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NEW YORK CITY TEACHERS' RETIREMENT SYSTEM

INVESTMENT MEETING

Held on Thursday, November 2, 2017, at 55 Water Street, New York, New York

ATTENDEES:

JOHN ADLER, Chairman, Trustee

THOMAS BROWN, Trustee

ANTONIO RODRIGUEZ, Mayor's Office

SUSANNAH VICKERS, Trustee, Comptroller's Office

DAVID KAZANSKY, Trustee

RAYMOND ORLANDO, Trustee

MELVYN AARONSON, Teachers' Retirement System

JOHN DORSA, Comptroller's Office

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ATTENDEES (Continued):

SUSAN STANG, Teachers' Retirement System

RON SWINGLE, Teachers' Retirement System

MICHAEL FULVIO, Rocaton

ROBIN PELLISH, Rocaton

THAD McTIGUE, Teachers' Retirement System

VALERIE BUDZIK, Teachers' Retirement System

LIZ SANCHEZ, Teachers' Retirement System

SHERRY CHAN, Office of the Actuary

DAVID LEVINE, Groom Law Group

SANFORD RICH

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MR. ADLER: Good morning, everyone. Welcome to the Teachers' Retirement System of the City of New York Investment Meeting for November 2, 2017.

Thad, would you please call the roll?

MR. McTIGUE: Mr. Adler?

MR. ADLER: I am here.

MR. McTIGUE: Thomas Brown?

MR. BROWN: Here.

MR. McTIGUE: David Kazansky?

MR. KAZANSKY: Present.

MR. McTIGUE: Debra Penny?

Raymond Orlando?

MR. ORLANDO: Here.

MR. McTIGUE: Susannah Vickers?

MS. VICKERS: Here.

MR. McTIGUE: We have a quorum.

MR. ADLER: Thank you very much. Okay, with that I hand it over to Rocaton to take us through the Passport Funds.

MR. FULVIO: Great.

Good morning, everyone. We will begin with the performance of the Passport Funds in September, 2017.

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As you might recall from the meeting last month, September was a strong month for public equity markets, particularly in the U.S. and other developed markets throughout the world. The U.S. equity market was up about 2.4 percent. In developed non-U.S. market that number was 2.5 percent. So both equally strong. And then within emerging markets, we saw a softer market that was down about 1.2 percent when you look at the custom proxy that we use for the Teachers' emerging market portfolio. So all told when you put together the exposures across those markets that make up the Diversified Equity Fund, the return for that fund during the month of September was about 2-1/4 percent. That served to be roughly in line with the hybrid benchmark and through the allocation to non-U.S, which I mentioned before did slightly better than the U.S. That served to help the fund, I'm sorry. All told the fund as a whole was up about 2-1/4 percent.

What drove the returns for the month, in particular, was a little bit of a stronger

return from the U.S. equity markets and a little bit of extra value added from the actively-managed strategies in the U.S. The developed composite was up about 1 percent, so not exactly keeping the pace with the broad U.S. equity market, but a positive return nonetheless. And the international component of the fund was up about 2.1 percent. On a calendar year-to-date basis, that brought the fund's overall return to about 14.8 percent. That's about 90 basis points ahead year to date versus the U.S. equity market and that was due to the non-U.S. exposure within the fund as a whole, which I mentioned before up about 21-1/2 half percent calendar year to date. So these are big numbers. Relative results from the actively-managed equity strategies in both the U.S. and non-U.S. contributed to relative results this year. And though the relative results in the defensive composite could have been a little bit weaker on a relative basis, the composite, the defensive composite was still up about 10 percent calendar year to date. So still

pretty notable return when compared to the Russell 3000, which was up about 14 percent.

The Bond Fund for the month of September was down about a quarter of a percent. Year to date that fund got a return of about 1-1/2 percent. The International Equity Fund up about 2 percent for the quarter, again year to date very strong positive return of about 21.1 percent. The Inflation Protection Fund was down about a quarter of a percent like that of the Bond Fund. Obviously the underlying strategies are pretty different. Year to date that strategy, though, is up about 1.9 percent. And that is good enough to outpace the CPI and its custom benchmark. The Socially Responsible Equity Fund was up about 2-1/4 percent for the month of September, bringing its year-to-date return to about 12.26 percent. And that's lagging the S&P by about 2 percent so far year to date.

If there is no questions --

MR. ADLER: Just one minor typo, I guess, on the percentage of funds in target percentages for the international equity

composite under Diversified Equity Fund.

MR. FULVIO: That's definitely not correct. It's a typo, so that should be --

MS. PELLISH: We will send out an update.

MR. ADLER: Probably just a decimal point correction, I would imagine.

MR. AARONSON: I think they do it like I used to do for my classes, put it in to see if anybody is paying attention.

MR. FULVIO: So for the record, though, there is a 20 percent target to the international equity composite. And the rebalancing process in the Diversified Equity Fund has served to keep the underlying components in the Diversified Equity Fund pretty close to their respective targets. We will send out a revised.

MS. PELLISH: The same is true for the Bond Fund.

MS. STANG: Yes, that's crazy.

MR. FULVIO: So with that, maybe we will turn to October.

And October was another strong month for global equity markets. The U.S. was up about 2 percent yet again bringing the calendar year-to-date return there to about 16.4 percent. The international market all rolled under, including the developed and non-developed non-U.S. and emerging markets were up about 1-3/4 percent, calendar year to date up over 23 percent. The defensive composites also up just shy of 2 percent in the month of October bringing its calendar year return to about 14 percent. The Diversified Equity Fund's hybrid benchmark as a whole is up about 2 percent and the estimated year-to-date return to about 17.5 percent for that proxy, so very strong numbers across the board. There is additional detail breaking out the developed and non-developed non-U.S. and emerging equity markets in the middle of the page. The developed non-U.S. piece was up about 1-1/2 percent and the emerging market piece was up about 3.6 percent. So emerging outpacing the U.S. and developed market as a whole. And then below

that, the underlying strategy for the Inflation Protection Fund up about 3/4s of a percent. And the underlying strategy for the Socially Responsive Equity Fund up about 1 percent, lagging the S&P during October.

Were there any questions? So that concludes the performance portion of today's agenda. Happy to introduce the next item if --

MR. ADLER: Please.

MR. FULVIO: So today, as you might have noted on the agenda, we have invited in two providers of what we will call solutions for institutional investors looking to constructively approach ways of lowering the carbon footprint in their investment program by implementing -- which are essentially indexed strategies.

So one of the providers, the first one Mellon Capital, manages a strategy that seeks to lower the carbon footprint of the portfolio as a whole while minimizing the tracking error relative to an index of the investors choosing. And MSCI, they don't manage

portfolios but rather they construct an index that you can then license and have one of your managers such as BlackRock or State Street, other index providers actually implement that index on your behalf. And so they go about this in a bit of a different way depending on which provider you are looking at, but today's presentation is going to be more of an educational discussion for how they approach this, you know, task that many of their clients ask them to look at for them. And then maybe after that concludes, we can help distinguish a little bit the characteristics that make them different.

MS. PELLISH: Just to provide sort of a context the reason -- or just to remind everyone: The reason the board requested that we bring in some providers was because as a result of the Mercer presentations, there was a conclusion that one of the potential next steps was to take a portion of the U.S. Equity Index assets and allocate them to a low carbon strategy. So there are increasing number of service providers who are willing to do that

for you. And Susan and her team and we at Rocaton have been meeting with a broad range of those providers. And we thought that these two firms had compelling, but different strategies to facilitate passively investing in low carbon portfolios. And so we thought that it would be interesting to bring them in front of the board so that can you begin to get a sense of how or -- how strategies differ, how it is possible to implement a low carbon index portfolio, what might be the benefits and costs of doing so.

MR. ADLER: Can I just ask a question? Sorry, Valerie.

MS. BUDZIK: Maybe just add in from what Robin is saying, we view this as an educational presentation. If the board determines it wants to proceed with low carbon providers or another product in the area, it would be a solicitation of sorts.

MS. PELLISH: A more thorough --

MR. FULVIO: Formal process.

MS. BUDZIK: Right, this is --

MS. PELLISH: Just to give examples I

think.

MS. VICKERS: This is informational.

MS. BUDZIK: This is informational, educational.

MR. TAMONEY: Well, my name is Drew Tamoney. I am glad to be here for Mellon Capital. Thank you for making time for us today.

As you may know, we serve as a manager currently and have so for 20 years. Pleased to do that and we do that on indexed funds that we manage for the plan. Today we are not here to talk about that account. We are here to talk about indexing in an educational way and in sort of an educational endeavor. With me I have Karen Wong, who is in charge of the indexing team. Our firm is known inhouse among the BNY Mellon family as the indexing firm. We manage in excess of $300 billion at the firm and certainly a lion's share of that 320 billion is under Karen's supervision and her team, indexing particularly some $270 billion. So we are known -- we are going that way internally as a place to serve as a

manager for you.

We are known as an indexing firm because we started indexing in the industry. 1973 was the first S&P index fund that we started. Actually, founders of our firm started it so we are pleased to be here. Karen has been at the firm for 17 years. She'll lead the discussion today about indexing and particularly how we are thinking about the environment. She is on the senior management committee, the risk and compliance committee, a very senior member of the firm, and not a surprise today as we are here to talk about things that affect the environment she is the head of the ESG committee at the firm.

Today as I think about it, we are here to talk about indexing with a cause, the environment, how can we make a difference for the environment with our pension dollars. Karen will talk about it, but some five years ago a client of ours, the McKnight Foundation, asked us to look at what happens with the environmental investing and could we make a difference in their portfolio. And that was

the catalyst for us to get into this business some five years ago and Karen will tell that story. I can tell you that now we do have a trademark on green data. Pleased to do that.

So I will turn to Karen who will lead the discussion on how we think about the environment and how to invest in a proper way and then we will bleed into just a little bit of what we do at Mellon Capital, one way that we think makes sense. Not the only way that we think makes sense for you to understand. Make sense.

MR. ADLER: Sounds good.

MR. TAMONEY: Karen.

MS. WONG: Terrific, and thank you.

Before we get started, I want to do a quick time check. Do we have 20 minutes roughly?

MS. STANG: Yes.

MS. WONG: Thank you.

So why don't we go to the next page. Just very quickly, this is our agenda for today and these are the key questions that we want to talk about and ask ourselves. And a

lot of what you see here is things we have gone through in developing a strategy for our client McKnight Foundation that Drew mentioned earlier.

Now, going to the next page I think most of you are familiar with this topic of low carbon investing or the common elements that go along with it; the fossil fuels, the carbon emissions, the engagement, the divestment. I think it's important to recognize if you go to the next slide, this campaign of fossil fuel divestment started in a lot of university campuses a few years ago and there are many elements to it. And I think you are already ahead of the curve by divesting from pure plain coal and that's what we are managing for you right now, so I congratulate you for staying ahead of the curve there.

Now, what goes along with divestment on page 5, it's important to recognize the investment risk of divestment. Now, what we are talking about here is a broader fossil fuel divestment, not just coal. And we did a hypothetical analysis of getting out of coal

fossil fuels and how that will impact the investment risk. And what you see here is the result of that divestment of the energy sector as a proxy of fossil fuels. Now, on an ex ante basis the risk of that fossil fuel-free portfolio, it's 124 basis points per anum since '97.

MS. PELLISH: Can you define "risk" when you are talking?

MS. WONG: Yes, thank you.

Risk in terms of tracking errors, so that's the volatility of return. That's one way of thinking about it. On an ex post basis it's a little higher, 139 basis points per anum. So that's the risk that we face if we were to get out of the fossil fuels.

MR. ADLER: I'm sorry. Can you distinguish between ex ante and ex post?

MS. WONG: Of course. Ex ante is the forward looking, so what would the portfolio expect to generate in terms of risk. Ex post is kind of backwards looking too. So over the time period of this analysis from 1997 up to 2016, so 20 years. Over the last 20 years

getting out of fossil fuels would introduce 139 basis points of ex post tracking error.

MS. PELLISH: Can you just expand on that a little bit, about how an investor might think about that on an annual basis? So you are talking about a multiyear basis and also what does that mean about the probable range of outcomes? So that's one standard deviation?

MS. WONG: Right, exactly. So in the very technical term, 139 basis points is really a one-standard deviation. Now, what is one-standard deviation. That is in math -- in a statistical term, two-thirds of time you would be above or below the 139 basis points. Now if you want a bigger probability, you are talking about two-standard deviations. So 95 percent of the time, roughly speaking, you could be 280 basis points above or 120 points below the benchmark at any given point.

Now perhaps a way of understanding it is looking at the year over-year deviation, so you see it on this top here with the energy run up from 2004 to 2007. What you are

looking at is underperformance of this portfolio to almost 200 -- I would make a guess -- 280 basis points. That was in 2007. Underperformance of this portfolio relative to the benchmark. That is an outcome of getting out of the energy sector. Now in more recent years obviously that could generate positive return, but that is the volatility that we are talking about. You could be at any year up and down against the benchmark by a significant amount.

MS. VICKERS: So if you had to sort of summarize this entire slide in one or two, you know, layman terms sentences, how would you?

MS. WONG: I would say if you decide to completely divest from fossil fuel, you will face very high volatility in your return.

MS. PELLISH: Relative the benchmark?

MS. WONG: Relative to the benchmark. And you see the volatility on this slide here over the last 20 years. In one year you can be up 200 basis points, in another year you could be down over 200 basis points and that is the volatility.

Now putting it into context of your current portfolio, the expected return of that portfolio right now is about 45 basis points.

MS. STANG: Of the passively managed?

MS. WONG: Correct, of the portfolio that you currently manage.

MS. PELLISH: Relative to the benchmark?

MS. WONG: Relative to the benchmark. So you can get a sense of how much more risk you were to face if you were to divest fully from fossil fuel.

MS. VICKERS: And are these the numbers of how much more risk you will face if you divest fully from fossil fuel?

MS. WONG: Right. Basically you will be looking at incremental risk of 120 basis points just from divesting from fossil fuel. Now, keep in mind that is just one risk that people talk about related to climate change risk. It's the stranded asset risk, right? You also have physical risk. You also have transition risk, you also have many other elements of risk that you should think about, because divesting from fossil fuel doesn't

really solve or mitigate all of your risks related to climate change.

MS. VICKERS: I'm sorry, one last question: How do you define energy divestment? You know, what's the universe of companies that are excluded in that slide?

MS. WONG: This slide, we use the energy sector as a proxy because --

MS. PELLISH: The energy sector defined by?

MS. WONG: Gates, which is a pretty widely accepted classification of industry in the sector.

MS. VICKERS: Do you know approximately how many companies that is?

MS. WONG: 200 plus.

MS. PELLISH: And it's about what percentage?

MS. WONG: The energy sector, I actually have it on a different slide here. I will get it for you. I will get it for you. That is 5.6.

MR. TAMONEY: On page 16.

MS. WONG: 5.6 as of July 31st. Any

more questions on this slide before I move on?

LIANG: I had a question. So, you know, this was a great slide about what we might expect in terms of volatility. What about expected return; when you remove the sector from the -- from the portfolio, do you have -- is there a sense of expected -- difference in terms of expected returns, because you see ups and downs? So to me just from the ups and downs, does it average out that the expected return is about the same as the benchmark but now based on higher volatility?

MS. WONG: Well, because you face higher volatility and the return would be more dependent on the performance of the energy sector, right, so it's a little hard to put the expected number. But if we go back and look at what has happened in the last 20 years in this analysis, getting out of fossil fuel I think will generate negative return to the benchmark. So it was definitely a negative looking backward that was the past 20 years.

MS. VICKERS: I'm sorry, can you repeat

that?

MS. WONG: So I don't have the number with me right now, but if I remember correctly this return stream over the last 20 years was negative relative to the benchmark. I can certainly get you the number.

MS. VICKERS: That would be very interesting. Thank you.

LIANG: But in the future, so suppose we had this idea that energy companies are not going to do well because of climate change maybe policies and things like that, the future cash flow streaming might not be negative for the sector? It's unknown at this point?

MS. WONG: It's unknown, but also we are assuming that the energy companies would not change because there is also -- that's why I was talking about the transition risk, right? An energy company can try to transform and try to do more in R&D to get out more energy per unit of fossil fuels, so that's a possibility. So it's very hard at this point so say oh, I think I know what the return, expected return,

would be because there are so many unknowns.

MS. PELLISH: And it's fair to say you are taking the approach of a client comes to you and says I would like to try to mitigate the carbon footprint of my index strategy and this is one way you deal with that rather than predicting returns?

MS. WONG: Rather than predicting, Mellon Capital is a very quantitative and systematic firm and we always try to put everything into a model. And the reason why we spent so much time in creating this strategy was we are trying to make the perfect model out of it. And as we were doing it, we realized there are so many unknowns on the valuation side. There is also unknowns as related to the innovation so who knows that Tesla, an electric car, would become the largest automobile company in the U.S. by market cap. Ten years ago it didn't even exist.

So it's really hard to try to predict how innovation can change and transform the industry. So -- and that's why the approach

we take is if we can't put all the pieces together in a perfect model, let's try to think of it as a way to hedge the risks. What are the things that we can do without introducing a lot of incremental risk, what are the things that we can do to provide the broad market exposure that's unique. Because you still need to invest, right, you want to continue to invest in the Russell 3000 I presume. Then what are the things we can do to try to mitigate the unknowns, to hedge out unknowns in a meaningful and sensible manner.

MR. TAMONEY: We can certainly follow up what would it mean to divest of the energy. I would like to move the conversation along to thinking about other things, getting specific on carbon and maybe a way to manage that idea if that's okay.

MS. WONG: So the way we also start thinking more about it is aside from the stranded asset argument, aside from the fossil fuels, what are the things that we should consider.

Now on page 6, the next slide, you see a

chart of the energy breakdown and this was the latest available. And, as you can see, we are looking at the total energy consumption by different source from coal, oil, gas to renewable. And this green slice of the pie that's 6 percent, that's renewable and that's how much currently in the U.S. energy is produced from various sources of renewable sources. What we want is the green slice to be a bigger portion of the pie. Now, ten years ago this green slice was about 7 percent; nothing actually moved in ten years. Globally, this number we looked at across the globe, it was also about 6, 7 percent. We are far from a low carbon economy. We cannot ignore all the fossil fuels. We can do something about certain elements like coal for example, but there are things we need to ask ourselves. We have such a huge reliance on fossil fuels. We don't really have a switch that we can just flip and go let's get out of all fossil fuels. We have to accept it's going to be a long and gradual transition and doing that, what are the things that we can do

and how do we measure the risks of climate change risk.

MR. ADLER: I have a question. This U.S. energy consumption gives a source, but does that mean including transportation, like would cars be included in that or not?

MS. WONG: This is really measuring all the electricity produced.

MR. ADLER: Electricity, so this is electricity?

MS. WONG: Yes.

MR. ADLER: Got it. Thank you.

MS. WONG: No problem.

So going to the next slide if we think of a risk measure, if we say that cash reserve or carbon or fossil fuel reserves are not the best measure of climate change risk, then what would be a better measure. So we decided on page 7 that we should take a closer look at carbon emissions. It's not the fossil fuel itself, it's the burning of the fossil fuels that's causing climate change risk. It's the carbon dioxide concentration or greenhouse gas concentration. So what you see here is an

indicator of carbon dioxide concentration level historically from pre-industry revolution to the most recent. And you see how that has increased over time and started to really go up almost exponentially. So the question that we ask ourselves is this is a really good risk indicator, because if we can help manage the carbon dioxide emissions or the carbon emissions then we would have a better chance of success in terms of balancing climate change risk itself.

MS. PELLISH: So I just want to make sure the point you are raising here is clear to everyone, because I think it's a critical and distinctive element of what you do which is not to focus on the stranded asset issue of large integrated oil companies. So you are making the argument that that may be an issue, but that's not the most immediate priority in terms of constructing a benchmark or portfolio?

MS. WONG: It's a very good point. Because what we are thinking is what's under the ground, it's what's under the ground.

What is really happening right now, climate change is about what's in the air right now. So how can we use a measure that would allow us to address the urgency or the immediacy of the issue and so we think that carbon emissions is a better indicator of climate change risk.

Now, the other question that I think we should ask ourselves is, next slide, do we focus on carbon measures or is there something else that we should consider as well in mitigating climate change risk. And sure enough we started to ask ourselves about other environmental issues; what about water stress; what about waste management, what about governance. If you think about the Volkswagon diesel scandal, that is more of a governance issue than an environmental issue. It's because the company really did not have independent board members, right? So you start to think more about there are other S&G elements within the nonfinancial considerations that we should consider that can also help address climate change risk.

The other example that I would give is think about the carbon footprint of a product, right? Do you want to invest equally into General Motors and Tesla or should you invest more into Tesla because its product has a lower carbon footprint. Now, if you just look at carbon emissions by itself you would not consider the Scope 3, if you will, if you get technical into the carbon measure, but really it's about the indirect carbon emissions from products. So we started thinking about what we should really look a little beyond just the carbon emissions measure by looking at ESG factors that could help improve the profile of the portfolio that we invest in.

Next slide. So the one thing that I have to stress a lot within the development of the strategy is the power of engagement. Now, I don't think I need to spend too much time here because I know you spent a lot of time in your proxy voting in your engagement. And I want to actually congratulate you for what you have done over the last few years on proxy access on climate change risk mitigation, on

board diversity. So you certainly understand the power of engagement.

I am going to skip the next slide as well and go to page 11. This is something that I think you want to consider because there are a number of low carbon indices out there. And knowing that you currently invest in the Russell 3000, if you want to switch a benchmark, the one question -- we are away from all the carbon and environmental discussion; we are back to kind of the choice of a index. As soon as you start considering another index provider this is something that you need to be aware of, and that is there is inherently tracking error or high volatility as soon as you move away from another index. So for example if you go to a comparable MSCI USA IMI Index to the Russell 3000, you would be looking at an increase in tracking error of 9 basis points. A comparable S&P composite 1500, you would be looking at an increase in tracking error of 48 basis points. So just keep that in mind if you do consider moving away from Russell 3000, inherently you would

face higher tracking error.

So what are the things we should consider. Next slide, please. We talk a little bit about the carbon reserves, the carbon emissions, and think about whether you should consider more of renewable energy. As you manage risk there is the question of should we divest, should we reweight, and should we consider engaging more with the fossil fuel companies that we choose to invest in.

The following slides before I show you, how they -- we think of low carbon investing, it's really about balancing the two priorities. Now, as a fiduciary you still want to generate a capital rate of return that is consistent with your benchmark choice. That's your financial responsibility. But also more and more organizations like yourself are considering the other environmental responsibilities that you should consider in your -- as you carry out your fiduciary responsibility. How should you consider that now? Oftentimes they can be in conflict. We

looked at the fossil fuel divestment analysis. Are you comfortable taking that level of risk to address your carbon emission risk. In our strategy as we think about low carbon investing, it's really about balancing the two priorities; how do we balance the two priorities and get -- and strike the right balance and still maintain the exposure to the right market that you choose, while at the same time significantly mitigate the climate change risk in your portfolio.

So moving on to Slide 14, this is how we do it. And it's really about at the high level addressing the immediacy by focusing on carbon emissions as the key indicator. Effective impact is where we balance the two objectives. We really try to reduce exposure to carbon emissions by over 50 percent and improve the overall ESG profile. We also at the same time aim to minimize tracking error to less than 50 basis points. Now keep in mind, remember when we looked at the fossil fuel divestment the risks there was over 20 basis points, so keep it in the right context.

And then within the strategy we also incorporate shareholder engagement.

Now the next slide, this is how we actually do it within our process. It's a reward and penalty model. So we want to reward the low carbon footprint company and want to penalize the high-carbon footprint company. Now, it's not as simple as that. We also consider a number of different factors. The model has two scores. So on the left you see the carbon intensity score and on the right the carbon readiness score. The intensity score on the left helps us set the direction where we -- do we want to overweight or underweight.

Now, how do we choose? We look at the carbon footprint of a company, we look at it within each sector. So it's important, very important to consider the sector. Otherwise when you compare a utilities company to telecommunications company, I think you know what you want to buy more and what you want to buy less but that's not the point. The point is you have to consider all the utilities

together and you want to reward more of the companies that are lower in carbon footprint within the utility sector and penalize the ones with higher carbon footprint. After that we also adjust that ranking with its ESG score, so we want to look at how well the governance aspect. We also want to look at the product carbon footprint. We want to look at how companies are considering green technology and whether they are taking advantage of the green technology out there. So we adjust the carbon footprint ranking within the sector by its ESG score and then come up with this carbon intensity score that helps us determine whether we want to overweight or underweight a company.

MS. PELLISH: Can you talk for a moment how you got the data supporting those scores?

MS. WONG: So we look at MSCI ESG data. We use a proprietary model to do the ranking and then do the adjustment with the ESG score. Now, the data itself is a little challenging. Not a lot of companies actually report, I am sure you know. Then we have to rely on

estimation. So we have gone through, doing our strategy development we looked at a number of different data providers. We look at analytic MSCI, South Pole -- there is another one that I missed.

MR. TAMONEY: Chukoff.

MS. WONG: Chukoff, thank you. We think about the breadth of the data and try to see, analyze, the estimation models that they have. And then at the end, we were more comfortable with what MSCI was able to cover.

Now, there is a lot of estimations. But I would say that over the last three years that we are managing the strategy live now, we are seeing more company reporting, we are seeing the actual reported data coming out and validating the estimation. And at this point, we feel very comfortable with the choice that we have.

MR. ADLER: Can I ask a question in terms of the carbon intensity, is that just Scope 1, Scope 2?

MS. WONG: Scope 1 and Scope 2. Now, that is why we have the ESG score incorporated

here, because intensity score is only Scope 1 and 2. Everyone familiar with Scope 1, 2 and 3? Okay, Scope 3 is the indirect and the only way right now that is captured is through the ESG score integration, because there we consider the product carbon footprint and Scope 3 it's impossible to get. Very few, very few, you can almost count by the number of one hand, actually report Scope 3 emission.

Sorry, there is a question?

MS. VICKERS: I was just going to ask just so I understand it, the weightings and the rankings are within the sector?

MS. WONG: Correct. Correct. And that's very important because, like I said, if you don't do it you are going to tilt towards the lower-carbon footprint sector.

MS. PELLISH: Why wouldn't you want to do that?

MS. WONG: Well, we think -- this is a beta strategy. This is not really trying to do a sector rotation where we believe one sector is going to do better than the other. So we think it's more important to try to keep

the sector neutral and by doing a best-in-class sector ranking will allow us to achieve that goal more easily. But more importantly we just don't think when you go out and engage let's say a utilities company, when we tell them hey, look, you are not doing enough and they often ask who are you comparing me to and I can't say well, I am comparing to you telecommunications, they wouldn't think that's effective, right? So this also helps a lot with the engagement, right? What we are comparing, Pennsylvania Power and Light with Dominion Energy or, right, so you get the more peer-to-peer comparison and it makes the engagement message much more powerful.

MR. ADLER: And also probably helps with your tracking error, too.

MS. WONG: Absolutely. Are we good with the intensity score before I move on to the right side of the page, which is the readiness score. And this readiness score helps set the magnitude. So we now have a score on the left telling us whether we want to overweight or

underweight on the right-hand side of page 15. We have the readiness score that helps us decide how much to overweight or underweight. This score measures how well a company mitigates and manages its climate change risk, whether a company reports carbon emission, whether a company has a target-to-target carbon emissions, what are they doing, are they achieving it or falling behind the target, is it a renewable energy company; those are the questions that we look at. Everything else equal, a company with -- two companies with the same identical intensity score on the left, a company with a higher readiness score, would be overweighted more or underweighted less. So that's helping us determine how much to over or underweight.

MR. FULVIO: Should we think of that as a more forward-ahead assessment of how the company is addressing?

MS. WONG: Absolutely, because the carbon intensity score is more of current state. That's where the company is right now of its carbon footprint. The readiness score

would help because it's more related to policy, more related to governance, more related if you think about carbon emission deduction and what they are doing to that. We know a company that has a higher better carbon readiness score would be more ready when there is a carbon reconciliation, when there is a better technology available, a company is more proactive in adopting carbon-friendly or environmental-friendly policies. So, yes, you are absolutely right, this is a measure of more qualitative forward-looking measure of a company.

MR. TAMONEY: Just touch on the business of Pattern versus Southern. Southern people might know about, but Pattern and how they are different and the kind of energy company they are. So you will understand why the weightings are the rankings and, hence, the weightings came out the way they do.

MS. WONG: So the two companies at the bottom of the page under utilities.

Pattern Energy has a carbon intensity of 6, 6 metric tons of carbon emissions per

million dollars in sales. And I also want to make a very quick point. When I say "carbon," I actually mean more broadly like greenhouse grass. So it does cover everything, not just carbon emissions. That's 6 metric tons compared to sector average of a 1,078. Low carbon footprint, ESG score of 7. And that is a score in the range of 0 to 10, 10 being the highest, so pretty good ESG score. This company has an intensity score of 2.1. Now, 2.1 is a pretty good score; it's a normalized score. Mean is 0, 1 is standard deviation, so 2 means this number -- this company is 95 percent better than the rest of the utilities. It's readiness score is 20. 20 is the highest and 20 -- it has a score of 20 because it's a renewable energy company, so we are giving the perfect score to a renewable energy company. The benchmark Russell 3000 has this company with a weight of one basis point. Within the portfolio, we are holding it to the maximum. So we are overweighting it, we are overweighting it by the maximum which is 20 basis points.

Now, Southern Company is a more traditional utilities, has a lot of fossil fuels in its energy source. It has a carbon intensity almost six times the sector, right? ESG score is right in the middle, pretty mediocre. It has then intensity score of negative 2, so 95 percent worse than the sector. It's readiness score is 6.4, so again it's actually below the average, the average being 10. So when the benchmark has a weight of 18 basis points, we actually underweight it by 13. We are holding just a tiny bit of it, 5 basis points.

MR. FULVIO: So you maintain the ability to still engage?

MS. WONG: Correct, correct. That's important because this strategy is about engagement, it's not about divestment.

MR. ADLER: Can I ask a question: How did you arrive at the limit of 20 basis points?

MS. WONG: So it's really a number of different scenario analyses. So when we decided to work on this we come up with

different levels, 20, 35, 5, 10 and try to see how that would impact the tracking error and impact the carbon emission reduction. This number happens to give us the best ability to achieve the 50 percent reduction in carbon emissions and then achieving a 50 basis points below tracking error. Now, this number can change. This strategy, this model, is very flexible. This 20 basis points is the maximum overweight. We.

Actually have a client in this strategy right now that is not so comfortable with the risk parameters that we have. They want it to be closer to the benchmark, so we have this carbon readiness score at the scale of 0 to 5 for that particular client. Now of course with that what you get is a lower reduction in carbon emissions, so again it comes back to the tradeoff that you would face between the two key numbers.

MR. ADLER: Let me ask one other question. What's the effect on capitalization? In other words, my guess is that Pattern Energy Group, which I never heard

of, is a --

MS. WONG: It's a one basis point benchmark.

MR. ADLER: One basis point compared to Southern which is a big, giant company. And I don't know if that's a pattern or if that happens to be just the companies you included here, but does it have an effect of the overall capitalization, the median capitalization?

MS. WONG: When we looked at this the last time, the capitalization sector was well within 100 basis points or 150 basis points. So we are actually still maintaining pretty good kind of risk characteristics of the benchmark.

MR. LEVINE: Can I ask one question to John's point on that because when you do the carbon intensity sector average, Southern Company is also a very large utility. When you compare it to the average, if you have a very big company of course they are going to have higher carbon output.

MR. ADLER: But it's per million dollars

of revenue.

MR. LEVINE: Oh, that's right, it's per million. That answers it. Thank you.

LIANG: Following on that point about scale, the carbon readiness score, that's forward looking. So a reduction if Southern was ever willing to be more green, they would have a larger impact because of what they produce right now. Is that --

MS. WONG: Absolutely.

LIANG: Is that taken into account in the readiness score or are you a little more agnostic to the scale?

MS. WONG: Right now we are agnostic to the scale. But that's why when we engage with Southern, right, we would have that point; hey, you are a huge contributor right now to the total carbon footprint just because of what you do, so little steps that you take can have a pretty dramatic impact or improvement to the economy. So one thing we try to do right now is we try to focus on 50 top most carbon-intensive companies and do more of a focused engagement, because it's more

effective if we do it that way. But that's kind of a little different occasion.

MR. TAMONEY: I would like to move on. I don't want to overstay our welcome. I know page 17 is an important page and we want to spend a couple of minutes on that for the group.

MS. VICKERS: If the time is okay.

MR. TAMONEY: We have plenty of time. We can be here through the weekend.

MS. STANG: The other people are on ice, we are good.

MS. VICKERS: Please go through the same conversation with the two companies on the energy sector just going through the scores and --

MS. WONG: Yes, of course.

MS. VICKERS: -- if you can, just walk us through that.

MS. WONG: So we have got Schlumberger and ExxonMobil. Schlumberger has a carbon intensity -- did I say it correctly Schlumberger?

MR. ADLER: It just shows my ignorance.

MS. WONG: Absent my Chinese accent, I think I got pretty close. It's carbon intensity is 56 metric tons per million dollars in sales. Sector average 309, so again lower carbon footprint than the sector. ESG score is higher than the average, right, so it has an intensity score of 1.3. Now, not as good as Pattern as you compare to the top line, but it's still a pretty good company within the sector of energy. It's readiness score is 15 so that's also pretty good, 15 out of 20. Benchmark weight, 37 basis points, right. We are overweighting them. Now we are overweighting it by 15 basis points and that 15 basis points, again, is the maximum overweight determined by the readiness score.

MS. STANG: Why does it have a 15 readiness score versus a 10 versus a 20 being perfect? Because they are doing --

MS. WONG: Well, I don't -- I don't have the details on this. But what I can say is that knowing what we consider, better policy, better willingness to accept climate change risk, more willing to set policies and also do

something to really keep up -- because one thing is to set the policy, the other thing is actually doing, executing to actually hit the emissions target or putting climate competent members to the board of the directors. So those are the things that we consider. And I think Schlumberger would have done quite a few of those to be able to get a pretty good carbon readiness score of 15.

ExxonMobil, I think we actually know better what ExxonMmobil does or does not do. Intensity score 572, so higher than the sector. It's ESG score of 3. Well, I think we all know why and there is enough on ExxonMobil, the shareholder proposal and how they come back, the lobby that they do to try to kind of dismiss the risk, and what we have all read about on the news. Therefore it has a carbon intensity score of negative 1.1, so definitely below average. And readiness score 7.4, again that is not surprising that it has a readiness score below median. Benchmark weight, 1.33. Very big company in the sector.

We are underweighting it by 14 basis

points. Now, again the point of still holding it to stay engaged with the company is what is important about this strategy. We are not divesting from it. We think it's more important to have a seat at the table and be able to vote proxy and be able to engage with them on what they are doing in their corporate plan to transition to lower-carbon economy.

MS. VICKERS: Right. But your model can penalize ExxonMobil for their low scores or their behavior by reducing the holdings, without -- if you -- you know, divestment was on the table, then we would have --

MS. WONG: You would have no seat at the table --

MS. VICKERS: -- to influence that.

MS. WONG: Right. So the example that we saw earlier, the page about the divestment risk, that is with Exxon to come completely out of the portfolio.

MS. PELLISH: Can you talk very briefly, because I am sure this can be a very long discussion, who in your organization is actually implementing engagement?

MS. WONG: So within BNY Mellon, we have a proxy voting and governance committee. So that committee is responsible for setting proxy voting guidelines and also responsible for corporate outreach. So we meet with -- Exxon is definitely one of them. We meet with management, we meet with sometimes the board of directors, we talk to them, and that has been around before any of this is a significant topic, executive compensation, board diversity and things like that. And more recently this is an important topic around the table and that team is responsible for meeting with hundreds of companies every year in events and topics like this.

Now obviously we also -- Mellon Capital is a signatory to CDP, a signatory to PRI. We work with SIRI, for example. We signed a G20 letter when our president decided to pull out of the Paris agreement. We think it's important for us to stay in front of this very important topic. And so our commitment to the Paris accord, so we signed a G20 letter. And those are the things that we do to help

engage, stay engaged.

MR. ADLER: Two questions. The first for Robin or Susannah, in our case we hold onto the our proxy voting ourself? That's true for TDA and QPP, right?

MS. PELLISH: Yes.

MR. ADLER: And carbon readiness score, the range is 1 to 20.

MS. WONG: 0 to 20; 0 the lowest, 20 the highest.

Now, we can move on to page 17 and this shows you what our portfolio actually looks like after the model. We have a 50 percent reduction in carbon intensity, so we meet that green objective. ESG rating is 17 percent better than the benchmark, so we are doing better than the benchmark in terms of ESG profile. I would say the beauty of the model is the bottom -- the very bottom of this slide you see the sector-by-sector reduction and how you see we are able to achieve reduction in carbon exposure one sector after another across the -- sorry, the eleven sectors within GIX. So this is GIX. What's the message?

The message is climate change is everyone's issue. It's not one sector; it's not just the utilities or the energy. Now they have more to do with it and we think we would emphasize that point in engagement meetings, but it's also important to recognize that other sectors can also do something. Think about real estate. If they don't address this risk, think about the rising sea level, what it would do to the value of real estate companies. So those are the things that it's important to us. This strategy is inclusive. And we are able to achieve carbon reduction in every sector of the strategy.

Now, what does it do to the risk profile and that's on Slide 18. The empty risk or tracking error is 32 basis points, so that's below the 50 basis points. The 50 basis points is a cap. And we will say that we achieved that objective if we stay below the 50 basis points, so we are doing that at 32 basis points. If you look at the sector profile at the bottom of this page, you see utilities we are underweighted by 13 basis

points. Energy, 14 basis points. So the point I would make here is we don't have to take a significant sector underweight to achieve the carbon footprint reduction that you see on page 17. Right, so at the 13 basis point underweight in utilities, we are able to reduce its carbon footprint by 64 percent. And that is achievable because of the best-in-class process.

LIANG: What about the exposed tracking error?

MS. WONG: So we just hit three years in this strategy at the end of October. We started it in October 31, 2014. That portfolio has exposed tracking error of 51 basis points, so right at the 50 basis point mark.

MR. FULVIO: We are going to be looking and talking to others about how they approach this and look at a lot of numbers. When we think about others who might be -- we recognize you could apply this process to really any benchmark that TRS or any other investor would choose. And when we start

thinking about how efficient this strategy is at minimizing tracking error but also reducing the carbon exposure, is that efficiency greater in the U.S. or when we look at more global mandates?

MS. WONG: I actually through our analysis, and we -- just to give a little bit of context, we are currently running live Russell 3, Russell 1 and EAFE. We also have a paper portfolio in ACWI including emerging markets, because EAFE is all developed markets. I see more efficacy in emerging markets. So like for example here you see a 32 basis point tracking error, a 50 percent reduction. In a portfolio against ACWI, again including all developed and emerging markets I see a similar risk level, a reduction of 60 percent in carbon footprints with emerging markets.

MR. FULVIO: So we shouldn't compare the efficiency of the U.S. market to the efficiency of the global market?

MS. WONG: Right. You should expect to see better, more bang for the buck if you

will, with any benchmark with emerging markets.

LIANG: What about the data challenges for emerging market companies; do you find they are more or less transparent?

MS. WONG: It's really the same old issue with just the accuracy and availability. So the data -- if you really want to look at only reported data, you can't come up with a strategy, there is no way. To give you a little bit of background: When we looked at the Russell 3000, the number of reported companies were really around 600. 5, 600 or so companies that actually report carbon emissions. The percentage is a little better in terms of market capitalization. We are looking at 70 percent, because the larger companies tend to have more resources to do the reporting. Same thing with emerging markets; the number is pretty similar. Now, that's why it's important to build the confidence in the estimation model, because without estimation you can't really ignore 30 percent of your benchmark and not invest in

those, right.

MR. TAMONEY: Do you want to talk a little bit about our ability to customize, whether an investor was willing to relax tracking error, would want us to have a bigger penalty, lower penalty just as far as customization?

MS. WONG: Right. So I mentioned we have an investor right now that is not too comfortable with the 50 basis points tracking error because their investment committee wanted to get closer to the index. So there we were running 25 basis points tracking error, the readiness score is recalculated to 5 as opposed to 20. We also have other investors who would want to have bigger penalty, so they were asking us to go to 100 basis points in tracking error and want to be willing to do that to get a higher reduction in carbon footprint.

So the model itself is capable of doing kind of the scaling up or down depending on obviously your risk profile, which I think is a good segue onto the next slide. This is

what we call the carbon efficiency frontier. Right, so this is a traditional investment frontier except on the Y axis, we have the reduction in carbon emission exposures. So the X axis is still tracking error. Typically in an investment world you see the return on the Y, but here we have that in terms of carbon emission reduction. The top curve here is the carbon intensity reduction curve and the bottom curve is the ESG improvement. What you see here is for every single level of risk, you have -- you can have different reduction in carbon footprint in your investment. Now obviously it levels off, so after a certain point it really doesn't make sense. Why would you want to take extra risk when there is really no more additional green return, if you will. But on the left-hand side you can certainly choose more risk or lower risk, again to your level of risk tolerance. And given that you are in the separately managed account, this is very, very doable in terms of scaling the risk up or down.

MR. ADLER: So there is no scale on here, you know. At the most, if you would say the most efficient on tracking error, what would you say that is?

MS. WONG: Well, so in terms of the Russell 3000, we didn't really put it in here because this is supposed to be for illustration purposes only. But in the current Russell 3 portfolio, the most efficient is what we have chosen within the 50 percent reduction and the 32 basis point tracking error.

MR. ADLER: Oh, the current, okay.

MR. TAMONEY: We have overstayed our welcome, but we are pleased to have the time that we did with you. I think at this point I would be glad to take followup questions. Susan can direct them my way. I want to thank you for your time. I hope it's been instructive and I hope we can be of help.

MR. ADLER: Thank you.

MS. WONG: And I will get the followup on the return of that divestment page.

MR. ADLER: Now we are bringing in group

number 2.

Welcome to the TRS Investment Meeting. Just so you know, we are in public session and being live-streamed. Please introduce yourself for our stenographer and then the floor is yours.

MS. TIMMONS: Sounds good.

Good morning, everyone. Thank you for having us today. I am Margaret Timmons. I am part of the asset owner coverage team at MSCI. And I really appreciate the invite to join today's meeting. I have Raman Subramanian who is our managing director and head of applied research. And really our hope today is to outline a couple of thoughts and some information that was brought to our attention and has to do with climate change and specifically around low carbon, fossil fuel, and some of the exposures that a lot of our investment clients and their portfolios are being faced with in today's environment.

And one of the things that we found is that there are several stages that the clients, the asset owners such as New York

City Teachers, are coming to us with is the education phase, the analysis phase, and then there is the implementation. But in all three of those phases, there are a lot of questions that arise. And one of the things that has sort of been a bittersweet situation is the abundance of information that is now present around this topic and sorting through that to find out what is effective and what applies to our specific case and the questions that you have.

So what we put together today is a number of slides. We wanted to be interactive. We welcome the questions that you have. I think we are in a fortunate position at MSCI, for those that are not at as familiar in terms of the businesses that we cover. Index being the primary business that we are here today. We also have a risk analysis business more commonly referred to as Barra and then our research component, but I share that because we don't actually directly invest any assets. So in terms of being a third-party and the incentives that may be

included in that, our responsibility really is to make sure that any tools, any of the indices, any of the information that we have that's available to you as New York City Teachers and that analysis, that we make sure that is brought to your attention today.

So with that being said, I will turn it over to my colleague Raman and we can begin with the presentation today.

MR. SUBRAMANIAN: Thank you, Margaret.

Thank you for inviting us to talk about climate change and the risk involved. The way I have structured this presentation is I will start with laying down the problem, so what we are trying to solve for. I will try to also talk about the risks that is involved in the portfolio because of the climate change. Then we will talk about the frame work which investors have used, asset owners, pension plans, foundations have used, kind of what are the framework, what are the tradeoffs involved. Then the solutions that have been presented to them and what they have done, so implementable action, look at the solution,

and what are the tradeoffs, and then what they have decided.

So I will probably spend some time laying down the problem because that will set the stage for the framework and the solution. So if you look at the dec and go to Slide 3, we can move the slides. So there are -- when we talk about climate change, I think some of this for you because you have might have heard from others, there are two kind of risks we are talking about:

One is broadly the scientific community says that if the global warming continues, then we have also catastrophic climate change and raising the sea level and everything. So that leads to what we call a physical risk. That means if you have properties in the coastal region, if you have refineries in the coastal region, they will get impacted because of what is called the physical risk.

The second kind of risk, which is more related to the impact which has taken place and the low carbon transition we are talking about, is more related to the fact that the

entire countries, various countries have come together and started to understand that they didn't want the global warming to continue. So the scientific community have said by 2100 if the current rate of emissions and release of carbon greenhouse gases continue, the global temperature can go up to 4 percent or 4 degrees centigrade. And they took a pledge in 2015 held in Paris, they said we are going to reduce that target from 4 percent to 2 percent. They want to say we want to do a 2-degree increase in the temperature. What it means that if that pledge has taken place, then some of the carbon-intensive assets will not be able to sustain the amount of emission. So that's what we are talking about, the transition risk.

So to put some numbers, if you go to the next slide, on Slide 4 this leads to the concept of carbon budget. Carbon budget says if you take the pledge and let the total raise to be not more than 2 degrees, then the total budget stays at about 1 trillion tons of carbon dioxide can be released in that

process. But that's the budget based on the pledge which has taken place. But if you take all the assets, all the reserves of fossil fuel which are there and you burn them, you are talking about 3 trillion tons of carbon dioxide which has been released. So that means that if you abide by the pledge, then we are not going to burn all the carbon and that is going to release -- that won't be released and that will create what is called carbon-stranded assets. So that's a basic problem we are trying to solve saying if you have in your portfolio today exposure to assets which are carbon intensive and fossil fuel reserves, then you are not going to burn them and that will -- basically they will lose economic value because you cannot take them out and resell them. And if you have exposure to coal companies and oil companies and everything, because of that the economic value will go down, that will impact your portfolio. So that's one of the problems.

The second one which is related to carbon-stranded assets is as technology is

improving, and we have seen it happening in other parts of the world, slowly there is a move towards renewable energy. That means if you have an asset which was constructed or built to use fossil fuel as an energy parameter, that won't be able to use be used. So if you have a utility power plant which is based on coal or natural gas, you cannot run that because there will be no fuel to run it. That will create a second kind of issue, which is also part of the carbon-stranded assets. And this was highlighted by various practitioners. And you will see one on Slide 5 you will look at, Al Gore who brought this up.

If you look at Slide 6 this is not a new thing, carbon-stranded asset is not a new thing. It has happened in our industry's histories. We have seen these kind of things happening, so many of you might still be holding onto those cameras that use films. But there was one historical case of what is called Pony Express and this is 1860s was launched. They was providing mail service

from East Coast to West Coast and it ran for 19 months. And then the Pacific Telegraph opened up, so all the ponies and horses which were there got stranded and there was no utility for them. So this is -- the carbon-stranded asset is not a hoax or fake news kind of thing. It's actually happened historically. And many of the assets which are linked to that has got stranded. And so we see that this is coming down and coming down very fast.

So on Slide 7 what some of the corporates have reacted to that, especially in Europe, we have seen some of the larger power plants operators like GDF Suez have started to write down their property. They took about a $20 million or 14.9 billion euro write-down in 2015. Same thing happened with RWE, which is a German power plant operator. They also took a close to $5 billion write-down, so these write-downs are coming up in a very fast manner. And if they have to abide by the regulation in the budget, we will see more of this scenario going to play out in near time.

So that's the problem.

And then the next question is that if carbon-stranded assets are going to be a big point of it, where -- in a broad portfolio like All Country World Index, which is the MSCI global benchmark which includes emerging markets companies, where does this exposure lie in. So on Slide 8 we show down that if you look at just emissions, those are the blue bars, roughly 80 percent of emissions is concentrated in three sectors; energy, materials, and utilities. So they are the biggest polluters in the world in terms of the operations they are doing. If we look at the future reserves, the potential stranded-carbon assets of the debts, most of the assets are in the energy sector. About 80 percent of the future potential emissions sits in the energy sector. So what we are trying to solve is trying to minimize this stranded-asset exposure risk, so that's one thing.

Second thing is in terms of number of companies, when you talk about number of companies because this is sector-wise, these

three sectors represent about 15 percent of market cap in the global benchmark. But in terms of real impact, you are talking about 20 percent of the names. The broader benchmark has about 2,500 names, so you are looking at 20 percent of the names is what you are really worried about in terms of getting stranded assets.

Now, in terms of the --

MS. VICKERS: May I interrupt before you go to Slide Number 9. Just in terms of carbon exposure, are you talking about sort of carbon emissions and footprints as well as stranded assets and, you know, future emissions; how do we, you know, keep those two things in mind at the same time?

MR. SUBRAMANIAN: Yes. So when we come to the solution, you will see there are two different ways of approaching it. So one is that most one simple solution can be, I don't care about today's emissions, I do care about the potential emission. So I can completely remove those companies which have potential to be stranded assets, so those that have

reserves, fossil fuel reserves and everything. So kind of divestment approach. I would say that I look at a company it has coal reserves, I don't want to hold that coal company because I am worried that that will get stranded.

The other one, which that completely ignores, emission. The other approach is I do worry about the stranded assets which are the potential emissions, but also worry about how technology can impact on the current emissions. If you have utility company which is completely based upon fossil fuels and renewables come into that region and regulation comes in, then that also becomes stranded assets. So when we talk about trying to find a solution, we are trying to minimize the impact of both the current emissions, also the potential emission. So that's why when we look at the solution, you will see that one of the indexes which we will talk about -- or actually two is trying to minimize both the current emission and future emission. And when we talk about emission, again there are different definitions. There is the Scope 1

definition, Scope 2 definition, Scope 3 definition. So what we are worried more about, the Scope 1 and 2. Scope 1 is direct burning of fuel in your premises. Scope 2 is more in data. So for example if you are buying utility, you are adding to the carbon footprint. So when we talk about minimizing the impact of your total emission of carbon footprint, we are trying to look at both Scope 1 and 2 definitions.

MS. VICKERS: And because you don't have Scope 3, is that the reason why other sectors don't have any future emissions listed?

MR. SUBRAMANIAN: So future emissions is mostly related to the stranded assets which are the fossil fuel reserves under that, so these are the ones that potentially when you burn them. So if you don't burn them, there will be no -- and those are mostly confined to energy and material companies' risk.

MS. VICKERS: Right. But of course, you know, all of these sectors they are currently emitting and also will be emitting going forward?

MR. SUBRAMANIAN: That will be captured in the emissions. But if the -- if the energy is not generated through the fossil fuel, then they will not be able to generate anything in the Scope 2 emissions.

MS. VICKERS: Got it.

MR. KAZANSKY: Can I ask something. If we go back to page 6, just curious, so in the examples that you use clearly with the Pony Express there was one piece of technological concept that showed up on the side that immediately made the Pony Express obsolete. With Kodak, it was having the digital camera. So with coal we have had wind for a while, we have had solar for a while, we have electric -- you know, electric cars for a while. What kind of horizon do you foresee that either one piece of this current technology is going to make that flip or is something down the road going to happen that we are not aware of yet that's going to accelerate?

MR. SUBRAMANIAN: I think that's a great question, because at the end of the day what

matters for investors or the users of this energy is what is called the cost of them. And today when you look at the cost of the ratings of renewables, it started to reach risk parity. Risk parity is when you look at the economic value of generating one kilowatt of power from coal and fossil fuel, what's cheaper maybe five years ago but without subsidies now. The risk parity of costs of production has come down to solar and other renewables. As risk parity has been approaching if you are given the option to either use a fossil fuel based and then non-fossil fuel based, then probably going for the one which is much, much more cleaner.

The second one there is going to be regulations coming up, concept of carbon tax. So as carbon tax is being put on the fossil fuel, the cost of generation will be exceeding that of risk parity for renewables. That means all things will be accelerated. And then if you look at the commitment made by companies like China and India to put more renewables, you will see those companies will

slowly move towards more a non-fossil fuel-based economy. Whereas some of the market in the Europe has started to move out, U.S. is the one that is lagging behind. So at some point U.S. has to come up and have to go to the commitment they made on the budget on the carbon capping. Then the acceleration of the stranded assets will be much more volatile. That's what Al Gore is saying. You will see it very soon because you already started to see that, so that risk parity is the one magic number. And I think 2015, 2016 it was reached for solar and many other markets which don't even subsidize the fuels.

So let's move on to Slide Number 12 and 13, because now the solution and the framework. So we all agree that it's getting hotter and climate change is bad. What is the solution. One solution can be, you know, I don't like coal, I want to get rid of it. I want -- this is what happened in tobacco also; we said we don't like it, let's divest it. When you do that, there is two things:

One is that you don't give -- the

companies which are today coal operated or utility-operated based, you don't give a chance for them to reform. And why I am saying that, there are already many utility companies are slowly moving away from the coal-based fossil fuel based into more renewables. That means if you take the divestment approach, you are forcing them to be not part of your portfolio. And that means either the commitment they made to move into renewables will get out of the table and also if they have done the renewables as part of the policy you will not be able to capture the growth of the new technology in your portfolio so. That's one of the issues with divestment. And it also creates a short-term risk. Short-term risk is that maybe it's a long-term thesis that stranded assets will come in, but in the short term what's going to happen once you have divested something. Maybe all the energy companies, you are probably 15 percent away from your parent benchmark which is like All Country World. If there is a huge energy rally for whatever reason, it's not related to

short-term cyclicality, then you are going to underperform your total portfolio. So that is something that's a first issue that we have to resolve.

What is the short-term risk, how much tolerance do you have for short-term risk. I know in endowment space, we have seen foundations and endowments are less focused on short term. They are more focused on long-term thesis. Saying in the long term all these assets will get stranded, so that's a second thing. If you have a long-term view, not a short-term view, then probably divestment could be an option.

The third dimension to this is a stakeholder commitment. So in some cases if the regulation and the stakeholders are very forceful and they are forcing you to do the thing, then going for a non-divestment approach can create confusion. When you go to the board meetings, every time they are saying why are you still holding the coal companies and the fossil fuel companies. So that's a third kind of dimension, how much stakeholder

pressure you have.

The fourth is the public stance. And this is very crucial for universal owners, pension plans, public plans because at the end of the day you are there for a long term, you are not there for short term. You, as universal owner of the assets, you are trying to create sustainable growth in the company and as capital providers you are making sure there are engagement, there is good corporate governance in the workplace and that will lead to -- that means that you can't use that as an option in that case.

So those are the four different parameters. One is short-term risk, long-term thesis which is whether you have a long-term commitment to this goal, stakeholder commitment, how much stakeholder pressure is there, and the fourth is the dimension of universal ownership or the public stance you want to take. Depending upon the view you have, the options can change. You had a question?

So if you look at on Slide 13, if

divestment is an option and short-term risk is completely ignored, fossil fuel exclusion indices come in. So very simple. You take All Country World Index, roughly about 2,400 names, look at all the potential those that have reserves, there are about roughly 130 companies. Some are coal companies, some are energy companies and you completely exclude them. So that's one of the options very simple, very transparent, easy to communicate when you go to the board and say listen, I have excluded all the bad guys from the portfolio. That will create a short-term risk. And I will explain what is the short-term risk.

The other two options which are on the left side talks about low carbon. There are two different variances; one is call low carb target and low carbon leader. The main difference can be seen on Slide 14 and 15 is the recap. Now, as I said before, in case of ex-fossil fuels we are definitely excluding and divesting. We don't focus anything on the direct and indirect current emissions; we are

focused mostly on future emissions.

The other two indexes, low carbon target and low carbon leaders, is more focused on both aspects, both current emissions and fossil fuel reserves. Now, the difference comes where in case of low carbon target, the primary objective is to minimize the complete intensity of the low carbon emission from the current standpoint or future, but also put in the aspect that you have a short-term risk, want to minimize short-term risk. So you have a tracking error budget. So you put a tracking error budget of 30 basis points. Now, why 30 basis points, I can explain a couple of slides later. But, yes, I do believe in the long term these assets can get stranded, I do believe some of the current emissions can have a technology issue. So why don't I minimize the long-term risk, but also try to minimize the short-term risk that can come because of the complete divestment. The carbon leader index takes the middle ground. I do believe I do want to minimize short-term risk by tracking error, but I also want to put

a stakeholder commitment. I want to tell my stakeholders, I am excluding this long-term risk by excluding those companies. So what the carbon leader takes the middle ground by excluding the largest polluters or largest future polluters and then do the minimization of the tracking error risk. So you will see that net-net, both behave similarly. But in terms of intensity, current intensity and future intensity, carbon targeting index is much more powerful and you will see the numbers. You will see about 80 to 90 percent reduction in carbon target index without taking a huge short-term risk. Carbon leaders only achieve 50 percent reduction and slightly similar tracking error to that than carbon target index.

So those are the two variants. Main difference is fossil fuels only focus on the future. These two approaches, target and leaders, focus on future and current. Leaders take a middle ground by also excluding the larger polluters by divesting them, so the chances of engagement gets reduced in the

leaders kind of approach.

So now the question goes that why the 30 basis points tracking error. Go to the next slide. You see that as are reducing your carbon exposure, so intensity on the Y axis and X axis talks about the leeway you have in terms of tracking error. You see you don't have to go all the way to 0 percent emission. You can pretty much achieve 80 percent reduction, approach 90 percent reduction with 30 basis points or less 30 basis points of tracking error. So this is a very crucial aspect that if you are also worried about short-term risk, then this kind of clearly shows that you don't have to do a complete 0 percent reduction going to 0 percent. You can still achieve 80 to 90 percent by just putting a tracking error of less than 30 basis points. So this is crucial because what we have seen in previous divestment examples, like tobacco and all those things, sometimes the headlines will become higher and sometimes you will see that tobacco companies are generating a lot of excess return compared to the benchmark. And

start to highlight why this $5 million loss we are seeing in the portfolio, what are my peers who do not have carbon emissions in their portfolio.

MS. TIMMONS: This is what we have found has been most utilized by the asset owner community. But also keep in mind if there is specific parameters based on that, there is also customization that can be taken into account depending on what the client needs. So this is what has been the most utilized example that we thought would be important to share, but certainly there is customization on both of these forms.

MR. SUBRAMANIAN: So let's go to Slide 19 that puts some numbers to this thing. Any questions on the methodology?

MS. PELLISH: I just want to make sure I understood the most utilized, the low carbon target.

MR. SUBRAMANIAN: In the U.S. we have seen more low carbon target. I will give you a case of CalSTERS, they put $2.5 billion into the carbon target index, passively managed,

internally passively managed, so that was one of the largest commitment that we have seen on the target. If you go to some European players like FRR and also AP4 from Sweden, they have gone for the leaders' approach because their stakeholder commitment -- because they have a little bit more pressure from the stakeholder to go and divest. But they also realized when you are completely divest, you have no way of engaging with the culprits.

MS. PELLISH: Thank you.

MR. SUBRAMANIAN: So on Slide 19, we can look at the two parameters. So here we look at the performance numbers. So the first column is for All Country World Index. And this is for the last seven years and reliability of data phases out when you go prior to 2010. You have the carbon data available from 2008 onwards, but the reliability goes down. The estimation number increase with everything, so we have calculated this index from 2010. The live index exists from September, 2014 low, so

there is annualized tracker for close to three years now. What you can see, All Country World Index during the time period generated a return of 9.8 annualized return with a risk of 12.3. When you look at the Low Carbon Target Index, you can see they are very comparable performance because again the index is tracking that broader benchmark with similar kind of risk. And you look at their active return is about .2, 20 basis points, but the realized tracking error -- because we were targeting 30 basis points of tracking error, the realized tracking error is 40 basis points.

MS. PELLISH: Can I ask a question. So maybe you are going to get there to the turnover, but does this include the impact of transaction cost?

MR. SUBRAMANAIN: This doesn't include the impact of transaction cost.

MS. PELLISH: If you were going to guesstimate, because it's a pretty significant difference between --

MR. SUBRAMANIAN: So I can tell you some

performance drag which can happen. So if you look at cost of replication, the leaders will have a drag of about 4 basis points per 25 basis points of transaction value and ACWI, Low Carbon Target Index will have a 6.6 basis point of cost of replicating. So very comparable, 2 basis points difference between leaders versus low carbon target.

MS. PELLISH: Thank you.

MR. SUBRAMANIAN: And then if you look at the leaders you are talking about similar kind of performance, slightly higher tracking error.

MS. STANG: I just had a question. So the low carbon target has a 6.6 basis point drag. So the total return up there because of the higher turnover, so the 10.0 percent just take 6.6 basis points out of that?

MR. SUBRAMANIAN: Yes, on an itemized basis.

MR. ADLER: I'm sorry, where is that number?

MS. TIMMONS: It's not in here, but he is referring to what the drag would be.

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MR. SUBRAMANIAN: The way the drag is calculated is I just calculate the total times 25 basis points. That's what I have done.

MS. STANG: If you have more zeros, you can take off.

MR. SUBRAMANIAN: And the drag is very simple. Total times the basis point, I put 25 basis points. If you want to put 100 basis points that 3. number will be ten times that number, depending how much basis points things you want to talk about. Now if you look at the low carbon leaders, you will see that again similar performance. Both these indices have a total. We put a 10 percent turnover reduction, so every rebalancing we do a semiannual rebalance. We don't want the turnover to be more than 10 percent for both indexes, so you see on an annualized basis both indexes have achieved less than 20 percent turnover because they are each balancing 10 percent, 20 percent maximum. So leaders have about 7.9 percent annualized turnover versus low carbon target of 13.9. And the fossil fuel is the last one. You can

see that they have done better because energy prices have not been really doing well. That's the kind of a short-term headline performance that you got, but the tracking error is close to 1 percent. So there is a two-thirds chance that you can either outperform or underperform the larger benchmark by that 1 percent number.

Okay, but let's look at the intensity reduction, which is rather key. If you look at Slide 20 for the low carbon target and I am looking at both numbers, the current emission and future emission, the reduction from the benchmark for the current emission which is based upon what is called carbon intensity, it's a very simple metric. You look at how much of your portfolio for a billion dollars of sales, how much of -- the portfolio has a lot of sales. So look at the sale of number for a billion dollars -- million dollars of sale, how much is the carbon return. So for a broader benchmark like ACWI is about 243 tons of carbon is emitted for $1 million sale which is generated by the portfolio. You can see

the ACWI low carbon generated only 42 tons of carbon emission. If you look at low carbon leader. Generates 120 tons. And then ex-fossil fuels generated 200 tons of carbon emissions. So that's the highlighted box. Compared to the ACWI Index, the target index reduces the overall current emission by about 83 percent. And that number is about 18 percent for the ex-fossil fuel. If you come to the potential emission which is the future emissions, you see the reduction is about 98 percent for the Low Carbon Target Index, 64 percent for the low carbon leaders, and 100 percent for the ex-fossil fuel because you don't involve any of those. So net-net, you can see that you achieve close to a 100 percent in the target without divesting anything.

MS. PELLISH: Can I just ask: This number 83 percent is very striking. If you were doing this -- and if you said this and I missed it, I apologize, but if you were doing this for U.S. only, for your U.S. only benchmark, what might that 83 percent look

like?

MR. SUBRAMANIAN: Depends upon -- I don't have the right number. But it will be depending upon if you look at the three largest sectors, which are here are energy, utility, and material. In the U.S. energy sector will be the only largest one which will be impacted on, but most of the energy is on the future reserves rather than current emissions. So we can get back to you with the numbers.

MS. PELLISH: It would be lower I would guess?

MR. SUBRAMANIAN: It would be lower, depending upon how much of impact. So the bigger utility weight company are in the Europe. And reserve-wise I think U.S. has the largest, because the larger-owned companies are in the U.S.

MS. PELLISH: So I just wanted to raise that point, because we have been having conversations on that topic. And I think to date we focused on U.S. benchmarks, so the numbers have been lower in terms of reduction

in carbon intensity. So I just want to point out, I think this number is higher, the numbers we have seen because this is a global --

MR. SUBRAMANIAN: It's a global one. And the U.S. is about 60 percent of the benchmark, so you would see some of the reduction would come down because U.S. is not --

MS. PELLISH: -- as intense. Thank you.

MR. SUBRAMANIAN: So let's go to some of the commitments.

Any questions so far on this methodology or the numbers?

I will show one summary slide on the various parameters. And Slide 23 is the one which kind of summarizes the four dimensions and where each of these places. So what you are seeing is that the ex-fossil fuel is the one which is completely divesting. So it doesn't consider short-term risk, but builds on the long-term pieces. It's easy and transparent, but it leads to less engagement. Low carbon leaders take a middle ground. It

also has a -- it may have a short-term risk because you are divesting some of the things, but has similar kind of view point of carbon target. And the carbon target uses both approaches, it focuses on both the short-term risk and also long-term commitment.

And looking at examples of how people have used: So on Slide 25 I give you some of the names, but then I will walk you through the CalSTERS in much more detail. So on 25 I told you FRR and AP4. FRR is the French and the AP4 is the Swedish. They use the carbon leaders approach. U.S. environment agency, they use a low carbon target. And the UN joint staff in the U.S. here, they use a low carbon target. Maryland Retirement uses low carbon target.

MS. PELLISH: In each of these cases, are they internally managing the portfolio using your index?

MR. SUBRAMANIAN: Some of them are internally managing; some of them are externally. CalSTRS is externally managed. FRR uses an active manager to achieve it. It

becomes a benchmark by them. UN uses an ETF, so they have different approaches based on the commitment.

But the biggest commitment you see on Slide 26 is -- from the U.S. standpoint is from CalSTRS. We were invited to present to the board meeting at about two years ago and they went through the whole process, because California has regulations also. For them both the short-term risk was important and then they also believed that their -- as a universal owner they wanted to have engagement. Because their corporate governance policy states it wanted to engage with the company and they don't want to lose out the opportunity for utility companies to completely reform themselves to become a green technology company. Why would you want to divest that company. So they looked at the various benchmark options between target and leaders and ex-fossil and finally they went with the carbon target index. They manage it on a regional basis. They have U.S., non-U.S. and emerging market portfolio, but they

combined that to ACWI. It's internally managed because they have a large internal management team, so they were able to utilize that expertise to manage this portfolio internally because net-net it's the same active portfolio. You are just reweighting to hold different stock levels, so you don't have to use an external manager to run this portfolio if you have an internal management team.

MR. ADLER: I just want to ask a question. So I think you said that CalSTRS allocated 2-1/2 billion to this strategy. And CalSTRS, I don't know the current number, over 200 billion in assets, it's 1 percent. So just to be clear, most of their assets are not in the strategy and therefore if they wanted to engage outside of the strategy, they still can? In other words, if they were choosing to put 1 percent into your ex-fossil fuels, they would still have 99 percent in which they could engage?

MR. SUBRAMANIAN: Yes, they could still engage. And this was kind of a nice way to go

and reduce exposure, but also keep the engagement option open.

MR. ADLER: I understand.

MR. SUBRAMANIAN: Then the second one, which is interesting on Slide 27 which recently happened, is the New Zealand Super. They are also a very large asset owner in New Zealand. They also adopted low carbon target, but they put a little twist to that. What they said was maybe I want to go and look at companies which are non-- they are the polluters today, but they have commitment to improve their practices. I don't want to divest, I want to bring them back into the portfolio. So a little bit of a subjective -- We have a large team, we look at the business practices and everything. We look at the involvement score, they use that score as an overall way to identify that corporate governance commitment. They don't divest; they bring them back into the portfolio. So a little subjective, but that's one of the approaches we have seen. But in terms of the U.S. approach we have seen, it's

mostly toward a very transparent methodology either internally or give it to an external manager to manage it.

Okay, with that I conclude my climate change session. Any questions? Again, this is not a hoax; this is not a fake news. This is real, so...

MR. ADLER: Any questions?

Okay, thank you very much. So, Robin, are we going to discuss this now?

MS. PELLISH: Well, yes. So I guess the question is whether there are any further comments or questions or how the board would like us to proceed. Has there been a decision made that you would like us to proceed with a more defined process?

MR. ADLER: Clearly there is no decision made yet, but we do want to have a discussion about these options that have been presented to us and how people -- what folk's reaction is to them.

LIANG: I have a question.

MR. ADLER: Go ahead, Liang.

LIANG: He didn't seem to go into detail

of the index construction. How did they reduce the weights or increase the weights as based on carbon emissions per sale or whatever? Is that something he just did not cover it or is that something that's proprietary that they don't reveal?

MR. FULVIO: No, they are happy to discuss that. We put together a few slides that give a little bit of a high-level overview as to how they construct the indices, and it differs depending upon which flavor MSCI offering you look at.

LIANG: But do they include the S& like the way Mellon did or is it only carbon?

MR. FULVIO: Theirs is based on the carbon reserves, the size of the market capital of the company, and then that's one aspect. The second aspect is like Mellon, they will take into account carbon intensity; so what are the emissions being burned, emissions relative to the size of the company sales. So they will take those two factors and do the weightings in that way.

And certainly for the carbon target, in

Low Carbon Target Index which he mentioned was more popularly used in the U.S., it's just using those measures to create the index. In the others there is sort of this initial level of divestment or exclusion and then they optimize based on tracking error. But in the Low Carbon Target Index, they will -- they will use those weightings the same way Mellon will. But it won't incorporate to your point, the ESG overlay or assessment of the carbon readiness, the things companies are doing to be more forward-looking in their operations.

MS. PELLISH: More data based I would say, which you would expect with an index provider.

MR. ADLER: Although, ironically enough, the data that Mellon is using is the MSCI data.

MR. FULVIO: The interesting thing beyond that too is the point they both made I think about just the inability, the fact that so much of that data is unavailable or not reported by companies. The largest ones have the resources to do that reporting. And the

engagement process that Mellon goes through and the MSCI research team goes through to try to talk to companies about being more proactive about reporting, that's certainly there.

What I will say in the comments we got from MSCI is that as companies begin reporting that data, they will do an assessment for what the estimates have been in the past. And they have seen the estimates look pretty close to what exactly is getting reported. Once companies have the ability to do that, I think they generally capture about 70 percent of the information that they were estimating. So -- but the data is certainly getting better over time, it's not the same.

MR. AARONSON: If we made the decision to do this and use the MSCI Index, that means we can ask one of our index managers, managers like Mellon, to set an index for the U.S. instead of indexing to the Russell 3000 to this or we can hire Mellon as the index, would be less costly.

MS. PELLISH: So the real answer is we

don't know until we begin negotiating. If I just ask them for their cost estimates, they are roughly similar and they are certainly more expensive than you are paying right now. So we include it again in the data that we distributed, this estimate that the cost to license one of these benchmarks from MSCI is about 3 basis points. But that's before we have started talking to them about the billions of dollars that can be devoted and the fact that they can reference New York City Teachers in their material. So they cited a number of about 3 basis points and if you talk to Mellon --

MS. STANG: We have to hire an investment manager on top of that.

MS. PELLISH: Right. So you can use Mellon or BlackRock depending which plan you are looking at, but --

MR. AARONSON: So this whole thing if we went into it, 3 basis points.

MS. PELLISH: The question is: What's the incremental cost? The incremental cost could be 3 to 5 basis points.

MR. ADLER: But then you have the transaction costs.

MS. PELLISH: If you are doing something like this that has higher turnover, yes.

MS. STANG: Because right now we only have .3 of a basis point.

MS. PELLISH: That's in the variable fund, so the pension has --

MR. ADLER: Let me ask another MSCI question: It says that they can optimize it to any MSCI Index, but we use the Russell 3000. So how would that work?

MS. PELLISH: So that's why, if you notice, in Mellon's material that's why they talked about the tracking error of the Russell 3000 to MSCI benchmarks, because that introduces and they estimated 9 basis points. So that introduces tracking error relative to the Russell 3, so -- and that's an issue. They are not going to do anything with the Russell Index, obviously.

MR. ADLER: MSCI?

MS. PELLISH: Right.

MR. ADLER: But Mellon does.

MS. PELLISH: Mellon's strategy, they are not in the index business. So they are agnostic about what benchmark they use and they apply that technology to any benchmark.

MR. ADLER: Mellon will?

MS. PELLISH: Mellon will. Now, what I don't know is what Russell has been doing in this regard so that --

MS. STANG: I called Russell -- and they gave me MSCI. So I don't know. Did Russell get caught?

MR. FULVIO: They are part of FTSE now.

MS. PELLISH: So there are other index providers we can consider. But our sense is MSCI, they are ahead of most other indexes. So, again, this is a subset of the available alternatives. You have a big relationship with Mellon. We think Mellon has done a lot of interesting work in this area. MSCI is also -- you know, you also -- you use MSCI as a benchmark for portfolios in the international space.

MR. ADLER: Well, and also they are our risk for BAM.

MS. PELLISH: So the two firms you already have relationships with clearly, but there are other very interesting firms. And also noting that we have only been focusing on passive strategies, which I think also my sense is that the board agrees that's the most -- that's the first priority or first step should you wish to implement a low carbon strategy.

MR. ADLER: I do believe -- without advocating one approach or another, I do believe that the argument about -- as you can tell from my question about engagement is not a real argument because we are not going to put our whole portfolio into this strategy. And so, you know, it's not -- I don't really think it's going to affect our ability to engage because we are still going to own every company in the index through our standard passive portfolio, so...

MS. PELLISH: Good point.

MR. FULVIO: The other interesting thing about that when you start thinking about the tracking error you are comfortable taking, you

can actually think about it more broadly and take into account this question of whether or not you allocate more or less to a low carbon index or toggle the active risk you are allowing managers to take within just the low carbon piece of your portfolio.

So, for example, Mellon Capital pointed out that they are targeting less than 50 basis points of tracking error and if you put 10 percent of your portfolio, your global equity index portfolio or U.S. index portfolio, in that you are only taking -- you are actually taking a lot less active risk from a total portfolio standpoint because it's just a small portion of the portfolio. So would you be more comfortable -- the question is, would you be more comfortable taking more active risk in that small slice knowing that that overall risk level is mitigated by the fact that you only put 10 percent in that small slice. So there is different ways of approaching this question of how much risk you want to take, how much tracking error you want to take.

MR. ADLER: Also just another question:

Are we talking about -- again, I always ask the question TDA and QPP or are we just talking about TDA here?

MS. STANG: Here specifically I think we are just talking about TDA. But it's broadly applicable everywhere, right, because TRS is having -- Mercer did the report for Teachers' Retirement System for both pension and variable so, you know, it's a little of both I guess is your answer. It's applicable to both.

MS. PELLISH: The only distinction is one is participant dollars, more participant dollars. So I think that's a board discussion where you want to take the first step.

MR. ADLER: Michael, let me just say, that point you made about tracking error is really helpful to think about it across the whole portfolio and not just within whatever slice we might put into low carbon.

MS. PELLISH: And on top of that, though, we have to remember the curve stayed true. So you don't get -- it's not this linear curve where you get more lower carbon

intensity on a proportional basis. Every additional basis point of tracking error, that flattens it out at 80 percent.

MS. STANG: It's not the only old 80/20 rule.

MR. ADLER: Truthfully, I think the numbers they have provided with regard to the target products where they basically reduce the carbon emissions by 98 percent and the carbon intensity by 83 percent is astonishing on page 20 of their -- you know, so doing that with a --

MR. KAZANSKY: And it certainly seems a better total tradeoff than the excluding fossil fuels one?

MR. ADLER: And either one of them, either the all fossil fuels or the partial, you know, excluding the largest emitters, you know, really looks like a -- you know, across the measures it's very impressive. And, you know, it does have higher turnover, that's the one drawback.

MS. STANG: And it is an All Country World, to Robin's point. It's not directly

applicable to Mellon because Mellon was just to Russell 3.

MS. PELLISH: So -- although, they would be happy to apply it to a more global portfolio as well.

MR. ADLER: To more domestic.

MS. PELLISH: Mellon can do global.

MR. ADLER: Oh, Mellon can do global or we can MSCI with a U.S. index like the one they have.

MS. PELLISH: Absolutely, there is a variety. So I know you didn't want to get too focused on specific managers in that part of the meeting, so at some point we look to the board for what -- how to provide if there is interest in additional information or education and how we can be helpful in facilitating this discussion.

MR. BROWN: Review it.

MS. PELLISH: There is a lot of stuff. It's a big topic, absolutely.

MR. ADLER: Okay. Anything more on the low carbon?

MR. FULVIO: John, I just want to --

your point about 98 percent reduction, that would be potential carbon emissions based on reserves. So it's basically a reserve number, not necessarily a current emissions per sales?

MR. ADLER: No, the current is the 83 percent. I said the two numbers are still very, very, you know, impressive reducing essentially fossil fuel, you know, reserves by 98 and current emissions by 83 or it's actually current emissions by 84 and carbon intensity by 83, because those are big numbers.

MR. FULVIO: Yes.

MR. ADLER: Okay. Anything else today on low carbon?

Right, thank you very much for bringing it up.

MS. PELLISH: And Susan was very --

MR. ADLER: Susan, thank you very much. I thought that was really helpful.

So the last item on the public agenda is the divestment policy, but I think that we are going to table that for today and we will move

it to next month's agenda.

So we have items for executive session, do we?

MR. FULVIO: We can address them. There is no manager updates.

MS. PELLISH: We are just following up on actions.

MR. ADLER: Why don't we do a brief executive session. So is there a motion to enter executive session?

MR. KAZANSKY: So moved.

MR. ADLER: Great. Is there a second?

MS. VICKERS: Second.

MR. ADLER: Any discussion?

All in favor of the motion to enter executive session, please say aye. Aye.

MS. VICKERS: Aye.

MR. BROWN: Aye.

MR. KAZANSKY: Aye.

MR. ADLER: All opposed, please say nay. Any abstentions?

Okay, we are in executive session. Okay.

(Whereupon, the meet went into Executive Session.)

MR. ADLER: Okay. Any questions? We are good. Anything else for executive session?

Okay, so I think a motion to go back into public session would be in order.

MR. KAZANSKY: So moved.

MS. VICKERS: Second.

MR. ADLER: Any discussion?

All in favor of the motion, please say aye. Aye.

MS. VICKERS: Aye.

MR. BROWN: Aye.

MR. KAZANSKY: Aye.

MR. ADLER: All opposed, please say nay. Any abstentions?

Okay, let's go back into public session. Okay, we are back in public session. Susan, do you want to make a report?

MS. STANG: Sure. In executive session, there was a discussion of implementation of various previously approved processes.

MR. ADLER: Okay, that concludes our business for today.

Is there a motion to adjourn?

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MR. KAZANSKY: So moved.

MR. ADLER: Is there a second?

MR. BROWN: Second.

MR. ADLER: Any discussion?

All in favor of the motion to adjourn, please say aye. Aye.

MS. VICKERS: Aye.

MR. BROWN: Aye.

MR. KAZANSKY: Aye.

MR. ADLER: All opposed, please say nay. Any abstentions?

The motion carries. The meeting is adjourned.

[Time noted: 12:38 p.m.]

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C E R T I F I C A T E

STATE OF NEW YORK)
: ss.
COUNTY OF QUEENS)

I, YAFFA KAPLAN, a Notary Public within and for the State of New York, do hereby certify that the foregoing record of proceedings is a full and correct transcript of the stenographic notes taken by me therein.

IN WITNESS WHEREOF, I have hereunto set my hand this 12th day of November, 2017.

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YAFFA KAPLAN