MEKETA INVESTMENT GROUP

BOSTON SAN DIEGO

CLIENT RETIREMENT SYSTEM

ASSET-LIABILITY STUDY

Submitted
January 28, 2010

100 LOWDER BROOK DRIVE SUITE 1100 WESTWOOD MA 02090
781 471 3500 fax 781 471 3411 www.meketagroup.com

TABLE OF CONTENTS

STRUCTURE OF THIS DOCUMENT

This asset-liability study is highly data-intensive. While these data are important to review and to understand, the conclusions reached after evaluating the data are as important for the decisions the Trustees will be making.

Consequently, we have placed our conclusions at the front of this document. The data that support these conclusions are shown in detail in the appendices. In addition to the data in these appendices, we have included text that describes the data and how it is relevant to the study.

INTRODUCTION

Background

The most important consideration for the Investment Committee is the Retirement System's overall asset allocation policy. More than any other Trustee decision, the Plan's asset allocation will influence the Plan's investment results over the next twenty years.

To gain a better understanding of the Plan's liabilities, and to analyze how the Plan's assets and liabilities might behave under different economic scenarios, we have undertaken an asset-liability study. The results of the asset-liability study will allow Meketa Investment Group and the Investment Committee to develop a prudent, long-term asset allocation policy for the Plan.

Defining an Asset-Liability Study

"Asset-liability study" is a broad term used for any study that incorporates information from a plan's liabilities and expected asset class returns, in order to reach an informed decision on how best to structure a plan's assets. Asset-liability studies recognize that an investment strategy cannot be developed in isolation. Assets are invested to meet long-term plan benefit obligations, and the underlying liabilities should be considered when developing a prudent investment strategy.

For example, a plan that consists primarily of very young workers, who are unlikely to retire for thirty or more years, should be invested largely in assets that match that timeframe (i.e., equities). However, a plan that consists primarily of participants who are only a few years from retirement may need to limit the risk associated with longer-term assets, since much of the Plan will be liquidated to pay benefits in the near term.

Most plans fall between these two extremes. An asset-liability study can provide Trustees with a clear understanding of the trade-offs resulting from more aggressive and more conservative asset allocation policies. The trade-offs illuminated by an asset-liability study will allow Meketa Investment Group and the Trustees to develop a prudent, well-informed asset allocation policy for the Client Retirement System.

Components of the Asset-Liability Study

This asset-liability study was a collaboration between Meketa Investment Group and the actuary. Meketa Investment Group is most knowledgeable about the Plan's investment structure, and the actuary is most knowledgeable about the Plan's liability structure.

The asset-liability study consists of five components that are each necessary to reach an optimal asset allocation recommendation.

1. **Developing Economic and Capital Market Scenarios**

   Meketa Investment Group developed three economic and capital market scenarios that could potentially unfold over the next twenty years. These scenarios include moderate, optimistic, and pessimistic. Note that none of the three scenarios are worse or better than any economic and capital market environment actually experienced over the past century. The three scenarios are based on *actual* historical relationships.

2. **Developing Asset Allocation Policies**

   We developed four potential asset allocation policies for the Plan, ranging from conservative to very aggressive. The goal of developing the policies was not to find the exact one that is optimal for the Plan but, rather, to view a mix of policies to give us and the Trustees a sense of how different asset allocation policies would react to different economic and capital market environments.

3. **Determining Impact of Scenarios on the Various Asset Allocation Policies**

   After developing the economic and capital market scenarios, and the asset allocation policies, we modeled how the four asset allocation policies would behave in each of these scenarios. In essence, we created twelve combinations of asset allocation policies and economic environments, providing the Trustees with a broad array of information on potential Plan outcomes.

4. **Determining the Impact of Scenarios on Plan Liabilities**

   The Client Retirement System is a very large and complex plan. Further, the complexion of the Plan changes constantly, as existing members age and retire, and new members join the plan. The Plan's demographics will likely change as a result of varying economic environments. For example, a stagnant economy with high unemployment could result in declining new entrants and increased retirements, placing a higher cash flow burden on the Plan.

   The Plan's actuary modeled the behavior of the Plan's liabilities during each of the selected economic scenarios.

5. Developing Outputs of the Asset-Liability Study

Meketa Investment Group and the actuary collaborated in developing the outputs of the asset-liability study. We identified several important elements of the Plan, and then evaluated how each element would behave under the various economic scenarios and asset allocation policies.

- *Accrued Actuarial Liabilities (AAL)* – This value is the amount it would take to pay for the already promised benefits over the period of the valuation.
- *Actuarial Value of Assets (AVA)* – The AVA differs from the Market Value of Assets in that the asset value is smoothed over time, in order to reduce the effects of short-term volatility.
- *Normal Cost* – This cost represents the portion of the cost of projected benefits that is allocated to each Plan year.
- *Unfunded Actuarial Accrued Liability (UAAL)* – When the Actuarial Value of Assets is smaller than the Actuarial Accrued Liabilities, a UAAL occurs, and it can be amortized over a period of thirty years. The presence of a UAAL means that the Plan's funding ratio is less than 100%.
- *Benefit Payments* – These payments are owed to Plan participants each year.
- *Total Required Contribution* – In order to cover each year's portion of the unfunded liability (UAAL) and the Normal Cost, the Plan would need to contribute the Total Required Contribution each year.

Each of these elements was evaluated under twelve pre-defined conditions (three economic scenarios and four asset allocation policies). This broad perspective provides much clearer insight into the true risk inherent in the Plan today, and over the next twenty years.

Asset Allocation Recommendation

We would not recommend a specific allocation policy to the Trustees without first reviewing the results of the asset-liability study with the Investment Committee. Much of the asset allocation decision has to do with the degree of comfort the Trustees have with different asset allocation policies. The degree of aversion to risk cannot be scientifically determined, but only ascertained through discussions with the Investment Committee.

Thus, our specific asset allocation recommendation will be made after consultation with the Investment Committee.

CONCLUSIONS

The Client Retirement System is an extremely large and complex pension plan. As such, planning for uncertain future events is a complex process. This asset-liability study provides the Trustees with many images of how the Plan would behave under various scenarios, assuming no fundamental changes to the Plan's operation are made.

A pension plan has three main variables that must be in equilibrium in order for the plan to operate effectively over the long term:

- contributions,
- benefit payments, and
- investment returns.

This study assumes that the first two variables are unchanged. While Trustees and/or bargaining parties often choose to change benefits and contribution levels, this is a discretionary decision that cannot be predicted. In this sense, the outcomes presented in this study are idealistic, since decisions to change contributions or benefit levels during the twenty-year period would certainly occur in some circumstances.

When the third variable, investment returns, is changed (as in this study), the Plan can reach a condition of imbalance. The Plan can remain imbalanced for short periods of time, but over a twenty-year horizon it should be structured such that its assets and liabilities remain in long-term equilibrium.

Below are our general conclusions from the detailed asset-liability study that follows.

1. **The Plan's financial position at the starting point of the study places it at a disadvantage.**

   Partially as a result of the recent market downturn, the funding status of the Plan is not strong. However, most Plans in America are in a very similar position.

   To overcome this deficit, the Plan must produce investment returns that exceed the Plan's "actuarial assumed rate of return." Otherwise, the Plan reaches an even worse financial condition in most economic scenarios, and with most asset allocation policies.

2. **The Plan should adopt an asset allocation policy that is more diversified than the current policy.**

   Over the entire twenty-year period, the Plan is nearly always better off with more diversified asset allocation policies.

   Further, in the most likely scenarios (moderate, pessimistic, and optimistic), more diversified asset allocation policies nearly always lead to a better long-term position for the Plan.

3. **The asset-liability study hides much of the interim volatility associated with more aggressive asset allocation policies.**

   Because the asset-liability study spans a full twenty-year period, interim volatility is somewhat hidden from view.

   For example, in the "moderate" economic scenario, the hypothetical year 2014 witnessed a significant deterioration in most of the actuarial statistics. This major deterioration in the Plan's results is hidden when looking only at the overall impact of the study, but should be taken into account. Trustees living through a very weak year are apt to be very sensitive to the degree of deterioration experienced.

   Thus, while more diversified asset allocation policies do best in the long run, the Trustees must be comfortable with the interim volatility associated with these more aggressive strategies, such that they do not change the Plan's policy at exactly the wrong time.

4. **There are many possible economic scenarios that will force the Trustees to decrease benefits or increase contributions, regardless of the asset allocation policy adopted.**

   Much of the future is out of the control of the Trustees. For example, in the "pessimistic," scenario, the Plan would not significantly improve its position financially over the twenty-year period, *regardless of the asset allocation policy chosen*.

   In other words, the potential outcomes of the Plan over the next twenty years are more sensitive to differing economic environments than they are to differing asset allocation policies.

POTENTIAL ECONOMIC AND CAPITAL MARKET SCENARIOS

Developing a prudent long-term investment strategy requires understanding the potential returns available from various types of assets. While no one knows what actual returns of various types of assets will be earned over the next twenty years, it is possible to estimate ranges of potential returns.

To estimate the ranges of potential asset returns, we have developed three realistic economic scenarios, ranging from pessimistic to optimistic. For each of these economic scenarios, we developed likely return expectations for various asset classes on a year-by-year basis.

This section outlines Meketa Investment Group's three distinct economic and capital market scenarios. *These scenarios are realistic in that they fall between the extremes actually experienced during the twentieth century.* Thus, the worst-case scenario is no worse than the twenty-year period that occurred around the Great Depression (1929 – 1948), and the best-case scenario is no better than the economic and financial environment experienced during the 1950s and 1960s.

The output of this analysis is used to calculate the potential year-by-year returns of various asset allocation strategies, and to estimate each scenario's impact on the Plan's liabilities (i.e., demographics and participant retirement behavior). Together, these asset and liability projections will allow the Trustees to better evaluate the potential long-term risks and rewards of various asset allocation policies.

SCENARIO A – MODERATE CASE

ECONOMIC CONDITIONS

- Overall, GDP grows at a normal rate, with frequent but shallow economic cycles. Unemployment is held largely in check, peaking around 8% during cyclical downturns.
- Inflation is high (13%) five years into the time period, then moderates after that. Long-term Treasury yields move within a range of 3% to 9%.

ASSET CLASS RETURNS

- Bond returns reflect the moderate interest rate environment. Negative returns occur only during a few periods of economic stress.
- Equities during the period exhibit normal levels of volatility and produce an average annual return of 7.2%. A "bear market" afflicts equity investors in 2014-2015.

SUMMARY OF TWENTY-YEAR ECONOMIC AND CAPITAL MARKET SCENARIO

	20-Year Annualized Average	20-Year Standard Deviation
Economic Conditions		
Real GDP Growth	2.3%	2.7%
Inflation	4.5	2.6
Unemployment Rate	6.2	1.5
Long-Term Treasury Yield	6.6	1.9
Currency	-1.7	6.8
Asset Class Returns		
Cash	5.0	2.3
Domestic Equities	7.2	16.4
Foreign Developed Equities	7.5	19.7
Foreign Emerging Equities	9.3	24.8
Treasuries	6.2	4.8
Corporate Bonds	5.4	8.7
High Yield Bonds	7.3	11.0
Opportunistic	8.3	19.5
Real Estate	4.9	20.6
Real Assets	4.3	10.5
Hedge Funds	6.6	10.1
Private Equity	9.3	24.7

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Economic Conditions										
Real GDP Growth	1.8%	-4.1%	1.6%	2.3%	-1.3%	-1.9%	5.3%	2.7%	3.8%	6.0%
Inflation	3.3	4.1	2.8	4.1	0.8	13.2	6.3	4.7	6.7	7.9
Unemployment Rate	9.6	8.3	6.5	6.7	8.2	5.0	7.4	7.3	6.5	5.4
Long-Term Treasury Yield	2.6	3.2	4.4	5.3	4.3	6.4	9.0	8.1	8.1	8.4
Currency	-7.7	6.6	-5.5	-11.5	14.5	0.4	3.4	2.5	-5.1	-7.4
Asset Class Returns										
Cash	0.8	1.7	3.3	3.9	1.6	4.8	5.7	4.8	5.2	8.0
Domestic Equities	5.5	-4.2	13.8	8.1	-39.0	-6.0	36.4	22.7	-8.2	5.8
Foreign Developed Equities	5.2	-7.1	27.5	17.4	-48.4	-8.6	36.4	3.3	18.6	33.4
Foreign Emerging Equities	7.6	-10.8	24.2	13.5	-57.2	-17.8	39.3	-6.2	14.8	20.5
Treasuries	0.1	5.3	3.5	7.7	11.0	5.6	7.3	7.3	4.1	2.9
Corporate Bonds	-7.2	6.2	7.4	-1.4	-5.7	-3.3	13.2	17.5	1.5	-0.3
High Yield Bonds	7.0	6.2	11.1	2.0	-30.5	16.6	17.9	15.1	12.0	10.0
Opportunistic	6.2	-4.7	16.3	8.7	-46.6	-7.6	43.2	28.8	-9.3	6.8
Real Estate	5.4	-11.0	25.1	-16.5	-2.7	-43.3	36.3	48.2	18.3	-2.4
Real Assets	8.3	-5.4	6.7	10.0	-27.6	9.2	-1.0	11.8	2.6	22.0
Hedge Funds	0.9	1.6	9.4	5.1	-18.6	-3.0	23.5	18.7	-3.4	3.0
Private Equity	5.6	-7.5	21.6	-5.2	-40.7	-25.7	57.1	58.5	29.0	24.3

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Economic Conditions										
Real GDP Growth	3.7%	4.5%	3.0%	2.4%	-1.6%	5.9%	2.7%	4.7%	1.3%	4.6%
Inflation	3.3	4.1	4.9	5.5	5.0	3.0	2.2	3.1	2.7	3.2
Unemployment Rate	7.0	5.0	6.5	5.5	6.5	5.7	5.4	3.5	4.8	3.7
Long-Term Treasury Yield	6.4	8.8	8.9	8.6	8.5	6.6	6.0	7.3	6.7	5.8
Currency	-12.2	-9.9	3.7	2.1	-6.1	3.8	1.8	-5.4	-1.8	3.3
Asset Class Returns										
Cash	5.9	5.4	8.6	8.7	7.4	6.0	2.8	3.3	6.5	5.2
Domestic Equities	19.3	-9.3	8.0	18.8	13.9	17.6	9.0	11.0	21.1	26.9
Foreign Developed Equities	40.4	6.0	10.4	4.5	2.4	-8.1	23.5	13.7	8.2	11.3
Foreign Emerging Equities	34.2	24.7	34.0	30.6	22.8	19.3	52.7	15.8	-16.7	9.3
Treasuries	9.0	4.4	3.0	10.1	11.9	8.0	11.4	-6.0	16.0	3.8
Corporate Bonds	9.2	1.9	6.3	11.5	11.9	10.5	14.1	-7.3	25.3	4.5
High Yield Bonds	14.8	2.2	6.9	-2.6	9.4	15.8	16.6	-1.4	17.7	11.1
Opportunistic	22.5	-10.5	10.3	21.4	15.6	21.1	11.6	12.8	26.1	32.5
Real Estate	12.7	-5.9	-1.0	-6.4	7.3	14.8	19.8	-6.4	18.2	29.0
Real Assets	9.3	16.7	14.3	8.7	-4.3	-6.9	1.7	8.0	5.9	7.3
Hedge Funds	14.1	-3.6	5.5	14.1	12.6	12.6	11.1	1.8	20.5	16.3
Private Equity	12.9	-11.9	15.0	-1.5	3.1	24.7	14.5	3.8	30.5	34.2

SCENARIO B – PESSIMISTIC CASE

ECONOMIC CONDITIONS

- The economy suffers from major recessions intermittently throughout the twenty-year period. Unemployment begins high and remains a significant economic concern. Unemployment averages 6.9% during the period.
- Inflation remains relatively low. The U.S. dollar declines in value by 3.2%.

ASSET CLASS RETURNS

- Bonds produce a relatively attractive return during the period, averaging 6.3% annually for Treasuries and 3.9% annually for corporates.
- Equity markets are volatile throughout the period, and produce an average annual return of only 1.9%, less than the rate of inflation. Twice during the period, in 2014 and 2024, domestic equities fall by nearly 40%. Developed and emerging market foreign stocks perform poorly as well.

SUMMARY OF TWENTY-YEAR ECONOMIC AND CAPITAL MARKET SCENARIO

	20-Year Annualized Average	20-Year Standard Deviation
Economic Conditions		
Real GDP Growth	1.5%	2.4%
Inflation	3.8	1.5
Unemployment Rate	6.9	1.5
Long-Term Treasury Yield	6.1	2.1
Currency	-3.2	8.8
Asset Class Returns		
Cash	3.9	2.8
Domestic Equities	1.9	16.9
Foreign Developed Equities	2.5	22.3
Foreign Emerging Equities	2.5	23.2
Treasuries	6.3	3.9
Corporate Bonds	3.9	6.7
High Yield Bonds	1.5	12.9
Opportunistic	1.6	20.4
Real Estate	-0.2	11.6
Real Assets	2.7	12.9
Hedge Funds	3.7	9.8
Private Equity	-2.4	17.2

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Economic Conditions										
Real GDP Growth	2.0%	-3.0%	2.3%	2.2%	-2.2%	1.7%	3.7%	3.7%	2.4%	-1.0%
Inflation	3.1	4.0	2.4	4.9	1.0	4.0	4.6	5.6	5.6	6.0
Unemployment Rate	10.3	8.1	7.0	6.7	9.4	9.0	5.5	4.8	6.1	6.9
Long-Term Treasury Yield	4.4	3.4	4.7	4.5	3.3	6.7	8.8	9.5	8.0	7.5
Currency	-8.8	6.4	-6.7	-10.4	15.0	-12.8	-10.9	3.6	1.9	-7.1
Asset Class Returns										
Cash	0.6	1.7	3.2	2.1	0.7	2.6	6.0	7.9	7.9	6.6
Domestic Equities	5.4	-4.0	13.0	7.0	-38.7	19.5	-8.4	8.8	19.1	13.2
Foreign Developed Equities	4.8	-7.8	27.9	15.8	-48.8	40.4	6.1	11.7	4.2	2.0
Foreign Emerging Equities	7.4	-9.7	23.8	14.4	-40.3	22.5	-5.2	7.9	30.1	23.2
Treasuries	0.2	5.0	4.2	8.2	11.4	9.4	4.8	3.5	9.9	12.5
Corporate Bonds	-6.4	6.6	7.9	-0.6	-6.4	9.1	0.9	6.8	12.0	11.9
High Yield Bonds	6.7	6.1	10.7	0.8	-32.2	14.3	2.3	7.6	-2.7	10.9
Opportunistic	6.3	-4.8	16.2	8.2	-46.8	23.0	-10.3	10.6	22.0	15.7
Real Estate	5.2	-10.1	24.7	-15.6	-2.6	13.1	-7.3	-1.3	-7.1	5.8
Real Assets	9.4	-7.0	6.0	10.5	-28.0	9.5	16.2	14.0	8.5	-4.4
Hedge Funds	0.3	1.9	8.7	4.8	-18.2	14.0	-4.0	6.4	15.0	12.9
Private Equity	6.5	-8.4	21.7	-3.7	-40.9	13.2	-11.8	15.1	-1.6	3.2

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Economic Conditions										
Real GDP Growth	3.4%	-2.8%	2.3%	2.6%	-1.1%	2.9%	4.6%	3.9%	2.6%	-0.4%
Inflation	3.1	3.2	1.8	4.6	1.3	3.2	3.5	5.1	5.0	4.9
Unemployment Rate	6.4	6.5	6.7	7.9	7.5	7.0	6.1	5.2	5.1	5.4
Long-Term Treasury Yield	3.3	3.7	4.9	5.8	4.0	6.8	8.4	9.2	7.5	8.0
Currency	-8.5	6.4	-5.3	-10.7	14.7	-12.7	-9.2	2.9	2.5	-6.4
Asset Class Returns										
Cash	0.3	1.8	2.4	2.0	1.3	3.6	5.8	8.0	8.2	7.0
Domestic Equities	5.5	-4.1	13.5	6.6	-38.5	21.2	-8.0	6.8	19.1	13.1
Foreign Developed Equities	4.8	-6.7	27.7	16.4	-47.8	33.9	5.4	10.9	4.5	2.0
Foreign Emerging Equities	-6.0	-7.4	19.9	19.2	-60.7	27.0	19.0	1.1	26.8	5.1
Treasuries	-0.9	4.7	3.1	8.0	10.8	7.5	3.6	2.6	8.0	11.4
Corporate Bonds	-6.7	6.3	6.6	-1.3	-6.2	9.6	1.1	7.1	11.5	12.3
High Yield Bonds	6.2	5.8	11.7	2.5	-32.3	14.5	2.6	7.2	-3.8	9.6
Opportunistic	5.5	-3.8	15.8	8.6	-46.6	26.1	-11.2	9.2	22.2	16.2
Real Estate	5.9	-10.5	23.9	-15.7	-2.6	12.8	-6.7	-2.0	-7.3	5.8
Real Assets	9.1	-6.4	5.9	10.7	-27.5	9.3	17.2	13.7	8.6	-3.6
Hedge Funds	0.8	0.9	9.4	5.2	-18.3	15.4	-3.0	5.3	13.7	13.0
Private Equity	6.2	-8.2	22.0	-4.8	-40.4	12.8	-12.9	15.0	-1.4	3.0

SCENARIO C – OPTIMISTIC CASE

ECONOMIC CONDITIONS

- The global economies enter a period of enhanced productivity and economic growth, very much like that experienced by America in the 1950s and 1960s. Real GDP grows at an average rate of 3.7%. After recovering from the current environment, the economy spends most of its time at or beyond what is now typically termed "full employment." The unemployment rate averages 5.3%.
- After a couple of high years between 2011 and 2014, inflation is controlled throughout the period. Treasury yields are stable, reflecting low inflation and a stable economy.

ASSET CLASS RETURNS

- Bond returns are strong, with Treasuries averaging 6.2% and corporate bonds averaging 7.8%.
- Equities produce a superb "real" return, as the economy's increased productivity results in high earnings growth for corporate America. For the entire period, U.S. stocks return 11.8% per year. Riskier segments of the equity markets (private equity, high yield bonds, real estate, and emerging markets) perform impressively as well.

SUMMARY OF TWENTY-YEAR ECONOMIC AND CAPITAL MARKET SCENARIO

	20-Year Annualized Average	20-Year Standard Deviation
Economic Conditions		
Real GDP Growth	3.7%	1.4%
Inflation	3.6	1.7
Unemployment Rate	5.3	1.6
Long-Term Treasury Yield	6.8	0.9
Currency	0.3	3.7
Asset Class Returns		
Cash	4.5	1.6
Domestic Equities	11.8	9.4
Foreign Developed Equities	10.3	12.1
Foreign Emerging Equities	10.8	17.8
Treasuries	6.2	7.0
Corporate Bonds	7.8	10.6
High Yield Bonds	11.3	6.4
Opportunistic	14.2	11.2
Real Estate	10.8	15.8
Real Assets	4.4	6.9
Hedge Funds	9.4	6.8
Private Equity	17.9	17.0

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Economic Conditions										
Real GDP Growth	2.2%	6.3%	3.1%	4.5%	5.9%	4.2%	2.7%	4.3%	1.9%	5.0%
Inflation	2.7	6.7	3.9	6.6	8.3	3.7	2.4	3.0	2.4	3.5
Unemployment Rate	9.9	7.9	7.1	6.8	6.0	6.1	5.2	3.9	3.9	4.6
Long-Term Treasury Yield	5.6	7.8	7.9	8.3	8.6	7.0	5.2	6.6	7.4	6.6
Currency	-0.7	4.5	2.7	-4.4	-6.3	5.5	2.5	-5.4	-1.7	2.5
Asset Class Returns										
Cash	1.1	2.2	5.0	5.7	8.6	4.6	3.4	3.7	6.4	5.2
Domestic Equities	-2.2	26.2	9.7	-8.3	5.7	17.4	8.8	6.8	21.3	26.7
Foreign Developed Equities	-6.1	24.7	3.3	18.7	33.6	-8.6	23.7	13.7	8.1	11.9
Foreign Emerging Equities	-9.7	15.2	-5.8	14.0	20.4	18.9	36.3	24.2	-17.3	9.4
Treasuries	4.2	6.5	11.4	1.3	2.9	8.5	12.4	-5.7	16.0	4.6
Corporate Bonds	-3.3	7.9	18.7	1.0	-1.5	11.5	14.0	-7.2	25.6	5.0
High Yield Bonds	2.9	14.8	15.3	13.0	9.8	15.3	15.6	-1.6	15.7	11.1
Opportunistic	-2.5	31.3	12.3	-9.6	6.6	21.4	10.4	7.6	26.0	32.7
Real Estate	-34.6	36.1	25.4	18.6	-1.2	14.7	20.1	-5.7	18.2	29.2
Real Assets	9.2	-1.4	12.1	3.2	21.5	-6.2	1.4	8.2	4.3	7.4
Hedge Funds	-1.1	17.3	12.5	-3.7	3.0	13.7	11.5	0.4	20.0	14.9
Private Equity	-26.9	57.4	18.9	21.5	23.5	25.3	14.1	-5.8	25.0	34.6

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Economic Conditions										
Real GDP Growth	4.2%	2.4%	3.3%	1.9%	4.7%	4.9%	2.0%	3.6%	1.5%	4.8%
Inflation	2.4	2.7	3.5	2.4	2.2	2.8	2.3	2.5	3.0	4.1
Unemployment Rate	5.2	4.9	3.8	4.2	4.2	6.3	4.7	3.2	4.5	4.5
Long-Term Treasury Yield	7.2	6.1	6.5	6.9	6.4	7.6	5.7	6.5	5.9	6.8
Currency	4.9	0.5	-3.9	-0.7	3.3	3.3	0.8	-3.4	-1.3	4.9
Asset Class Returns										
Cash	3.2	4.5	4.4	6.1	4.7	4.0	3.0	4.3	5.7	4.7
Domestic Equities	14.8	9.9	11.2	17.7	27.9	8.1	7.7	11.2	4.3	19.2
Foreign Developed Equities	-8.1	23.1	14.3	7.8	10.8	-8.6	23.9	15.0	6.2	11.0
Foreign Emerging Equities	19.2	44.9	16.8	-17.0	9.6	21.9	34.1	17.0	-17.5	9.4
Treasuries	7.9	12.2	-6.0	16.0	3.6	7.4	11.0	-5.9	16.3	3.4
Corporate Bonds	10.9	14.5	-7.5	25.0	4.5	11.2	13.1	-6.6	25.0	4.7
High Yield Bonds	14.8	15.1	-1.1	17.7	11.4	14.8	16.6	-1.2	17.0	13.3
Opportunistic	17.5	11.6	12.9	22.0	32.1	10.7	10.5	13.1	5.0	23.3
Real Estate	14.7	15.5	-6.1	17.1	20.2	15.8	20.0	-5.5	18.9	9.1
Real Assets	-7.5	2.2	8.5	5.1	7.4	-7.3	1.9	8.3	5.9	7.7
Hedge Funds	11.3	11.0	2.7	18.5	15.6	9.5	10.1	1.5	11.8	12.0
Private Equity	24.3	16.5	4.0	30.6	33.6	23.8	19.2	4.0	15.1	25.5

ASSET ALLOCATION POLICIES

Introduction

Presently, the Client Retirement System's asset allocation policy can be interpreted in several different ways.

Most broadly, the Plan has a long-term policy to invest 64% in equities and 36% in bonds.

However, the Plan has significant investments in non-traditional financial instruments, many of which do not fit neatly into the two major asset classes, equities and bonds. For example, the Plan has a 6% target allocation for real estate and 5% in private equities, neither of which behave like traditional equities or bonds.

In this section, we identify four potential asset allocation policies. One potential policy is the *status quo* allocation. Three other potential asset allocations vary in terms of their return and risk expectations. These "potential" policies are not meant to represent the only policies from which Meketa Investment Group and the Trustees may choose; they simply represent a diverse mix of policies that help clarify how the Plan would behave under different asset allocation policies.

Defining Asset Classes

Asset classes can be, and are, defined in many different ways. Traditionally, asset classes consisted of the basic equity, bond, cash, and real estate categories. More recently, many in the institutional investment industry have more finely defined asset classes to incorporate non-traditional investments such as private equity, hedge funds, and emerging markets equities. Adding asset classes allows for greater Trustee control of investment strategies, but also complicates long-term planning.

Meketa Investment Group defines asset classes as groups of similar assets that have the following characteristics:

- a unique return behavior,
- a sufficient, demonstrable return history, and
- a robust market.

Presently, the asset classes that fit these criteria include:

- cash equivalents,
- investment grade bonds,
- high yield bonds,
- opportunistic,
- real estate,
- real assets,
- public domestic equities,
- public foreign equities (developed),
- public foreign equities (emerging),
- hedge funds, and,
- private equity.

ASSET ALLOCATION POLICIES

The table below shows the three potential asset allocation policies we developed for the asset-liability study. The "current" asset allocation policy represents the Plan's current approximate asset allocation targets.

Asset allocation policy two is more conservative than the Plan's current structure, but also more diversified than the current structure. Asset allocation policies three and four represent two potential policies that are more aggressive than the Plan's current investment posture.

ASSET ALLOCATION POLICIES

	1. Current Target	2. Option A	3. Option B	4. Option C
Cash	0%	0%	0%	0%
Domestic Equities	33	17	19	20
Foreign Developed Equities	20	17	19	20
Foreign Emerging Equities	0	5	7	9
Investment Grade Bonds	27	30	20	15
High Yield Bonds	9	8	8	5
Opportunistic	0	3	3	5
Real Estate	6	5	5	5
Real Assets	0	5	9	10
Hedge Funds	0	5	5	5
Private Equity	5	5	5	6
Expected Return (MVA)*	7.4	7.4	7.7	7.9
Standard Deviation (MVA)*	10.6	9.2	10.1	10.8

* Expected Return and Standard Deviation based on mean-variance analysis, using assumptions provided by the Client Retirement System. These numbers will differ from the Expected Return and Standard Deviation in later pages that are based on a path-dependent analysis.

IMPACT OF ECONOMIC SCENARIOS ON ASSET ALLOCATION POLICIES

Once we developed the potential asset allocation policies for the Plan, we modeled the returns that each of those policies would have produced for each year in our three economic and capital market scenarios. Consequently, we produced twelve distinct investment return scenarios.

The table below summarizes the impact of the economic and capital market scenarios on the four asset allocation policies. The table shows the average annual return during the twenty-year period for each of the asset allocation policies in each of the three scenarios.

AVERAGE ANNUAL RETURN OF ASSET ALLOCATION POLICIES
GIVEN VARIOUS ECONOMIC SCENARIOS
(GROSS OF FEES)
20-YEAR PROJECTIONS

	1. Current Target	2. Option A	3. Option B	4. Option C
A. Moderate	7.4%	7.4%	7.5%	7.7%
B. Pessimistic	3.1	3.4	3.1	2.9
C. Optimistic	10.7	10.2	10.4	10.7

The average annual returns vary greatly for each asset allocation policy and for each economic scenario. Note that for the "current target," or status quo, asset allocation, potential annualized returns range from 3.1% to 10.7%.

On the following pages, we show the detail of the return matrix on a year-by-year basis. (Note that the total Plan market value assumes that no contributions or withdrawals are made to the Plan.)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
A. Moderate Scenario										
Asset Allocation Policy Returns										
1. Current (gross of fees)	3.1%	-1.7%	15.1%	5.9%	-26.8%	-5.8%	28.7%	18.7%	5.4%	10.9%
Return Net of Fees	2.2%	-2.6%	14.2%	5.0%	-27.7%	-6.7%	27.8%	17.8%	4.5%	10.0%
Total Plan Market Value ($ mm)	1,667	1,599	1,804	1,881	1,354	1,258	1,608	1,896	1,984	2,186
Ave. Long-Term Treasury Yield	2.6%	3.2%	4.4%	5.3%	4.3%	6.4%	9.0%	8.1%	8.1%	8.4%
2. Option A (gross of fees)	2.9%	-1.5%	14.4%	6.0%	-25.2%	-5.1%	25.9%	16.8%	6.3%	11.4%
Return Net of Fees	2.0%	-2.4%	13.5%	5.1%	-26.1%	-6.0%	25.0%	15.9%	5.4%	10.5%
Total Plan Market Value ($ mm)	1,663	1,599	1,793	1,872	1,376	1,288	1,610	1,867	1,972	2,183
Ave. Long-Term Treasury Yield	2.6%	3.2%	4.4%	5.3%	4.3%	6.4%	9.0%	8.1%	8.1%	8.4%
3. Option B (gross of fees)	3.9%	-2.7%	15.4%	6.9%	-29.5%	-5.5%	27.1%	16.4%	6.7%	13.4%
Return Net of Fees	3.0%	-3.6%	14.5%	6.0%	-30.4%	-6.4%	26.2%	15.5%	5.8%	12.5%
Total Plan Market Value ($ mm)	1,680	1,595	1,804	1,899	1,315	1,226	1,548	1,792	1,901	2,145
Ave. Long-Term Treasury Yield	2.6%	3.2%	4.4%	5.3%	4.3%	6.4%	9.0%	8.1%	8.1%	8.4%
4. Option C (gross of fees)	4.4%	-3.8%	16.3%	7.4%	-32.3%	-6.8%	29.0%	16.7%	6.7%	14.4%
Return Net of Fees	3.5%	-4.7%	15.4%	6.5%	-33.2%	-7.7%	28.1%	15.8%	5.8%	13.5%
Total Plan Market Value ($ mm)	1,688	1,586	1,808	1,912	1,270	1,167	1,497	1,739	1,848	2,107
Ave. Long-Term Treasury Yield	2.6%	3.2%	4.4%	5.3%	4.3%	6.4%	9.0%	8.1%	8.1%	8.4%

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
A. Moderate Scenario										
Asset Allocation Policy Returns										
1. Current (gross of fees)	19.6%	-1.8%	7.3%	9.3%	9.7%	10.2%	14.5%	4.3%	18.4%	16.7%
Return Net of Fees	18.7%	-2.7%	6.4%	8.4%	8.8%	9.3%	13.6%	3.4%	17.5%	15.8%
Total Plan Market Value ($ mm)	2,591	2,507	2,646	2,846	3,075	3,339	3,774	3,880	4,536	5,226
Ave. Long-Term Treasury Yield	6.4%	8.8%	8.9%	8.6%	8.5%	6.6%	6.0%	7.3%	6.7%	5.8%
2. Option A (gross of fees)	18.9%	1.2%	8.8%	9.9%	9.6%	9.5%	16.0%	3.6%	16.3%	14.4%
Return Net of Fees	18.0%	0.3%	7.9%	9.0%	8.7%	8.6%	15.1%	2.7%	15.4%	13.5%
Total Plan Market Value ($ mm)	2,571	2,566	2,746	2,969	3,203	3,453	3,948	4,029	4,619	5,210
Ave. Long-Term Treasury Yield	6.4%	8.8%	8.9%	8.6%	8.5%	6.6%	6.0%	7.3%	6.7%	5.8%
3. Option B (gross of fees)	20.2%	2.0%	9.9%	10.3%	9.1%	8.9%	16.5%	5.4%	14.7%	15.2%
Return Net of Fees	19.3%	1.1%	9.0%	9.4%	8.2%	8.0%	15.6%	4.5%	13.8%	14.3%
Total Plan Market Value ($ mm)	2,559	2,576	2,788	3,025	3,246	3,477	3,991	4,142	4,682	5,316
Ave. Long-Term Treasury Yield	6.4%	8.8%	8.9%	8.6%	8.5%	6.6%	6.0%	7.3%	6.7%	5.8%
4. Option C (gross of fees)	21.3%	2.1%	10.8%	11.1%	9.1%	9.0%	17.2%	6.7%	14.0%	16.3%
Return Net of Fees	20.4%	1.2%	9.9%	10.2%	8.2%	8.1%	16.3%	5.8%	13.1%	15.4%
Total Plan Market Value ($ mm)	2,539	2,560	2,796	3,059	3,284	3,522	4,064	4,269	4,792	5,490
Ave. Long-Term Treasury Yield	6.4%	8.8%	8.9%	8.6%	8.5%	6.6%	6.0%	7.3%	6.7%	5.8%

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
B. Pessimistic Scenario										
Asset Allocation Policy Returns										
1. Current (gross of fees)	3.1%	-1.8%	15.0%	5.5%	-27.0%	19.7%	-1.6%	8.0%	9.3%	9.5%
Return Net of Fees	2.2%	-2.7%	14.1%	4.6%	-27.9%	18.8%	-2.5%	7.1%	8.4%	8.6%
Total Plan Market Value ($ mm)	1,671	1,607	1,820	1,893	1,361	1,613	1,569	1,681	1,825	1,979
Ave. Long-Term Treasury Yield	4.4%	3.4%	4.7%	4.5%	3.3%	6.7%	8.8%	9.5%	8.0%	7.5%
2. Option A (gross of fees)	3.0%	-1.6%	14.4%	5.9%	-24.6%	18.4%	-0.3%	8.1%	9.9%	9.6%
Return Net of Fees	2.1%	-2.5%	13.5%	5.0%	-25.5%	17.5%	-1.2%	7.2%	9.0%	8.7%
Total Plan Market Value ($ mm)	1,669	1,608	1,810	1,890	1,403	1,643	1,620	1,734	1,891	2,049
Ave. Long-Term Treasury Yield	4.4%	3.4%	4.7%	4.5%	3.3%	6.7%	8.8%	9.5%	8.0%	7.5%
3. Option B (gross of fees)	4.0%	-2.9%	15.3%	6.6%	-28.5%	19.5%	0.0%	8.7%	10.2%	9.0%
Return Net of Fees	3.1%	-3.8%	14.4%	5.7%	-29.4%	18.6%	-0.9%	7.8%	9.3%	8.1%
Total Plan Market Value ($ mm)	1,685	1,603	1,819	1,913	1,346	1,591	1,573	1,696	1,857	2,003
Ave. Long-Term Treasury Yield	4.4%	3.4%	4.7%	4.5%	3.3%	6.7%	8.8%	9.5%	8.0%	7.5%
4. Option C (gross of fees)	4.5%	-3.9%	16.2%	7.2%	-31.0%	20.4%	-0.5%	9.1%	11.1%	9.0%
Return Net of Fees	3.6%	-4.8%	15.3%	6.3%	-31.9%	19.5%	-1.4%	8.2%	10.2%	8.1%
Total Plan Market Value ($ mm)	1,693	1,593	1,822	1,925	1,307	1,557	1,533	1,660	1,834	1,979
Ave. Long-Term Treasury Yield	4.4%	3.4%	4.7%	4.5%	3.3%	6.7%	8.8%	9.5%	8.0%	7.5%

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
B. Pessimistic Scenario										
Asset Allocation Policy Returns										
1. Current (gross of fees)	3.0%	-1.7%	14.9%	5.4%	-26.7%	18.8%	-1.7%	7.0%	9.0%	9.3%
Return Net of Fees	2.1%	-2.6%	14.0%	4.5%	-27.6%	17.9%	-2.6%	6.1%	8.1%	8.4%
Total Plan Market Value ($ mm)	2,013	1,952	2,213	2,303	1,666	1,971	1,931	2,072	2,271	2,493
Ave. Long-Term Treasury Yield	3.3%	3.7%	4.9%	5.8%	4.0%	6.8%	8.4%	9.2%	7.5%	8.0%
2. Option A (gross of fees)	2.1%	-1.4%	13.9%	6.1%	-25.4%	17.7%	0.8%	7.0%	9.3%	8.5%
Return Net of Fees	1.2%	-2.3%	13.0%	5.2%	-26.3%	16.8%	-0.1%	6.1%	8.4%	7.6%
Total Plan Market Value ($ mm)	2,063	2,004	2,250	2,355	1,732	2,027	2,036	2,178	2,389	2,598
Ave. Long-Term Treasury Yield	3.3%	3.7%	4.9%	5.8%	4.0%	6.8%	8.4%	9.2%	7.5%	8.0%
3. Option B (gross of fees)	2.9%	-2.6%	14.9%	7.0%	-29.7%	18.9%	1.6%	7.4%	9.7%	7.6%
Return Net of Fees	2.0%	-3.5%	14.0%	6.1%	-30.6%	18.0%	0.7%	6.5%	8.8%	6.7%
Total Plan Market Value ($ mm)	2,034	1,954	2,215	2,340	1,623	1,922	1,949	2,099	2,316	2,502
Ave. Long-Term Treasury Yield	3.3%	3.7%	4.9%	5.8%	4.0%	6.8%	8.4%	9.2%	7.5%	8.0%
4. Option C (gross of fees)	3.1%	-3.5%	15.7%	7.6%	-32.5%	19.9%	1.6%	7.6%	10.6%	7.3%
Return Net of Fees	2.2%	-4.4%	14.8%	6.7%	-33.4%	19.0%	0.7%	6.7%	9.7%	6.4%
Total Plan Market Value ($ mm)	2,017	1,919	2,193	2,331	1,551	1,855	1,884	2,037	2,270	2,449
Ave. Long-Term Treasury Yield	3.3%	3.7%	4.9%	5.8%	4.0%	6.8%	8.4%	9.2%	7.5%	8.0%

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
C. Optimistic Scenario										
Asset Allocation Policy Returns										
1. Current (gross of fees)	-5.0%	21.9%	11.8%	4.7%	10.8%	10.2%	14.5%	2.5%	18.0%	17.0%
Return Net of Fees	-5.9%	21.0%	10.9%	3.8%	9.9%	9.3%	13.6%	1.6%	17.1%	16.1%
Total Plan Market Value ($ mm)	1,535	1,829	2,006	2,066	2,254	2,445	2,749	2,759	3,187	3,648
Ave. Long-Term Treasury Yield	5.6%	7.8%	7.9%	8.3%	8.6%	7.0%	5.2%	6.6%	7.4%	6.6%
2. Option A (gross of fees)	-4.3%	19.2%	11.5%	5.6%	11.2%	9.7%	15.2%	2.7%	15.8%	14.7%
Return Net of Fees	-5.2%	18.3%	10.6%	4.7%	10.3%	8.8%	14.3%	1.8%	14.9%	13.8%
Total Plan Market Value ($ mm)	1,547	1,801	1,970	2,046	2,242	2,421	2,739	2,756	3,125	3,506
Ave. Long-Term Treasury Yield	5.6%	7.8%	7.9%	8.3%	8.6%	7.0%	5.2%	6.6%	7.4%	6.6%
3. Option B (gross of fees)	-4.3%	19.7%	10.6%	6.1%	13.2%	9.0%	15.3%	4.6%	14.1%	15.4%
Return Net of Fees	-5.2%	18.8%	9.7%	5.2%	12.3%	8.1%	14.4%	3.7%	13.2%	14.5%
Total Plan Market Value ($ mm)	1,546	1,809	1,963	2,048	2,285	2,451	2,775	2,844	3,176	3,585
Ave. Long-Term Treasury Yield	5.6%	7.8%	7.9%	8.3%	8.6%	7.0%	5.2%	6.6%	7.4%	6.6%
4. Option C (gross of fees)	-4.9%	20.9%	10.0%	6.0%	14.3%	9.1%	15.6%	5.8%	13.4%	16.5%
Return Net of Fees	-5.8%	20.0%	9.1%	5.1%	13.4%	8.2%	14.7%	4.9%	12.5%	15.6%
Total Plan Market Value ($ mm)	1,536	1,815	1,958	2,043	2,301	2,471	2,805	2,908	3,226	3,675
Ave. Long-Term Treasury Yield	5.6%	7.8%	7.9%	8.3%	8.6%	7.0%	5.2%	6.6%	7.4%	6.6%

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
C. Optimistic Scenario										
Asset Allocation Policy Returns										
1. Current (gross of fees)	9.2%	14.6%	4.5%	17.1%	16.4%	6.9%	14.2%	4.7%	11.7%	12.7%
Return Net of Fees	8.3%	13.7%	3.6%	16.2%	15.5%	6.0%	13.3%	3.8%	10.8%	11.8%
Total Plan Market Value ($ mm)	3,892	4,349	4,422	5,035	5,703	5,935	6,593	6,713	7,285	7,978
Ave. Long-Term Treasury Yield	7.2%	6.1%	6.5%	6.9%	6.4%	7.6%	5.7%	6.5%	5.9%	6.8%
2. Option A (gross of fees)	8.8%	15.7%	3.9%	15.3%	14.0%	7.4%	14.9%	4.1%	11.2%	11.3%
Return Net of Fees	7.9%	14.8%	3.0%	14.4%	13.1%	6.5%	14.0%	3.2%	10.3%	10.4%
Total Plan Market Value ($ mm)	3,724	4,202	4,252	4,770	5,296	5,538	6,195	6,278	6,794	7,362
Ave. Long-Term Treasury Yield	7.2%	6.1%	6.5%	6.9%	6.4%	7.6%	5.7%	6.5%	5.9%	6.8%
4. Option B (gross of fees)	8.0%	16.0%	5.8%	13.6%	14.8%	6.6%	15.1%	5.9%	9.2%	12.0%
Return Net of Fees	7.1%	15.1%	4.9%	12.7%	13.9%	5.7%	14.2%	5.0%	8.3%	11.1%
Total Plan Market Value ($ mm)	3,782	4,276	4,403	4,867	5,441	5,645	6,320	6,515	6,923	7,543
Ave. Long-Term Treasury Yield	7.2%	6.1%	6.5%	6.9%	6.4%	7.6%	5.7%	6.5%	5.9%	6.8%
5. Option C (gross of fees)	8.1%	16.5%	7.1%	12.7%	15.9%	6.5%	15.4%	7.3%	7.8%	12.7%
Return Net of Fees	7.2%	15.6%	6.2%	11.8%	15.0%	5.6%	14.5%	6.4%	6.9%	11.8%
Total Plan Market Value ($ mm)	3,877	4,402	4,589	5,032	5,675	5,879	6,597	6,881	7,206	7,892
Ave. Long-Term Treasury Yield	7.2%	6.1%	6.5%	6.9%	6.4%	7.6%	5.7%	6.5%	5.9%	6.8%

ASSET-LIABILITY OUTCOMES

Introduction

Meketa Investment Group provided to the actuary the data shown thus far in the study. The actuary then used these data to calculate the impact that each economic scenario would have on important Plan actuarial statistics, given the five potential asset allocation policies.

The liability calculations by the actuary for each of the characteristics below were modified for each economic scenario.

The characteristics we evaluated are described below:

1. *Accrued Actuarial Liabilities (AAL)* – This value is the amount it would take to pay for the already promised benefits over the period of the valuation. The AAL remains the same for all asset allocations, but grows under more positive economic scenarios.
2. *Actuarial Value of Assets (AVA)* – The AVA differs from the Market Value of Assets in that the asset value is smoothed over time, in order to reduce the effects of short-term volatility.
3. *Normal Cost* – This cost represents the portion of the cost of projected benefits that is allocated to each Plan year.
4. *Unfunded Actuarial Liability* – When the Actuarial Value of Assets is smaller than the Actuarial Accrued Liabilities, an Unfunded Actuarial Liability occurs. Its presence means that the Plan's funding ratio is less than 100%.
5. *Amortization of Unfunded Actuarial Accrued Liability* – The Unfunded Actuarial Liability is amortized over a period of thirty years.
6. *Benefit Payments* – These payments would be owed to Plan participants each year.
7. *Total Required Contribution* – In order to cover each year's portion of the unfunded liability (UAAL) and the Normal Cost, the Plan would need to contribute the Total Required Contribution each year.

The following pages display the detailed year-by-year outcomes as calculated by the actuary. In calculating the output, the actuary used the actuarial assumptions that were used in the June 30, 2007 Actuarial Valuation Report. Assumptions included:

- A discount rate of 8.25%, which includes inflation of 4% and a real rate of return of 4.25%.
- Interest credited to member contributions of 3%, compounded annually.
- Salary increase rates of 4.25% annually, with an additional merit component of 0.75% to 5.5% based on years of service at the valuation date.
- Rates of separation due to disability (0.04% to 2%) or withdrawal (0% to 11%) in each year.
- An age of retirement for inactive members of 58 years, and an assumed rate of retirement for active members.
- Mortality rates for both active and post-retirement members based on the 1994 Group Annuity Mortality Table.
- Member contributions of 4% per year.

Actuarial methods included the following:

- *Financing of Unfunded Actuarial Accrued Liability* – The balance of unfunded actuarial accrued liabilities was amortized by level percent of payroll contributions over a 30-year period (principal and interest combined).
- *Asset Valuation Method* – The Actuarial Value of Assets recognizes 20% of total return in excess of (or less than) the investment return assumption for each of the last five years. This method has the effect of smoothing volatility in investments returns.

SCENARIO A (MODERATE), CURRENT TARGET ALLOCATION

Year	Accrued Actuarial Liabilities ($ millions)	Market Value of Assets ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Unfunded Actuarial Liability	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments	Total Required Contribution ($ millions)
2010	2,257	1,667	1,754	51	503	29	108	80
2011	2,385	1,599	1,717	54	668	38	117	92
2012	2,518	1,804	1,651	57	867	50	125	106
2013	2,656	1,881	1,579	60	1,078	62	134	122
2014	2,800	1,354	1,557	64	1,243	71	144	135
2015	2,950	1,258	1,521	67	1,428	82	155	149
2016	3,105	1,608	1,439	72	1,666	95	167	167
2017	3,265	1,896	1,421	76	1,844	106	180	182
2018	3,430	1,984	1,440	82	1,989	114	193	196
2019	3,601	2,186	1,476	87	2,125	122	206	209
2020	3,778	2,591	1,630	94	2,148	123	221	217
2021	3,963	2,507	1,859	101	2,104	121	236	222
2022	4,154	2,646	2,019	109	2,135	122	251	231
2023	4,353	2,846	2,135	117	2,219	127	265	244
2024	4,564	3,075	2,270	126	2,294	131	278	257
2025	4,788	3,339	2,414	135	2,373	136	291	271
2026	5,026	3,774	2,542	145	2,484	142	305	287
2027	5,281	3,880	2,761	155	2,519	144	319	299
2028	5,553	4,536	2,984	168	2,569	147	334	315
2029	5,845	5,226	3,266	180	2,579	148	351	327

SCENARIO A (MODERATE), ALLOCATION OPTION A

Year	Accrued Actuarial Liabilities ($ millions)	Market Value of Assets ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Unfunded Actuarial Liability	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments	Total Required Contribution ($ millions)
2010	2,257	1,663	1,754	51	503	29	108	80
2011	2,385	1,599	1,717	54	668	38	117	92
2012	2,518	1,793	1,650	57	868	50	125	106
2013	2,656	1,872	1,576	60	1,080	62	134	122
2014	2,800	1,376	1,552	64	1,248	71	144	135
2015	2,950	1,288	1,520	67	1,429	82	155	149
2016	3,105	1,610	1,444	72	1,660	95	167	167
2017	3,265	1,867	1,428	76	1,837	105	180	182
2018	3,430	1,972	1,444	82	1,985	114	193	195
2019	3,601	2,183	1,478	87	2,123	122	206	209
2020	3,778	2,571	1,627	94	2,152	123	221	217
2021	3,963	2,566	1,848	101	2,115	121	236	222
2022	4,154	2,746	2,017	109	2,137	122	251	232
2023	4,353	2,969	2,157	117	2,196	126	265	243
2024	4,564	3,203	2,317	126	2,247	129	278	255
2025	4,788	3,453	2,485	135	2,303	132	291	267
2026	5,026	3,948	2,634	145	2,392	137	305	282
2027	5,281	4,029	2,868	155	2,412	138	319	293
2028	5,553	4,619	3,098	168	2,455	141	334	308
2029	5,845	5,210	3,373	180	2,473	142	351	321

SCENARIO A (MODERATE), ALLOCATION OPTION B

Year	Accrued Actuarial Liabilities ($ millions)	Market Value of Assets ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Unfunded Actuarial Liability	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments	Total Required Contribution ($ millions)
2010	2,257	1,680	1,754	51	503	29	108	80
2011	2,385	1,595	1,720	54	665	38	117	92
2012	2,518	1,804	1,653	57	865	50	125	106
2013	2,656	1,899	1,580	60	1,076	62	134	122
2014	2,800	1,315	1,561	64	1,239	71	144	135
2015	2,950	1,226	1,521	67	1,429	82	155	149
2016	3,105	1,548	1,428	72	1,676	96	167	168
2017	3,265	1,792	1,400	76	1,864	107	180	183
2018	3,430	1,901	1,402	82	2,028	116	193	198
2019	3,601	2,145	1,419	87	2,182	125	206	212
2020	3,778	2,559	1,574	94	2,205	126	221	220
2021	3,963	2,576	1,805	101	2,158	124	236	225
2022	4,154	2,788	1,988	109	2,165	124	251	233
2023	4,353	3,025	2,150	117	2,204	126	265	243
2024	4,564	3,246	2,332	126	2,232	128	278	254
2025	4,788	3,477	2,514	135	2,274	130	291	265
2026	5,026	3,991	2,668	145	2,358	135	305	280
2027	5,281	4,142	2,905	155	2,375	136	319	291
2028	5,553	4,682	3,145	168	2,408	138	334	306
2029	5,845	5,316	3,423	180	2,422	139	351	318

SCENARIO A (MODERATE), ALLOCATION OPTION C

Year	Accrued Actuarial Liabilities ($ millions)	Market Value of Assets ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Unfunded Actuarial Liability	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments	Total Required Contribution ($ millions)
2010	2,257	1,688	1,754	51	503	29	108	80
2011	2,385	1,586	1,721	54	664	38	117	92
2012	2,518	1,808	1,654	57	865	50	125	106
2013	2,656	1,912	1,580	60	1,076	62	134	122
2014	2,800	1,270	1,564	64	1,236	71	144	134
2015	2,950	1,167	1,516	67	1,433	82	155	149
2016	3,105	1,497	1,411	72	1,694	97	167	169
2017	3,265	1,739	1,374	76	1,890	108	180	185
2018	3,430	1,848	1,366	82	2,063	118	193	200
2019	3,601	2,107	1,373	87	2,227	128	206	215
2020	3,778	2,539	1,530	94	2,248	129	221	223
2021	3,963	2,560	1,770	101	2,193	126	236	227
2022	4,154	2,796	1,961	109	2,193	126	251	235
2023	4,353	3,059	2,133	117	2,220	127	265	244
2024	4,564	3,284	2,331	126	2,233	128	278	254
2025	4,788	3,522	2,526	135	2,262	130	291	265
2026	5,026	4,064	2,691	145	2,336	134	305	279
2027	5,281	4,269	2,942	155	2,338	134	319	289
2028	5,553	4,792	3,201	168	2,352	135	334	302
2029	5,845	5,490	3,493	180	2,352	135	351	314

SCENARIO B (PESSIMISTIC), CURRENT TARGET ALLOCATION

Year	Accrued Actuarial Liabilities ($ millions)	Market Value of Assets ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Unfunded Actuarial Liability	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments	Total Required Contribution ($ millions)
2010	2,385	1,671	1,718	54	667	38	117	92
2011	2,518	1,607	1,651	57	867	50	125	106
2012	2,656	1,820	1,578	60	1,078	62	134	122
2013	2,800	1,893	1,555	63	1,245	71	144	135
2014	2,949	1,361	1,517	67	1,432	82	155	149
2015	3,103	1,613	1,487	70	1,616	93	167	163
2016	3,261	1,569	1,475	74	1,786	102	180	177
2017	3,423	1,681	1,444	80	1,980	113	193	193
2018	3,592	1,825	1,434	85	2,157	124	206	208
2019	3,765	1,979	1,545	90	2,221	127	221	217
2020	3,944	2,013	1,617	96	2,327	133	236	229
2021	4,128	1,952	1,682	102	2,446	140	251	242
2022	4,317	2,213	1,760	108	2,557	146	265	255
2023	4,515	2,303	1,840	115	2,675	153	277	268
2024	4,722	1,666	1,797	121	2,926	168	290	289
2025	4,941	1,971	1,765	128	3,176	182	304	310
2026	5,170	1,931	1,760	135	3,411	195	318	331
2027	5,413	2,072	1,735	144	3,678	211	333	354
2028	5,669	2,271	1,740	153	3,930	225	348	378
2029	5,940	2,493	1,892	162	4,049	232	365	394

SCENARIO B (PESSIMISTIC), ALLOCATION OPTION A

Year	Accrued Actuarial Liabilities ($ millions)	Market Value of Assets ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Unfunded Actuarial Liability	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments	Total Required Contribution ($ millions)
2010	2,385	1,669	1,717	54	668	38	117	92
2011	2,518	1,608	1,651	57	867	50	125	106
2012	2,656	1,810	1,576	60	1,080	62	134	122
2013	2,800	1,890	1,552	63	1,248	71	144	135
2014	2,949	1,403	1,521	67	1,428	82	155	148
2015	3,103	1,643	1,498	70	1,605	92	167	162
2016	3,261	1,620	1,495	74	1,766	101	180	176
2017	3,423	1,734	1,475	80	1,948	112	193	191
2018	3,592	1,891	1,477	85	2,115	121	206	206
2019	3,765	2,049	1,592	90	2,174	124	221	214
2020	3,944	2,063	1,668	96	2,277	130	236	226
2021	4,128	2,004	1,731	102	2,397	137	251	239
2022	4,317	2,250	1,805	108	2,512	144	265	252
2023	4,515	2,355	1,882	115	2,633	151	277	265
2024	4,722	1,732	1,838	121	2,885	165	290	286
2025	4,941	2,027	1,808	128	3,133	179	304	307
2026	5,170	2,036	1,810	135	3,361	192	318	328
2027	5,413	2,178	1,797	144	3,615	207	333	351
2028	5,669	2,389	1,812	153	3,857	221	348	374
2029	5,940	2,598	1,970	162	3,970	227	365	390

SCENARIO B (PESSIMISTIC), ALLOCATION OPTION B

Year	Accrued Actuarial Liabilities ($ millions)	Market Value of Assets ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Unfunded Actuarial Liability	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments	Total Required Contribution ($ millions)
2010	2,385	1,685	1,720	54	665	38	117	92
2011	2,518	1,603	1,654	57	864	50	125	106
2012	2,656	1,819	1,580	60	1,076	62	134	121
2013	2,800	1,913	1,559	63	1,240	71	144	134
2014	2,949	1,346	1,520	67	1,429	82	155	148
2015	3,103	1,591	1,483	70	1,620	93	167	163
2016	3,261	1,573	1,471	74	1,790	102	180	177
2017	3,423	1,696	1,443	80	1,980	113	193	193
2018	3,592	1,857	1,436	85	2,155	123	206	208
2019	3,765	2,003	1,554	90	2,211	127	221	217
2020	3,944	2,034	1,634	96	2,310	132	236	228
2021	4,128	1,954	1,698	102	2,429	139	251	241
2022	4,317	2,215	1,773	108	2,545	146	265	254
2023	4,515	2,340	1,853	115	2,662	152	277	267
2024	4,722	1,623	1,801	121	2,922	167	290	288
2025	4,941	1,922	1,755	128	3,185	182	304	310
2026	5,170	1,949	1,751	135	3,420	196	318	331
2027	5,413	2,099	1,732	144	3,681	211	333	354
2028	5,669	2,316	1,739	153	3,931	225	348	378
2029	5,940	2,502	1,901	162	4,040	231	365	394

SCENARIO B (PESSIMISTIC), ALLOCATION OPTION C

Year	Accrued Actuarial Liabilities ($ millions)	Market Value of Assets ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Unfunded Actuarial Liability	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments	Total Required Contribution ($ millions)
2010	2,385	1,693	1,721	54	664	38	117	92
2011	2,518	1,593	1,654	57	864	50	125	106
2012	2,656	1,822	1,580	60	1,076	62	134	121
2013	2,800	1,925	1,561	63	1,238	71	144	134
2014	2,949	1,307	1,516	67	1,433	82	155	149
2015	3,103	1,557	1,470	70	1,633	94	167	163
2016	3,261	1,533	1,453	74	1,808	104	180	178
2017	3,423	1,660	1,418	80	2,005	115	193	194
2018	3,592	1,834	1,406	85	2,186	125	206	210
2019	3,765	1,979	1,528	90	2,238	128	221	218
2020	3,944	2,017	1,611	96	2,333	134	236	229
2021	4,128	1,919	1,676	102	2,451	140	251	242
2022	4,317	2,193	1,752	108	2,565	147	265	255
2023	4,515	2,331	1,835	115	2,680	153	277	268
2024	4,722	1,551	1,776	121	2,946	169	290	290
2025	4,941	1,855	1,721	128	3,219	184	304	312
2026	5,170	1,884	1,711	135	3,460	198	318	333
2027	5,413	2,037	1,685	144	3,728	214	333	357
2028	5,669	2,270	1,687	153	3,982	228	348	381
2029	5,940	2,449	1,854	162	4,086	234	365	397

SCENARIO C (OPTIMISTIC), CURRENT TARGET ALLOCATION

Year	Accrued Actuarial Liabilities ($ millions)	Market Value of Assets ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Unfunded Actuarial Liability	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments	Total Required Contribution ($ millions)
2010	2,257	1,535	1,754	51	503	29	108	80
2011	2,385	1,829	1,696	54	689	39	117	93
2012	2,518	2,006	1,661	57	857	49	125	106
2013	2,656	2,066	1,634	60	1,022	59	134	119
2014	2,801	2,254	1,649	64	1,151	66	144	130
2015	2,951	2,445	1,761	68	1,190	68	155	137
2016	3,108	2,749	1,922	73	1,186	68	167	141
2017	3,270	2,759	2,077	79	1,192	68	180	147
2018	3,438	3,187	2,207	85	1,230	70	193	155
2019	3,613	3,648	2,385	92	1,228	70	206	162
2020	3,796	3,892	2,618	98	1,179	68	221	166
2021	3,986	4,349	2,864	105	1,123	64	237	169
2022	4,183	4,422	3,124	112	1,059	61	252	173
2023	4,388	5,035	3,397	121	991	57	266	178
2024	4,605	5,703	3,680	130	925	53	279	182
2025	4,835	5,935	4,008	138	827	47	292	186
2026	5,079	6,593	4,346	146	733	42	306	188
2027	5,339	6,713	4,698	155	641	37	320	192
2028	5,615	7,285	5,066	167	549	31	336	198
2029	5,909	7,978	5,400	177	509	29	352	206

SCENARIO C (OPTIMISTIC), ALLOCATION OPTION A

Year	Accrued Actuarial Liabilities ($ millions)	Market Value of Assets ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Unfunded Actuarial Liability	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments	Total Required Contribution ($ millions)
2010	2,257	1,547	1,754	51	503	29	108	80
2011	2,385	1,801	1,698	54	687	39	117	93
2012	2,518	1,970	1,659	57	859	49	125	106
2013	2,656	2,046	1,625	60	1,032	59	134	119
2014	2,801	2,242	1,635	64	1,165	67	144	131
2015	2,951	2,421	1,745	68	1,206	69	155	138
2016	3,108	2,739	1,901	73	1,207	69	167	142
2017	3,270	2,756	2,060	79	1,210	69	180	148
2018	3,438	3,125	2,197	85	1,241	71	193	156
2019	3,613	3,506	2,369	92	1,244	71	206	163
2020	3,796	3,724	2,578	98	1,219	70	221	168
2021	3,986	4,202	2,796	105	1,190	68	237	173
2022	4,183	4,252	3,031	112	1,152	66	252	178
2023	4,388	4,770	3,278	121	1,109	64	266	185
2024	4,605	5,296	3,531	130	1,074	62	279	191
2025	4,835	5,538	3,817	138	1,018	58	292	197
2026	5,079	6,195	4,114	146	966	55	306	202
2027	5,339	6,278	4,425	155	913	52	320	208
2028	5,615	6,794	4,754	167	860	49	336	216
2029	5,909	7,362	5,058	177	851	49	352	226

SCENARIO C (OPTIMISTIC), ALLOCATION OPTION B

Year	Accrued Actuarial Liabilities ($ millions)	Market Value of Assets ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Unfunded Actuarial Liability	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments	Total Required Contribution ($ millions)
2010	2,257	1,546	1,754	51	503	29	108	80
2011	2,385	1,809	1,698	54	687	39	117	93
2012	2,518	1,963	1,660	57	858	49	125	106
2013	2,656	2,048	1,625	60	1,032	59	134	119
2014	2,801	2,285	1,636	64	1,165	67	144	131
2015	2,951	2,451	1,752	68	1,199	69	155	137
2016	3,108	2,775	1,915	73	1,193	68	167	141
2017	3,270	2,844	2,079	79	1,190	68	180	147
2018	3,438	3,176	2,231	85	1,206	69	193	154
2019	3,613	3,585	2,413	92	1,200	69	206	160
2020	3,796	3,782	2,626	98	1,170	67	221	165
2021	3,986	4,276	2,849	105	1,137	65	237	170
2022	4,183	4,403	3,089	112	1,094	63	252	175
2023	4,388	4,867	3,345	121	1,043	60	266	181
2024	4,605	5,441	3,608	130	997	57	279	187
2025	4,835	5,645	3,902	138	933	53	292	192
2026	5,079	6,320	4,207	146	872	50	306	196
2027	5,339	6,515	4,524	155	814	47	320	202
2028	5,615	6,923	4,864	167	750	43	336	210
2029	5,909	7,543	5,177	177	732	42	352	219

SCENARIO C (OPTIMISTIC), ALLOCATION OPTION C

Year	Accrued Actuarial Liabilities ($ millions)	Market Value of Assets ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Unfunded Actuarial Liability	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments	Total Required Contribution ($ millions)
2010	2,257	1,536	1,754	51	503	29	108	80
2011	2,385	1,815	1,696	54	689	39	117	93
2012	2,518	1,958	1,659	57	859	49	125	106
2013	2,656	2,043	1,624	60	1,033	59	134	119
2014	2,801	2,301	1,633	64	1,167	67	144	131
2015	2,951	2,471	1,752	68	1,199	69	155	137
2016	3,108	2,805	1,921	73	1,187	68	167	141
2017	3,270	2,908	2,090	79	1,180	68	180	146
2018	3,438	3,226	2,253	85	1,184	68	193	153
2019	3,613	3,675	2,446	92	1,167	67	206	159
2020	3,796	3,877	2,671	98	1,126	64	221	163
2021	3,986	4,402	2,906	105	1,080	62	237	167
2022	4,183	4,589	3,161	112	1,022	59	252	171
2023	4,388	5,032	3,437	121	950	54	266	175
2024	4,605	5,675	3,720	130	884	51	279	180
2025	4,835	5,879	4,036	138	799	46	292	184
2026	5,079	6,597	4,365	146	715	41	306	187
2027	5,339	6,881	4,704	155	635	36	320	192
2028	5,615	7,206	5,070	167	544	31	336	198
2029	5,909	7,892	5,403	177	506	29	352	206

APPENDICES B

The Updated Asset Liability Outcomes in these appendices reflect recent changes made by the Board of Trustees. These changes include a decrease in the discount rate from 8.25% to 7.75% over the next five years, as well as a modified amortization method for gains and losses.

SCENARIO A (MODERATE), CURRENT TARGET ALLOCATION

Year	Accrued Actuarial Liabilities ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments ($ millions)	Total Required Contribution ($ millions)
2010	2,628	1,732	61	54	117	115
2011	2,775	1,686	64	69	126	133
2012	2,927	1,640	68	84	136	152
2013	3,086	1,652	72	96	146	167
2014	3,251	1,647	75	110	157	185
2015	3,422	1,596	81	127	170	207
2016	3,598	1,622	86	139	183	225
2017	3,780	1,697	92	149	196	241
2018	3,968	1,793	98	158	210	256
2019	4,165	2,024	106	157	225	262
2020	4,368	2,345	113	151	242	264
2021	4,580	2,587	122	151	257	273
2022	4,801	2,779	131	156	271	287
2023	5,034	3,000	141	159	285	301
2024	5,281	3,237	151	163	299	315
2025	5,545	3,458	162	170	313	332
2026	5,825	3,802	174	170	328	344
2027	6,125	4,152	188	170	344	358
2028	6,446	4,589	201	167	362	368
2029	6,790	5,149	217	155	380	372

SCENARIO A (MODERATE), ALLOCATION OPTION A

Year	Accrued Actuarial Liabilities ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments ($ millions)	Total Required Contribution ($ millions)
2010	2,628	1,731	61	54	117	115
2011	2,775	1,685	64	69	126	133
2012	2,927	1,638	68	84	136	152
2013	3,086	1,647	72	96	146	168
2014	3,251	1,646	75	110	157	185
2015	3,422	1,603	81	126	170	207
2016	3,598	1,630	86	139	183	225
2017	3,780	1,701	92	149	196	240
2018	3,968	1,793	98	158	210	256
2019	4,165	2,018	106	157	225	263
2020	4,368	2,331	113	152	242	265
2021	4,580	2,585	122	151	257	273
2022	4,801	2,808	131	154	271	285
2023	5,034	3,060	141	155	285	296
2024	5,281	3,325	151	157	299	308
2025	5,545	3,571	162	162	313	324
2026	5,825	3,934	174	160	328	334
2027	6,125	4,292	188	160	344	348
2028	6,446	4,714	201	158	362	359
2029	6,790	5,233	217	149	380	365

SCENARIO A (MODERATE), ALLOCATION OPTION B

Year	Accrued Actuarial Liabilities ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments ($ millions)	Total Required Contribution ($ millions)
2010	2,628	1,734	61	54	117	115
2011	2,775	1,688	64	69	126	133
2012	2,927	1,642	68	84	136	152
2013	3,086	1,656	72	95	146	167
2014	3,251	1,645	75	110	157	185
2015	3,422	1,584	81	128	170	208
2016	3,598	1,600	86	141	183	227
2017	3,780	1,655	92	152	196	244
2018	3,968	1,731	98	163	210	261
2019	4,165	1,964	106	161	225	267
2020	4,368	2,292	113	155	242	268
2021	4,580	2,564	122	152	257	275
2022	4,801	2,814	131	153	271	284
2023	5,034	3,095	141	152	285	294
2024	5,281	3,378	151	153	299	304
2025	5,545	3,629	162	157	313	320
2026	5,825	3,995	174	156	328	330
2027	6,125	4,366	188	154	344	342
2028	6,446	4,793	201	152	362	353
2029	6,790	5,324	217	142	380	359

SCENARIO A (MODERATE), ALLOCATION OPTION C

Year	Accrued Actuarial Liabilities ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments ($ millions)	Total Required Contribution ($ millions)
2010	2,628	1,736	61	54	117	114
2011	2,775	1,688	64	69	126	133
2012	2,927	1,642	68	84	136	152
2013	3,086	1,659	72	95	146	167
2014	3,251	1,640	75	110	157	186
2015	3,422	1,566	81	129	170	210
2016	3,598	1,572	86	143	183	229
2017	3,780	1,618	92	155	196	246
2018	3,968	1,684	98	166	210	264
2019	4,165	1,921	106	164	225	270
2020	4,368	2,260	113	157	242	270
2021	4,580	2,543	122	154	257	276
2022	4,801	2,807	131	154	271	285
2023	5,034	3,108	141	151	285	293
2024	5,281	3,409	151	151	299	302
2025	5,545	3,674	162	154	313	316
2026	5,825	4,059	174	151	328	325
2027	6,125	4,456	188	148	344	335
2028	6,446	4,901	201	144	362	345
2029	6,790	5,460	217	132	380	349

SCENARIO B (PESSIMISTIC), CURRENT TARGET ALLOCATION

Year	Accrued Actuarial Liabilities ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments ($ millions)	Total Required Contribution ($ millions)
2010	2,628	1,732	61	54	117	115
2011	2,775	1,686	64	69	126	133
2012	2,927	1,640	67	84	136	152
2013	3,086	1,649	71	96	146	167
2014	3,250	1,641	75	109	157	184
2015	3,420	1,649	79	123	170	201
2016	3,594	1,677	84	135	183	219
2017	3,773	1,691	89	148	196	238
2018	3,958	1,733	95	160	210	255
2019	4,150	1,911	101	163	225	264
2020	4,347	2,049	107	170	241	277
2021	4,550	2,177	114	177	257	292
2022	4,760	2,329	121	184	271	306
2023	4,979	2,488	128	191	284	320
2024	5,209	2,482	135	212	298	347
2025	5,449	2,500	143	232	312	375
2026	5,703	2,556	151	251	327	402
2027	5,969	2,593	161	272	342	433
2028	6,251	2,678	171	291	359	462
2029	6,549	2,973	182	296	377	478

SCENARIO B (PESSIMISTIC), ALLOCATION OPTION A

Year	Accrued Actuarial Liabilities ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments ($ millions)	Total Required Contribution ($ millions)
2010	2,628	1,732	61	54	117	115
2011	2,775	1,685	64	69	126	133
2012	2,927	1,638	67	84	136	152
2013	3,086	1,647	71	96	146	167
2014	3,250	1,646	75	109	157	184
2015	3,420	1,661	79	122	170	200
2016	3,594	1,699	84	133	183	217
2017	3,773	1,725	89	146	196	235
2018	3,958	1,779	95	157	210	252
2019	4,150	1,961	101	160	225	261
2020	4,347	2,101	107	166	241	273
2021	4,550	2,228	114	174	257	288
2022	4,760	2,375	121	181	271	302
2023	4,979	2,528	128	188	284	317
2024	5,209	2,522	135	209	298	344
2025	5,449	2,542	143	229	312	372
2026	5,703	2,610	151	247	327	398
2027	5,969	2,664	161	267	342	427
2028	6,251	2,764	171	285	359	456
2029	6,549	3,066	182	289	377	471

SCENARIO B (PESSIMISTIC), ALLOCATION OPTION B

Year	Accrued Actuarial Liabilities ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments ($ millions)	Total Required Contribution ($ millions)
2010	2,628	1,734	61	54	117	114
2011	2,775	1,688	64	69	126	133
2012	2,927	1,641	67	84	136	152
2013	3,086	1,654	71	95	146	167
2014	3,250	1,644	75	109	157	184
2015	3,420	1,644	79	123	170	202
2016	3,594	1,673	84	135	183	219
2017	3,773	1,691	89	148	196	238
2018	3,958	1,736	95	160	210	255
2019	4,150	1,923	101	163	225	263
2020	4,347	2,069	107	168	241	276
2021	4,550	2,196	114	176	257	290
2022	4,760	2,343	121	183	271	305
2023	4,979	2,502	128	190	284	319
2024	5,209	2,484	135	212	298	347
2025	5,449	2,484	143	233	312	376
2026	5,703	2,542	151	252	327	403
2027	5,969	2,588	161	272	342	433
2028	6,251	2,678	171	291	359	462
2029	6,549	2,988	182	295	377	477

SCENARIO B (PESSIMISTIC), ALLOCATION OPTION C

Year	Accrued Actuarial Liabilities ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments ($ millions)	Total Required Contribution ($ millions)
2010	2,628	1,736	61	54	117	114
2011	2,775	1,688	64	69	126	133
2012	2,927	1,641	67	84	136	152
2013	3,086	1,656	71	95	146	167
2014	3,250	1,640	75	109	157	184
2015	3,420	1,631	79	124	170	203
2016	3,594	1,654	84	137	183	220
2017	3,773	1,664	89	150	196	240
2018	3,958	1,704	95	163	210	258
2019	4,150	1,896	101	164	225	265
2020	4,347	2,046	107	170	241	277
2021	4,550	2,176	114	178	257	292
2022	4,760	2,326	121	185	271	306
2023	4,979	2,488	128	191	284	320
2024	5,209	2,460	135	213	298	349
2025	5,449	2,446	143	236	312	379
2026	5,703	2,496	151	255	327	406
2027	5,969	2,534	161	276	342	437
2028	6,251	2,617	171	296	359	466
2029	6,549	2,935	182	299	377	481

SCENARIO C (OPTIMISTIC), CURRENT TARGET ALLOCATION

Year	Accrued Actuarial Liabilities ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments ($ millions)	Total Required Contribution ($ millions)
2010	2,628	1,710	61	56	117	116
2011	2,775	1,697	64	68	126	132
2012	2,928	1,698	68	80	136	148
2013	3,087	1,746	72	89	146	162
2014	3,252	1,897	77	92	157	169
2015	3,425	2,101	82	91	170	173
2016	3,603	2,304	88	90	183	179
2017	3,789	2,481	96	92	196	188
2018	3,982	2,717	103	91	210	194
2019	4,185	3,016	110	85	226	196
2020	4,394	3,333	118	80	242	198
2021	4,612	3,671	126	74	257	200
2022	4,839	4,026	136	67	272	202
2023	5,079	4,396	145	60	285	205
2024	5,334	4,824	155	50	300	205
2025	5,603	5,265	164	42	314	205
2026	5,889	5,727	174	33	329	207
2027	6,192	6,208	186	25	345	212
2028	6,516	6,654	198	30	363	228
2029	6,858	7,123	210	35	381	245

SCENARIO C (OPTIMISTIC), ALLOCATION OPTION A

Year	Accrued Actuarial Liabilities ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments ($ millions)	Total Required Contribution ($ millions)
2010	2,628	1,712	61	56	117	116
2011	2,775	1,695	64	68	126	132
2012	2,928	1,688	68	81	136	149
2013	3,087	1,732	72	90	146	163
2014	3,252	1,881	77	93	157	170
2015	3,425	2,080	82	92	170	174
2016	3,603	2,288	88	92	183	180
2017	3,789	2,473	96	93	196	189
2018	3,982	2,701	103	92	210	195
2019	4,185	2,974	110	88	226	199
2020	4,394	3,261	118	85	242	203
2021	4,612	3,572	126	81	257	207
2022	4,839	3,898	136	76	272	212
2023	5,079	4,236	145	72	285	217
2024	5,334	4,617	155	65	300	220
2025	5,603	5,013	164	60	314	224
2026	5,889	5,432	174	54	329	228
2027	6,192	5,873	186	49	345	235
2028	6,516	6,289	198	47	363	244
2029	6,858	6,720	210	45	381	255

SCENARIO C (OPTIMISTIC), ALLOCATION OPTION B

Year	Accrued Actuarial Liabilities ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments ($ millions)	Total Required Contribution ($ millions)
2010	2,628	1,712	61	56	117	116
2011	2,775	1,696	64	68	126	132
2012	2,928	1,688	68	81	136	149
2013	3,087	1,732	72	90	146	163
2014	3,252	1,889	77	92	157	169
2015	3,425	2,095	82	91	170	173
2016	3,603	2,308	88	90	183	179
2017	3,789	2,509	96	90	196	186
2018	3,982	2,747	103	89	210	192
2019	4,185	3,025	110	85	226	195
2020	4,394	3,315	118	81	242	199
2021	4,612	3,630	126	77	257	203
2022	4,839	3,966	136	71	272	207
2023	5,079	4,314	145	66	285	211
2024	5,334	4,703	155	59	300	214
2025	5,603	5,107	164	53	314	217
2026	5,889	5,530	174	47	329	221
2027	6,192	5,982	186	41	345	227
2028	6,516	6,405	198	38	363	236
2029	6,858	6,835	210	37	381	247

SCENARIO C (OPTIMISTIC), ALLOCATION OPTION C

Year	Accrued Actuarial Liabilities ($ millions)	Actuarial Value of Assets ($ millions)	Normal Cost ($ millions)	Amortization of Unfunded Actuarial Accrued Liability ($ millions)	Benefit Payments ($ millions)	Total Required Contribution ($ millions)
2010	2,628	1,710	61	56	117	116
2011	2,775	1,695	64	68	126	132
2012	2,928	1,687	68	81	136	149
2013	3,087	1,730	72	91	146	163
2014	3,252	1,889	77	92	157	169
2015	3,425	2,102	82	90	170	173
2016	3,603	2,319	88	89	183	178
2017	3,789	2,533	96	89	196	184
2018	3,982	2,782	103	86	210	189
2019	4,185	3,072	110	81	226	192
2020	4,394	3,376	118	77	242	195
2021	4,612	3,707	126	71	257	197
2022	4,839	4,065	136	64	272	200
2023	5,079	4,434	145	57	285	202
2024	5,334	4,847	155	49	300	204
2025	5,603	5,275	164	41	314	205
2026	5,889	5,721	174	33	329	207
2027	6,192	6,201	186	25	345	212
2028	6,516	6,644	198	30	363	228
2029	6,858	7,095	210	35	381	245