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Session 3: "EIA's 2010 Annual Energy Outlook Highlights"

Speakers:

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[Note: Recorders did not pick up introduction of panel (see biographies for details on the panelists) or introduction of session.]

Paul: All right, now we're running a little bit late here after all, lunch, so let's get started if we could. Either way, my speakers will be cut down to only 10 minutes each and we'll just do questions. First of all, make sure you're all at the right session. This is the session on the 2010 Annual Energy Outlook: The Highlights of EIA. Topic is a little bit broader. I think we're talking about outlooks in general. We have three very qualified speakers here to talk to the Energy Outlooks.

The order we're going to run in is: Tom Eizember from Exxon Mobil who's the Planning Division Manager for Corporate Strategic Planning, who'll present Exxon's outlook which is more international in nature. Mary Novak, who's Managing Director for Energy Services at Global Insight, will present the Global Insight's outlook in the midterm, which is more domestic U.S. And then John Conti will finish up. John is the Director of the Office of Integrated Analysis and Energy Forecasting at the U.S. Energy Information Administration. And most importantly, he's my boss; so everybody, give him kudos for no matter what I do. He'll finish up with that.

You know, I've been in the forecasting business for 30 years now. And the one thing I've learned in this business is that nobody who forecasts — whether it's in

midterm, the long term, or the short term — can do it often enough, largely because, of course, markets change all the time. The policy assumptions you make, the price assumptions that you make, assumptions about economic growth, all impact your forecast aggressively. And it's important to understand how the forecasts are structured, what they're including, and what their assumptions are about a lot of different factors to really get a feel for what the forecasters themselves are trying to tell you about their thought process, about the energy market.

And ultimately, that's the biggest value of these forecasts. None of U.S. has a crystal ball. If you go back and look at our forecast 20 years ago, there isn't anybody I know who wouldn't like to redo them over and over again after that. But that process of thinking about the future, about how it's going to evolve, about what's important to the future, is really the contribution that forecasters generally make. And with that, let's get started here with Tom Eizember.

Tom: Thank you, Paul. As Paul mentioned, I'm from Exxon Mobil's Corporate Planning Department in Dallas. Every year corporate planning presents...prepares a long-term energy outlook, which we use to guide our internal business planning. We've been doing so for over 60 years now every year. And recently we have started sharing the key points of our outlook with the public, with policy makers to try and raise the awareness of the issues and understanding in the energy business. Now, as Paul mentioned, our outlook is global. We look at all energy types. We look all over the world. We work this by individual country and region for a total of nearly a hundred. We look at nearly 20 different demand sectors and we look at every fuel type that we can identify.

Now today I'm going to focus on the U.S. view, that outlook and, in more particular, why our forecast varies somewhat from the EIA's forecast to give you a little bit of understanding there. To the extent this piques your interest in the broader energy forecast, I would encourage you to go to our website, exxonmobil.com, and there you will find the detailed write up of our broad energy forecast.

So let's begin and we begin with people because, fundamentally, people drive energy use. We use energy to accomplish what we wish to accomplish, and, frankly, it's hard to accomplish almost anything without using energy. So going forward, we see the population growth in just slightly under 1% a year; that the population — the rate of increase — is slowing. In fact, some agencies would suggest that perhaps by the middle of this century we'll reach a plateau of about nine billion people.

Anyway, from today through 2030, which is the horizon year on our outlook, we're going to add about a billion people, huge growth of an increase in people. And those people are going to drive economic activity. Global GDP showing here, we show growing at three times the rate of population growth. And this is a good thing. This represents increasing wealth and prosperity.

And that's critically important. Today in the world, we have two and a half billion people that still don't have access to modern fuels. They're cooking and they're heating with wood and charcoal and animal dung. We got a billion people with no access to electricity. This economic growth forecast projects that many of these people will work their way out of poverty or at least to a lesser state of poverty going forward. Now to support that energy, that economic activity, we have energy growing at about 1.2% a year, so not quite the third but close to a third. And the difference between the energy growth rate and the economic growth rate is efficiency. And efficiency is critically important in our outlook, and we believe it's critically important to the world.

I'll talk about efficiency in particular when we talk about transportation. But we also have a tremendous amount of efficiency assumptions in both the industrial segments and in the residential and commercial segments that I don't have time to talk about here. Now, some of you could look at that chart on the right and say, you know, with the exception of the little bubble with the recent rapid growth of China in the early 2000s and the economic cutback, I could make that forecast with a ruler. And that sort of looks right on the chart. But it's not nearly that easy because things get a lot more

interesting when you start looking segment by segment and region by region. So let's look by region on this chart.

On the top-end blue, I show the economic activity of the OECD — the developed world, so to speak — and on the bottom, the non-OECD, the developing world. And you can see first of all that, today, the developing world has about a quarter of the economic activity of the developed world. Going forward, the developed world in blue grows more slowly about 2% a year, the developing world much more quickly about 5% a year. By 2030, the developing world has grown to about 40% of the total. Now, energy demand. You see the developed world we project flat going forward. And again, this is efficiencies offsetting the 2% economic activity, the developing world still growing about 2% a year, supporting that 5% increase so some pretty significant differences in trends.

Now let's focus in on the U.S. and you can see some even more interesting trends going on here in the U.S. We show, as we have for quite a few years now, oil demand is dropping going forward driven primarily by transportation, and I'm going to detail that on the next couple of slides. Gas is increasing, coal is decreasing, nuclear is increasing, and those are fundamentally driven by some assumptions we have in the power generation sector that I'll also tell you about shortly. We have biomass about flat...wind solar and biofuels on the top and the light blue. Wind is growing at about 10% a year, but it's still a relatively small percentage of the total base.

So, let's move on to transportation. Let me talk to you briefly through some of our transportation discussions. In theory, transportation is easy. It's the number of vehicles times the efficiency of the vehicles times the number of miles that you guide them. Now, the number of vehicles is relatively easy because we have licenses. The other two are a lot more difficult. I'll start about what's happening with the number of vehicles. Here we show in dark blue the total population of the U.S., 2005 and 2030 in our projection, growing somewhat to about 300 million. The hatched are the number of cars. We have

roughly 800 cars per a thousand people in the U.S. We think that's about a saturated level, like that's about as many we need. That's more than one per license driver.

Going forward, that saturation level stays so cars grow with population. We look in Europe and we see a similar story although at different level, slightly larger population, not growing as much. But they're saturated roughly 450 cars per thousand people, much more urbanized population, more access to mass transit; so again, they grow but at a little lower level. The interesting story is when you start looking at the developing world. In 2005, China had perhaps 15 cars per thousand people. We have them growing to 80 in 2030. That's still only a tenth of the U.S. saturation level. But that's a massive increase in the number of cars.

Now, looking at the types of vehicles which become important as we think about efficiency, here's what we show going forward: Gasoline continuing to grow, diesel growing slightly. Diesel is preferred in Europe because of the tax structure on the higher mileage. And the blue wedge on top is what we call advanced vehicles. These are primarily hybrids. They are also this small amount of plug-in hybrids and electric vehicles, although we don't see those growing to any significant part of the fleet by 2030. Here, we show advanced vehicle hybrids making up about 15% of the total global vehicle fleet by 2030.

Now, let's talk about how that translates into efficiency for new cars. I've shown here U.S. fleet deficiency for the new car fleet each year, which had been relatively flat at about 20 miles a gallon since about 1980, started rising in the early 2000s as oil prices rose and gasoline prices rose not surprisingly. Going forward, our assessment is that it will continue to rise. We have it meeting the requirement...the recent requirement, Executive Order...in 2016, although the actual effective level on road is lower than the 35.5 that you hear advertised and then continuing to increase going forward is technical efficiencies turn in to actual fuel efficiencies in the vehicle as opposed to just generating vehicles that are heavier with higher performance.

When you compare that to what's happening overseas, you can see that that in Europe, as well as in Asia Pacific, generally smaller vehicles, lighter vehicles, higher mileage vehicles, but also inefficiency trend going forward. Now that translates into fuel demand as follows: Light-duty vehicle fleet worldwide flat. Used to be light-duty vehicles consumed the majority of transportation oil; that won't be true going forward. Heavy-duty vehicles, commercial activity, will continue to increase, driven by economic activity while the light-duty fleet gets substantially more efficient. So, a pretty radical change there in transportation.

Now, switching briefly to electrical generation, this is our assessment of the cost of generating power notionally 2025 timeframe in the U.S. You can see coal along the left as the lowest cost followed closely by gas, nuclear, wind actually compares well in the right location. This doesn't include any additional transmission lines whether you need them for wind or a nuclear plant; it doesn't include in the intermittency cost.

Also show coal and gas plus CCS. An interesting thing that most people don't realize is that gas with CCS is actually a cheaper source of power than coal with CCS. Just inconsistent with the discussion of clean coal on one hand that gas is a transition fuel on the other. Solar on the right, concentrated solar radiation is the bottom of that range, photovoltaic is on the top. Now, this is without the cost of CO2 emissions. If you add the cost to CO2 emissions, roughly $60 a ton, here's what you end up with. Suddenly the seriatim changes and you see coal as suddenly higher than gas, just higher than nuclear and higher than wind.

Our forecast going forward does assume that the OECD countries adopt some form of system that puts a cost on CO2 emissions that takes U.S. to this realm of roughly $60 a ton in the 2030 timeframe. And so that's driving, in the U.S., a shift away from coal toward gas. We have assumed that policies do support nuclear. We have about 25 gigawatts of new nuclear being built in this timeframe. There are more permits for that and are already submitted.

You still see, however, that the two options with CCS still don't make sense even at this cost of CCS. It has to get substantially higher yet for that to come into play. So that is fundamentally driving our fuel selection in the developed world in this outlook.

So, if we look at what's happening to fuel, this is power generation. In the U.S. you can see coal is declining, gas is increasing. There's essentially no oil in power gen in the U.S. Don't let anybody tell you we can build windmills and reduce our dependency on foreign oil. Nuclear is growing. Renewables is growing. About half of that renewables today is hydro. The growth is primarily in wind. Now, Europe very similar story, of course, because we're assuming a similar cost there. The real story in power gen is what's going on in Asia Pacific, China, and India. Massive growth in coal, much of these plants are already built but as well are building gas, nuclear, and wind as well.

Gas supply, very briefly. This is U.S. gas supply conventional on the bottom. Unconventional, which is tight gas, shale bed gas, and coalbed methane is cross hatched. Pipeline imports from Canada in the yellow and on the top cross hatch just a slight sliver of LNG. You can see the significant increase in unconventional gas that has happened going forward. That happened recently and we assume going forward. This is a major technological shift in one where technology has really outpaced people's expectations even just a few years ago. If we look at Europe, much more heavy reliance on pipeline supply from Russia and the Caspian, also additional imports of LNG there. But the real LNG story, as you can see, is in Asia Pacific, which has still substantially more conventional, less unconventional, mostly coalbed methane in Australia but LNG being the primary story in gas supply.

I want to touch on biofuels very briefly because we show a lower biofuels outlook than the EIA does. The EIA also shows a lower biofuels outlook than the ISO 2007 requirements. This is for the U.S. You see, we have corn ethanol topping off at 15 billion gallons, a small amount of bio diesel. You see the light purple wedge second

generation. This is any ethanol manufactured from non-food stuffs. Whether it's LG or cellulose is going to depend on what happens by technology and imports of Brazilian sugar cane ethanol. Our forecast basically assumes that there isn't any magic breakthrough in cellulosic ethanol, and cellulosic ethanol doesn't come in to significant play until the later part of the 2020 decade. We put that in perspective in the world.

Now, I've changed scales here by the way, so just to mention on that. U.S. is about a third of the world, then we have Brazilian ethanol roughly in other third, and the rest is about half and half split between ethanol and biodiesel. This total supply, by the way, in 2030 for the world is about 5% of transportation fuel. So, it's a pretty significant addition to the supply picture.

I want to wrap up briefly. Well, just to mention the CO2 emissions. Here we have the OECD, CO2 emissions in blue on the bottom falling consistently with a flat-end total energy demand but a shift from coal to gas nuclear renewables. The real story in CO2, of course, is in red on the top. This is the developing world, which already emit more CO2 than the developed world does and are growing substantially going forward to the point that if you stop CO2 emissions in the developed world, the global atmospheric CO2 concentration would still rise.

And this is why it's important in any CO2 policy, any greenhouse gas mitigation policy, we have to figure out how to positively engage the developing world or that policy has no chance of success in actually mitigating any risk of climate change. Our outlook for the U.S. does differ from EIA's primarily because of our assumption of the cost of CO2 emissions. Between 1980 and 2005, the U.S. grew about a billion tons a year of CO2 emissions, from about five to about six. Our forecast shows that reversing that trend in getting basically back down to where we were in 1980 by 2030, so a pretty impressive feat considering the fact that economic activity is growing 250% and population has grown 50%. So, this is about a 24% lower CO2 emission than the EIA's forecast for 2030.

So, let me wrap up. Here, we show just briefly where we are now and where we're headed: Continued increase in population, hopefully an increase in prosperity, pretty massive shift in economic activity to the developed world, hopefully progress on environmental goals. At the heart of this we see three requirements: We need to increase the efficiency of all energy use sectors, we need to expand all available and economic sources of supply, and we need to mitigate emissions. And when we put those all together, we see technology at the heart of achieving every one of those requirements. So with that, thank you.

Paul: I want to thank Tom for keeping U.S. online in terms of the time here, almost to the second. I'm going to hold questions right now to the end. If you do have questions, please write them down on the cards and they'll obviously bring them up to me. In turn, I'm going to introduce Mary Novak here, who will take over for the next talk.

Mary: Good afternoon, I'm Mary Novak with IHS Global Insight, and we produce a full U.S. energy outlook and a full European energy outlook each summer. So, this is our third quarter, came out in third quarter, the U.S. energy outlook. But moving forward, I'm going to skip some of my slides to keep within my timeframe and I think they'll be available on the EIA website.

Similar to Tom's presentation, the Global Insight Macroeconomic Forecast calls for about, after the somewhat recovery, slow recovery actually so that we don't get back to where we were in 2007 until about 2015 or 2016 in terms of economic activity. After that, the growth rate is about 2.5% per year for GDP. We have just under 1% growth rate for population and so those are the big demographic activity indicators. Further on in this presentation, I'll also be demonstrating our outlook for industrial production. However, in the modeling that we do, we actually don't use the outlook for industrial production. We use subset variables that actually get at more direct use of energy rather than the aggregate index.

The aggregate index is growing pretty darn fast in the forecast. So when you look at economic information and you see an industrial production outlook, it's growing a little bit more than 2.5%, maybe 2.7%, per year. However, if you weigh it for energy, it's growing under 1% per year. So that's what, you know, a big driver of our current forecast.

In the current outlook, this is what we're using in terms of a projection for WTI and Henry Hub. One of the interesting things to note there is that after years of being relative...moving at relatively constant rate of growth, of course WTI has moved way out of the sphere of gas. This gets back to what Tom was saying is that, you know, the technological advances in natural gas markets has actually ended up keeping the price relatively low. Like right now, we're talking $3.50 for gas, we expect it to recover to $5.50, maybe $6, and then hold it at that level. Oil on the other hand, we expect to average about $80 a barrel over the forecast interval. So this has some big implications mostly in terms of transportation and the potential for doing some new and interesting things in transportation that we're not currently doing. Although, those are not included in the basic forecast.

But turning to this slide, we refer to our forecast as evolutionary rather than revolutionary. So we don't include in the current forecast a carbon tax at this point or a carbon fee of any kind.

However, we see some dramatic changes in the market, and those are captured here in a very summary fashion. Because if you look at the slide and it's...I probably should have fixed the slide but...petroleum, which includes biofuels, if you look at actually the amount of petroleum that's coming from crude oil, the growth rate would be nothing, just about nothing. It's all coming from biofuels. So, that would mean that the renewable line would be much larger. So, this is the evolution that's happening in the market today.

Now as we go forward to the forecast discussion, we track two things. One, you know, we incorporated in the forecast all of the legislation, energy legislation, that was passed during this decade and it was significant. I thought it was funny when Larry Summers was saying, you know, we need a comprehensive piece of legislation. I thought to myself, well, gosh we got too much now, you know, that we just keep adding on top of it. But the thing that's really taken hold and really is making significant change in the market today is actually stayed actions.

There are 32 states that have renewable portfolio standards. And they all have efficiency measure standards. So, they've really jumped over all the legislation that the federal government has put in place. And they are the fundamental underlying driver for what is transforming the energy sector today. They are the fundamental driver of that renewable growth.

Here, you can see the look for demand shares by product which is of course expanding the middle of the barrel. But it's expanding the middle of the barrel because conventional gasoline is going away. So, what's in our forecast in terms of the miles per gallon is we actually just take, you know, the EPA rated MPG that's in the current legislation which takes here up about...to about 35, 36 MPG by 2016 or 2017. But in terms of the evolution of that market, we anticipate that light-duty vehicles that cars will actually run up to about 50 mpg by 2040. And we have light trucks actually running up to about 38 mpg. So, the average for the light-duty vehicle fleet, by the time we get out to 2035, 2040 is more...is about 45 miles per gallon, double of what it is today.

If we are expecting sales of vehicles to basically keep pace with population because of the saturation factor, what that does is it just takes all the demand and flattens and straight out. So, basically it can overwhelm your population growth with those efficiency gains and keep oil demand constant. Because in this chart, that purple bar at the top is biodiesel and ethanol, so that any growth that's anticipated in the oil sector is going to come from renewables.

What does this do in terms of net oil imports? Well, as you could see, because we have some improvement...well the continuation of demand growth...net import actually stays constant. So, the import share rises slightly from where it is today. But it does not regain the import share that we were experiencing in the middle of this decade. We actually have it achieving running up to about 57%, 58% by 2030 and then holding constant. So, in terms of economic activity, of course, the oil...oil is a big drain on the economy. So, to the extent that we could hold that constant or we can have it drop a little bit, anything that we can do to create domestic product, to meet transportation needs is better for the U.S. economy. So, on a go-forward basis, the introduction of ethanol and other biofuels actually improves economic activity whereas the increase in import share actually dampens economic activity.

What's the other big change that's going on? Probably the biggest change is actually the change in the outlook for electricity demand. Over the period 2010 to 2030, we actually have electricity demand only growing 1.2% per year. That's a little bit faster than I think the EIA has but it's consistent. Ten years ago, the outlook was that the electricity demand would be growing somewhere between 1.6% and 1.8% per year for 2030. So, this has been probably the most significant change in the outlook over the last 10 years.

Now, why do we have that change? It's actually due to all the policies that were passed between 2000 and 2009. Just a shear amount of efficiency requirements and the change in the structure of the economy moving from a highly industrialized economy to a less industrialized economy results in a significant change in electricity demand, and it's possible that we could actually even cut this further. And the outlook is significantly influenced by that because loses are so great in the electricity sector. So, the biggest change we have to make on a go-forward basis is to not only continue what we're doing in terms of energy efficiency but actually speed the rate of new legislation to reduce electricity demand. And here's where the states are really stepping up because

this used to be all federally dictated. But with the state actions, on top of the federal actions, we're starting to see this dramatic change occur. And it's really making a huge difference in terms of transforming the energy sector.

Note here, that what it means is that we really just don't need to build more; we don't have any net addition required in the forecast. In fact, we tell our industrial clients not to worry though. There's a lot of capacity out there that really needs to be switched out. So, older coal capacity actually needs to be replaced with newer coal capacity. And we have to put on a lot of scrubbers. So it's not that there's no activity within that sector, it's a kind of activity. So, what our forecast here showing is net annual additions are zero for the next 15 years of the forecast. It also shows up in fuel requirements. Because we're building some renewable, we're actually retiring all of the remaining oil plants and we will also be retiring quite a bit of natural gas plants.

The remaining steam units for natural gas will all be shut down within the next 10 years, and we have a slight change in coal only due to the switch out as we refurbish coal units. In our forecast, as in Tom's, we have about 25 gig of nuclear coming on. So, in terms of generation, what we have is the non-carbon fuels will dominate the increase in generating fuels. Gas will be next to move up and begin to absorb some of the over build in natural gas units from the last 10 years. Coal will be a net loser.

The reason we have coal generation declining is because of the switch out. We actually as is the case right now, the power just retired to coal units and built to coal units. So that the tonnage in terms of the generation and the tonnage, you know, they're actually reducing their tonnage a lot because they got about a 20% increase in efficiency relative to their old units. All of those units, IRPs are going in all over the gas...again and the IRP movement which is against stated dominated, is actually to improve efficiency not just putting on pollution abatement equipment but actually improve the efficiency of their existing units. Now, they don't have much they can do

with natural gas because all that stuff is really just recently built. But with coal, there is a tremendous opportunity to improve the efficiency and reduce coal tonnage.

So, what does this mean for natural gas? Well, these are the drivers and that's what I was talking about in terms of the industrial output's growing faster than real GEP. But this is the change in industrial gas demand by the major industries that use natural gas.

So, what happens is, in the forecast, we have a slight decline in residential demand for natural gas saturated market. Commercial stays about flat, not growing anymore. But this change in industrial natural gas demand, it is growing very, very slowly under 1% per year. So, what does that mean for the gas market? Well, any *[inaudible]* growth that has to come from whatever market it could steal from coal in the electric sector. There's just really no activity in the other sectors just to generate anything.

Now why is that both a good thing and a bad thing? As Tom discussed, the development of the shale is a tremendous opportunity for the United States to take advantage of domestic resources. But actually in our forecast, because we have relatively low growth in electricity demand and no growth in the other sectors, we actually have a situation where we are shutting in gas. And here the opportunity is much bigger. Let's say it's going to be 25 TCF per year, but demand is only 20, 21.

So, there's going to be that continued pressure on the gas market. And what it's done is it forced out LNG and it keeps the price of gas around $5, maybe $5.50 per million BTU at the wellhead. So, when you look at our forecast, it's not that the opportunity to use additional gas isn't there. It's just that it doesn't make it without a carbon program. So it gets kind of forced back. So, we only end up having demand for natural gas between 20 and 21 TCF over the forecast interval when probably the opportunity on the supply side is more like 25 TCF. So, it's changing the whole way the

industry has to think about what they're doing if they cannot create demand for natural gas.

So, that is why there's a big pressure from the gas industry to look at the transportation market to figure out how to get the transportation market to actually absorb that natural gas. It's also influencing the development of PHEVs. And we have some of that in the model but not enough to overcome these programs. So, what does this do for the coal market? Well, the answer is that we do not have a carbon tax or a carbon fee in the program at all, but we do have tremendous investment in coal going on right now. Of this, this is the cumulative picture for the period 2007 and 2015.

It says approximately one third of coal capacity will have scrubbers installed over that period. However, pre 2007, we already installed scrubbers on one third. So, that means by 2015, we'll have invested in scrubbers to the tune of about 65% of our coal capacity. So, that's a tremendous impact. And it will actually just drop the bottom out of the SO2 and NOx market, although they're pretty far down right now.

What does that do to coal consumption? Well, we have significant changes going on in that sector also. We had a situation where, because of the SO2 requirements, we developed part our coal basin and we developed big railroads to put...move coal out of the west, east. And that's starting to unravel right now. What we have had is a tremendous investment over the last two or three years in productivity and underground mining in the east, Northeast Appalachia and Illinois basin particularly, so all across Ohio, Indiana, Illinois. This was the companies that consolidated during the 1990s now investing and developing high sulfur coal because once you have 50%, 60% of your coal capacity with scrubbers, a scrubber can take 90% of the SO2 and NOx out of the market. And the scrubber takes out a lot of the mercury also.

So, the changes that are coming shift back to high sulfur coal from the low sulfur coals of the West. And what our forecast shows, this is *[inaudible]* coal production in the high sulfur coal regions, shifting back to Illinois, back to Ohio, and other Northeast

Appalachia regions. So, all of the increase in coal...it's a little more complicated...that Central Appalachia, which is West Virginia, is basically in decline. So, all of the coal that was coming from Central Appalachia, which was a relatively low sulfur region, is being shifted to the higher sulfur regions in Indiana, Ohio, and Illinois. And it's going to change not only the coal market, but it's going to have tremendous impact on the rails because the rails did this big built out to move PRB coal East. So, there is both tremendous opportunity and tremendous transformation of the coal market as we go forward over the next 20 years.

So, as I said, we believe our forecast is evolutionary, not revolutionary, and that we believe that there are tremendous changes coming that are going to rework entire markets over the next 20 years. Thank you.

Paul: Thank you Mary. Our last speaker is John Conti. Again, I remind you if you have any questions please...I got a whole pile of them here...please make them out. Thanks.

John: Good afternoon everyone. When I first started envisioning this session a number of months ago, I thought what an interesting exercise it would be if we could do a comparison of model results. So, we first started looking at this and realize...I should have known better and that's a tremendous exercise that takes many months of effort. That certainly wasn't going to happen for these presentations here today.

So, I'm glad that Tom was able to go first and present the picture of the world with an emphasis on United States and Mary then presented a U.S. forecast. What I hope to do is to present a brief summary of EIA's reference case because that, in of itself, usually takes an hour. And then maybe throw up a few slides, putting some of the Exxon Mobil results as well as the Global Insight results along side of ours just to give a flavor for where the results are different. Because as Paul started this all off, it's really interesting to see how people think about how their models work and their models provide a methodology for providing projections.

It also brings out some very important differences between the projections that we've sort of touched on already. But I guess when people just look at results, they usually don't come to those conclusions right away. So, let me start. And I guess I'll have a disclaimer from the start almost is that the macroeconomic results in the AEO are more or less those of IHS Global Insights. We have incorporated their models within ours. Mary might be presenting a more recent view than what we use for AEO. But basically they're the same thing. And by that I mean GDP grows by about 2.4%, population grows by about 0.9%, labor force by about 0.6%, productivity by 2%. And it was alluded to by Mary earlier also is that the recession was profound and lasting. And by that I mean GDP does not return to 2008 levels until 2011, primary energy consumption will not return to 2008 levels until 2012, and that CO2 emissions will not return to 2008 levels until the year 2019. So, the recession had a long-lasting impact on the U.S. energy markets.

All right. First a few slides and some basic results from the AEO. And I guess I usually like to start about some major assumptions and it becomes obvious right away. You know, the AEO basically assumes current laws and regulations. And Tom has already said where his forecast basically assumes a carbon tax.

So, as we see later there, that produces some very profound differences in the projections. We incorporated the recently enacted CAFE standards. And we'll get into that in a little bit more detail because that's a very interesting thing.

A couple of years ago, we were looking at how capital expansion of coal power was happening and we noticed that there was being a risk premium putting on...on sort of CO2 and intensive technology so we incorporated that methodology within our models.

But the AEO only contains those commercial technologies that exist today. So those breakthrough technologies that maybe the Secretary alluded to early this morning, they're not in there. The ones that we don't know about today, the ones not on

the *[inaudible]* benches today are not included in the AEO. However, we do include the improvement of the known technologies and their cost performance. All right, I have a lot of slides. Some, I will skip over and Paul's going to give me a warning when I get too close to the end to allow enough time for questions and answers.

All right. So, this year we extended the period of performance of the model up to 2035. We included the recently enacted CAFE standards because we went out a number for *[inaudible]* years. We had to make assumptions about nuclear plant life, so we basically assume they could be extended another 20 years.

Revised capital cost, okay; in between the 2009 forecast and the current forecast, one of the things that became more obvious with the publication of a number of reports was that capital intensive and technologies have become more expensive. So, the cost for building a coal plant and nuclear plant or the projected cost of carbon control and sequestration has increased pretty dramatically, 10% to 20% since. This is the last time we had done this in the AEO and we've even incorporated that here. And the other main thing that sort of happened over the past year is what everyone has talked about today. It's the shale gas.

Now I think, I'd like to credit the EIA as one of the few projections that actually included shale gas years and years ago. But still every year we go back and revisit it and it seems to get yet a little bigger. And this year was for the modeling geeks' perspective; we added a new lower 48 onshore oil and gas supply module.

Okay so what are the key results? As alluded to earlier, a lot of projections are that energy growth is going to be modern in our projections. We have a fair...well, not...a moderate growth in GDP and there's a lot of energy efficiency either by standards or programs that are in effect. And as a result, we have some...some moderate growth and energy consumption. As Mary said, we see a declining reliance, Tom said as well, a declining reliance on imported liquid fuels. Oil use stays close to its current levels as they are today. But the growth in transportation liquid fuels is met through increased

biofuels. And more so, as Tom alluded to, more so than in the Exxon Mobil forecast, even though we still don't meet the ease of target in 2022, it's eventually met later in the projections.

As Mary said, electricity consumption is slightly less but not that much, 1% per year. And energy-related CO2 emissions are fairly flat, only growing by about 3% per year throughout the projection period. And that's due to a number of factors.

All right, so let's look at some key differences than between some of the projections here. And it becomes pretty obvious, you know, why maybe the AEO and the IHS Global projections might differ. And one of the major inputs or assumptions is the price of oil. You know, in the AEO we do a number of cases, some high world oil price, low world oil price cases, because I think, finally, everyone is emitting. They really can't project the price of oil, even though certain people in Exxon Mobil said that years and years ago.

But anyway, so one of the things to take note from this chart is that we have the price going up to a $133 per barrel by the end of the projection period from where it is today. Global Insight projection is fairly flat in real terms throughout the projection period.

Our scenarios, there's a number of assumptions that go into them. And one of the main assumptions that go into it is that we believe that OPEC will continue to produce about 40% of the world...of the crude oil. And they've done that for a number of years. We think they're going to continue to do that into the future. And that sort of helps U.S. formulate where we think prices are going in our projections. We think the prices are slightly lower in this year's projections than last year's due to some higher elasticity in demand and a greater drop in petroleum and demand than we had expected. And the continued access limitations on rich non-OPEC countries that continued to strain the growth of non-OPEC liquids production. So, maybe I'll leave that one there and move on.

Okay. I'm going to introduce a new concept here. Now, this is the...I don't want anybody to get confused in the future — this is the only slide that goes to 2030 and I did it to illustrate that if I wanted to compare to something like Tom's projections, we did a case as alluded to by Richard this morning that we did analysis for the Congress that did a Cap and Trade legislation. So this was the Markey-Waxman legislation.

And if I wanted to really try and compare it with Tom's projections, we'd look more like that bar. Excuse me, I could point with this. We look more like this bar hung out here to the right. This is the 2030 result from our Markey-Waxman analysis.

And I think the key things to note here is, and becomes a lot more similar to the Exxon Mobil projections, is that the whole primary energy supply is a lot lower than what we have in our AEO reference case. And if you noticed the coal use is dramatically less. Natural gas is slightly less, which we can get into with some different, nuclear is higher, and renewables is higher.

But in the AEO reference case this year, I think the projections are very similar to both Global Insight and into the Exxon Mobil results, is that petroleum demand is basically flat. Coal use in our projections increases slightly, natural gas increases slightly, nuclear increases slightly, and there is renewables increase fairly dramatically especially not hydro renewables, and then there's the liquid biofuels which grow to really meet the additional liquid demand and the transportation sector.

All right, and this point highlights something Mary said directly just a few minutes ago. And I think it's a function of two things mostly...okay, so if you look at the solid lines, those are the ones that are AEO 2010 reference case. And so in the reference case, we have basically the top line consumption going up slightly. But if you look at the, I guess the, darker red lines, the solid line, the production is actually going up much faster than the consumptions. So, as a result, net imports of liquids decrease from what was a peak a few years ago of about 60% — excuse me once again — from about 60% here down to about 45%.

Now, when I compare that to the IHS Global Insight projections that these lines are at the consumption is fairly similar. You know, I think we have a more robust return from the recession here. But the real difference is the production. Our production basically increases, and that's mostly due to offshore liquids production as well as enhanced oil recovery. Whereas, I think the Global Insight production basically continues on the past trend, which shows decreasing production from a lower 48 unless we get through a bump of a few years.

So, that's something for U.S. to sort of note and potentially explore in the future. Everyone's touched on the CAFE standard. I found this interesting. I haven't fully digested it yet. I'm not sure what to make of it but this is in comparison of all the three different new light-duty vehicle on road efficiency.

A thorough understanding of this chart would probably take about a half hour. I'm not sure if I still understand it. But if this...and probably the person that explained it to me is sitting at the back of the room...okay, so starting with the new CAFE standard, a 35.5 miles per gallon. Part of that could be met through a greenhouse gas credit. That's my name. Make up your own. But anyway, you can do certain things to the car whether it's low-e glass or whether it's improve aero dynamics or whether it's better sealants of your refrigeration unit that will allow you to get a credit and basically of up to 1.5 miles per gallon.

So, the remainder of that will be made up through the traditional CAFE fuel efficiency standard. Okay, so then we take that and from that, which brings U.S. down to about 34 miles per gallon in one specific year, and we know that this really starts to hurt in 2016 as the new standard goes into effect. In the past, there has been alternative compliance credits that have been banked and alternative fuel credits that have been banked. And we think that the automotive industry is going to use a lot of these, especially early in years. And so as a result of that, the on-road efficiency — excuse me — the tested efficiency would drop to about 31.5 miles per gallon. And then finally when

you do the on-road degradation, it drops even lower to about 26.5 miles per gallon in the year 2016.

So, I can understand basically Exxon Mobil's and our projections are fairly similar for a long time of forecast. When I look at Global Insights, I think the results are the same even though this one chart seems to differ somehow. So, maybe there's additional adjustments that go on after that that gets the transportation and fuels to line up better.

All right. I think this is our projections in the AEO. And I guess the point is here is we have a significant increase in unconventional vehicles throughout our forecast. It grows from about 13% in 2008 to about half of the vehicle fleet in terms of sales in 2035. And I guess the only point I'll make here in the interest of time is that, if you did have something like a carbon tax, as I drop that middle bar and I hear again from that Markey-Waxman analysis, we see a heck of a lot more hybrid vehicles, slightly less fossil...flex fuel vehicles, but those that are on the road use much more intensively than they were in the reference case scenario, and some more diesel vehicles as well. So one of the things to know, we have a tremendous amount, more biofuels in a car scenario. And our reference scenario is even more, I think than Exxon Mobil's because we have more advanced cellulosic technologies and we also have a biomass-to-liquids technology as well with part of the cellulosic. Okay.

All right. Here's another part of the comparison to the Global Insight projections which shows that in the AEO, we basically have natural gas, well our prices are increasing from forecast certainly from the lows…let's get off this little screen not on the big screen...so, currently from the lows where they are today increasing through the projection period once they bump back up right after session and increasing throughout the projection period. And then once again the Global Insight projections are fairly flat and in real terms from natural gas wellhead prices. We think it will become increasingly

more difficult to develop natural gas even though more shale gas will be available, not necessarily very, very cheap to produce it.

It's certainly cheaper than people thought in the past for natural gas. As a matter of fact, this year's Annual Energy Outlook does have natural gas prices that are about 11% lower than last year's natural gas prices.

And this is a point that Mary made earlier when if you tried to compare crude oil and natural gas prices. We really are projecting a different world with respect to the oil and natural gas price ratio. In the past, it was about 1.7 on average. You know, we're up above three for this, really a separation of the oil and gas markets at least in North America. And it has *[inaudible]* or I guess maybe for at least the Eastern basin as well. But Global Insight has slightly higher than the past but not nearly as high as we do because our oil price basically increases a lot faster than our natural gas price. And that's mostly due to the transportation demands that are increasing throughout the world while there's fairly abundant supplies in natural gas in the United States.

All right. And so this is where our natural gas comes from. As you could see the big growth areas are the shale gas areas and as well as gas from Mobil...the Alaska pipeline. This year's forecast delayed the Alaska pipeline about three years initially from the last time we did it. That's mostly due to the economics of the natural gas that came into effect here. And I'm going to move faster now that I know how much time I have left.

As Mary said earlier, electricity growth is slowing. I think we've noticed this for the past few years and we've been slowing our growth rate, I don't know, for the past five years. We have our growth rate in this year's AEO to about 1% depending on what span of year you choose over the projection period. Mary said it's about 1.2% and that has implications for how much capacity you're going to need.

We certainly think that we're going to need more capacity than Mary alluded to earlier. And I break this chart into three parts. Certainly, you could see the big donut on

the left is what the capacity that we have there today, the larger sections of it being coal and natural gas and large sections also of hydropower, nuclear, and some renewables.

But the top right donut then is what we expect in our reference case and you see you don't need all that much more capacity. You need about 250 gigawatts over this whole projection period out through 2035. And we think most of that is going to be met through a combination of natural gas and renewables. There's some coal additions, some that are planned and under way currently today. But by the end of the forecast without a carbon tax or cap and trade or any other proposals we've heard about today, we do expect coal to be a competitive choice once again.

However, once you move to a cap and trade regime, then all the coal you add here...first of all you need more capacity because you're going to have to retire more capacity. And the coal that you build here is going to replace the existing coal, is going to have carbon capture and storage.

We think you build less natural gas because, you know, unlike where Tom alluded to earlier, we think that the coal with carbon capture and storage in a carbon-constrained world is relatively cheaper than natural gas with carbon capture and storage, basically because the fuel cost so much lower for coal. So we see that squeeze natural gas further. Also, you could see the big growth of the renewables and the big growth in nuclear. All right.

We catch up to my notes here. This is similar to a chart I represented. This is electricity generation by share. And you could see that although coal is growing, the share declines slightly through the projection period. So that's nuclear even though that's the overall capacity. The generation is increasing as the share of nuclear decreases.

Natural gas basically stays constant. It's higher at one period. By the end it's slightly less. The big growth area, of course, would be renewable for a number of reasons on the next slide, down to about two probably. Okay, the next slide, it sort of

decomposes that somewhat. And you could see that in the near term, we expect a lot more when to be built over the forthcoming years. But then without a production tax credit which is slated to expire and without funds like UA that was available and the recent Reinvestment and Recovery Act, we expect wind capacity editions to moderate significantly. At the same time programs, like Mary alluded to, with the renewable portfolio standards will require increased renewable at the state level to drive biomass consumption and biomass generation.

Finally, carbon emissions. So, the left is where we're at today, 5814. We expect it to grow somewhat up to 6320 by the end of the projection period, not a big increase. And in a Markey-Waxman world, of course, it's significantly less and you squeeze out a significant amount of carbon emissions in the electric power sector.

So, this is where you need to take existing coal and it's got to become either repower coal with carbon capture and storage or it has to become nuclear or it has to become renewables. There's a lot of debate out there about what's the role for natural gas in a carbon-constrained world, and we think it depends on a number of factors. It depends on the price of the gas. It depends on the price of the alternatives, mostly carbon capture and storage which hasn't been commercialized yet, and the price of nuclear which no one has built yet. But under the assumptions we use in the AEO, basically because there's still 40% of the carbon emissions of the traditional coal plant when you have natural gas combined cycle, that in a carbon- constrained world, you would push out natural gas and it would be replaced with the carbon-free source. And with that, I will stop.

Paul: Okay. We have a few moments for questions. But with questions, we have moments for. First one that I want to ask that was just a sort of addressed to everybody. Well, not to everybody. Let me do one first. Sorry about that.

There was one person...since Tom's dealt with the international, someone asked, how does their forecast, Exxon's forecast, compared to the IEA? And I want to give him a chance to address as a starting point.

Tom: Yes, relative to the international energy's most recent forecast, the 2009 World Energy Outlook, our forecast for total liquids demand is about 4% lower than theirs. That's liquids. That's both petroleum liquids and biofuels. We're actually slightly higher than their forecast on biofuel production in 2030 about 10%. And the difference there appears to be they are more pessimistic in the areas outside of the U.S. and Brazil, European sugar beets, palm oil, that kind of thing from Indonesia.

Now, I'd also point out our liquids forecast for 2030 is about 15% lower than the EIA's in the U.S., so a fairly substantial difference there. Unfortunately, I don't have the specifics for total energy relative to the IEA with me. So, I can't give you that.

Paul: Okay. Let me ask a general question for the panel as a whole? There's couple of questions on the same topic which is the one of uncertainty people tend to ask in forecast. Basically the point is there's some disagreements but if they all started talking about the different uncertainties and their forecast, where they come to some level of agreement about what is the major concerns out there, and I don't know who wants to start. But at looking for, what are the key uncertainties?

John: I could start.

Paul: Go ahead.

John: I guess the number one certainty and we've heard it here today is what future policies will come into effect. And you know, in a world in terms of energy policy, climate policy, I'm not sure if that's what we mean by uncertainty. But that certainly, you know, you could see the difference in the projections that I threw out, the vastly different energy outcomes due to that one potential policy.

In addition to that, other things alluded today, technology breakthroughs. Any potential technology breakthrough that occurs today could have very different results in all of our energy projections.

There's other uncertainties as well. I would think they're smaller but certainly no one knows if China's going to grow at 5.6% per year, which would be unheard of because no one has grown that fast for so many years or the 10% that they think they're going to grow per year. So, there's uncertainties inherent there. I'll let you guys add to that.

Tom: And I think I'll just emphasize that policies are probably one of the most significant uncertainties. What happens with nuclear in the U.S., nuclear in Europe? Parts of Europe, we're talking about shutting down nuclear plants. At the same time they need additional power or to extend their time period. Clearly, whether we build nuclear in the U.S. or not to potentially replace coal will be entirely dependent on whether there are supportive policies or not.

So policies are clearly part of it. For sure, the policies on causative carbon, causative green house gas emissions, and let me just back up here for a minute and suggest. We hear a lot about carbon cost, CO2 cost. You should think in terms of greenhouse gas emissions cost, because CO2 emissions from fossil fuels are less than 80% of total greenhouse gas emissions. And if you're really talking about an 83% reduction by 2050 like Waxman-Markey, you can't get there working CO2. You have to address all the rest of the greenhouse gas emissions. And as John mentioned on the economic activity side, there are uncertainties as well. Clearly as you saw in the charts, the recent three years are pretty radically different than the forecast that we had five years ago.

Mary: Well there are a few things that come to mind. Alternative transportation technologies: Are electric vehicles that are going to become a significant share of market? Should they become a significant share of the market if or depending upon the

coal? Maybe there's an increased opportunity for natural gas in that market if we switch vehicles to the electric side of market.

The other thing that has actually played a remarkably dominant role in the transformation of the energy sector over the last 10 years, which I don't think most people really understand, is recycling. We recycle so much product now that, you know, you don't need the virgin product the way that we needed it 10 years ago. All of that plastic we're recycling, it takes a different kind of energy to use it but you don't need the virgin product. So, when we look at our industrial outlook for the U.S., we have to always keep in mind that we're ever increasing recycling and that actually ends up being one of the big influences on total demand for energy.

So, can we keep that rate of increase up? Can we mine recycled material? We might be able to. It might be what we need to do next. So, those things which are really big system changers are coming but that's just one.

Paul: Okay. This is a question to Tom. I know I don't want to send you a question on prices per se. But the question is asked and Mary and John pointed this out, is that both of them have forecasted, show a rather large disparity between oil and gas prices with the rising oil-to-gas price ratio. And the question is really just, what is Exxon's view on that disparity? Do you expect that to be a sustainable possibility or something that would go away?

Tom: That's a very interesting question. As we look over history and look going forward, we see fewer and fewer linkages between oil price and gas price. There used to be substantial substitution in the power generation sector.

These days you see very little oil in power generation. Most of what you see is in the Middle East and a small amount for emergency generators to make up for unreliable production in India and China. There is still substitution capability in chemical production where steam crackers producing electricity can run either oil and gas. But the volume of

that is becoming relatively small such that it's not clear that what used to be a reasonably strong linkage necessarily has to continue going forward.

Paul: Mary, this is for you. They're looking at your gas price at $5 per million of BTU or so and they're asking about the potential for the use of natural gas and vehicles particularly for natural gas vehicles and other vehicles.

Mary: Well, that's a policy question. Natural gas vehicles...it's not the vehicle that's the issue, it's the infrastructure. So, who would put in the infrastructure? Now, there are gas pipelines that run along most of the interstate highways. So, that's what you hear about gas fueling stations on the interstate. And from that standpoint, that's what supports some people's view that we could convert at least part of our truck fleet to natural gas. There goes to say generally by the interstates. It's kind of hard to believe that enough infrastructures would go in to actually get natural gas vehicles in the light-duty vehicle fleet.

So in our view — but we don't have there in natural gas vehicles — we don't think that unless the government puts on some big program to put that infrastructure in, that the vehicle manufactures will come first. It's a chicken and egg thing but first of all, you need a gigantic government program to put that infrastructure in place. And until you have that, you're not going to have natural gas vehicles.

So of the two, if we think well, the alternative vehicle structure could be electric vehicles, which then could use any kind of fuel. I mean, you just have to plug it in. It's electricity. You know, you could take advantage of coal, natural gas, whatever. So right now, we have electric vehicles in our forecast and we don't have any natural gas vehicles on our forecast. It's just too big an assumption on the infrastructure side.

Paul: Tom, let me follow up with you on that because here another question's specifically targeted at you, which is really the issue which Mary just raised, was the issue of the infrastructure for a natural gas vehicle fleet and Exxon's perspective on that.

Tom: Thank you. And I'll back up and take a slightly different perspective. I'm not sure that the issue with natural gas vehicles is policy. I would suggest the issue is fundamental economics. And the problem is that containing natural gas is substantially more difficult than containing gasoline. It's the same problem you have with electricity. Same problem you have with hydrogen. And that's to create and put on a vehicle enough pressurized containment for natural gas, give it the kind of range that you see for a gasoline vehicle, is very expensive.

You can buy a natural gas Honda Civic today. It's thousands of dollars more. Today there is a fuel price difference between gas and oil. But the economics of that vehicle generally won't make sense unless you assume that the oil gas price difference remains even further out of whack indefinitely into the future.

Regardless of the infrastructure, there are natural gas vehicles operating today. There are even retail self-service natural gas dispensers in Canada. They've been put into place in South America but the economics of equipping the vehicle to hold the natural gas in a compressed form generally doesn't work for a passenger vehicle.

We think it can make sense for a centrally fueled fleet. A delivery truck fleet for instance where they're not necessarily constrained by weight. They don't need a huge range. They're always coming back to the same place in the evening to fuel. So they're not struggling with a massive amount of pressurized storage on the vehicle to give them a typical personal vehicle range.

Paul: John, this question is for you. Obviously, Tom showed a forecast of about 25 gigawatts of additional nuclear capacity being billed. I assume that was worldwide. I wasn't sure if that was U.S. or worldwide.

John: Oh, I'm sorry. That was in the U.S. We have China building four- to five-gigawatt nuclear plants per year in the U.S.

Paul: All right so in this forecast. And Mary had 20 gigawatts or 25 gigawatts nuclear. Obviously, the EIA forecast is much lower. And the person's asking, why are we so low for new nuclear capacity?

John: Nuclear capacity is expensive. That's the basic answer. No. That the price of people, you know, first of all, we use to get accused that our nuclear price or at least the last seven years we've been accused that our nuclear price is too low. Before that we were accused that the nuclear price was too high. But currently, we have a price on the order of, I'm going to say, $4000 a kilowatt to build a nuclear power plant.

Well, at today's current prices for natural gas combined cycle and today's current prices for natural gas, you wouldn't build a nuclear plant. You'd build a natural gas combined cycle. However, if you were in a carbon- constrained world as you might be in some scenarios, then you would build nuclear power. So, it's basically a price issue in the electric power sector.

Paul: Let me stay with you, John, and I'll come back in the other direction. Someone asked about the outlook relative to hydrogen fuel from the fact that we have very little penetration to the forecast.

John: Yes. We've had no hydrogen projections in our forecast for a number of years now. We've done service reports on it. We don't think that fuel makes a lot of competitive sense in the markets. And that's basically the answer to that.

It's very expensive to generate the technology you need, the fuel cells, everything you need is expensive. And so unless you had some policy that either subsidizes and installs infrastructure or had other requirements on it, you wouldn't see on your reference case forecast.

Paul: Tom, this question is, why not more on conventional gas in Europe like 2030? Obviously, you showed tremendous growth in shale in the U.S. but very, very little outside the U.S.

Tom: Yes, and part of that may just be our understanding of what potential actually exists in Europe at this point. But part of that is also that the substantial part of Europe more heavily populated, perhaps it's more difficult to access the resources that are there. But Europe also continues to have North Sea gas, Russia…

[BREAK IN RECORDING]

…Caspian Gas that are quite competitive from a production cost standpoint. So, you'll have likely less drive for unconventional in Europe. And that's what's leading to our forecast.

Paul: Okay. Mary, question here has to do with the energy prices and the potential for a, as they're worded here: Why is the IHS Global pessimistic on the chemical industry? Isn't the lower cost of energy use in attraction? Could that spur on manufacturing?

Mary: It might, but the chemical industry has been in decline here in the United States for a very long time. And the reason is partly due to the recycling. But we also are no longer an exporter of chemicals. So, chemical production outside the United States is growing...expanding rapidly. And so what we've done is, you know, we've kind of wiped out the export market. So we're only meeting current domestic needs. And many of the products of the chemicals were used in are actually being...we're importing now. So we're importing finished product rather than producing it here in the United States.

So, the combination of those effects makes the outlook for chemical use of natural gas lower. I mean, certainly within the chemical sector, the overall chemical sector; we have tremendous growth because it's all in pharmaceuticals and other elements. So, if you look at a chemical index from Global Insight, you'd see a pretty robust number. But we do look at, you know, the basic chemicals that are produced using natural gases of feedstock. No, we don't see much growth there.

Paul: Okay. John, this is a more technical question but unless you can, anyway. Somebody writes says as wind generation grows to a significant percentage of total will EIA continue to account and share as the thermal value of electrical output or the thermal equivalent of comparable fossil fuel inputs? This is the issue of how you account for that energy.

John: Excellent question. Excellent question. Let's see if I could find her in the audience. There's a study...Reneé, where are you? There is a study group in EIA right now evaluating how you account for the thermal equivalent of renewable fuels. And you have everything from 3412 with the electricity that it's producing to the fossil unit. It might be displacing a traditional measure that EIA has used of 10,000 or to 11,000 per million BTU to a pure engineering type of estimate which is somewhere in between.

So the answer is we are evaluating it. It's going back and forth. There's no...we could tell you that the IEA uses 3412. But we haven't made a decision yet as to how going forward, we might switch our accounting. I think what we probably will do in this year's Annual Energy Review is have tables in the back that do it in an alternative way. So maybe doing it at a 3412 as oppose to the standard way.

Paul: All right, last question I think given the time. I think we've run over now by almost 15 minutes and this is for everybody. Traditional question, how much you want to delay it. Do you expect the Alaskan gas pipeline to be built?

John: I've answered that one already.

Paul: I know you do. We're at the other two.

Tom: We actually have the Alaskan gas pipeline in the little conventional block on the U.S. that I showed. There's an upward movement around the 2020 timeframe. But that timing is highly dependent, again, on policy as well as both supply and demand developments in the United States. It is an expensive pipeline.

Paul: Mary?

Mary: We include it after 2035.

Paul: After 2035.

Mary: But we forecast it 2040. So it's always …

John: That's where we have hydrogen, after 2035.

Mary: Yes, you know it's always on the horizon and never gets built. Well, it depends upon our forecast for natural gas now is hovering about 2021 TCF of natural gas forever. And you know, at the meeting of the forecast period, it's all domestic. At the end of the forecast period, the question is, would we bring on the Alaskan gas pipeline or would there still be adequate supplies of LNG that it would compete? And right now, we just kind of push that pipeline right out there to pass 2035 figuring how it might get built.

Paul: All right. I think that's all we have time for because we're running into the next session. We thank you all. Thank you.

END OF RECORDING