

**ALASKA STATE LEGISLATURE
JOINT MEETING
SENATE RESOURCES STANDING COMMITTEE
SENATE FINANCE COMMITTEE
JUNEAU, ALASKA
April 4, 2018
9:03 a.m.**

MEMBERS PRESENT

SENATE RESOURCES

Senator Cathy Giessel, Chair
Senator John Coghill, Vice Chair
Senator Natasha von Imhof
Senator Bert Stedman
Senator Kevin Meyer
Senator Click Bishop

SENATE FINANCE

Senator Lyman Hoffman, Co-Chair
Senator Anna MacKinnon, Co-Chair
Senator Click Bishop, Vice Chair
Senator Peter Micciche
Senator Natasha von Imhof
Senator Gary Stevens

MEMBERS ABSENT

SENATE RESOURCES

Senator Bill Wielechowski

SENATE FINANCE

Senator Donald Olson

COMMITTEE CALENDAR

PRESENTATION: BP WORLD ENERGY OUTLOOK

- HEARD

PREVIOUS COMMITTEE ACTION

No previous action to record

WITNESS REGISTER

MARK FINLEY, General Manager
Global Energy Markets and U.S. Economics
BP America

POSITION STATEMENT: Provided BP's world energy outlook.

ACTION NARRATIVE

[9:03:10 AM](#)

CO-CHAIR ANNA MACKINNON called the joint meeting of the Senate Resources Standing Committee and the Senate Finance Committee to order at 8:36 a.m. She announced members present from the Senate Finance Committee were Senators Bishop, Micciche, Von Imhof, Stevens, and Co-Chairs Hoffman and MacKinnon. Senator Olson was excused.

CHAIR GIESSEL announced members present from the Senate Resources Committee were Senators Meyer, Coghill, Stedman, Bishop, Von Imhoff, and Chair Giessel.

WORLD ENERGY OUTLOOK

CO-CHAIR MACKINNON announced that the World Energy Outlook presentation was the only item on today's agenda and invited Mr. Finley to the table to present "BP Energy Outlook 2018 Edition."

[9:03:57 AM](#)

MARK FINLEY, General Manager, Global Energy Markets and U.S. Economics, BP America, said he is an energy economist by training and profession and has spent 35 years in both the public and private sectors studying the intersection of energy, economics, and geopolitics.

He said the long-term outlook that formed the background for the presentation is something that BP uses to inform its own strategic thinking about the future, its portfolio, and investments across the energy space. Why share this outlook externally? The answer is two-fold: first, they feel it's important to be part of the conversation in the world of energy

and the energy transition that the world is in. They think and hope their perspectives can add to that conversation.

[9:06:29 AM](#)

As a member of the team that produces the outlook, Mr. Finley said he has another reason, which is to avoid group think. They want to expose their ideas to as many different brains as possible around the world because these are hard, complicated issues and no one has a crystal ball. The more constructive conversation and criticism they can get for their work, the better off everyone is. Mr. Finley welcomed members' feedback and challenges as he goes through the presentation.

MR. FINLEY said they approach the outlook process with a spirit of humility. In this case, they are looking out to 2040, a long time, and can't be too conclusive about it. This is not about predicting the future but about understanding the uncertainty that the world's energy system faces: what dimensions people have some confidence in and what dimensions are massively uncertain and could put the world in very different outcomes depending on how key variables break out.

[9:08:03 AM](#)

Slide 2

Their approach is to use a range of scenarios that illustrate key uncertainties around the world's energy system. He used tons of oil equivalent (TOE) in energy demand and supply profiles to compare energy sources like solar energy and coal. For the purposes of telling a story, he built much of the presentation around the scenario labelled "Evolving Transition" (ET) that is consistent with the continued evolution of the energy system over the last 20-25 years.

[9:09:35 AM](#)

Slide 3

MR. FINLEY said he used a variety of lenses for looking at the challenges. He repeated the same picture three times but sliced different ways for perspective. An energy demand profile from 1970 to 2040 was sliced into sectors of the economy with the center panel slicing it by location in the world; another panel sliced demand by fuel. He said these lenses provide insights into the progress and changes in the energy system.

He explained that much of the analysis is driven by the first panel, the sectoral profile, because at the end of the day, people don't consume gas or oil. They consume space heating or

mobility, and a lot of the underlying economic drivers come from this kind of energy consumption.

Slide 4

MR. FINLEY showed the breakdown of energy demand for regions of the world. The U.S. is in the group of countries called the Organization for Economic Cooperation and Development (OECD), basically the club of mature market economies in North America, Western Europe, and Japan. There is no growth of energy demand in the U.S. and other mature developed economies of the world in this scenario. One of the key drivers is a greater focus on the more efficient use of energy, a common theme around the world in this scenario. In fact, this scenario projects that the growth of energy demand will slow significantly over time and that all of the net growth will be in the emerging economies, in particular, India and China.

[9:12:14 AM](#)

SENATOR MICCICHE said it's interesting that the population escalator for 40 years seems unrealistically flat considering the variation in OECD countries.

MR. FINLEY responded that is a fair challenge and at the end of the day they need to humbly acknowledge this is just one scenario and there are lots of different possible outcomes. Recent historical data shows relatively flat consumption of energy since about the year 2000 for the green countries including the United States. That includes the Great Recession, but it also includes periods of economic growth before and after it. Some evidence is emerging that the historical relationship between growing economies and growing energy demand, especially in these more mature economies, is changing. Partly because of efficiencies and partly because of the growing concentration of services and less-heavy industry. However, there are places of upside risk for the demand profile.

[9:13:50 AM](#)

SENATOR BISHOP asked if he was factoring in population growth, because the United States' population is starting to go the other way.

MR. FINLEY indicated yes. He explained that population growth is a factor, but that is happening mostly in the emerging economies. The good news is that the working age population in 2040 has been born already, but the per capita income and the degree of urbanization/sophistication in those populations is a big behind-the-scenes issue. He pointed to another document

called the "Main Outlook Document" that explores different prospects for African energy demand that is driven by different assumptions around the rates of industrialization and the urbanization of the population, because the profile for energy consumption is very different in a city than in the country.

[9:15:38 AM](#)

MR. FINLEY said the right-hand side of the panel shows annual average growth rates broken out into 10-year periods. In this narrative scenario, the growth of energy demand slows significantly from where Chinese energy consumption over the last 20 years, which has been the big driver of the world's energy demand as it has embarked on a very rapid period of economic growth and industrialization. But that is already changing; while economic growth in China remains robust it is slowing. Also, the mode of development is changing away from heavy industry towards domestic consumption of goods and services. China has air pollution problems and there is a big push to use energy more efficiently and to shift the profile of energy consumed.

Taking all those factors into account, India replaces China as the biggest source of growing energy demand in the later years of the outlook, he said. But overall, global energy demand grows much more slowly than has been the case historically even with continued economic growth.

[9:17:12 AM](#)

In the interests of time, Mr. Finley skipped to slide 6 that graphed energy demand by form of energy (fuel) noting that renewable forms of energy today are a very small share of the world's energy mix, but by far the fastest growing group of fuels. This is primarily due to wind and solar in power generation, but also bio-fuels in transportation, smaller quantities of geo-thermal energy, and other renewable forms of energy. By far the fastest growing group of fuels that rises to almost 15 percent of the world's energy by 2040 in this scenario is renewables, which accounts for about 40 percent of the growth of total energy consumption in the world.

MR. FINLEY said the other growth story is natural gas, which in this scenario is the fossil energy type that gains global market share. Global consumption of coal in absolute terms is roughly flat with big declines in the U.S., Europe, and China that are offset by increases in India and other emerging economies. But in terms of market share, coal drops significantly. This

represents the biggest change in the outlook relative to the experience of the last 20 years.

9:18:53 AM

Slide 7

MR. FINLEY said one of the interesting observations he drew from this chart if history is extended and all the non-fossil forms of energy are combined into a single category, is of the long-term evolution of the different forms of energy the world economy uses. First, in this scenario, the world ceases to have a single dominant source of energy, which has never been the case before. Moreover, the world's mix of fuels becomes much more diverse than has ever been the case. This highlights that the world is trending in the direction of becoming much more competitive in the energy space. And as already seen, the projected growth of energy demand is likely to slow so the pie isn't getting as big as quickly as it used to. Secondly, a much more diverse fuel mix results in more opportunities to compete against each other. Finally, there are growing prospects for competition between different suppliers to meet this demand. The key takeaway is that they believe the world of energy will become even more competitive over time.

9:20:36 AM

SENATOR VON IMHOF noted the still big demand for coal and oil on slide 6 and said she didn't want people to get the idea that renewable and hydro were going to overtake it.

MR. FINLEY said that was an accurate observation. While they do believe that renewable energy is likely to gain significant market share, the world still continues to consume significant quantities of fossil fuels, but its share will decline.

9:22:05 AM

Slides 8&9

MR. FINLEY said these slides focus on five key questions:

1. What has been learned about electric cars and the transformation of the transportation sector, which is uncertain, because by itself, electrification is unlikely to be the game changer. However, combining electrification with other factors in the mobility revolution, particularly in autonomy and ride sharing, acts as a force multiplier that can result in much bigger implications for oil demand.

"How many electric cars do you have in your forecast?" is almost a "parlor game" in the energy circles, he said, and the answer is there will be 300 million electric cars by 2040 in a global

car fleet of 2 billion cars. But that is the wrong measure. It's not how many cars; it's how they get driven that matters. Electric cars in this narrative scenario will total 30 percent of miles driven.

He explained that roughly speaking, the global car fleet doubles to about 1 billion and that grows to 2 billion cars with most of that growth in the rapidly growing emerging economies. And they believe that electric cars will be driven more miles; the rationale being its autonomy and the fact they believe that autonomous cars are likely to become commercially available at scale in the mid-2020s and will grow rapidly after that. At first, electric cars will likely be relatively expensive to buy but not expensive to operate.

MR. FINLEY informed them that many ride sharing services are really big on autonomous cars, because it turns out that the driver is 40-50 percent of the cost of operating the vehicle. So, if you're going to pay more up front for a car that's autonomous, the economics work if it is operated more miles. The logic is that at least at first as autonomous cars ramp up, they will be primarily used in the ride sharing and fleet services.

That same logic also applies to electric cars, and they believe that electric cars will form the majority of those autonomous cars as they work their way into the fleet. The result is that while only 15 percent of the cars are electric, they drive 30 percent of the miles driven, because they are primarily used in these autonomous fleet applications.

[9:26:38 AM](#)

SENATOR GIESSEL asked him to update them on how autonomous cars work. How do they detect the road and determine speed?

MR. FINLEY said that expertise is beyond him and noted that BP just published a companion piece of work called "The Technology Outlook" that reviews in much more detail BP's internal research and its understanding of the underpinning technological issues around not only autonomy but a wide spectrum of applications within the energy space.

CO-CHAIR MACKINNON reminded Senator Stedman, that as Transportation Chairman, he should research that and remarked that Alaska's conditions are very different than other areas, especially in snow and ice. She gave the example of her car that has all the standardized bells and whistles with an alarm if she crosses a line or if someone is in the car's perimeter. But

sometimes it pushes the brakes automatically in ice road conditions when she is trying to maintain a steady speed or doesn't recognize the difference between a white line and snow. So, it becomes dangerous specifically in icy conditions.

SENATOR GIESSEL added that Alaska also has a lot of dirt and unpaved roads and she is interested in how this technology is actually applied in those situations.

MR. FINLEY said those are fair questions and in the spirit of being humble and acknowledging the uncertainty, one of the things BP observed is as they think about risks in the outlook, that talking about the number of electric cars is only one scenario among many. Everyone says no matter what number one uses that people say it's not big enough, and that's exactly what you would expect a big oil company to say. But autonomy introduces a dimension of risk that can go either way. He is saying that autonomous cars are beginning to come into the fleet by the mid-2020s, but it could easily be 10 years later if the issues they flagged rightly can't be adequately addressed. But it's unlikely that it will be 10 years earlier, because that's today. The framework he is using allows them to bring in risks on both sides of the outlook to bring some balance to the conversation.

9:30:11 AM

Slide 11

MR. FINLEY said this chart tries to show the implications of this scenario for oil demand by cars. It shows that about 19 million barrels per day are being consumed by cars and that about 20 percent of all the oil consumed in the world is consumed in cars in the form of gasoline and diesel fuel. If the number of cars on the road doubles and nothing else changes, one would expect the amount of oil consumed by cars to double, also, but things are changing, and in this scenario the main thing that changes is the fuel efficiency standards. He emphasized that this is a global scenario and fuel efficiency standards are tightened aggressively in China, India, and Europe. In this scenario, the significant improvement in the average fuel efficiency of a car completely offsets the doubling of the car fleet. If they add in an additional reduction of oil demand because electric cars are being used in fleet services and driven more intensively, they come out with a view that oil demand by cars in 2040 is exactly what it is today even though the number of cars on the road doubles.

MR. FINLEY noted that electric vehicles appear twice on this chart due to a combination of factors that auto companies can use to meet their corporate average fuel efficiency standards. He explained that regulations as written today do not say that every car has to get more efficient, but that the average of the fleet of cars that a maker sells has to get more efficient. That threshold can be met by making all the cars more efficient or by selling a higher number of smaller cars, or they can meet it by selling electric cars.

The key point is that the number of electric cars is irrelevant for oil demand. The regulation defines the size of that box: if you sell more electric cars it creates space for the automaker to sell more bigger cars instead while still meeting their average target.

9:33:11 AM

To fight the next challenge of a scenario where people say. "Of course, an oil company would say that electric cars aren't having that big of an impact," they developed a different scenario that says let's go ahead and ban the sale of the internal combustion engine (ICE) in cars by 2040 worldwide and make it even more rigorous by not allowing plug-in hybrids that would offer a combination of ICE and a battery. In this scenario, only electric cars can be sold by 2040 and those sales have to ramp up very early in the process. The result is that by 2040, instead of one-third of the miles being driven are powered by electric cars, two-thirds of the miles driven are powered by battery cars. But why not 100 percent if the internal combustion car sales are being banned? The answer is legacy internal combustion engine cars will still be on the road that will account for the remaining one-third of miles, because who buys a car every year? So, overall, oil demand is growing, and even with banning the sale of the internal combustion engine, oil demand in 2040 is higher than it is today. Cars account for only 20 percent of the world's oil demand, but there is still growing demand for trucking, aviation, maritime, and for industrial applications.

SENATOR VON IMHOF referenced slide 23 and asked if he could touch upon the economic assumptions used for the renewable energy sources, because politics influences economic growth as well as creates secondary effects such as the need for copper, lithium, and zinc for the batteries amid growing anti-mines/development, environmental obstructionists, and not in my back yard (NIMBY) attitudes. There is a desire by Americans to see renewable resources, but they don't like the discomfort that

goes along with it. She asked if his team had analyzed the push/pull that will certainly happen in the next 30 years regarding development of renewables.

[9:37:25 AM](#)

MR. FINLEY replied that as economists, they translate everything into cost, and public opposition and permitting delays were accounted for in the narrative scenario. But they haven't explicitly modeled an alternative scenario that digs more deeply into those assumptions.

Slide 13

The right-hand panel graphed the implications of banning the ICE for global CO₂ emissions using the CO₂ emissions from energy in the narrative scenario and a scenario consistent with global commitments to the Paris Climate Accord. The impact of banning the ICE can hardly be seen, and the reason is simple, because you're only attacking one piece of one fuel. This highlights a theme he will come back to which is the degree to which you are concerned about a global problem, like climate change, a comprehensive solution is needed. Policy options that just push a single lever, like banning the ICE, won't move the needle on a global scale due to the size and complexity of the energy system.

[9:40:10 AM](#)

Slide 15

The next question is, "When is global oil demand going to peak?" For most of the history of the world's oil industry, people have been worrying about running out of supply, but through innovations like shale and simple economics, BP believes the world is more likely to see an emerging age of abundance for oil and gas. The more likely drivers will be transformation of the transportation system, climate policy, and other changes.

Slide 16

The narrative scenario shows a profile for global oil demand that grows but slows over time. The profile indicates very strong growth in global oil demand due to a combination of a strong synchronized global economic recovery and consumers reacting to the recent price collapse. Going through time, one can see that the growth of oil demand slows significantly until it ceases to grow in 2035-2040. The net declines slightly after 2035, but it is a very small number. They refer to this as a "plateau" rather than a "peak."

Non-combustive uses remains a positive contributor and consists largely of petrochemical feedstocks. This is important, because it means that that portion of oil demand can continue to grow but because it doesn't get burned it doesn't add CO₂ emissions to the atmosphere.

He said that petrochemicals is the basic building block of modern economies and if the world's economy is to keep growing, the petrochemicals need to keep growing, too. There aren't many substitutes available and the scope of efficiency is relatively limited. However, a provision was made for policies around the world that seek to reduce the use of single-use plastics like water bottles through recycling, which reduces oil demand by about 2 million barrels a day.

[9:43:43 AM](#)

Slide 17

MR. FINLEY said that is just one view of future oil demand and there are lots of different potential cases. He showed a range of different outcomes on this slide. He said there are upside risks to the outlook; for example, if fuel efficiency doesn't gain as quickly as projected and oil demand goes higher. The key question is, even in a scenario that is consistent with meeting the Paris Accord, the world will be consuming 85 million barrels a day of oil in 2040 compared to about 95-100 million barrels today.

[9:45:02 AM](#)

Slide 18

MR. FINLEY said this slide had been "profoundly impactful" in informing BP's thinking and basically illustrates what happens if investment in new production doesn't happen. He explained that an individual well declines over time by about 3 percent and so they just applied a 3 percent annual decline (even though his operators would say that is a very conservative number). But a higher decline rate is not needed to make his point, which is under any imaginable future scenario for oil demand the world will need to continue to invest significant amounts in producing new supply to meet it due to the phenomenon of the underlying decline of the existing production, what he calls "mine the gap." There will be a lot of competition to meet that supply, so within BP, executives talk about continuing to invest in oil that is competitive, because there is a need to continue doing that.

Slide 19

Where does supply come from to meet this demand profile? Half comes from the United States (due to growing shale production especially in the early years of the forecast) and half comes from the Organization of the Petroleum Exporting Countries (OPEC). But as with everything, there are uncertainties. For U.S. shale, what if the resource doesn't change but the pace at which it is developed accelerates or what if the resource is even bigger than thought? Slide 21 graphs the outcomes of both scenarios is graphed on this slide.

9:48:27 AM

SENATOR MEYER asked how he defines "advantaged oil," a term he used earlier.

MR. FINLEY answered that it simply means is the oil competitive? For much of the industry history, people thought this was a scarce resource and they would run out. So, they had to access it where it was. But that is not the right framework for thinking about the future world in which they think the resource is abundant. (A companion piece of work tracks the BP annual statistical review of world energy (proved reserves of oil and gas.) Since 1980, when BP began to track proved reserves, the world has cumulatively produced more oil than it had, and it has not run out of oil. In fact, the proved reserves today are double what they were in 1980. The resource is not constrained and therefore the obligation to their shareholders is not to access a resource at any cost but rather to invest in projects that are competitive and can earn a competitive rate of return.

SENATOR MEYER asked if Alaska is considered advantaged oil.

MR. FINLEY replied that he is not an expert on Alaska, although it is a world class province. Based on official data, oil production in the state has increased for the last two years and according to the U.S. Energy Department's data, that hasn't happened since 1987/88. So, the answer is, it depends on how the people in this room are able to work with industry to deliver projects that can compete in a global supply curve. He merely wanted to note that in a global context, that's the way a company like BP would think about it.

9:51:18 AM

SENATOR MEYER said from a state legislator's perspective and since oil is so important to Alaska's economy, it's important to have advantaged oil. That concerns him in light of shale oil production in the Lower 48.

MR. FINLEY replied that is a fair observation and pointed out that BP believes that the combination of supply and demand factors playing out in the oil market are changing the strategic calculus of a number of key oil producers around the world. Many key Middle East oil producers, for example, have embarked on programs of very aggressive reforms to their economies to reduce their dependence on oil revenues and are positioning themselves to compete in a much more competitive oil and energy space going down the road. So, holders of large natural resources are similarly wrestling with trying to position themselves to be competitive in that new reality.

9:53:17 AM

Slide 21

MR. FINLEY said he talked about the scenario of U.S. shale getting delivered more aggressively, but on the other hand, if the resource turns out to be bigger than currently appreciated, the U.S. by itself could meet all of the projected growth in global oil demand over this outlook with obvious significant ramifications for the rest of the market place. So, if the U.S. increases production rapidly, the question is, "Is that because the resource is bigger or simply because the resource is being exploited more quickly and likely to decline?" The answer by looking beneath the surface to understand the drivers, because the longer-term ramifications of those two different pathways are profoundly impactful for the oil market outlook.

9:54:39 AM

MR. FINLEY said the next question is just how fast renewable energy will grow, and their renewables outlook has been revised higher every year, especially for India and China and not the world as a whole. If it was simply the case that renewables were more competitive for everyone, he would expect the forecast to be higher for everyone. The fact that revisions are concentrated in India and China suggest something else in play. And their outlook has been built around the assumption that government support for renewables will be reduced over time, because as renewables scale up they become more competitive. They believe the level of government support for renewables in India and China are more aggressive than previously expected.

Slide 23

He said this slide showed the base underlying data in the narrative scenario; the left-hand side showed the regional contributions to the growth of renewables in power generation, and historically the Organization for Economic Co-operation and Development (OECD) countries dominated, but now China has passed

the U.S. to become the largest producer of renewable energy in the world. Part of that is because China has become richer, part of that is because renewables have become more competitive, and part of that is because China is trying to diversify its fuel mix. He observed that in the latter years of the outlook (2030-40) significant contributions are seen from other emerging economies.

[9:57:31 AM](#)

MR. FINLEY noted that he began the presentation by showing that renewables gained market share very rapidly in the world energy mix, but the point of the right-hand chart is to show that in this scenario the pace at which renewables penetrate the global system is "without precedent" in the historical record of the world's energy system. The closest analogue is nuclear energy in the 1970/80s.

Slides 24/25/26

However, they could be wrong, so they examined a scenario that says what if we keep today's aggressive support for renewables throughout the forecast interval. The left-hand panel scenario shows more aggressive government support; so, instead of getting 50 percent of the growth of power generation, renewables get 100 percent.

[9:58:38 AM](#)

MR. FINLEY said in the evolving transition case, the carbon content of the world's power generation falls by about one-third. In the far-right scenario, consistent with meeting the Paris Accord, one sees a total decarbonization of the power sector. In the "push scenario" (now) he observed diminishing returns: as one pushes harder to get renewables into the power mix, it becomes more expensive to manage the grid's intermittency and storage needs.

Again, he reiterated, if policy makers only push one lever it's hard to move the whole needle. Other scenarios include scope for gas to push coal out of power generation, more efficient use of energy, and carbon capture and underground storage illustrating that systemic-wide policy options have better opportunities to find low cost solutions for society and to really move the needle at a system level.

[9:59:58 AM](#)

Slide 26

MR. FINLEY said natural gas is the only fossil fuel that gains market share in the global mix and BP and many other energy

companies are investing to grow the role of natural gas in their portfolios. So, how could they be wrong on that one?

Slide 27

This slide has the base data for the outlook of gas consumption. The left-hand panel shows that the growth in natural gas consumption is broadly based around the world. On a sectoral basis, however, this is really a two-horse race: a story of the growing use of gas used for power generation and industrial applications. A bit more is used in transportation, but that is not a global gas driver.

Slide 28

Mr. Finley said this slide has a rough estimate of how much gas is growing just because everything is growing and how much is because gas is winning market share from other forms of energy (particularly from coal in power generation and potentially from oil in transportation). The answer is another question is, what is driving much of that switching that accounts for half of the growth of natural gas in this scenario. Some of it is economic: in the U.S., cheap shale gas is pushing coal out of power generation, but in China and Europe much of it is driven by policy. So, BP asked themselves what if policy, largely environmental policy in this case, is not as aggressive as their narrative scenario assumes.

Slide 29

He answered that it turns out that eliminating that policy-driven switching would reduce the growth rate of natural gas demand by about half, which may not look like much, but it is the difference between gas gaining market share around the world and losing market share. So, from a strategic perspective, it is a significant change. But the future of natural gas demand could fail to materialize in scenarios with both more aggressive environmental policy where it would lose to renewables, or in scenarios with less aggressive environmental policy, in which case, gas fails to gain market share from coal. So, one can see that the gas outlook is highly sensitive to gas policy assumptions.

[10:03:08 AM](#)

Slide 30 Prospects for liquefied natural gas (LNG) exports and imports.

MR. FINLEY said on the LNG export side, the U.S., especially driven by the rapid growth of Lower 48 supply, is a big driver of that growth. On the demand side, its Asia. The reason they

think this rapid growth (doubling) of global trade in LNG is important is because it provides the opportunity to more closely link regional gas markets through trade.

He observed that this more flexible LNG trading system, especially for the Lower 48, is well situated to compete, but being on the margin has both risks as well as opportunities. If, for example, China and other Asian consumers don't push as hard to open up their economies to gas, or on the supply side, if the Emirate of Qatar decides to do what OPEC producers are doing on the oil side, which is grow their market share and be more competitive, both of those things could squeeze the supplier who is at the margin. They think the Lower 48 will be in that position.

[10:04:45 AM](#)

Slide 32: Energy transition and the move to a lower carbon future.

MR. FINLEY said while CO₂ emissions will grow less rapidly in the future, they will still grow by a little over 10 percent in the narrative scenario, and to be on a sustainable trajectory consistent with the Paris commitments the transition should happen faster.

[10:06:28 AM](#)

Slide 33: Impact of faster transition on global energy system.

MR. FINLEY said a serious conversation about CO₂ should begin and end with the power sector, because over half of the world's energy is consumed just to generate electricity. It is also the sector where all the fuels compete with each other. So, the opportunity for finding the low-cost solutions are most apparent in the power sector.

The graphs on slide 33 illustrate what the world's energy demand profile would like in some different scenarios. He said in any scenario including those that are consistent with meeting the Paris climate objectives, world-wide energy demand grows. In the Paris objectives, all of the growth - labeled as even faster transition (EFT) - comes from renewable energy. But even there, oil and gas consumption in 2040 is about what it is today. So, while this is a much more aggressive scenario for the uptake of renewable energy, there is also significant space for continued investment in oil and gas.

[10:07:22 AM](#)

Slide 34: Conclusion.

MR. FINLEY said BP doesn't do this outlook to predict the future; they do it to understand the risks they are facing and identify what dimensions of the energy system they have some confidence in and key uncertainties. So, one can be "reasonably comfortable" that if the world continues to grow its economy and continue to lift people out of poverty and improve their quality of lives, that the world is going to need more energy in the future. That growth may slow due to a greater focus on efficiency, but at the same time on the supply side, they see an emerging age of abundance in terms of a much more competitive dynamic in the oil and gas space and for the world's energy system. Renewables play a growing role, but even under sustainable climate trajectories, there is still a significant role for investment in oil and gas.

Some of the key uncertainties are around electrification and the interplay of electrification with other factors like autonomy and ride sharing services. They have seen very clearly from the data that the future pathways for natural gas and renewable energy are highly dependent on underlying assumptions made for policy and technology.

While they see significant progress in using energy more efficiently and reducing the carbon intensity of energy activity, a much more decisive break from past trends is needed if the world is to get on a more sustainable trajectory.

MR. FINLEY thanked them for the opportunity to speak.

10:09:50 AM

SENATOR GIESSEL commented that one of the upsides for Alaska is "our significant wealth in minerals, which the renewables will need."

SENATOR MEYER asked if the recently announced trade tariffs with the United States and China and other countries played a role in their forecast.

MR. FINLEY replied that all the scenarios he presented today are built around a starting point of success in the sense of continuing to grow the world's economy, lifting 2.5 billion people out of poverty, and improving peoples' quality of life. Trade frictions and both international and domestic policies could put potential future economic growth at risk. At the end of the day, energy is consumed to fuel economic activity, and

one can imagine scenarios with higher or weaker economic growth that results from these policy developments that would go straight to the bottom line of world oil demand.

SENATOR STEVENS remarked that China is often underestimated and asked if China has energy sources that people haven't considered like hydro, renewables, nuclear, and shale, because BP assumes the U.S. will keep producing and China will keep buying.

[10:12:24 AM](#)

MR. FINLEY answered yes; that is a highly uncertain issue. Both the future trajectory of economic growth and therefore energy demand in China are uncertain. In the last 20 years, the Chinese economy grew by 9 or 10 percent per year on average. The outlook projects growth that is more like 4 or 5 percent. So, based on history there was even faster growth in the economy and therefore energy demand. The narrative scenario has China very rapidly growing nuclear energy, essentially building one new nuclear reactor every three months for the next 20 years. Not so much on hydro, because the large-scale conventional hydro applications are already developed. China has the biggest growth of renewable energy of any country in the world in this scenario and yet still has room for growth of natural gas: partly because it's still growing and partly because of their effort to displace coal.

He said another chart shows that about 30 percent of the world's energy is consumed in the form of coal. In China, it's more like two-thirds and they are trying to reduce that share significantly to diversify their energy mix, but also to clean up local air pollution.

China is also looking at buying natural gas from Russia and via pipeline from central Asia republics like Turkmenistan and Kazakhstan. Other potential competitors of supply come from LNG. The Emirate of Qatar for a long time had a moratorium on developing new gas projects, but they are sitting on the largest gas field in the world. And they recently lifted the moratorium. So, it's important to keep an eye on the internal dynamics for China, but also the other eye on the potential for competition from elsewhere in the world.

SENATOR MICCICHE reminded members this is one company's view and others' risk assessment on the future of energy could look quite different. The ICE ban is a fascinating concept, but he wasn't sure how realistic it is. The weight of electrification and ride sharing is stronger than probable along with the environmental

hypocrisy of the reality of renewables and what that would require as they oppose every option for providing the materials of those renewable technologies. He understands the reasons for BP's outlook, but he wouldn't put a lot of weight on one particular study.

10:16:26 AM

SENATOR BISHOP said he thoroughly enjoyed the presentation and asked how BP has diversified its portfolio into renewables.

MR. FINLEY answered that BP acknowledges the dual challenge of how to provide the energy the world needs today and work toward a more sustainable energy system at the same time. To straddle that, BP's strategy is aimed at making sure their operations are as efficient and safe as possible so that they are up and running all the time, because that is good business and continued investment in "advantaged" oil. They have been growing the role of natural gas in their portfolio and renewables. BP has significant investments in wind energy in the Lower 48; they are a significant distributor of bio-fuels worldwide through blending into their fuels in their distribution network; they also invest in the production of biofuels in sugar cane ethanol in Brazil; they have a joint venture in with one of the leading chemical firms to work on next generation biofuels; and they also have invested significant venture capital into a lot of different potential start-up new technologies in the renewable and the more broadly energy space environments, including digital innovation. They sprinkle the money around to kind of watch and learn where the landscape is.

MR. FINLEY added that when he joined BP 17 years ago, it was the largest producer of solar panels in the world. However, they learned that just because something is growing rapidly doesn't mean you can make money at it. It has to play to corporate strengths, and the particulars of manufacturing solar cells didn't do that. Now, more recently, BP has invested in a company in the UK that builds and distributes solar systems but doesn't actually build the solar cells.

Relevant to the conversation, although it's not renewable energy, he also observed that BP not only has to play to its strengths but has to change themselves to keep up with the changing world. An illustration of that is what BP has done in the Lower 48 with its on-shore production unit. Having realized that this is a game that is fast-moving and driven by world-class operators, they legally separated their Lower 48 production business and hired a CEO from an independent company

and asked him to try to remake that company into a more-nimble company and more like an independent to enable them to compete. The results are good so far.

10:20:46 AM

SENATOR BISHOP remarked that it appears to be a buyers' market going forward.

MR. FINLEY agreed with him but added that big challenges need to be addressed. But within that, they believe this is a much more competitive space, but it is a good news story in the sense that they conclude across all of the scenarios that the world can have the energy it needs, and Alaska has the energy it needs to continue to grow its economy.

10:22:46 AM

CO-CHAIR MACKINNON finding no further questions, thanked Mr. Finley for joining them today and adjourned the Joint Senate Resources and Finance Committee meeting at 10:22 a.m.