



# Energy Outlook - 2020 edition: Webcast Q&A Transcript

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This transcript contains minor modifications from the original for accuracy or clarification, none of which change the substance of the original. Please refer to both the introduction (page 3) and disclaimer (page 157) included in the Energy Outlook 2020 Edition.

## Q&A TRANSCRIPT

**Spencer Dale:** I have been joined by Kate, who is going to help us on the Q&A.

Just before we start into the Q&A, we are going to start the poll. Some of you may recall we did this last year, where we asked you your views about the energy transition. The answers were fascinating, so we are going to do the same again today.

The poll will be open until about five minutes before the end of this session and then we'll come back and show the answers before we wrap. So, three questions we wanted to get your views on today. First, 'Will COVID-19 make the pace of the energy transition faster, slower, or largely unchanged?' That's question one. Question two: 'Out of the four scenarios I presented to you today: so Rapid, Net Zero, Business as Usual and Delayed and Disorderly, which do you think is most likely to happen?' So which of those four scenarios do you think is most likely to happen? Finally, question three, 'Of those four scenarios presented, what would you most like to happen?' So they are the three questions. On your screen now, hopefully, is the URL for you to join the poll and for those of you significantly younger than me, also a QR code, if you know how to use that as well. Please do go online. It should only take a couple of minutes and as I say, we are going to close it just before the end of the Q&A and then we'll show you the results. So that is all that, now for the questions and over to you, Kate.

**Kate Arbuthnot:** Perfect. Thank you very much, Spencer.

We have had hundreds of questions but we have got a team at the back who are updating it constantly as the live ones come, so please do submit your questions. Spencer, the first question that we have had is: 'As bp looks to further renewable energy substitutes, are there limits to growth for renewables?'

**Spencer Dale:** So, as I just was saying, we see a really strong growth in the pace of renewables, with renewable energy accounting for around three quarters of the growth of energy power generation in Business as Usual and more than the entire growth of power generation in Rapid and Net Zero, as it is gaining share from coal. In doing so wind and solar power and renewable energy are penetrating the energy system more quickly than any fuel ever seen in history. We showed that analysis in quite a lot of detail last year in the energy outlook, if you want to probe more into that question.

So, we see a really bright future for renewable energies. I think there are limits though and I think I would perhaps point to three things. First is that point I was just showing you about how the pace at which renewable energy may start to flatten off as they start to get to levels, in our analysis, sort of much more than 60–65% for wind and solar. So overall renewables more but once wind and solar starts to get to 60–65%, the cost of that intermittency rises and that sort of dampens that growth.



A second point here is we will need to see significant levels of investment: as I was showing you, those sort of mind-boggling numbers of between \$500–750 billion per year in Rapid and Net Zero. Now, those numbers aren't huge, compared to total business investment, that was a point I was making but much of that investment will be needed in the developing world. It is the emerging markets that account for the majority of growth of renewables in all three scenarios. They are the same emerging economies which are likely to be significantly hit by COVID. So, the willingness of capital to flow to those economies, I think, will be a second issue to think about.

I think, thirdly, increasingly, as we go forward over the next ten, 15, 20 years, we are going to all become more aware of the physical presence of power as we see more power stations, we see more wind farms, we see more solar farms as well. I think part of the issue here is society accepting that greater physical presence of those energies. One of the issues that we highlighted in Net Zero of why you are able to get an even faster energy transition is the fact that society embraces these changes as part of that transition to a lower-carbon cleaner world. So, the future for renewables is extraordinarily bright but some of these things may mean it is, rather than really, really, really quick, just really, really quick.

**Kate Arbuthnot:** Thank you, Spencer. The second question we have is from Andre Romaneau apologies for the pronunciation, from Canada. Andre's question is: 'How do you see the competitiveness and adoption of a blue-hydrogen-based economy versus renewables-based green hydrogen?'

**Spencer Dale:** So, all these colours of hydrogen get really complicated. There are blues, greens, there also greys and depending on who you speak to, there is lots of variety of other colours as well.

For the Energy Outlook, we have framed it into terms of these two: so blue hydrogen, largely coming from extracting the hydrogen from natural gas combined with CCUS and the second one, green hydrogen, which in the Energy Outlook is based largely from renewable power using electrolysis of water.

We start from a position today that, in most countries, blue hydrogen starts at a cost advantage relative to green hydrogen but, over the next 20–30 years, the costs of green hydrogen are likely to fall more sharply than blue hydrogens. So, in our analysis, for some key countries, we have the cost of green hydrogen falling by 60–65% over the next 30 years. That fall in the cost of green hydrogen is coming both because of renewable power, the power source getting cheaper but also electrolysis, the underlying technology, also: the cost of electrolyzers coming down.

As you see, as the cost of green hydrogen falls more rapidly than blue hydrogen, we see an increasing share of green, versus blue. So, by the end although it is broadly equal, green hydrogen is accounting for slightly more than blue. So, both playing a role.

I think the other point to emphasize is that point I tried to emphasize in the presentation. That role of blue hydrogen means it takes the pressure off of the green hydrogen. My sort of instinct in nearly all aspects of the energy transition is if we try and find a single energy source or a single type of technology to solve all the problems, we are putting too much weight on one thing. If we want the hydrogen economy to grow, which we need to grow,



to complement electricity, I think what we need is both of these sources of clean hydrogen, blue and green, working together and expanding together.

**Kate Arbuthnot:** So really, some of the hydrogen is taking the pressure off the renewables, really having both types.

**Spencer Dale:** Yes, indeed.

**Kate Arbuthnot:** Okay, that is clear. Thank you. Andre, I hope that answered your question. The next one we have is from Patrick Jankowski, he's based in the USA. Patrick's question is: 'Have we already reached peak demand for oil?'

**Spencer Dale:** So, peak oil demand. The press office people always worry when I say this but my sort of instinct on trying to predict the timing of peak oil is I do not know and I do not think it really matters. Let me explain why I do not know, which is perhaps a worry for a Chief Economist at bp and why I do not think it matters.

On the do not know, I showed you four scenarios today, if we include Delayed and Disorderly: two in which oil demand has peaked and two in which it hasn't. So, we do not know. *If* it has peaked within Rapid and Net Zero, the reason why that peaking has happened is the impact of COVID which has brought forward oil demand, from the mid-2020s. So, I do not know.

The second thing is why do I not think it really matters? I think there are two points here. First, when we are setting a strategy for bp and I am talking to Giulia and I am talking to Bernard, we are not setting a strategy based on when oil demand peaks, when that first derivative oil demand goes from a small positive number to a small negative number. What we are trying to do is think about a range that we face for oil demand over the next ten or 15 years. So you think about that picture I showed you earlier: you have a range for oil demand where oil demand goes back up to its pre-COVID levels and a little bit higher and stays around that level for the next ten years or so. The alternative is it carries on declining and falls by around 10 million barrels a day over the next ten years.

So, when I think about the strategy, that is the sort of range I am trying to think about. I think we need to set a strategy which is good for a world where oil demand is sort of rising back up above pre-COVID levels and staying there and another one where it is falling off by about 10 million barrels a day. That is what resilient strategies are, not trying to pick, whether it is one year or another year.

The second point why I do not think this is so important is sometimes people think that once oil demand peaks, somehow demand goes away and vanishes. That is clearly not the case. In all the scenarios I showed you, oil demand remains a central part of the energy system for the next 10–15 years. In the Outlook, in the investment section, we show that the levels of investment needed in upstream oil and gas are between \$10–20 trillion over the next 30 years. So even if we do see peak oil, oil is going to play a critical role in our energy system for the next 10 or 15 years, requiring significant levels of investment.

Sorry, that is a very long answer about why I do not know and why I do not think it matters, which I thought I needed to give, because Bernard is watching, he may worry if I do not know or do not think it matters. So, a long answer to your question.



**Kate Arbuthnot:** The next question we have is from Jonathan Webster in the UK. This is a question which I have wondered about a lot, so thank you Jonathan for asking it. It is: 'What role will bioenergy play globally in general and specifically outside of Brazil?'

**Spencer Dale:** Thank you, Jonathan. So, as I was just saying, we see an increasing and important role for bio energy as the world moves away from fossil fuels, providing alternative sources of energy. It is coming in two or three different places. One: biofuels, where those fuels can be used in long-distance transportation, marine, aviation, bits of the energy system which are hard to electrify and so there is a role for de-carbonization. Biomethane is like a direct substitute for natural gas and so you can start to mix biomethane with natural gas and so start to de-carbonize the gas which is being used in industry and in our houses. There is also biomass, where one of the really exciting aspects of biomass is, when used in the power sector, if you use biomass combined with carbon capture use and storage, it produces a negative source of power which is why the power sector in Net Zero has net negative emissions, so contributing to offsetting emissions in other parts of the energy system.

Brazil, I think, is sort of like the Saudi Arabia of bioenergy. It is extraordinarily blessed with tremendous amounts of bioenergy. As I am sure you know, we have a very significant business in Brazil producing biofuels. So, I see there are potential sources of bioenergy around the world and I think they are going to become increasingly important as we shift to a lower-carbon energy system. However, Brazil is extraordinarily blessed in terms of the resources that it can offer in terms of bioenergy. We are very excited with our partnership in Brazil. We have been in Brazil an awful long time and I think we expect to be there for an awful long time, too.

**Kate Arbuthnot:** Thank you. Our next question comes from Zhengguo Li, based in China and Zhengguo's question is: 'How will the wave of de-globalization affect the energy transition?'

**Spencer Dale:** Zhengguo, thank you very much for your question. I think de-globalization is becoming an increasingly important issue. We actually had some analysis in last year's outlook on de-globalization, which at that point was prompted by the increasing levels of trade wars and concerns about how sanctions are being used and affecting trade.

I think COVID has increased even more the focus on de-globalization as companies have reduced and shortened their supply chains. We see governments focusing closer at home and I think we see countries around the world being less comfortable with being exposed to having to import certain absolutely critical materials: energy being one of those. So in this year's outlook we sort of again look at de-globalization. We have a particular scenario, or sensitivity analysis, in the booklet, which I encourage you to look at.

That has two features: that de-globalization scenario. One feature is a world which is less open, with less trade, will tend to grow less quickly. There is always this joke: if you put ten economists in a line and ask them a question, they will come up with 11 answers. Okay, economists never agree but one thing they do agree on is that trade is good for growth. So, in this scenario of lower globalization, we reduce the average growth rate of the economy by one or two tenths, not much, but one or two tenths.



In addition, what we say is that countries which are importing energy are more concerned about energy security. They are worried about being dependent on their economy being able to grow in importing that energy. So, what we say is there is a way to proxy this. We say, suppose they put a 10% risk premium on energy they import relative to that which they produce themselves. So, with oil prices today at \$40, this would say they would be indifferent to importing at \$40 or producing their own oil at \$44 because that gave them that extra security.

These are pretty small changes, okay, one or two tenths off of growth, just 10% risk premium. The impact it has on the energy systems is really quite profound. That is why sometimes these types of outlooks are really helpful. They just help order your thinking.

The overall level of GDP in this scenario is around 6% lower. That is just the maths associated with knocking off that small growth rate, with energy demand around 5% lower. However, what you see in particular is this impact of more concern about energy security really hits traded fuels, particularly oil and gas. So, what you see is, in China, China's imports of oil and gas are around 30% lower as a result of just these small changes and US exports of oil and gas about 50% lower. So what I found fascinating about this scenario was just these relatively small changes, which you would nod your head to and say, 'Well, they sound pretty reasonable,' can have really quite profound changes on the structure of the energy system, particularly in terms of the fuels which are being traded.

So, thank you for the question because I think de-globalization is becoming an increasingly significant topic and it could have quite profound effects on the energy system.

**Kate Arbuthnot:** Just a follow up question for that: so are we are expecting prices to generally increase, or will that be offset by the diversification of different sort of available energy resources?

**Spencer Dale:** I do not think it necessarily pans out to prices as such. I think, in this scenario here, what happens is it encourages domestic production. So in countries like China and India, which are the largest importers of energy, it encourages greater growth of renewables, so that is a good news story for the environment. However, it also encourages greater use of coal because they have abundant elements of coal. So, in some sense, the impacts for this on carbon and the environment is somewhat mixed. It boosts those new energies, in terms of renewable energy but it also means that the coal is more persistent.

So, to give you an example, one of the massive drivers of growth of natural gas demand over the last few years has been China switching away from coal into natural gas in order to improve air quality in their cities. This is the so-called battle for the blue skies. However, much of that marginal source of gas is imported gas and if you are worried about being able to access that gas, you may be less keen to make that type of fuel switch. So that is sort of the issue.

**Kate Arbuthnot:** Thank you. Our next question comes from Arlene Lynchhe is based in Trinidad and Tobago. Arlene's question is: 'What does this transition mean for the countries, usually in the developing world, whose economies depend on oil and gas export revenues?'



**Spencer Dale:** Thank you very much, Arlene, for your question. I was in Trinidad and Tobago visiting our business there. I think it must have been at the end of last year. I was lucky enough to go to an evening T20 match, which was spectacularly good fun. So, fond memories.

I think this is an important question, Arlene, because it relates to that increasing competition story I was talking about during the main presentation. So, as we see this shift to a lower-carbon energy system, two things are happening in terms of oil and gas.

One is increasing competition across fuels. You can see this most naturally for gas, where gas is having to compete far more competitively against renewable energy in the power sector. In oil, we are seeing increasing competition in transport, where oil is now competing against electricity and also natural gas. So, one: competition across fuels.

Secondly, also, competition within fuels. In the world I showed you, say, for oil demand, oil demand in some scenarios goes back to about pre-COVID levels but it is not growing very significantly. In others oil demand is starting to contract. In that world we are going to have increasing competition within oil as owners of oil resources compete to make sure that their oil is produced and consumed.

So, I think the message for countries who are large oil and gas exporters is the world is going to become more competitive, with heightened competition. To make sure you are a winner in that world, you need to make sure that your oil and gas upstream operations are as efficient as possible so you can compete in this increasingly competitive world.

Arlene, I hope I am going to be coming back to Trinidad and Tobago at a future date, once the COVID pandemic is under control. I can spend time with our business, of course, but also get to watch another T 20 match as well.

**Kate Arbuthnot:** Our next question comes from Jacqueline Wong Phat, who is based in Australia. Jacqueline's question is about CCUS: 'How credible is the application of CCUS, as CCUS technology developments have been very slow and not receiving the appropriate attention compared to renewable energy?'

**Spencer Dale:** That is a great question, Jacqueline. I was going to say about the last time I went to Australia, but Bernard will be worrying about my travel budget

So, in the energy outlook, Rapid CCUS accounts for around four gigatonnes of carbon capture by 2050 and in Net Zero about 5.5 gigatonnes. Now, for those of you who do not have these sort of numbers in your mind, we start today with carbon emissions from the energy sector around 32 gigatonnes. That is how four gigatonnes and 5.5 gigatonnes can relate to that.

The impact of carbon capture use and storage: the amount of money that needs to be invested to achieve that is relatively small compared to the investments needed in renewables, so that is not a significant issue. Moreover, any studies that we have done and other people have done around the world show that the pathway to decarbonize the energy system including CCUS is an awful lot cheaper than the pathways where you do not have an active role for CCUS.





So, I totally agree with you, Jacqueline: developments have been slow. What is sort of frustrating to me is it has not received the same sort of support as we have had for renewable energy. As an economist, the way one thinks about this is when you have a new technology which has not yet reached scale, you sometimes need to provide support around it. You put a ring fence around it, not to provide it with unfair advantage but just to allow it to grow to the point it achieves scale. Once it has achieved scale, you can let go and it can compete in that same world. We have not had that same sort of support for CCUS, where I think it needs to play a very significant role going forward.

Those numbers, I just told you: 4–5 gigatonnes for CCUS. Look at the most recent IPCC report, that report I was mentioning earlier, and you look at all the scenarios in the IPCC report and you look at a point where all those scenarios get to a Net Zero energy system. There is another piece of really fascinating work, I think, in the Energy Outlook that uses the IPCC scenarios to look at what a Net Zero energy system may look like.

The range of CCUS in those IPCC scenarios is between 8–18 gigatonnes of CCUS. Some people say, 'bp would be very extreme about CCUS, it is helping their natural gas.' Those IPCC scenarios are consistent with a Net Zero energy system: between 8–18 gigatonnes. So, I think there is general consensus, not just in our analysis but across many, many people that CCUS needs to play a role in terms of the de-carbonization of the energy system. I hope we will see more projects going forward.

**Kate Arbuthnot:** Thank you. Building on your government support point, the question from Thomas Streeter, based in the UK: 'Many governments will be banning internal combustion engine vehicle sales in the future. Do you see these policies as realistic given the world's need for mobility?'

**Spencer Dale:** My starting point here is I do not think there is one rule for everyone here. I think the needs for different parts of the world are going to be very different. I would expect the pace at which electric vehicles penetrate the rich developed world, to be far quicker than the pace at which it penetrates in some of those emerging economies, where levels of car ownership are still incredibly low, so people still do not have the same sort of access to mobility that we do.

In the outlook, the main drivers of electrification for much of the period are vehicle emission standards, like the CAFE standard in America, or the EU vehicle emission standards here in Europe. As they tighten, one of the key ways in which the car companies are able to achieve those standards is by selling more and more electric cars.

So, in Rapid and Net Zero, we see the tightening in those vehicle efficiency means you are largely getting a phasing out the sales of internal combustion engine cars by around 2040 or so in Rapid, in the EU in the US; and around 2035 in Net Zero.

So I think, in the advanced world, a phasing out, or a tightening in a vehicle efficiency standards, which is predominantly going to really push electric cars, is part of that future. You saw Bernard before he was introducing me talking about that in the context of the UK. However, I think that is a very different story to the developing world, where the priorities are somewhat different.



So, in some sense, we need the advanced rich world to decarbonize their whole economy, and the transport system in particular, more quickly to allow space for the developing world to catch up.

**Kate Arbuthnot:** Thank you. Our next question comes from Nils Cheyhan, again apologies for the pronunciation, from the USA. Nils's question is: 'What are the key policy initiatives needed for the Net Zero scenario?'

**Spencer Dale:** Thank you for your question, Nils. A key role being played in both Rapid and Net Zero is carbon pricing. We have, in the developed world, carbon prices in Net Zero and Rapid getting to \$100 per tonne by 2030, \$200 a tonne by 2040 and \$250 a tonne by 2050. The wonderful thing about carbon prices, as an economist, is it provides a level playing field. It puts a price on carbon and then lets markets, producers, investors, consumers find the most efficient way of reducing carbon emissions. So, rather than saying to a government or regulator, 'You tell me the most efficient way of doing that,' which is incredibly hard to do, it puts a price and then lets the market, producers and consumers find the most efficient way. So carbon pricing will play a key role but carbon prices cannot do it all. We cannot rely purely on carbon pricing. So, other policies in particular sectors: in transport, those vehicle emissions standards playing a key role, there would be other roles for other types of standards and policies in other sectors, particularly hard-to-abate sectors.

The other point I want to stress, Nils, is in that Net Zero scenario, the answer is not just government. I think if we just say, 'What is government going to do?' I worry that there are just political and economic limits to what government can do unless society supports. So a key feature of that Net Zero, of why you get a faster transition, is not just more and more policies, it is also because society, consumers, businesses in particular, are also changing their behaviours: more willingness to adopt clean technologies, clean energies, changing their behaviours in terms of how they use, reuse and recycle products. So I think it is government policies but to get to Net Zero quickly, I think it's also society playing its role as well, so a combination of the two, Nils.

**Kate Arbuthnot:** Thank you. The next questions are getting slightly more personal. The next question comes from Azerbaijan, Anar Valiev. Anar's question is: 'Spencer, how has your personal standpoint shifted on the topic of energy transition forecasting through the years and why is that?'

**Spencer Dale:** My goodness, that is a fantastic question, Anar.

I think two or three things have changed. I think it is as we are just thinking more and more about these issues. I think one significant thing that comes to mind is a growing awareness of the role that hydrogen can play in terms of the energy transition is one part of that. I think, alongside that, bioenergy as well.

One of the things in this year's Outlook, if you look at this year's Outlook relative to previous Outlooks, is we spent far more time thinking about the role that hydrogen can play and also the role that bioenergy can play as a complement to electricity. That is part of the story. So, I think there is a technical issue there in terms of some of those sources of energy or energy carriers and the role that they can play.



I think the other point is perhaps more a policy point than a technical point. The thing that I have been very struck by in the last couple of years, Anar, is the role that society has played in driving the energy transition, sort of more quickly or alongside government. So rather than relying on governments to take their cue, we see companies like bp, and many other companies commit to what they want to do. At the same time, we have seen investors also put increasing pressure on companies in saying, 'This is how we want to invest in companies, that behave in this way.' I do not think that dynamic was so powerful two or three years ago. I think that dynamic means we may be able to make quicker pace in terms of the energy transition than if we only relied on government. It relates back to Nils's question a moment ago.

So there are some technical things about fuels and fuel carriers but I also just think the environment has changed, in a way, with this greater role being played by society, setting its own, if you like, voluntary carbon price, which is affecting people's behaviours.

**Kate Arbuthnot:** Thank you. We are coming through to our final question now. Our final question comes from David Horgan, who is based in Ireland. David's question is: 'How will the extra costs of intermittent renewables be paid for and after, what role will nuclear power play?'

**Spencer Dale:** David, you got two last questions.

When thinking about the, quotes, 'extra costs' of renewable energy, I would make two points. First, that cost of renewable energy is coming down very significantly. I showed you that chart a moment ago in the main presentation where we saw solar costs falling by about 60%. So, over time, that cost of that renewable energy will become cheaper and cheaper. So, there will be a cost associated with intermittency but that will be offset by that low cost.

The other point we think is really important is that we have to see this thing in the round. Even if renewable energy is more costly at the margin, the costs that coal will have on all of our lives and not just sort of in terms of air quality but in a hard-nosed way in terms of the economic costs associated with climate change are very significant. We shouldn't just see these things in a narrow sense. I think the overall costs here of renewable energy are far lower than continuing on the sort of unsustainable path we are on at the moment.

In terms of nuclear energy, nuclear power generation more than doubles out to 2050 in Rapid, so it is playing quite a significant role. We have, in terms of capacity, something like 500 gigawatts of nuclear capacity built out to 2050 in Rapid. That is really strong growth. That is going back to the heyday of the 1980s, when that growth was being built. At the same time, a number of nuclear power stations are coming up for decommissioning in the 2030s and 2040s, when they get to 60 years old. We are pushing out some of that decommissioning to make sure that that capacity stays and so nuclear can play a role. So nuclear can play a role as well.

Thank you for those two questions.

The poll. Okay. I will let you into a secret. Over lunch, we had our own poll about what the answers will be. I may give you a wink if they are similar to what I expected. Somebody just flashed up in front of me: we had over 2,000 people respond to the poll, so thank you.



Part of the poll is just to make this interactive. I am also fascinated in the answer. So, I think, now, as long as we have no more hitches, we will have the answers come up.

So, answers to the first question. If you remember, the first question is: 'Will COVID-19 make the pace of the energy transition faster, slower, unchanged or do not know?' As you can see here, an overwhelming response for faster. So over two-thirds of the people responding saying that it will lead it faster. I think that is consistent with this sort of pressure: greater awareness of the fragilities of the planet and the planetary boundaries we are in; this big momentum of building back better, which relates to that role of society I was just talking about and also the role of government. The scale of government interventions we are seeing at the moment to support the economy and get the economy going again, if you like, provide a once in a lifetime opportunity to build back better. So, I share the optimism of two-thirds of our respondents.

**Kate Arbuthnot:** Absolutely.

**Spencer Dale:** So, question two: 'Out of scenarios presented today, which do you think is most likely to happen?' We had a split vote here. So, as you can see, I would have thought, given the confidence bands here, we have people broadly split perhaps in a three-ways vote: Rapid and Delayed and Disorderly and the other two between Net Zero and Business as Usual. However, the two biggest here are Rapid, which would be this world where we are moving on a path broadly consistent with below two degrees. I guess another way of saying that is more than half the respondents saying a combination of either Rapid or Net Zero. So more than half of our people think we are going to get on a path consistent with the Paris goals. More worrying is almost a third highlighting that Delayed and Disorderly. Do remember the Stein's law when we were going forward here, and I think the Stein's law is very important when we are on such an unsustainable path.

Final question: 'What would you like to happen?' Okay, so we did hope that the majority of our people watching would go for some combination of Net Zero and Rapid. As you can see, we have an overwhelming response: the majority wanting to go for some combination of either Net Zero or Rapid.

I think that is fascinating. I think it sums it up. It's clear what we would like. We would like an accelerated transition, consistent with meeting those Paris goals. Some people are hopeful about that. More than half are hopeful that that is going to be achieved. However, a sizable minority worry that the pace will be delayed, and it will end up being disorderly. If you like, that is why a key part of bp's aims is not to just to get the company to Net Zero but also help world to get to Net Zero, to try and avoid that sort of Delayed and Disorderly scenario.

Okay. I am out of time. Apologies again for the technical hitches earlier. I think it's going to be completely smooth from now on, I am assured, for the rest of today and for the next two days. I think we are taking a quick break, after which we will be handing you back to Bernard.

So, thank you very much. Just to say: if we have whetted your appetite, please do go online to look at the full booklet of the Energy Outlook.

We know we do not know the answers to all these things. This sets out our analysis of where we are today, but we keep on learning. So please let us know what you think and if there are ways in which we can do better or improve it, please do and let us know. A key message from Bernard and the whole leadership team over the next few days is dialogue. Please open that dialogue with us, tell us what you think and how we can improve it. Together, we can all build a better view and understanding of the energy transition. So, thank you very much.