: This is two percent underlying in the revised forecast.

MR. KAVALEC: Okay.

MR. CHAUDHURY: And we have about four percent.

MR. KAVALEC: All right, okay.

MR. CHAUDHURY: So this is our comment on the electric vehicle.

Now I want to talk a little bit about a group of electric technologies, what I call electric goods and people movement. Okay, what I mean by that is the port electrification, you know, freight rail, light rail, truck stop electrification and truck refrigeration units at the warehouses. Now, Edison has a forecast that included now a load forecast and in the CPUC (sic) forecast there is no load associated with this group of programs. And we had discussion with CEC staff – and granted our forecast is

based on 2008 numbers which are a little dated – and we agreed that some of the load forecast we assume for the ports, freight, rail and truck stops could be lowered given the current reality.

However, on the other hand, our forecast does not include the electric light rail development that came about from the Measure R that passed a couple of years ago. And based on that there are currently twelve new systems that are in development in the LA area. So we feel that maybe clearly there is some load growth associated with this group of programs that should be included in the forecast.

Now, with respect to sort of overall forecast, Chris mentioned that our service territory is growing both on the peak and energy basis the slowest compared to others. And Chris also mentioned that part of the reason is that the industrial sector and the agricultural sector is growing, you know –

MR. KAVALEC: Relatively flat.

MR. CHAUDHURY: Flat or even negative growth in the industrial. Now, when we look at our sort of customer class the industrial sector comprises about nine percent of our total load and agricultural sector is very small, like one to three percent. So based on that it is not clear why we are so much different from the other service territories in terms of future growth. When we compare our retail growth

with Chris' forecast over the 2012 to 2022 period, our retail sales forecast is higher. And if you break it up into sort of two periods, 2012 through 2017 versus 2017 to 2022, our growth is higher in the second five year period. When you compare our peak load for the 2012 to 2017 period, that six year period, our peak load growth is right on the money, it's 1.6 percent. But we are growing higher in the next, 2017 through 2022, period. Chris, you have like 1.3 percent and we have 1.8 percent.

Now, when we compare sort of the customer class bases, our customer class breakdown is based on our retail customers, which is bundled plus direct access. And, Chris, you have it on a planning area basis so it's hard to compare on a level basis. But if we compare the growth rate we see that our residential sector is higher than the CEC forecast, particularly in 2012 through 2017 period. And if you look at that our higher number underlying the PV load growth explained a large part of our higher growth forecast.

Now, I think the biggest divergence comes in the non-residential and by non-residential I'm including commercial, industrial and the government sector. For 2012 through 2017 period it is pretty comparable, 1.2 percent, Chris, for you versus 1.3 percent for us. But what is sort of a quite difference is that 2017 through 2022 Chris is forecasting an almost halving of the growth whereas we are

projecting a doubling of the growth, that's the main difference. And we are scratching our head a little bit. But in our model, our econometric model, you know, the commercial sector is largely tied to the residential sector. The number of commercial customers depends on the number of residential customers and the commercial load growth depends on the employment in the commercial sector. And it's an econometric model. So I like Chris' econometric forecast a little better than the end use model forecast.

Those were my comments.

CHAIR WEISENMILLER: Thank you. A couple of follow-up questions. I mean, the one thing which I have neglected to ask Chris and SDG&E, but we will start with you, what is your assumption on charging, off-peak, on-peak charging for the electric vehicles?

MR. CHAUDHURY: I think we are assuming that most of the charging is going to happen in the off-peak hours after people go home, say, starting maybe five in the afternoon. So it's not going to have much impact on the peak.

CHAIR WEISENMILLER: And, Chris, I think yours is like –

MR. KAVALEC: In our case 75 percent of the charging is done in off-peak hours with the rest spread evenly across the other hours.

CHAIR WEISENMILLER: And is that similar to what

SDG&E is assuming?

MR. VONDER: Tim Vonder, SDG&E. Yes, we do most of our charging in the evening, in the late evening.

CHAIR WEISENMILLER: Okay. Yeah, I had heard from your –

MR. VONDER: I don't have the exact numbers.

CHAIR WEISENMILLER: I had heard from your company that you were seeing some of the retail stores offering charging?

MR. VONDER: Yes, that's beginning to filter in, yes.

CHAIR WEISENMILLER: But anyway it would be good to get on the record both your assumptions and PG&E's assumptions just on this on-peak/off-peak charging.

MR. VONDER: Okay.

CHAIR WEISENMILLER: You know, obviously at this point we're guessing but it would be good to make sure we get the best data we can or, again, any data you've gotten from your experience with the EV fleet would certainly be helpful to Chris.

MR. VONDER: Yes, we can supply that.

CHAIR WEISENMILLER: Okay.

MR. KAVALEC: Our information came from an EPRI study done about three years ago so it's a little dated by now.

CHAIR WEISENMILLER: Yes, and I thought your point on goods movement was very good. I mean, obviously with the LA Basin that's like 17 percent of the economic activity there, is goods movement.

MR. CHAUDHURY: Right.

CHAIR WEISENMILLER: So that's certainly a key part, I'm not sure that it's as important in the other service territories. But again something that's worth looking at. I guess I should ask the proverbial question from my ex business partner, What are we assuming about high speed rail?

MR. KAVALEC: That would fall under the uncommitted portion.

CHAIR WEISENMILLER: Okay.

(Laughter)

Fairly appropriate term. But anyway so it's part of our counterbalance there.

Yes, I was very interested in trying to understand the differences on our forecast and yours. I think historically we have had issues, differences on the commercial forecast. So again I don't – one of the questions I had was: Your econ-demo, is it the same as Chris' or different? I mean, is it the econ-demo or is it the model itself?

MR. CHAUDHURY: Your Honor, we also rely on Moody's

Economy.com and the Global Insight. However, I think what Chris does is for his base case and the lower case you are using Moody's, is that right?

MR. KAVALEC: That's right.

MR. CHAUDHURY: Okay. Now, for us we use Moody's Economy.com for personal income forecast. Whereas for employment forecast we use Global Insight numbers for the base case. And for, say, residential building permits we take the average of two. And what we are realizing is that over time – originally it was to rely on all our economic data on Global Insight. Then we have been noticing a divergence between Moody's and Global Insight. And Global Insight has been more optimistic about things. That's why when we forecast our new customer addition we basically take the average of the two. And we may in the future go about doing the same thing for other forecasts like personal income, GDP. So currently for the personal income we use Moody's Economy.com and for the employment we use Global Insight.

MR. KAVALEC: Another difference is – I think why we run into differences on the commercial side is you folks don't use floor space directly as an input, right?

MR. CHAUDHURY: That's right.

MR. KAVALEC: You use employment and income, yeah. And that seems to be another reason why we have a

divergence. And you mentioned the slowing down of commercial growth in our forecast, later in the forecast period, and that's basically happening because of the implementation of the latest building standards that ramp up over time and have more of an effect later in the forecast period. Whereas on the residential side you have the impact of additional EVs so that drives up the growth rate towards the end of the forecast period.

MR. CHAUDHURY: Now, this appliance standard should apply to all the utilities, right? I mean, it's not just Edison.

MR. KAVALEC: Right.

MR. CHAUDHURY: Okay. Just an anecdotal evidence is that what I'm hearing is that the cubical size is getting smaller over time, I don't know if it's true. So maybe for a given floor space you have more people working.

MR. KAVALEC: More energy intensity per square foot you're saying, right?

COMMISSIONER PETERMAN: So can you just relay again then what for your forecast you found for the peak demand average growth rate?

MR. CHAUDHURY: For the peak demand for our SCE system for 2012 through 2017, CEC and SCE forecast both are like 1.6 percent, for the 2012 through 2017 period. For 2017 through 2022, CEC forecast is 1.3 and SCE forecast is

1.8 percent, for the peak demand.

CHAIR WEISENMILLER: I was going to ask in terms of – we've heard SoCal Gas' perspective on the South Coast push towards electrification. Are you capturing any of that in your forecast, these sort of South Coast measures, or not?

MR. CHAUDHURY: Can you elaborate the question a little bit?

CHAIR WEISENMILLER: Okay, the South Coast is certainly trying to move the LA Basin into a post-combustion era and so they are certainly talking about various things which would shift, you know, gas appliances to electric or substantial shifts from using combustion-based sources – natural gas – to electricity in the basin. And I was trying to understand if that's in Edison's forecast or not?

MR. CHAUDHURY: You know, I may get back to you on that. But my initial thought is that ours is econometric-based model, not end use type model, so we are not assuming any change of appliance mix over time.

CHAIR WEISENMILLER: You wouldn't pick up structural – characteristics of structural changes in demand such as electrification in the basin types of policies?

MR. CHAUDHURY: Our historical data, we have ten years of historical data that we rely on in estimating the regression parameters. And we do have time trend so it may capture some of the structural effect.

CHAIR WEISENMILLER: So it seems like the big question is if there is a way to zero in on this 2017 to 2022 period and further conversations and the staff to see if we can make some more progress there.

MR. KAVALEC: Yeah. And for the electrification issue, we talked about this during the preliminary forecast and we had our Fuels Office folks get involved who knew more than we did about the electrification. And they said at the time they thought, based on more recent information, that the electrification projections were a little too high. But Sharim tells us they have reduced those forecasts. So we are happy to, you know, get together and talk about that again and maybe incorporate something in the final version of the forecast.

COMMISSIONER PETERMAN: You also mentioned divergence in the Moody's versus the Global Insight data. Do you see that divergence greater at the tail end of the time period?

MR. KAVALEC: Well, typically what's happening with these forecasts is that they fast at the beginning because we are coming out of a recession and they slow down towards the end. So typically that's what you're going to get in your forecast, all else equal. In terms of – you said for employment you used Global Insight?

MR. CHAUDHURY: Yes.

MR. KAVALEC: Now, do you know if that forecast is higher or lower than Economy.com's mid case?

MR. CHAUDHURY: I don't know off hand. I can get back to you.

MR. KAVALEC: Okay, so that's something we can check.

MR. CHAUDHURY: And, Chris, I was just curious from your econometric model what are you getting for the growth rate for the commercial sector?

MR. KAVALEC: That's a good question. That's something we can talk about. Because the model is done at a sector basis so we can compare the different sectors using both our econometric and our end use models. So that's something we should definitely do.

MR. CHAUDHURY: Thank you.

CHAIR WEISENMILLER: Thank you.

MR. KAVALEC: Okay, our next victim is PG&E. For consumption and sales the growth is a little bit lower than previous forecasts, although the difference is very slight. Among the five planning areas, PG&E probably has the closest new forecast compared to the older forecast, it hasn't changed very much at all. Higher peak demand growth compared to previous forecast because of the impact of additional climate change effects. Some of the adders and subtractors, PV is reducing peak by around 600 to 700

megawatt-hours by the end of the forecast period.

High case matching the 2009 forecast by 2015, 2016 or so. Comparing the two mid cases and the 2009 forecast, slightly slower growth rate versus the preliminary mid case, almost exactly the same growth rate as the 2009 forecast. A little bit lower of a growth rate relative to the preliminary because of the additional savings from TV standards and lower electric vehicle forecast.

Basically the same story for sales as consumption. The high case meeting the 2009 forecast a little bit later because the sales forecast growth rate is a little bit lower because of increased self-generation. Very similar slopes in the three forecasts, a little bit lower in the revised forecast because of the additional savings.

For our peak forecast we have, as you can see, a significantly lower starting point versus the 2009 forecast but faster growth in the mid and the high cases so that the high case reaches the 2009 projection by 2020. Again the three forecasts, a lower starting point versus the preliminary forecast. Again, remember in the revised forecast we have the actual peaks and in the preliminary we had estimated peaks. So lower starting point but we basically through a higher growth rate we end up at basically the same place by 2022.

Load factors, again we have that initial starting

point in the dark blue, the preliminary forecast a little bit higher than the rest of the series. And, again, that's because we had a relatively cool year in 2011. Flat after that with a little bit of an increase towards the very end due to electric vehicles.

Same pattern with our per capita consumption, a little boost towards the end from EVs, continued increase throughout the forecast period in the high case. And the impact of the downward adjustment in population. So the difference from the population adjustment is around 500 kilowatt-hours in 2011.

Again, among the three major sectors growth is fastest in the residential sector followed by commercial but the growth is more balanced than we've seen in the other planning areas. We don't have as high a population growth in PG&E as we do in San Diego so the residential growth is not as high. But we have stronger employment growth, at least according to Economy.com versus Edison so we have a higher commercial growth rate.

PG&E has projected the strongest growth in construction energy use, which increases the industrial sector growth rate and makes it higher than Edison's. And like San Diego and the state as a whole we have around a one percent growth rate for agricultural and for TCU and streetlighting.

Our key inputs, you will see the downward adjustment of population around almost a thousand adjustment downward from the census data versus what we used in the preliminary forecast, between 500,000 and million, it looks like to me. Same growth rate as the preliminary forecast, a little bit lower than the 2009 forecast.

Faster income growth per household in the mid and high cases, about the same rate of growth in the low case versus the 2009 forecast. Lower starting point but a faster growth rate for commercial floor space versus the 2009 forecast fueled by faster employment growth.

Comparison of econometric versus end use sales, this is my favorite one because we match almost exactly by the end of the forecast period, around one- or two-tenths of a percent difference in 2022. Peak, however, there is a bigger difference. The econometric is around 2.7 percent higher by 2022.

Additional efficiency impacts from codes and standards programs and price effects of between 10.5 and 12.5 thousand gigawatt-hours between 2011 and 2022. Self-generation peak impacts helped along by increase in photovoltaic adoption, constituting a 300 to 400 megawatt decrease in peak between 2011 and 2022. And in the high case we are reaching almost a 1600 megawatt effect – excuse me, the low case. Our low demand case has more self-

generation. In the low demand case we are reaching almost 1600 megawatts peak impact by 2022.

And again this shows the difference, it shows the three scenarios for the electric vehicle forecast and it shows the different in mid case scenarios between the preliminary forecast and the revised forecast. So between those two mid cases we are losing about 700 gigawatt-hours by the end of the forecast period.

With that, questions and comments.

CHAIR WEISENMILLER: I think you've covered most of the topics. Let's see what PG&E has to say.

MR. KAVALEC: Okay.

MS. YUCEL: Hi. My name is Zeynep Yucel. I am with PG&E and I manage the Load Forecasting and Research Group. And thanks, Chris, you and everybody else at CEC who have helped achieve these results for us today. And thanks, Commissioners, for the opportunity to provide comments.

So after the last workshop, the preliminary forecast, we had multiple sessions with CEC staff. So our (indiscernible) first met and then we met collectively afterwards to understand the differences in our forecasts and what might be driving those differences. And at the end, you know, we kind of converged into the result that the difference is mainly coming from the incorporation of the incremental uncommitted energy efficiency. So if we were to

converge to similar assumptions for our forecast on the energy side and also on the peak side pretty much overlapping.

So from that perspective, you know, we are finding staff's forecast reasonable. As Chris highlighted today the difference between the preliminary and the revised, it's very close and slower as a result of the EV forecast. And what I want to highlight on that part of the forecast is that Chris provided us with the CEC's EV forecast and at PG&E internally we are using that as well. So we don't have any issues there, our internal group found that reasonable to incorporate.

So I just want to highlight a couple of areas that the other utilities also have touched. So I mentioned the EV items, so we are mainly using CEC's EV and our current internal forecast incorporates the current EV forecast. So the climate change, PG&E has been actually using the climate change impact for the last few years and we are happy to see that CEC actually incorporated this similar effort for this update. Again, the main difference is incremental uncommitted energy efficiency and how we are going to be treating that in our forecast.

So in terms of growth rates, again, you know, if we were to follow the same assumptions in the same way we are very close on the sales size, about 0.8 percent, and on the

peak side it's about 0.7 or 0.8 percent. So, Chris, one point that I want to highlight on the peak side, you mentioned that for the 2011 weather-adjusted number. So our adjustment is a little bit higher than yours so your starting point is still lower than ours. So I just want to have an offline conversation to see whether we are actually doing it right. Because otherwise – I mean the current forecast, the staff's forecast is a little bit lower than us but with the preliminary we were much closer. And our current weather-adjusted number is higher than what you have. So something to just close the loop on that. But beyond that we find the forecast very reasonable.

And with this opportunity I also want to join the other utilities to recognize the effort of DAWG group. I found it very useful, it was very rewarding for us to have collaboration and the transparency and kind of, you know, leveraging best practices and incorporating where we can. So that was very productive.

So the other thing that I want to highlight, you know, we are talking about the EV adoption, you know, where it's going to happen. So I just wanted to highlight that internally in my group. We did some study on the EV adoption where we used some advanced statistical analysis, like discriminant analysis to kind of use the current EV customers and kind of connecting their information, customer

information with the census data to kind of understand the similar characteristics of the customers from the income perspective and other, you know, census variables to see whether there are any potential customers with similar characteristics to the current EV customers but they don't have EV at this time and then where they might be located. So I am happy actually to share that study with Chris. So since we have interest in kind of understanding where the adoption might happen, whether we have the right proportions, maybe we can leverage that study going forward. So I just wanted to highlight that as well.

So I think this is all I have that I want to highlight on the forecast.

CHAIR WEISENMILLER: Well, thank you very much. I was going to say actually one of the reasons why the workshop is today is the DAWG. As you know, we posted late but we were also relatively aware that, you know, the DAWG had provided an opportunity to provide this stuff today, really adequate time for the utility reviews.

MS. YUCEL: Exactly. I mean, this is not a surprise to any of us because we really had those close interactions with staff. So I really appreciate the effort and we would like to thank Chris and the other members of the CEC staff. They made themselves available for us to kind of understand these differences. And especially on the PG&E side since,

you know, they are producing area forecasts so they took the time to breakdown some of the energy efficiency assumptions to service area levels so we can actually compare one to one to better understand the differences. So I really appreciate that additional effort as well. So that made it possible for us to see, you know, how close we are.

CHAIR WEISENMILLER: That's very good. And on the self-generation forecast, I mean, again how close or different are you on that?

MS. YUCEL: So for the energy efficiency, again, you know, we are using CEC's committed -

CHAIR WEISENMILLER: Right.

MS. YUCEL: - numbers and incremental uncommitted, we go with the goal study. The only adjustment that we have is the Big Bold and decay are not –

CHAIR WEISENMILLER: Right.

-- (indiscernible) to our forecast. But beyond that it's the same as, you know, what we had in preliminary forecast for staff's. EV is the same and CHP comes in internal. And again, you know, the difference from last year to this year was that we had more PV and it seems like it's similar for staff's forecast as well. For CHP we had more conservative assumptions like assuming it's mostly embedded and not much into the future.

CHAIR WEISENMILLER: Right.

MS. YUCEL: So those are the main assumptions that come into our forecast. We use the econometric forecast by customer class.

CHAIR WEISENMILLER: Right.

MS. YUCEL: And our source is mostly Moody's Economy.com for economic drivers.

CHAIR WEISENMILLER: Okay, that's great. Thank you.

MS. YUCEL: Okay.

MR. KAVALEC: And, Zeynep, where are you on your forecast? You've had final internal approval and it can be released?

MS. YUCEL: Yes, it's released at the end of January.

MR. KAVALEC: Okay.

MS. YUCEL: It's in use now.

MR. KAVALEC: Okay.

MS. YUCEL: Well, again thanks, Chris, for keeping us in the loop and with all the new forecasts he shares with us. So then we have ability to socialize that with the relevant team to make sure that they are okay with it before we incorporate it. So we appreciate that.

MR. KAVALEC: And thank you guys for your participation in DAWG. We appreciate it.

MS. YUCEL: Yes, it's very – so, I mean, I agree with the expert panel's recommendation. I think, you know,

we should formalize it. It has been very, very useful, I mean, on the personal side so where we can get a chance to meet with the other utilities, you know, counterparts in person and, you know, understand various ways that they do things. And, you know, it's very transparent. You are like at home, right, so you can kind of share anything and then take away anything. I think, you know, Chris and the team actually provided that setting for us and it's really noteworthy. Thank you.

CHAIR WEISENMILLER: That's very good. And if you do have a more recent demand forecast if you could submit that for the record that would be good, too.

MS. YUCEL: I'm sorry?

CHAIR WEISENMILLER: If you have a new demand forecast that came out at the end of January –

MS. YUCEL: Yes.

CHAIR WEISENMILLER: - if that's –

MS. YUCEL: Yes, I release that internally at the end of January.

CHAIR WEISENMILLER: So anyway when it's official if you could submit that for the record that would be good.

MS. YUCEL: Yes, so I shared the high level numbers with Chris so it gives him some guidance as to where we ended up as compared to the revised forecast.

MR. KAVALEC: When you are completely done do you

have a formal report that comes out?

MS. YUCEL: I just did memo to share the highlights of the forecast outlook and the tables with, you know, the monthly numbers or annual numbers by customer class.

MR. KAVALEC: I should have most of it now in the stuff you've sent me already, right?

MS. YUCEL: Yes, I think what's relevant to you I think I shared with you.

MR. KAVALEC: Okay.

MS. YUCEL: The rest are kind of details.

MR. KAVALEC: Okay, thanks.

MS. YUCEL: Okay, thank you.

MR. FUGATE: Okay, moving on to SMUD. So in the SMUD territory the average growth in sales is similar to the 2009 IEPR forecast. The fastest growth occurs in the residential sector and so we see slightly higher growth in peak than in sales. It's a 1.3 percent growth in sales and close to 1.5 percent peak growth in the mid case. Climate change adds 40 to 70 megawatts of peak demand by 2022 while PV adoption reduces peak by about 40 megawatts in 2022. TV standards decrease sales by over 100 gigawatt-hours at the end of the forecast and electric vehicles increase sales by 100 to 200 gigawatt-hours.

So here is the chart of electricity consumption and we see an average annual growth over the forecast period of

1.7 percent in the high case and 1.1 percent in the low case. The recorded consumption in 2010 was less than projected by CED 2009 so we have a lower starting point but the high case reaches CED 2009 levels by 2020, 2019 actually.

Similar for electricity sales. Sales growth is down about a third of a percent from the preliminary forecast as we incorporate lower electric vehicle projections and the television standards.

Average annual growth in peak demand is 1.9 percent in the high case and one percent in the low case. 2011 was a relatively cool year so the weather-normalized peak in 2011 is higher than the recorded peak. And the addition of climate change impacts helped push the growth above levels that we saw in the preliminary forecast.

So per capita consumption, the historical downward trend that we see levels off in the near term and then increases towards the end of the forecast period. As with the other planning areas, electric vehicles help push that up towards the end of the forecast period.

So some of the drivers, number of households, we see slower growth in the mid and low cases than we saw in 2009. As Chris mentioned, population was adjusted to agree with the 2010 census and so that affected also number of households and so that's why we have the different starting

points.

Income per household, we see rapid growth coming out of the recession for all three scenarios. Both Moody's and Global Insight project faster growth in total personal income and this is in contrast to what we see in the CED 2009 where we actually had a declining forecast in the near term and a much slower growth rate over the forecast period.

So here is commercial floor space, growth is similar to what we saw in CED 2009, a little bit higher. All three scenarios are above CED 2009, though, because the 2010 estimate of floor space is higher than we predicted in 2009.

So here are the committed efficiency impacts. So that would be standards, programs and price effects. Again there is little difference between the three scenarios, it just continues along the trend although this doesn't include the uncommitted efficiency so the growth rate is a little bit lower as you go out in the forecast period.

Self-generation peak impacts. So I think Asish mentioned in his presentation earlier today that some errors were corrected, data entry errors were corrected, and so we see a significantly different starting point than in CED 2009. The peak impacts are increased by 20 megawatts in the mid case. And for the SMUD territory the growth over the forecast period comes mainly from the addition of new PV.

And finally, here is the electric vehicle forecast.

We have nearly 150 gigawatt-hours of electricity consumption added in the mid case, about 100 in the low and 200 in the high. And comparing this to the preliminary forecast, the mid case – comparing the mid cases between the revised and the preliminary forecast we see about a 50 gigawatt-hours reduction.

And so I will stop here and ask for comments or questions.

CHAIR WEISENMILLER: Thank you. Any comments from SMUD?

MR. TOYAMA: Good afternoon. My name is Nate Toyama from the Sacramento Municipal Utility District.

I have my own little slide show that I wanted to present. I just thought it would be easier. I'm not going to go much into the details of the forecast because our forecast is very different from the CEC's. So this is sort of a background of our forecast. It's used for many reasons. We have forecast for everything.

Primarily the first one is revenues and budgets. This forecast is used for estimating revenues or expected revenues. It's used for determining the budget for the following year. We use the forecast also for resource adequacy purposes, RPS and our own IRP resource portfolio. It's a regression-based forecast. We regress several models, primarily retail sales, by rate classes, we have an

hourly load model which is measured at the system level, and then, of course, from the hourly load model we extract our peak demand.

What I will show is two different forecasts that SMUD uses. SMUD has an unmanaged forecast and a managed forecast. The unmanaged forecast is basically our trend forecast. It takes existing stock of homes and buildings and makes a forecast of our current customers. And then for our load growth and sales growth we have new construction models that we apply. And by new construction models, we basically examine our customer class by vintage. And in doing so we found that our new vintages, primarily built after 2000 for residential customers, were very, very efficient, using about 16 percent less than our current customers.

For small commercial we found that their actual energy use was increasing by about five percent, or was larger by about five percent. And then our slightly larger small customers with kilowatt demands between 20 and 200 kilowatts, we found that their usage also was declining, about six percent lower than our current customers. So when we look at our forecast we look at our current customers, forecast their usage as is, and then we look at our new customers with our new construction and then apply a customer forecast which gives us our growth. We take that

unmanaged forecast and apply three resources that we use as part of our policy. One is energy efficiency, the other is our SB PV program, and finally we look at potential electric vehicles.

Now, what this table shows you is how these components all fit together. We have our unmanaged sales and unmanaged peak, we have our EE forecast and SBI, which are subtracted from the unmanaged, we add in EV and then that results in our managed forecast. The same for peak, we have an unmanaged peak, we apply our EE forecast, our SB1 forecast, our EV forecast and then we produce a managed forecast.

I wanted to briefly talk about our EE forecast. Our EE forecast is not the same as what the CEC uses because our EE forecast is really measured above standards. It's really the impact of our EE program on energy use. I guess the implicit assumption in our modeling is that standards as well as potential increase in load growth from plug loads basically balance each other out. All we observe in this model is the above standard EE impacts that our programs do. And so they are not the same. The numbers look similar but they are not the same.

SB1, which is our PV program that we use to incentive solar PVs in our area, I don't know if it's similar to your self-generation forecast but this is our

program so it's based on our projected installation of PV programs. It is very similar, however, to the CEC's self-generation forecast but I'll let the CEC determine how closely ours is.

Finally, we have an EV forecast and our EV forecast is larger than the CEC's forecast. The growth path looks very similar in terms of the number of cars that you might expect to have EVs on the road. The amount of charging in this forecast might be a little bit higher than in future forecasts. We have begun a study where we are looking at EV charging and we found that EV charging is somewhat below what we expected to see. And so in the future we will be using that as part of our forecast for EV.

But what I really wanted to show is the next slide, which shows us our forecast versus the CEC's. This is the mid-point forecast that was presented and our unmanaged and our managed forecast. And from the slide you can see that they are very, very similar. The CEC's forecast, for example, on our retail sales is roughly about two percent higher than our unmanaged forecast. But when we look at our managed forecast it's roughly by the end of the period about 12 percent lower.

On the next slide we will see the peak forecast is slightly different. The peak forecast for SMUD's unmanaged forecast is slightly below the CEC's and then of course our

managed forecast is well below.

The next slide shows numbers for all of these charts just to give you an idea of what it looks like so you can compare them. I believe I used the mid-point sales, retail sales forecast for comparison. I used the CEC net peak forecast to represent what SMUD's peak forecast might look like. But one question is: You net peak is our system peak or is it coincident with the state peak?

MR. KAVALEC: Yours.

MR. TOYOMA: Is it our peak? Okay.

Again they are very close. If you looked at our unmanaged versus our managed relative to the CEC forecast, again they are within one to two percent of each other, with the sales being slightly higher, the peak being slightly lower, and then, of course, our managed forecast is well below.

Now, the way that we use these two forecasts is that we basically look at our unmanaged forecast for overall planning. The managed forecast is used for looking at our traditional resource acquisitions, thermal plants, other types of renewable plants, but that's our more traditional plant benchmark. Everything between the sales forecast, the managed and unmanaged as well as the unmanaged peak and our managed peak is used for very non-traditional resources, such as our energy efficiency, or SB1 and then, of course,

netted out would be our EV forecast.

So that's the way that we use these. And in general our forecasts are very similar even though our methods are very, very different. Anyway, that's my presentation. Do you have any questions?

(No response.)

CHAIR WEISENMILLER: Thank you for being here today.

MR. TOYOMA: Thank you.

CHAIR WEISENMILLER: We are certainly going to encourage the staff and SMUD to continue talking to see if we can get a little closer.

MR. FUGATE: Thanks to Nate for your presentation. So we will move on to our final planning area for the afternoon, LADWP.

So for LA's territory we see higher average growth in sales versus our previous forecast driven by higher population growth. Average growth in sales is about 1.1 percent in the mid case. Average peak growth is nearly double what we saw in the CED 2009. In the 2009 forecast it was about 0.7 percent versus this forecast is about 1.4 percent. Climate change adds about 100 to 170 megawatts of peak demand by 2022 while PV adoption reduces peak by over 50 megawatts. The TV standards reduce sales by over 250 gigawatt-hours at the end of the forecast and EVs increase sales by 250 to 500 gigawatt-hours.

So here we have electricity consumption, average annual growth over the forecast period is 1.4 percent in the high case and 0.9 percent in the low case. We're starting from a lower starting point as recorded consumption is lower than what we forecast in 2009 and the high case almost reaches the 2009 forecast by 2020.

So again a similar graph for electricity sales. Growth in sales is very close to what we saw in the preliminary forecast, it hasn't changed that much.

Peak demand, we had a relatively normal weather year so the adjustment to recorded peak was not that great. High growth in floor space is one of the reasons that peak growth is up nearly one percent in the commercial sector over what we saw in CED 2009.

Per capita consumption is very similar to some of the other planning area graphs we saw. It's relatively flat over history and in the near term forecast and then towards the end of the forecast period the electric vehicles cause an upward tick.

We see much faster growth in number of households due to the higher population growth. Sorry, the subtitle there should read "faster growth over CED 2009". Income per household, so over CED 2009 we have higher growth in total income but also higher growth in households so the net effect is a forecast that is not substantially higher than

what we saw in CED 2009.

Here is the commercial floor space forecast. We see rapid growth over CED 2009 which reflects in part the high population growth. And so this contributes to the fast growth in the commercial sector and particularly the commercial peak.

Here are the committed efficiency impacts, codes and standards programs and price effects for LADWP. We see over 3300 gigawatt-hours of projected savings over the forecast period, additional projected savings over the forecast period.

And here are the self-generation peak impacts. We see an increase of 80 megawatts in the mid case and a lower starting point, which reflects the data entry error that was corrected for the revised forecast.

And we will end with the electric vehicle forecast, which looks similar in shape to all the other electric vehicle forecasts we've seen today but this one reaches about 400 gigawatt-hours in the mid case. And that represents about a 100 gigawatt-hour decrease from what we had in the preliminary forecast.

So I will finish there and take comments or questions.

CHAIR WEISENMILLER: This is good. Again, thanks. Let's hear from the audience or from LA. I think we have

heard much of the issues like electric vehicles or electrification of basin probably covered enough in terms of the other utilities as opposed to jumping on them again here. So let's hear from LA.

MR. FUGATE: Do we have any?

MR. KAVALEC: Our friend Mike Cochayne at LADWP is out with an illness. So we wish him a speedy recovery.

CHAIR WEISENMILLER: Yes, certainly. And again we would certainly just encourage LA to provide written comments and we will read those.

COMMISSIONER PETERMAN: Chris, is there anything you can say about how these forecasts compare to what LA has done, from some of your DAWG conversations?

MR. KAVALEC: I can only speak to the last forecast I saw from them, which was in the summer of last year. And they were lower than us at the time by a little bit, not a lot. But I haven't seen a newer forecast.

COMMISSIONER PETERMAN: Great, thanks. So we look forward to their filed comments.

MS. KOROSEC: We do have one comment online. Go ahead, your line is open.

(Poor connection, inaudible comments)

Sierra, can you step away from your computer or turn off the sound? We're getting feedback from the time delay between our broadcast and your computer.

MR. MARTINEZ: Okay, how is it now?

MS. KOROSEC: That's better, yes.

(The telephone connection was very poor and parts of the speaker's comments were inaudible or unintelligible. The transcript will reflect what can actually be heard.)

MR. MARTINEZ: My name is Sierra Martinez and I am representing NRDC. I especially want to commend the staff for all the hard work that they have put into this forecast.

MS. KOROSEC: Sierra, I'm sorry, you're coming in and out. We are not able to hear you clearly.

COMMISSIONER PETERMAN: If you are on a speakerphone can you pick up the – whatever they call them nowadays – handset?

MR. MARTINEZ: Why don't you go to some other comment while I dig up a headset and then I will come back.

MS. KOROSEC: Okay, that would be great. Do we have any other public comments here in the room while we are waiting for the headset changeover?

MR. SKINNER: Hi. I'm Nathaniel Skinner, lead analyst for long-term procurement planning, here on behalf of the California Public Utilities Commission Energy Division.

I would like to add, like many others today, that we greatly appreciate the work that Energy Commission staff has done. We have also appreciated the opportunity to

participate on the Demand Analysis Working Group as well as its predecessor. We are also encouraged to see that the impacts of climate change are being considered in the most recent forecast, particularly as we look at many challenging issues such as the retirement or repowering of once-through cool power plants in the LA Basin, that we can make sure that reliability is maintained.

In particular on the demand side we are encouraged to see that demand response is being considered for the fist time in the IEPR forecast, even though to date the resources have been very small. I believe the report said it was about less than 20 megawatts. In particular, though, we wanted to comment on the use of incremental uncommitted energy efficiency or its noted lack in the revised forecast. As many others from the utilities have said, incremental uncommitted energy efficiency is critical to the planning efforts of the state.

In the 2010 LTPP the impacts of removing the incremental uncommitted energy efficiency totaled to about 5700 megawatts statewide, or I should say CAISO-wide, and about 15,000 gigawatt-hours of consumption. This translates into the need for an additional 5000 gigawatt-hours or renewable energy in the state. So we're talking of the potential impacts being quite large if this resource is not able to be considered in the long-term procurement plan.

Energy Division will be providing recommendations for ways that perhaps incremental uncommitted energy efficiency could be considered in the adopted forecast just due to timing constraints with the forthcoming 2012 LTPP as well as its use in other forums such as for the CAISO transmission planning process.

CHAIR WEISENMILLER: Okay, thank you very much. Obviously, we appreciate the issue, we've been working on that for decades. Although, again, I think you have to recognize that there is substantial uncertainty up and down.

MR. SKINNER: Yes.

CHAIR WEISENMILLER: And we're trying to capture that certainly in the low case. The low case includes not just uncommitted energy efficiency but certainly the DG, which you could use the committed/uncommitted metaphor there, and certainly the economic growth. So basically I think it's important that the PUC and the Commission understand the uncertainties, high and low both, and make prudent decisions based upon those. So again, thanks for your contribution, and suggestions on how best to reflect the uncertainties would be great.

MR. SKINNER: Thank you.

MS. KOROSEC: All right, Mr. Martinez, can we try again?

(No response.)

Your line is open.

(No response.)

Mr. Martinez?

(No response.)

All right, well, is there anyone else in the room who would care to speak?

(No response.)

All right. If not, then I would turn it over to the dais for any closing remarks you would like to make.

COMMISSIONER PETERMAN: Sierra, are you there?

MR. MARTINEZ: Hello. Is the audio working?

MS. KOROSEC: Yes, you're back on. Go ahead.

MR. MARTINEZ: Hello?

MS. KOROSEC: Go ahead, Mr. Martinez.

COMMISSIONER PETERMAN: We are all ears, go ahead.

(The telephone connection continued to be very poor and parts of the speaker's comments were inaudible or unintelligible. The transcript will reflect what can actually be heard and what appears to have been said.)

MR. MARTINEZ: Okay, sorry about the technical troubles. ... the staff for their hard work on the demand forecast...displaying it in an unclear fashion...all very interesting. My concern with the forecast is the lack of inclusion of the uncommitted energy efficiency...the demand forecast stated that because the Public Utilities Commission

had not yet updated future goals study they were going to not include the uncommitted in the mid forecast. While I appreciate the degree of uncertainty in forecasting, this is the case with all variables in the forecast, that future information will provide improved forecasts. In 2012 we will get improved future goals for efficiency as well as improved estimates of economic activity.

And my recommendation would be to use the best available data. In 2008 the goals study was updated and in 2009 the Energy Commission adjusted that for the amount that was uncommitted incremental and in 2011 the Public Utilities Commission adjusted that for their LTPP proceeding. And so I think it makes sense to use the best available estimate of uncommitted energy efficiency even if future information will improve that estimate.

Deciding to cut off future efficiency in 2012 for the IOUs and 2011 for the POUs means that for the IOUs ten of the eleven years forecasted will assume no future programs in efficiency and no future updates to codes and standards. For the POUs cutting off at 2011 means that all the programs that the POUs are running today currently...in 2012 are not occurring.

So my recommendation would be to use a non-zero number for the forecast of uncommitted energy efficiency, acknowledging that there is uncertainty in that estimate.

Thank you.

MS. KOROSEC: All right, Mr. Martinez. Did you end or did we lose you there?

MR. MARTINEZ: Oh, no, those are my recommendations and thoughts.

MS. KOROSEC: Okay. I wanted to make sure you weren't still continuing to talk. All right, thank you very much for your comments.

Is there anyone else who wants to say anything before we wind up?

(No response.)

All right, thank you.

COMMISSIONER PETERMAN: Yes, thank you for the public comments and for the participation by all the parties today. I found this to be a very informative workshop. In particular, I think we got some insights about how to better pin down some of the uncertainties in the demand forecast, in particular thinking about other data sources for electric vehicles and also some of the discussion we've had around energy efficiency and distributed generation.

I particularly want to make sure to thank those who participated in the DAWG. I think that we had a relatively smooth workshop today because of the conversations that have been occurring over the last number of months between the different parties. And it has been beneficial for us and

I'm glad to find that all the participants find it beneficial as well. I encourage you to continue to talk about the differences in the forecast between the utilities and the CEC estimates and for CEC staff to consider some of the additional data resources that have been suggested here today. And I look forward to seeing staff's final proposal.

CHAIR WEISENMILLER: Again I also would like to thank everyone that has been participating in the Demand Analysis Working Group. And, again, I think that's really helped to move issues along. Also I certainly want to thank our outside peer review group. Just again, we appreciate the activity to really step back and take a look. It was certainly reassuring to get sort of a vote of confidence out of them on the model structure.

I think the issue which would – you know, we are obviously trying to reach a conclusion on this and leave things for future IEPRs to keep making progress. I think, having said that, you know, there are certainly areas going forward that we need to look at. And, as we know, there are a variety of studies that are always going to be coming along. But we need to be making decisions relatively quickly.

I think I certainly encourage the staff and other parties to talk about the EV issue. Certainly our staff should try to talk about the TV standards. It would be good

to understand better what's going on in the Edison out years and also in terms of the goods movement area. I think, you know, certainly SMUD. The very interesting part of it may just get to our disaggregation question. But obviously we are very close with their unmanaged forecast, and our forecasts differ with the managed, although our forecast is more analogous, say, to the managed. So again, trying to understand. But, again, that is probably something for future years.

I think on the energy efficiency we are certainly looking forward to seeing the PUC study and to see how different that is and particularly to see how the nature of the PUC's energy efficiency programs are going forward and, again, how different they are going forward. I think certainly we understand the state's commitment, that's at the top of our loading order. And at the same time trying to make sure that we've got a broad enough range.

You know, initially with the Commission we struggled. I think I mentioned to the NRDC initially that in the 70s the utilities always made the case that the end use model didn't include what they called phantom appliances, and it didn't. And that, from their perspective, led to an underestimate. While in fact, you know, here we are thirty years later, we have computers, we have TV game sets, we have all kinds of things which – you

know, we have at least 11 battery charger in every house, which we certainly didn't think of in 1977 or 1978 in the demand forecast models.

So basically trying to come up with something which is relatively reflective of the range, I consider this probably to be one of the most difficult times to do the forecast, again, compared to the late 70s where people when we first got into this – the middle 70s for myself – you know, we felt we really needed to go disaggregated to really reflect energy efficiency policies. But at the same time now we also have the EV, we certainly had the DG and we had the economy. So there is a lot of uncertainty and I'm always concerned that our models don't quite reflect the full range. And certainly there is substantial cause for either under- or overforecasting. I agree, we need to figure out some way to deal with the uncommitted questions. And presumably that's part of what affects the low end numbers as we struggle to get sort of a reasonable reflection of what the potential range is.

But anyway, again I would like to thank everyone for their contributions. Certainly a lot of issues were dealt with today and if people want to give more thought to those and contribute comments.

MS. KOROSEC: Written comments are due on March 1st by close of business.

CHAIR WEISENMILLER: Okay, by March 1st, that would be good. But again I think we could – well, again, this is always a work in progress. So we will get something done this year and continue to work on the issues and encourage the Demand Analysis Working Group and also the outside review group to help us do better in subsequent years.

COMMISSIONER PETERMAN: I will also just add, I don't know if I explicitly called them out, so I just want to thank the staff of the Energy Commission who worked on these forecasts. Others have spoken about your collaborative nature and we appreciate that and your ability to work with the other state agencies and the other divisions within the agency on this. So thank you.

With that, our meeting is adjourned. Have a lovely afternoon.

(Workshop adjourned at 3:06 p.m.)

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