

Oil Ahead

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Greg Dalton: This is Climate One, changing the conversation about America's energy, economy and environment. I'm Greg Dalton. Today, we're discussing the future of oil and personal mobility. Petroleum prices have plunged to the lowest levels in years, and Americans are buying more trucks and SUVs. What does cheap oil mean for the economy and efforts to combat climate disruption?

Over the next hour, we'll look at how Californians power their cars, what the state is doing to make them cleaner, and how oil companies are responding to the push to cut carbon pollution. Joining our live audience at the Commonwealth Club in San Francisco, we're pleased to have with us two oil industry veterans and California's top carbon cop. Lou Allstadt is former executive vice president of Mobil Oil. He lives in New York and is now a member of the Citizens Climate Lobby, an advocacy group. Angus Gillespie is vice president for CO2 at Shell Oil Company. He is an economist based at the energy giant's headquarters in The Hague. And Mary Nichols is chair of the California Air Resources Board which was responsible for much of the state's efforts to move away from fossil fuels. In 2013 she was named in Time Magazine's List of the 100 Most Influential People in the World. Please welcome them to Climate One.

[Applause]

Greg Dalton: Mary Nichols, let's begin with you. Governor Brown recently laid out a plan to cut oil use in California by 50%. How is that going to be possible when gas is so cheap - two dollar a gas? Is that going to be difficult to cut something when Americans are buying more SUVs and using -- it's cheaper to drive around.

Mary Nichols: Well, we have cut our petroleum use in California already in the last decade, partly as a result of policy decisions about oil and gas, but mostly as a result of requiring more efficient vehicles. So the standards that California has had on the books since 2005, that were then adopted by the Obama administration nationally, are pushing for all new vehicles to use less and less petroleum per mile.

And while there's always a little bit of rebound effect, as they call it, where if the gasoline is cheap, maybe people will drive a little bit more. Nevertheless, the net of all of that has been a pretty big saving, to the point where now Congress and the state are worried about how we're going to get the money to repair our streets and roads, because we've become dependent on gasoline taxes over the years to pay for those things. So more people are perhaps worrying about too little gas being sold than they are about too much gas being sold.

But what the governor did was to put out there a marker to say, by 2030, which is kind of the horizon that we can look to and maybe begin to plan for now, we need to be using half as much of the stuff as we're using today based on everything we know today in order to meet our air quality standards. So this is not just about climate, this is also about public health, especially in Southern California and the Central Valley, and it's really a continuation of policies that we're already implementing. Primarily, what we're looking at is more efficient vehicles, ways in which people don't have to drive this far to get places, more use of transit, and then substitution of cleaner fuels. So those are the programs that we're implementing right now, and we'll just be doing more of that.

Greg Dalton: Lou Allstadt, is 50% cut in oil in California, is that a threat to the oil industry? Do you see something like that?

Lou Allstadt: I think we have to distinguish between short-term swings and long-term swings. What we're in now is a short-term downswing in prices because of an oversupply that's mostly generated by a lot of rapidly coming on shale oil production in the U.S.

It will not take that long, a couple of years maybe on the outside to get that back into a balanced position, and it doesn't take a very big imbalance to swing prices a lot. A few percent will have a big swing in prices. So if you look at the long-term, we've got fossil fuels with steadily increasing costs. It's an extractive industry. The best areas get produced first. The more expensive areas are the next along the line. So longer term, it's going up and that means that we really should be doing all the things that were just discussed about reducing energy consumption. We also have to consider that renewable energy costs are coming down, coming down fairly rapidly, and they're going to put a lid on fossil fuels at some point.

Greg Dalton: Angus Gillespie, when you hear California say they want to cut oil use 50%, what's your response to that? Is that something that's troubling or would you agree with Lou Allstadt that this is just a temporary price dip?

Angus Gillespie: So I agree with Lou when he says you need to keep -- really, this is a long-term issue. You have to keep an eye on the long-term. I mean the oil industry, well, I shouldn't say the oil industry -- Shell, in particular, has long woken up to the fact that we're the incumbent in an industry which there will be less production in future. It's just a matter of what can be done and what practical basis to get us there. I mean we've all woken up to the fact that road transport, I mean the emissions from road transport have to reduce by 80% or so. So it's going to take some amount of reduction in the volumes of gasoline and diesel used. But the thing also to be reminded, there's a lot of 80% reduction targets about the CO₂. So that if there's a way of using similar volumes of gasoline, but without emitting the CO₂ into the atmosphere, that would be the ideal solution. For the scientists in the audience, don't panic. I know that the laws of physics stand in the road of that, but it's an important point. It's not just about reducing volumes; it's reducing emissions.

Greg Dalton: There's a plan to do that in California and the oil industry, the Western States Petroleum Association, has often fought that plan to do that. So what is Shell's position with regard to that? You just said that it needs to be less intensive, less emission, not necessarily less gasoline.

Angus Gillespie: Yeah. So Shell is a member of a lot of associations, a lot of industry associations, and we are a member of several associations that have different views from us when it comes to climate change and the necessary responses. So it's always a challenge for Shell, in particular. I -- Shell pays my salary, I'm going to say this. I consider as one of the most progressive oil companies when it comes to accepting a need for a response to climate change. We often find ourselves in these industry associations as the odd one out, but it's a task we have to take. So inside, if you are privileged enough to see some of the debates that take place inside these associations, you'll often find not just Shell, but Shell and a few others trying to combat that view. And the associations, it's important always to remember, they're doing a great job when it comes to things like technical standards, levels of safety, precautions and other things, but there are always issues that any member finds itself at odds with. And increasingly, Shell frames itself as odds with some of these associations.

Greg Dalton: Bloomberg Business Week recently wrote what you just said that on paper, Shell appears to be one of the most progressive oil giants on climate. You joined recently in calling for a 40% cut in Europe for greenhouse gas emissions. Your CEO Ben van Beurden has said, "We're not

aligning ourselves with climate skeptics." And yet, so what are you doing to sort of differentiate yourself from other oil companies and say that climate is real, we need to do something about it?

Angus Gillespie: Yeah. So in addition to taking quite a strong, assertive stance and say to associations, we also -- we're vocal outside. I mean we do actively call for a strong price on carbon. We do actively call for the needs for gas to replace coal in power generation. We need to see the start of affirmative action on climate change.

You will struggle now to think climate deniers and say, "The oil industry has just become unacceptable." Shell, I believe, was one of the first to come out and say, "First of all, we recognize climate change. The next thing is we accept the fact the majority cause is manmade, a large part of it due to fossil fuels. There has to be a solution." And what that implies is the need for an energy transition. So it's about the timing it takes to make an energy transition that's there for the long-term. Again, I think long term is an important point here, Greg. We can't rush into something as an immediate effect, but then has no legs commercially to stay in place. So it's making sure that some of the solutions that are chosen are durable and they make sense technically and commercially.

Greg Dalton: Lou Allstadt, your former company, well, you were part of Mobil just before it merged with Exxon, which funded -- ExxonMobil funded a campaign to deny climate science. Are there still climate deniers inside ExxonMobil today?

Lou Allstadt: I can't say for sure because I don't know all of them. But from the people that I have talked to, I think that it's swung drastically. That people recognize it. I think the issue is what to do about it? And most of the oil companies seem to be looking to heavy-duty technical engineering solutions or mitigations, where I think the right place to be looking is at renewable energy: solar, wind, other forms. And we need to incentivize a way to get there. And to my thinking, the best way to do that is a revenue-neutral carbon fee with a dividend. All the proceeds going out to households around the country so that people see the closer to the real cost of the energy that they're consuming.

Greg Dalton: Mary Nichols, you sit at the center of this in trying to move California toward a clean energy. How much are oil companies trying to slow things down? Are they trying or they recognize this transition or they got their foot on the brakes pretty hard?

Mary Nichols: I think they're maybe one foot in each camp [Laughter].

Greg Dalton: A foot on the gas and a foot on the brake?

Mary Nichols: I think we've got people like Angus who can intelligently describe to you the process and what needs to be done. But then you've also got the people in their, inside their companies, who are continuing to fund the kind of campaign that we had to deal with over the last year and a half, where we saw advertisements being paid for by dozens of different groups with names like Grassroots Citizens for a Sound Economy, and so forth. Basically, made-up organizations lobbying against both our Low Carbon Fuel Standard and having fuels under the cap. And maybe the way to sort of join this conversation - I don't know if it's going to get us to an answer - but if you said to Angus, "Are you in favor of a price on carbon?" I believe he would say yes. I think he's already said that.

But then the question is, "Okay. So how much does that price have to be before it's worth your while to start really promoting some alternatives or changing your product?" Right now in California, ironically, the price that we have put on carbon -- and we are one of the handful of jurisdictions that have any kind of a carbon price -- under our cap and trade program, the price of a ton of carbon is

somewhere around \$12.50 today, going up to probably \$20 a ton by 2020. That's kind of the floor price on our program. I think - and again I won't speak for him - but I think Angus would agree that at ten times that amount, they'd think that that was an incentive to change the way they behave.

Greg Dalton: And Angus Gillespie, Shell and other oil companies have internal prices. You're planning for a price and yet some of the political arms of the industry is trying to delay and lower that price as long as possible.

Angus Gillespie: Yup, absolutely. So inside Shell, we use a value of \$40 a ton of CO₂. So what that means is basically when any economics, project economics have run inside Shell, you have to incorporate a value of \$40 a ton on CO₂. So it's almost four times as much as you see in California just now, maybe. I think it's -- the last time I looked, I think, the European Union Emission Trading System is trading about \$7. So it shows you how bold \$40 a ton is, because that's indicative of the kind of type of price we think is needed to really start change in motion.

Greg Dalton: And what happens to the stock of Shell Oil if there's a \$40 -- if you're saying that you only do projects that are economic if there's a \$40 price on carbon pollution, it means you're still in business, the sky hasn't fallen. Are profits less? Is the stock less? What's the impact of that scenario?

Angus Gillespie: So this is part of my frustration. I am Mr. CO₂ inside Shell.

Greg Dalton: You're the greeny guy.

Angus Gillespie: I'm the green guy. I have been accused of being the internal NGO inside Shell, yeah. I mean my daughter loves it, but the rest of the world hates it. And that's part of the challenge, is being inside an oil company. Listen, we are the incumbent. Our product is only going to go one way in the future when it comes to climate change, unless we find a way of making it more acceptable when it comes to CO₂ emissions. That's the challenge. Now the frustration I feel is that the market, the people that value the stock, don't recognize that. So you've heard a lot of talk recently about things like unburnable carbon, the carbon bubble, and other things. This is the market, the investors are starting to realize how significant a risk climate change can be to their investment stock. Now this is a type of thing that starts to get real action. Because once senior executives see the impact on the stock price, then real activity, long-term activity really starts to take traction.

Greg Dalton: The United Kingdom central banker Mark Carney recently wrote that the majority of proven oil, coal and gas reserves may be unburnable. That's a central banker in the UK. That's not an environment -- he said -- that's a tweedy banker and that's not an environmentalist saying that. So how is that rippling through the industry? They're starting to realize, "Whoa, this is not Greenpeace talking."

Angus Gillespie: So the first thing and again I'm going to excuse the cliché, but I would much rather use the title "unemitable carbon" than unburnable carbon. Because I believe there are viable ways. There will be viable ways in the future to use the hydrocarbons, but the same time take a lot of the CO₂ out so it becomes acceptable.

Now your question directly, Greg, what does this mean? This is the market starting to wake up to this issue. And if I can correct you, what the Bank of England have done did not acknowledge the risk that goes with hydrocarbons. What they have said is, "This could be a clear and present danger to the security of the British financial system, and therefore the Bank of England has to look at it."

So he said he's committed to look at it which is the right thing. The Norwegians have done this.

The Danish have done this. You probably heard of a lot of investment funds having done the same that starts the correct lens being applied to climate change. Because I always remember someone in the UK government saying that, "You know you're making traction when this issue moves from the Department of the Environment to the Treasury." And what you're seeing is this issue is now becoming a treasury issue, so it's getting more buy-in and it's easier for the industry and commerce to pick up and act on it.

Greg Dalton: That's quite a strong statement, Lou Allstadt, that fossil fuels could be bombs in the financial system ready to go off.

Lou Allstadt: I think absolutely they are. There are two big factors on the financial side when you look at project economics. One is the size of what a carbon fee might be, and the other is when it takes place. Some companies have done a reasonable job at talking about carbon fees, \$40 up to \$80 is what I'm hearing. Most of them appear to be far enough out in the future that they don't really impact project economics today. When the financial community realizes that they have to think about closer in financial impacts, they're going to start really discounting the value of some of these fossil fuel companies.

Greg Dalton: And how does that happen? So they're like, "Okay. We think that we're going to invest a billion dollars in this big oil or gas field. Thirty years it's going to bring a lot of money." That's what drives tech stocks. How does this play out? When does the market realize it?

Lou Allstadt: They're starting to realize it now. People are divesting and reinvesting. I've sold all of my ExxonMobil stock and I've been reinvesting in renewables.

Greg Dalton: And you wrote a letter to Rex Tillerson, chairman of Exxon. Tell us about that letter, why you wrote that to him.

Lou Allstadt: Well, it struck me as somewhat ironic in that he was complaining about a water tower that would hold fracking water within sight of his house. And I had just spent several years...

Greg Dalton: Was that inside his property maybe or inside his house?

Lou Allstadt: In sight -- near his house.

Greg Dalton: Okay.

Lou Allstadt: Within sight, I'm sorry I meant...

Greg Dalton: That's a cartoon waiting to be made there. Okay.

Lou Allstadt: Within sight of his house.

Greg Dalton: Yeah, in sight. Okay.

Lou Allstadt: Within sight of his house. And I had been for the past several years arguing that fracking was not a good idea in upstate New York, in part because of things like this infrastructure that were being imposed close to population centers and things like that. So I wrote him a letter suggesting that both he and I could afford to move if fracking came near us, but most people couldn't. And I urged him to start looking at renewables.

Greg Dalton: And you were part of a fracking ban in New York State. Recently Governor Cromwell banned fracking in New York State. So how do you think that's going to ripple out inside the

industry? And then I will get Angus on how that might impact.

Lou Allstadt: I think the ban within New York State is more symbolic. There wasn't really all of that much gas to be had, but it was sort of a battleground and New York is a big media market, and the industry really didn't want to see that go the wrong way. It has now. The ban is pretty well in place. That allowing each individual township to decide whether or not they want fracking. And when you get a lot of townships saying no, that pretty much knocks it out of the state.

Greg Dalton: Mary Nichols, your boss, Jerry Brown, you've worked with him a long time. Some people want a ban on fracking in California, is that in the cards in the future in his final term?

Mary Nichols: You know, the governor's spent a lot of time looking at this issue as you can imagine since there are some very passionate advocates out there urging him pretty much everywhere he goes. That he should be looking at a ban. But he took a serious look at this more than a year ago and decided to support legislation that set up more stringent regulatory scheme for California. I think the big difference is that here fracking was already going on within the oil development areas, Kern County and other places, there had already been fracking going on for years.

But there is a lot of concern about unconventional well stimulation and especially about the chemicals that are used and what impacts those could have on water and on air. And so the latest regulations that have just come out basically require advance notification on what those are, no trade secret protection for the chemicals and that sort of thing. So I think it kind of combines the reality that in California we are and have been for many, many years an oil and gas producing state, going back to the earliest days of California. But at the same time, that there is this increasing concern about some of these unconventional techniques that are being used. So we have a better handle on it now but I think it's -- the low price of oil is that premise behind your question to begin with means that there's just less interest in these projects than there was before.

Greg Dalton: Mary Nichols is chair of the California Air Resources Board. We're talking about oil at Climate One. Angus Gillespie with Shell oil, fracking -- Shell got burned on fracking, took a \$2 billion write-down in the United States. So is a ban on fracking a big deal to Shell or not?

Angus Gillespie: Obviously it would be you know if you have interests in the area. But I think the important point here Greg is when both Lou and Mary were pointing to. And it's a fight when there is a new play, a new technology; there is a need to get the regulatory standards correct. Now if I can use the example, when we -- Shell moved into fracking, onshore gas production, we saw the risk to the entire play by -- one bad behaving player could just damage everything because the chain is only as good as its weakest link. So what Shell did quite early is we came out with our own onshore gas operating principles.

So ahead of regulation we actually said these are the five or six principles that we'll always respect and again those are treated seriously inside the organizations. But what it also does is, I'm hoping, Mary, what it does is it catalyzes real regulatory action. And therefore it's not just Shell or the majors that do things responsibly; it's also the mom and pop companies that are trying to make a good living out of this play as well. But it's making it clear that there's an entry price to this game. And unless you're willing to pay as much attention to the environmental conditions as you are the economic returns, there's no place for you in this new play. It's quite a fragile new spot until it's done on a responsible basis.

Greg Dalton: Lou Allstadt, the industry, the oil industry says that fracking can be done safely, responsibly, that they have a handle on the methane that escapes, the potential to contaminate groundwater. Is that the case? Does the industry have a handle on fracking?

Lou Allstadt: I don't think they do. And just to build on what Mary said, there are a lot of places where fracking has taken place before including in New York State. But the hydrocracking that you're talking about today is like old conventional drilling on steroids. You're talking about 50 to 100 times as much fluid with chemicals going down into the well. You're talking about horrendous disposal problems of the materials that come out with a chemical constituency of those reproduced fluids is worse than what you put down. So that all has to be disposed of. The industry really hasn't gotten a handle on methane, this is something that surprised everybody myself included that there, the leaks of methane are far greater than anybody expected a few years ago which is part of the reason we have all these plans to replace coal with gas. But when methane escapes it's a far worse greenhouse gas than carbon dioxide, much, much worse.

And you really have to eliminate that methane leakage, which is virtually impossible. We're talking about gas going through city distribution systems where the pipes are 100 years old. We're talking about leaks at compression stations all along the way and were talking about leaks around the wells in the field, not just coming out the well but around them in the field. It's a huge number and it doesn't take a big percentage of methane to make natural gas worse than coal.

Greg Dalton: I should mention that Lou Allstadt is a former executive vice president of Mobil Oil, a thirty year oil industry veteran. Angus Gillespie, response?

Angus Gillespie: Yeah, it's just -- I think it's a dangerous generalization, Lou. I think you do find different standards and whenever the industry has looked into what the actual methane leakage rates are, and it's really fugitives that are the issue, the most difficult to manage aspect of it. I mean we can deal -- we should be able to deal with things like flaring but when it comes to the fugitives, the unknown leaks, those are difficult. And what the industry has tried to do in several occasions is actually encourage the responsible measurement, so you'll be aware of the Environmental Defense Fund University of Texas exercise. And that has now been repeated recently reported, you'll know that, the Environmental Protection Agency. The numbers -- and again it's the danger of an average, I know that. But on average that threshold of methane leakage below what it needs to be for code, to be of an equal status for climate impact would -- there's lots of hedging.

The danger is, again I think is irresponsible operator that -- I think the environmental defense fund called it a "fat tail" of distribution. That the average may be well within the tolerance but there's always a few examples of operators that do outside that. And my plea again is that when the regulation is in place no one should be capable of operating without satisfying those principles.

Greg Dalton: Lou Allstadt quickly, then we'll move on to Mary.

Lou Allstadt: Okay. Very quickly, the problem is not just what the individual drillers can control. It's along the whole system. What we are seeing is very rapidly increasing information on how bad that leakage is. And I don't think we've seen the end of it. The last EPA estimate probably is going to be increased.

Greg Dalton: Mary Nichols.

Mary Nichols: So I would just say that this conversation points out the fact which I think Lou alluded to, but it's worth kind of underscoring, which is that anytime somebody tells you that one fuel is better than another, that we should be switching from coal for example to gas and putting all of our policy direction behind getting more natural gas, used in our vehicles and our homes and so forth, you have to look at the question of the lifecycle emissions. And that you can't just say "Well it's cleaner when you burn it, therefore we must be using more of it" that the point here is that from the point of view of the atmosphere it's a matter of the cumulative amount of emissions that are

going into that atmosphere and it's at every point along the way, from where it's produced to how it's transported, to how it ends up being used. And so when you make those side-by-side comparisons then natural gas versus coal may not look quite as dramatically better. It's still likely to be better but it's not something that we should say "Oh well, we don't have to worry about it" because that would not be true.

Greg Dalton: Mary Nichols is chair of the California Air Resources Board. We're talking about fuel and cars at Climate One today. Other guests are Lou Allstadt, former executive vice president of Mobil Oil and Angus Gillespie vice president for CO2 at Shell Oil Company. I'm Greg Dalton. Angus Gillespie, what percentage of Shell capital expenditures today go toward renewable energy, is it more or less than 1%?

Angus Gillespie: I do know the numbers but you know the line here. If I told you you'd need to shoot me. But I can tell you it's a significant number.

Greg Dalton: I thought you'd shoot me, yeah, either way; I like the first one better.

Angus Gillespie: I'm there and say it to the face of the oil companies. It's billions of dollars, so again --

Greg Dalton: Per year or cumulatively?

Angus Gillespie: Well, let me talk through that number. So when I hear renewables, what I -- often people use the term renewables as interchangeable with wind and solar and overlook the role of biofuels. So we started off with the challenge of reducing the amount of gasoline in diesel which is used in road transport, biofuels is one of the fuel terms that's just now -- So Shell invested and this is in the public domain \$12 billion in the joint venture into Brazilian sugarcane ethanol. So far, we're the only oil company that's put that amount of serious money in biofuel production, so we are committed; we're in for the long term. We still have a large wind business, predominantly in the U.S. We -- I'm hesitating - we've been in and out of solar on various occasions just down to the economics because this is always the challenge. When you're a commercial company you have to find the commercial return to protect the business. And solar has gone through various cycles just now it looks very appealing but there have been times when it's not been appealing. So the way I would rather respond to the question is rather than talk of the percentages is absolute sums and it's genuine money it's in the tens of billions of dollars that Shell has invested in this area.

Greg Dalton: Mary Nichols, are oil companies serious about renewables or is it more just marketing and greenwashing?

Mary Nichols: Well I think depends on the company and their size and their diversity. I think Shell is making an investment that's real, it's not just to be ignored or just for window dressing. At the same time, until the rate of return on those investments come up to be, comes up to be parallel with what they get for their business, which is their core business which is producing oil and gas, it's never going to be anything other than sort of a side project. Just the way for many years tinkering around with electric drive vehicles was a project that the auto industry was engaged in. And it wasn't until the regulatory programs really started to hit home and the incentives and the combination of policy said, "You've got to produce these vehicles" that we began to see significant numbers of new alternative type vehicles making their way into the market. I think that's a pretty good analogy actually.

Greg Dalton: Lou Allstadt, if Angus Gillespie became CEO of Shell Oil and put a bunch of money into renewables, shareholders would fire him because it doesn't make as much money as the dirty

stuff?

Lou Allstadt: The reason it doesn't make as much money is because the dirty stuff doesn't have cost -- full cost associated with it. There are a lot of externalize costs that go behind fossil fuels. The cost of droughts, the cost of forest fires, the cost of pumping out subways in New York City, cleaning up towns that are deluge and more to come if we don't do something about climate. What you need is some way to internalize those costs so that people see the true cost of fossil fuels when they go to the pump or when they pay their heating bill. One way to get at that is to put on a carbon fee so that people see the cost.

Greg Dalton: And one of the main obstacles for that is fossil fuel industry associations making political donations and running political campaigns to not make that happen. Lou Allstadt.

Lou Allstadt: It's interesting but the atmosphere in Washington I think is changing. Citizens' Climate Lobby goes and talks to the congress.

I was with the group of 600 people last June and with a group of 100 people in November right after the elections. The change was extremely noticeable in the attitudes. In November after elections, what we were hearing is instead of well, that's nice, we're hearing "we have to do something about climate change." I think it's starting to sink in.

Greg Dalton: Mary Nichols, you are one of the key regulators in California. What do you see coming from Washington, do you see some change there or is California kind of marching ahead on its own regardless of what happens in Washington?

Mary Nichols: Well, President Obama is using his executive authority very assertively to force his administration, both the EPA and other parts of the administration, to take some meaningful actions. They are currently working on a set of regulations that will affect the electric utility industry across the country and require existing power plants as a whole to reduce the amount of greenhouse gas emissions that they're responsible for. And that regulation although they can't do it directly, indirectly will have the effect of putting a price on carbon and giving the utilities more of an incentive to invest in renewable energy and to work together which they need to do on a regional basis. He has already put down his marker on vehicle emissions from the light duty passenger vehicles and they're now working on a proposal which is due out this spring that will affect the new truck and other heavy engines as well. So I think there's a lot there and the Department of Energy is also putting its money where its mouth is, to the extent that they have resources under their control to invest. They're putting them in projects and programs, better designed to really move the needle on greenhouse gas emissions.

Nobody that I know predicts that congress is going to happen, going to find a way to do anything on greenhouse gases anytime soon. I think the failure of Waxman-Markey at the very beginning of Obama's administration just kind of put the lid on that, at least for a while. When they'll be ready to take it back up again, I don't know but most people are predicting that it won't be at least until there's a new congress as well as a new president. That doesn't mean that California has to change our course, we're steady on. We've got AB32 to keep us on course until 2020 and then the governor's directive to go beyond that. And we're talking more and more to other States within the United States, particularly the pacific west but also our colleagues in the northeast. And increasingly to states and provinces and other regions in the world as attention more and more gets focused on how the world as a whole is going to put a cap on emissions that are ultimately going to have to be dealt with on a global basis.

Greg Dalton: Angus Gillespie, Mary Nichols mentioned the auto fuel efficiency standards, the

CAFE standards. The auto industry, capital intensive, heavily regulated industry, is increasing by 100% fuel efficiency of American automobiles from about 27 miles a gallon up to 54 by 2025. Some people look at the oil industry and say has the oil industry also stepped up? And there's been a plan to reduce by 10% the carbon intensity of fuels in California and other states and the industry has litigated and fought vociferously so how is it that auto companies can increase 100% and oil industry fights like hell the 10%?

Angus Gillespie: I think it has to do with the laws of physics again, Greg. I mean this is one of the challenges you face is if you think of gasoline and diesel I mean it's been around for 150 years or so. And it's optimized through various generations to be the energy carrier of choice. It's such a great form of energy carrier, energy density. That the best you can do in its current form is to reduce it 10% or so, you know we can use carbon capture and storage and other things but you're limited in what you do. And that's why it's not just about the fuel that's used, about engines that use them; it's about the driver behavior whoever started them and the driving that's done. So it has to be a contribution from all. I mean there's always a danger when we talk about fossil fuels that's treated as a homogeneous sector. But still, I think there's a lot of scope for the switch fuels and power generation where you do have more options. The majority view is that replacing coal with gas could give you a 50% reduction on emissions for the same energy under the right conditions. Road transport, that's the challenge, that's why you don't see the alternatives come through in the way. You hit the barrier of what can be done on a practical basis much, much quicker.

Greg Dalton: Lou Allstadt, gasoline does have fabulous energy intensity. It's done great things for lifting people out of poverty a hundred so years. But how about that 10%, can the industry do 10%, as hard as they say?

Lou Allstadt: I think Angus is pretty much right on the physics. The problem is that there's another way to do it. Only about 20% of the energy of the gasoline that's in your tank gets to the wheels. If you use an electric vehicle, about 80% of the energy that's in the battery gets to the wheels. So it's not a matter of not being able to get greater efficiency, it's the fuel that you're using.

Greg Dalton: So anyone who's touched your engine, there's a lot of like wasted heat energy in your car engine. So are you saying that EVs are the solution? That EVs are more efficient?

Lou Allstadt: I think you have to be open to a lot of different solutions. I think EVs may be, hydrogen fueled vehicles may be part of the solution. Citizens' Climate Lobby is pretty agnostic on how you solve it just that you have to solve it.

Greg Dalton: Mary Nichols, California, EVs, hydrogen, paint a picture of us, how we're going to be getting around in the future. What kind of fuel in our cars?

Mary Nichols: We think that by about 2030 every cars sold in California will have to be either a plug in, a hybrid, a very advance plug in that uses a renewable fuel for the liquid fuel or it's a battery electric vehicle or it's a hydrogen fuel cell vehicle. And maybe there's other technologies out there. But I don't think there is much point just throwing up our hands and saying let's wait for something else because we got all of those out there today. And what we need to do is to direct the incentives and the investments in the direction of making those vehicles more viable. Now, having said that that's what all the new cars are going to be, there's still going to be a lot of cars using gasoline and diesel fuel out there on the roads at least until 2050. And we want to make sure that those vehicles are using the cleanest possible fuel. So we need the oil companies to use the tremendous technical and engineering and in-house research capacity that they have to help come up with cleaner, basically drop-in fuels that meet the same specs as the current fuels but do it out of something that isn't as polluting as petroleum.

Greg Dalton: Is this happening fast enough in correlation with what scientists say needs to happen, the IPCC that U.N. scientists said that we need to get off fossil fuels completely by the end of the century or face severe, pervasive and irreversible impact. Angus Gillespie, is it happening fast enough?

Angus Gillespie: Oh first of all, just a little correction. I think what IPCC said was unabated fossil fuels out of the mix so there was still a place for fossil fuels with carbon count and storage. I don't think things are moving quickly enough. And remember, the longer we take to get started, the longer this will take to get in place. Shell did a piece of work -- just understand when you take a new technology, how long it takes to maturity. So to Mary's point with the oil companies are getting their minds around this, you have to get started because we found on average it takes 30 years, 3-0, 30 years to go from zero to get a 1% share of the market. So when you're talking about electric vehicle, fuel cell vehicles, you need to get started now for what our kids and grandchildren will be driving in the future. We won't see the benefit, the next generation will.

Greg Dalton: Lou Allstadt, carbon capture and sequestration, these kind of magical sponges that suck carbon out of smoke stacks and other places. President George Bush threw a few billion dollars on that, pulled the plug on the project. It's talked about but it doesn't really exist yet.

Lou Allstadt: It's not really there yet, there are pilot plans. It's expensive. It adds substantially to the cost of a gas fired power plant, adds almost double, 80% on top something like that, just to try to suck out the carbon. Then you also have the problem what you do with the carbon dioxide once you got it. You got to inject it in the ground. One of the things that's being talk about is using it to produce oil. It can be used as secondary oil recovery mechanism. Well, if you put it in the ground to help produce oil then you got the oil and then you got more carbon to deal with. So it's not there yet, I actually hope it's successful. I hope they get the cost down. I hope they can scale it to a size that can be used in smaller plants, not just gigantic plants. But it's a ways to go and it's an awful lot to bet your future on that one particular technology.

Greg Dalton: But if these magical sponges don't materialize what does that mean for the fossil fuel industry? That seems to be their one, they need that to save their bacon.

Lou Allstadt: That's right.

[Laughter]

Angus Gillespie: Thanks Lou. [Laughter] The first thing is I think there's still a future for fossil fuels. That has to be abated, it has to be with CCS, that's right. So what happens if we don't have carbon capture storage? And you're right Lou, a commercially acceptable cost. I think what happens then is the focus has to be on large scale electricity storage. Because the one thing that holds back renewables is its inherent intermittency, you cannot rely on it. Again it's systems optimization. The benefit with hydrocarbons that we allow the demand to take the ship, it doesn't supply as flexible enough to follow demand because we can't store the electricity. When you go into a future where supply is determined by the weather, you either have very flexible demand or a way of storing electricity. So for me it comes down to technology then. Who do you have more faith in, a storage system, a battery that's gigawatts in size, or carbon capture storage. They're both frightening prospects but no one said tackling climate change was going to be easy, that's the nature of the problem. So for me, it's fossil fuels with carbon capture and storage or it's a completely renewables future, but it has to have large scale energy storage which I think, if you think carbon capture and storage is difficult, my goodness, you try storing electricity at that rate.

Greg Dalton: Yeah, those electrons like to move. There's a lot of people on Silicon Valley making

big bets and lot of wealth will be created, people who can get that right.

We're talking about energy and cars at Climate One, I'm Greg Dalton. My guests are Lou Allstadt, former executive vice president of Mobil Oil, Angus Gillespie, vice president for CO2 at Shell Oil Company and Mary Nichols, chair of the California Air Resources Board. You can follow the conversation on Twitter and listen to Podcast in the iTunes Store by searching for Climate One. Let's go to audience question, welcome.

Lauren Payne: Hi, my name is Lauren Payne and this question is for Mr. Gillespie. I'm trying to get a sense of what \$12 billion is, \$12 billion representing Shell's overall investment into the sugarcane, methane extraction research. And I was wondering what the fiscal year 2013 profits for Shell were?

Angus Gillespie: That's a good test.

[Laughter]

I think it was around about \$25 billion. So it's about half a year's profits being tuned into biofuels. Which to me, that's, that's a fairly material sum.

Greg Dalton: Are biofuels profitable for Shell?

Angus Gillespie: Not yet. Again, it's another thing, you have to speculate to accumulate, as to say. You have to invest upfront in order to expect a viable return in the future. But I think that's the type of question that for those companies who have yet to even reach the billion dollars is a good one. It just so happens I think it's an expression of significance.

Greg Dalton: Industry wide though it's true that there's been a pullback, Chevron just sold its clean energy unit which was very small and oil companies by and large have got out of the renewable business. Let's go to our next question.

Wayne Roth: Hi, my name is Wayne Roth. I appreciate Lou that you've divested from your Mobil Oil and I hope that Angus you do that soon.

Greg Dalton: Sell your Mobil stock or no?

Wayne Roth: No, no. So sell the Exxon stock, pardon me sell his Shell stock. Lester Brown from the World Policy Institute puts a price on carbon irrespective of the political climate. Just the scientific need to force carbon to be reduced, of \$200 per ton, that was -- just about what you said now, you said that you're going to go to \$20 but it really needed to be ten times that. How soon can we do this, we have very little time. Many people think that we have maybe ten years at best to really get off of carbon seriously. So we need to somehow make a sacrifice, all of us.

Greg Dalton: Thank you. Lou Allstadt.

Lou Allstadt: You're right, it has to be larger. And the early description of the Citizens' Climate Lobby approach was to put about \$15 a ton on and then go up \$10 a ton a year. It doesn't stop five years out, that continues. One of the benefits of doing that is that businesses have the certainty of knowing that the cost of carbon is going to keep going up. And that pushes them to move faster into alternatives. Either efficiencies, renewable energy, doing things differently, but that certainty that it's going up and the cost is going to be more and more each year will push people faster.

Greg Dalton: But the reality is the places that have put a price on carbon, EU it went down,

Australia put it on, took it off, there's been lots of zigzags. So if you're a company like Shell, that signal is erratic, it's not clear it's going up. Maybe China is the one, China is maybe going to put a price on carbon, Mary Nichols?

Mary Nichols: Well, and also you can't just add this new tax or price or fee or whatever you call it on top of our existing system and expect that not to have an impact on the economy as a whole. And on the public, I mean we do live in a society where people get to vote on these things. They vote for their representatives, they vote on whether or not they're willing to pay taxes. So unless you're willing to get rid of other taxes and assure people that the money is going to go for things that they want to spend money on -- I mean this is just Civics 101, you're not going to get it done. So I think it's really important for those of us who do believe that we need the carbon price signal and have to price it correctly to not just talk about this sort of in a vacuum because we come across there's a bunch of elitists who just want to make it painful for the average person who doesn't really have an alternative right now to driving to work.

Greg Dalton: British Columbia did that, they put a price on -- they reduced, they put a tax on fossil fuels, they reduced other taxes. British Columbia is still thriving, it hasn't fallen into the ocean yet. Let's go to our next question.

Male Participant: Hi, I like to ask a rather pessimistic question about the need to strand the oil assets. In the context of the upcoming international negotiations in Paris. The southern countries that haven't -- so called southern countries that haven't gotten wealthy developing on cheap energy. They maintain the right to do so. And even if a few countries has a carbon tax, even a hefty one, it would have to be very hefty considering that the oil can drop its prices, we've seen. Won't Shell and other companies be forced to sell to developing countries? Is there really any way to prevent all the oil and coal from being used even with the cost in a few countries?

Greg Dalton: Angus Gillespie.

Angus Gillespie: I apologize, I'm going to sound like a broken record. I think the role of carbon capture storage is absolutely essential. So to me, it's not unburnable carbon, it's unemittable carbon. And in its current form it's a big challenge. When we see real CO2 pricing up become more of a challenge and the only way that you can round the circle is by using carbon capture storage. So you help developing nations gain the sovereign wealth that they deserve with their own resources and at the same time you contain as much as is possible threat to the environment by managing the CO2.

Greg Dalton: But Lou Allstadt, in that question, was the idea that even if the rich developed countries did something, there's still other places to burn that fuels and those countries and those politicians have a responsibility and a right to develop their country and the fossil fuels are the way to do it.

Lou Allstadt: Well, if you put a fee on carbon and if you put a border adjustment so that imported hydrocarbons have the same fee as you'd have in the states. And that manufactured goods that have large energy inputs would have to pay a fee when they came into the states, then the other side, the developing countries that want to do business with the US or any other country that has this kind of a system, would actually have an incentive to put their own carbon fee in. So that they're not paying it when they get here, they're collecting it themselves.

Mary Nichols: And the developing world is not all dependent yet on petroleum. Many countries don't have any of it and do have other resources and it is going to be incumbent I think on the other wealthier countries, the so called Annex 1 countries, to assist them in that effort.

I think the great news that came out of this year's conference of parties in Peru was that the developing countries are now for the first time willing to acknowledge that they have to accept some limits on their own emissions and to be participants in a global effort to address this problem. But that doesn't mean that they can or should be expected to invest at the same levels that countries like the United States can. But a lot of what we hope for in California by being early movers in this field is to help demonstrate technologies that can be adapted and used in other parts of the world. Which will be a benefit for our entrepreneurs and inventors and it will also hopefully assist other places in avoiding going through some of the cycles that we had to go through to get to where we are now.

Greg Dalton: We're talking about the future of fossil fuels at Climate One. We have about seven minutes left. Let's go to our next audience question.

Tim O'Connor: Hello, my name is Tim O'Connor for the Environmental Defense Fund. There's several reputable sources that show that when you diversify the fuel mix with cleaner options you can save consumers money. You can clean up the air and you can create new business opportunities. The question is, did the majority of oil companies that are out there see this as an opportunity based in responsibility or did they see it, climate policy, as an impediment to the growth of their business model?

Greg Dalton: Lou Allstadt, I mean these big oil companies build billion dollar plants, their engineers, they're very invested in their capital their way of making money, the way their careers have been made, it's hard for them to switch to renewables that don't bring much to the party.

Lou Allstadt: Angus mentioned this a few minutes ago. The competencies don't match up really well. There are some parts of the big energy companies, oil and gas companies that can translate. For instance, if you had a hydrogen fuel system those companies are pretty good at distributing it, delivering it, things like that. If you start going off of fossil fuels then the whole exploration and development side of the business which is where the big investments are becomes pretty fragile in these companies. And those jobs are not readily translatable into renewables.

Greg Dalton: Mary Nichols.

Mary Nichols: That's why I wanted to put in a plug for the low carbon fuel standard in California because we designed this program in a way that didn't force the conventional gasoline suppliers to make all these new alternative fuels. They can buy credits. And there already are thousands and thousands of credits in the systems that have been brought in by suppliers of alternative fuels who are just waiting to market even more of their products here in a more diverse environment.

Greg Dalton: And Detroit didn't create Tesla. The big auto companies didn't create Tesla. So the oil companies are probably not going to create the exciting new clean energy startups. Is that fair Angus Gillespie?

Angus Gillespie: No.

[Laughter]

We're allowed entrepreneurship as one of our values as well. I think it's a good question and it's basic economics. So again as the incumbent supplying fossil fuels our future is threatened. So you have to look if you're going to maintain shareholder income, you have to look for the alternatives to the core business. And I think it's always dangerous when you -- because you don't see a material business presence you assume that people have the blinkers on inside oil companies. I can only speak from Shell perspective but we have lots of small investments to see so much like parts on the

fire and watching which ones going to bubble first that deserves the investment. So it's much about the threat of the incumbent business is the opportunities and what will be the future. It's just when the returns are there that will incite then the competencies to be built to actually bring it to material basis. Because I think the large oil companies play a really key role which is even if you believe as media has said a lot of the real enterprises and the small business sector when it comes to bringing that to maturity, often you need a large incumbent player to help bring it through. There's another role there to be played.

Greg Dalton: We have to wrap it up. I want to ask -- finish with each of you what you're doing in your personal life with your own carbon footprint. How do you -- Angus Gillespie.

Mary Nichols: He's got the best story.

[Laughter]

Greg Dalton: You're an oil guy who doesn't own a car. So tell us.

Angus Gillespie: Yeah, proudly I don't own a vehicle at all. So I'm a runner, I'm a cyclist. So I have a beautiful morning commute, an evening commute to and from the office I cycle 15 minutes to the office, 15 minutes back. I've relied completely on public transport. If I need to go within Europe, I rent a vehicle and I've rent a vehicle two or three times a year, other than that zero road transport emissions footprint. Please don't tell my boss.

[Laughter]

Greg Dalton: Mary Nichols.

Mary Nichols: I drive a Honda plug in fit, which I recharge in my driveway and I have solar panels on my roof but mostly I'm trying to work more from home than I used to by telecommuting. Not today though.

Greg Dalton: Lou Allstadt.

Lou Allstadt: Okay, I also have solar panels on my roof. My wife and I restored a very old house not long ago thoroughly insulated it to make it more energy-efficient. I'm on the Board of Trustees in the village of Cooperstown and I'm heading up a project to put solar on, to provide solar electric for all the municipal uses. Working with the school and surrounding towns to bring them into the package as well. And as I said I divested my Exxon Mobil stock and I'm buying renewables.

[Applause]

Greg Dalton: Are we going to see solar panels on the top of the baseball Hall of Fame?

Lou Allstadt: We actually looked at whether the baseballs would crash the panels and they probably won't. [Laughter] This panel is strong enough that they won't be broken by foul balls, put it that way. We actually thought about it.

Greg Dalton: And you thought -- are you worried about the foul balls breaking -- I got you, okay.

Lou Allstadt: Right.

Greg Dalton: Okay, alrighty. I'm Greg Dalton, I have solar panels, drive an electric car and we have to end it there. Our guests today at Climate One have been Mary Nichols chair of the

California Air Resources board, Angus Gillespie vice president for CO2 at Shell and bike rider and Lou Allstadt, former executive vice president of Mobil Oil. Thank you for coming today to Climate One and thanks for listening on the radio.

[Applause]