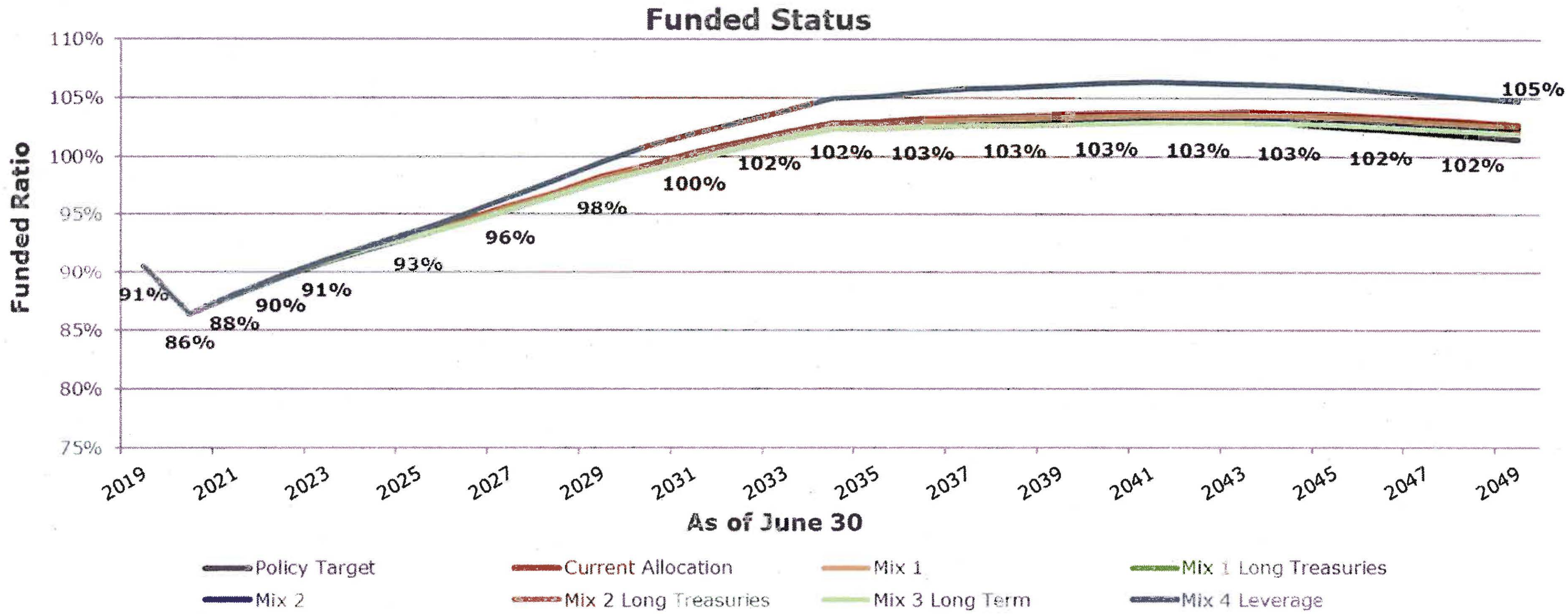
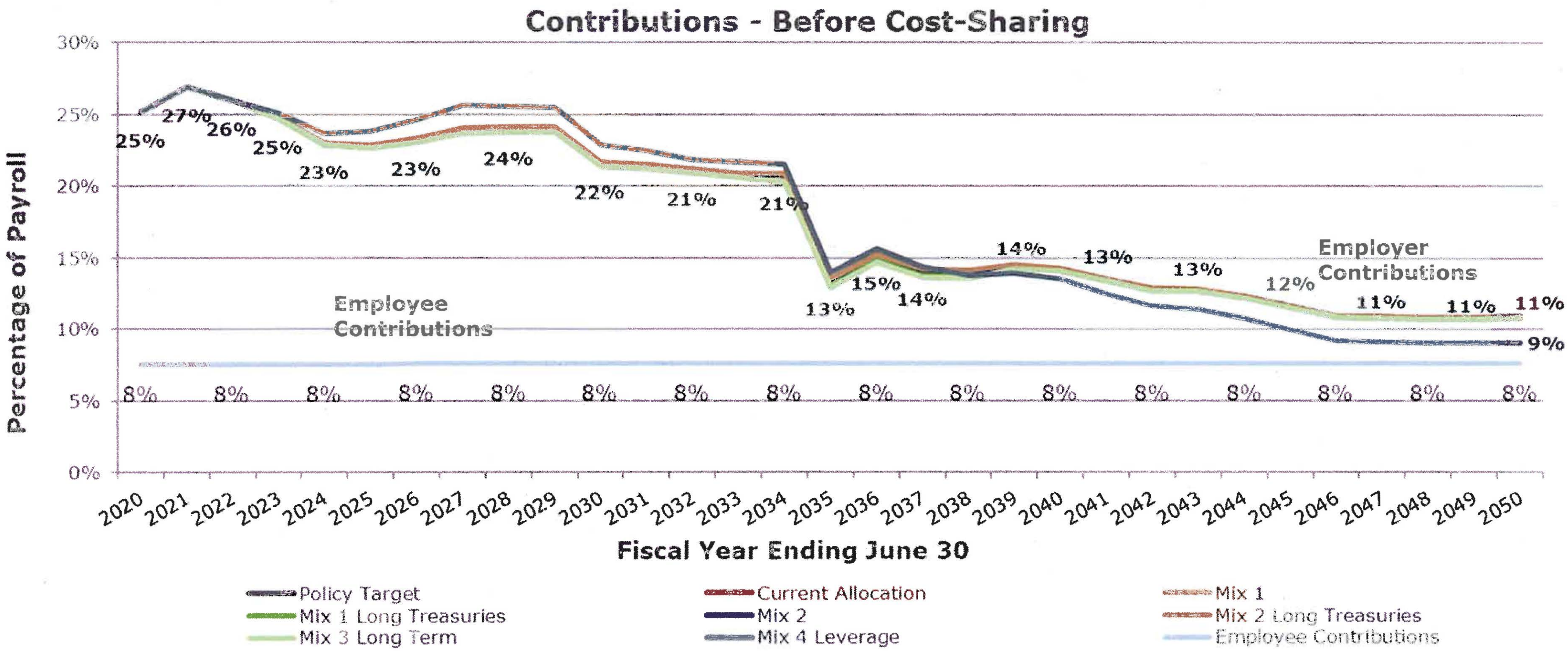
LONG-TERM EXPECTATIONS



- **Mix 4 Leverage results in higher funding ratios than all other asset allocation mixes**
- **The remaining plans all have similar results despite having structural differences**

Deterministic projections based on Current Policy Target allocation and NEPC's 2020 30-year return assumptions. FY 2019-2020 investment return is estimated to be 1.3%

LONG-TERM EXPECTATIONS



- **Mix 4 Leverage results in lower long-term employer contribution rate of 9% vs. 11% for all other asset allocation mixes**
- **The remaining mixes all have similar results under the baseline return expectations**
- **Employee contributions are projected to remain relatively level over the projection period, at 7.7% of pay**

Deterministic projections based on Current Policy Target allocation and NEPC's 2020 30-year return assumptions. FY 2019-2020 investment return is estimated to be 1.3%

NE PC

SCENARIO ANALYSIS

SCENARIO ANALYSIS: REGIME CHANGES

- **NEPC scenario analysis highlights the impact of shifting economic and market regimes on the portfolio and potential asset allocation mixes**
  - Scenario returns are based on asset class beta exposure informed by historical returns classified across market regimes and NEPC's current capital market assumptions
  - Allows for a better understanding of portfolio risk exposures under non-consensus inflation and economic growth outcomes over a five year time horizon

Expansion

Informed by four years of a rising economic growth and a rising inflation regime followed by a year of rising growth and a falling inflation

Overextension

Informed by three years of a rising economic growth and a rising inflation regime followed by a year of economic growth and inflation in balance, and a final year of falling growth and inflation

Goldilocks

Economic growth and inflation are in balance

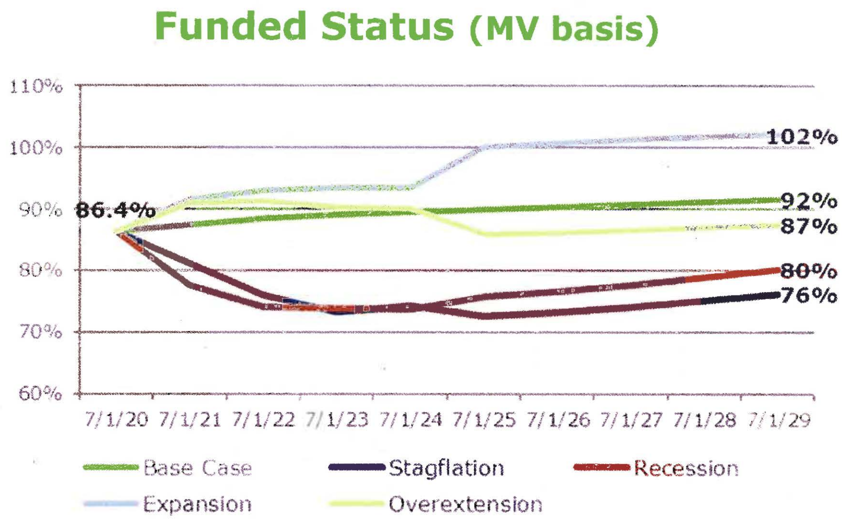
Recession

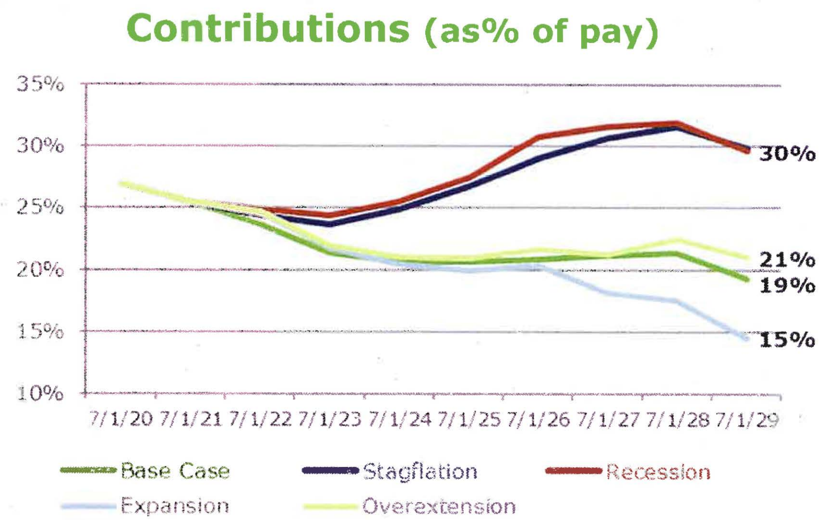
Informed by three years of a falling economic growth and a falling inflation regime followed by two years of an economic growth recovery and rising inflation

Stagflation

Informed by two years of a falling economic growth and a rising inflation regime, followed by two years of rising growth and inflation and a final year of falling growth and rising inflation

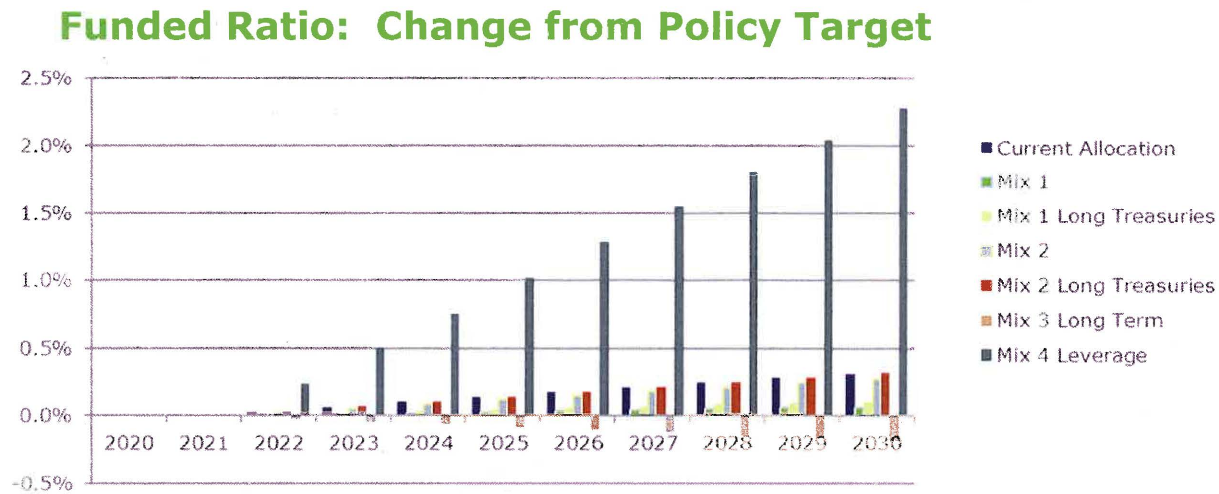
ECONOMIC SCENARIOS: POLICY TARGET

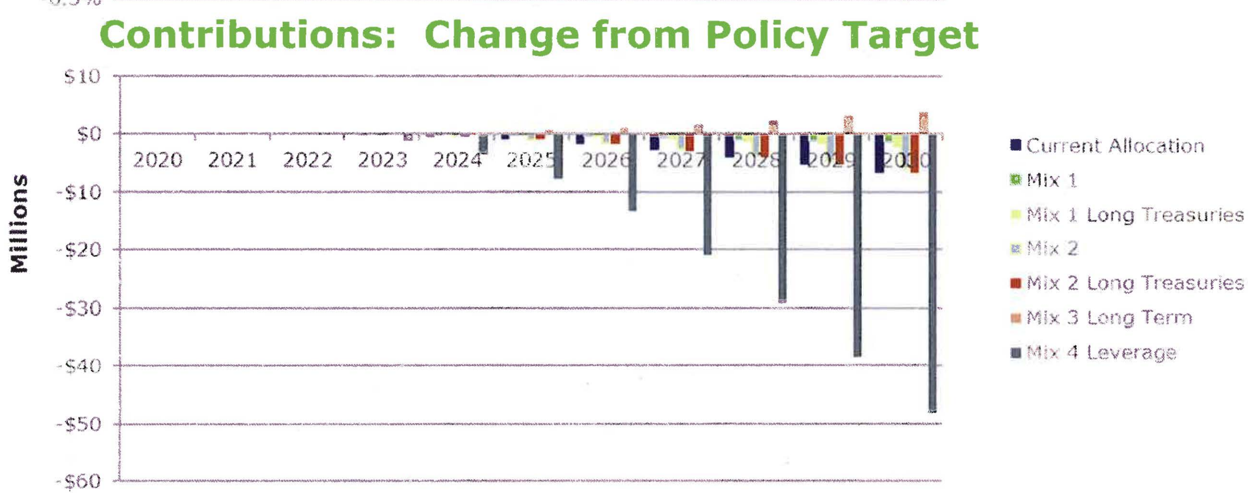




- **Funded status over the next 10 years can range between 76% and 102%**
- **The range of outcomes can be significant even with multiple smoothing techniques in place**
  - Actuarial assets smooths gains and losses over 5 years
  - Gains and losses in unfunded liabilities are amortized over 20 years
  - COLA increases in liabilities are amortized over 5 years
- **Negative asset returns under Recession and Stagflation have the most severe effect on funded status, but begin to recover at the end of the 10 year period**
- **Contributions follow a similar pattern, increasing to as high as 30% under the Recession scenario, or as low as 15% in a strong economy**

ECONOMIC SCENARIOS: BASE CASE



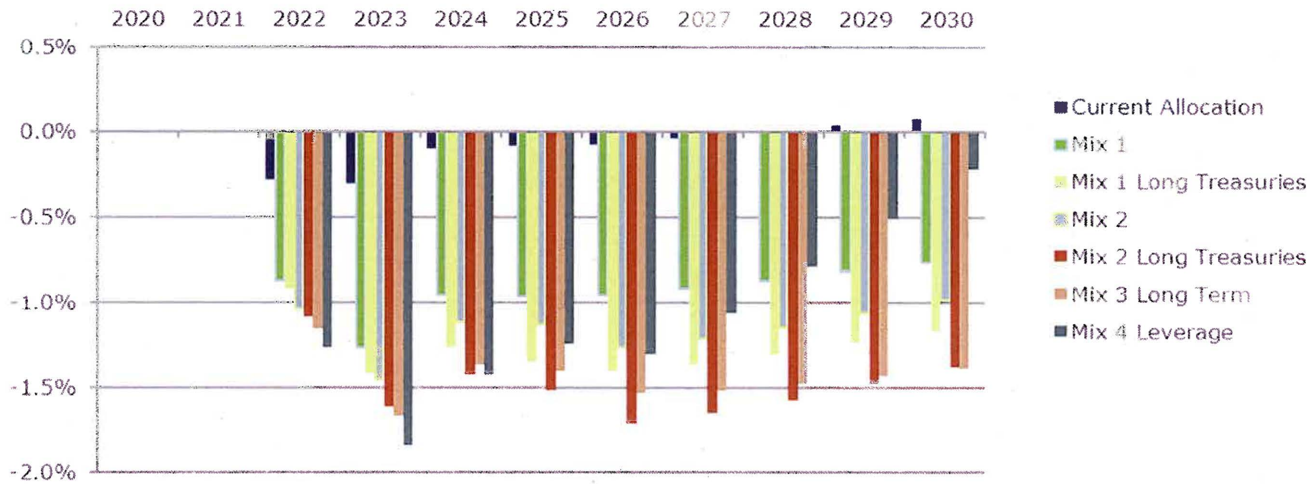


- **Mix 4 Leverage increases the Funded Ratio by 2.2% in 10 years while all other alternative allocations do not result in significant changes to Funded Ratio**
- **Employer contributions are projected to be almost $50m lower in 2030 under the Mix 4 Leverage allocation**

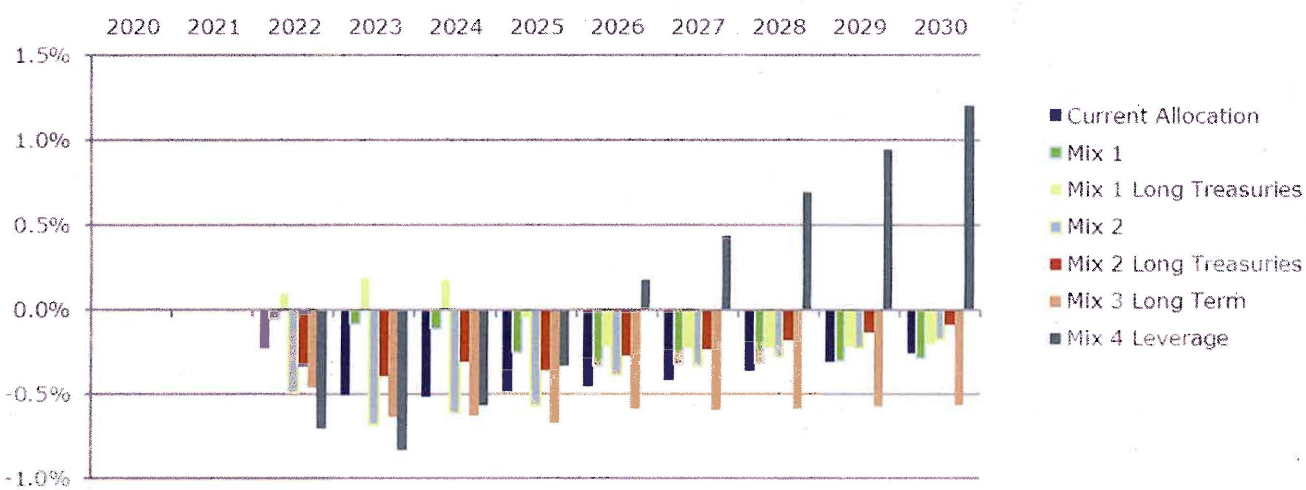
Funded status = Market Value of Assets/Accrued Liability

ECONOMIC SCENARIOS: FUNDED STATUS CHANGE FROM POLICY TARGET

Stagflation
Informed by two years of a falling economic growth and a rising inflation regime, followed by two years of rising growth and inflation and a final year of falling growth and rising inflation



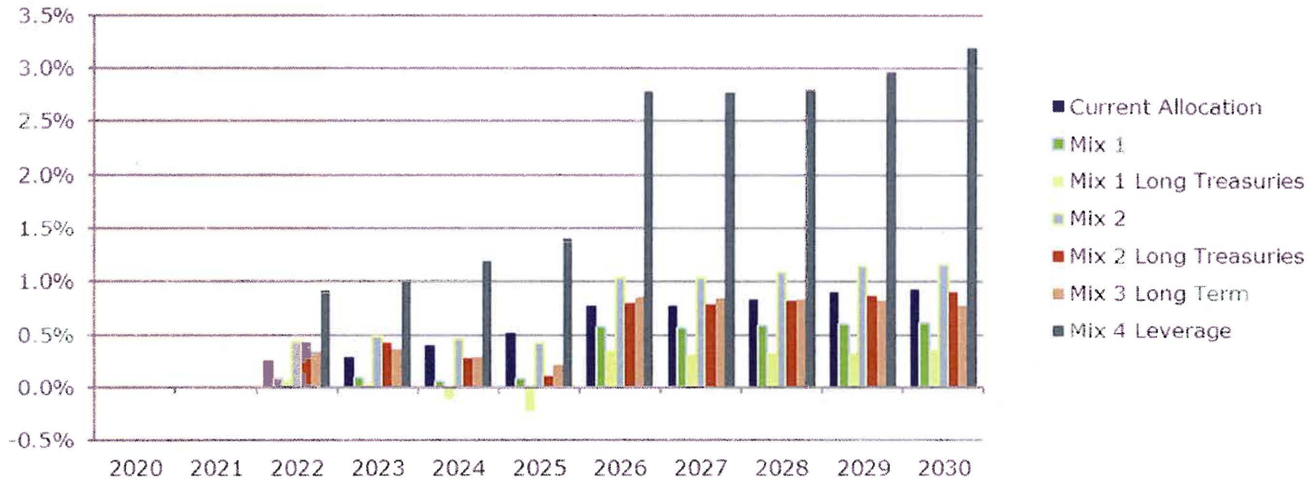
Recession
Informed by three years of a falling economic growth and a falling inflation regime followed by two years of an economic growth recovery and rising inflation



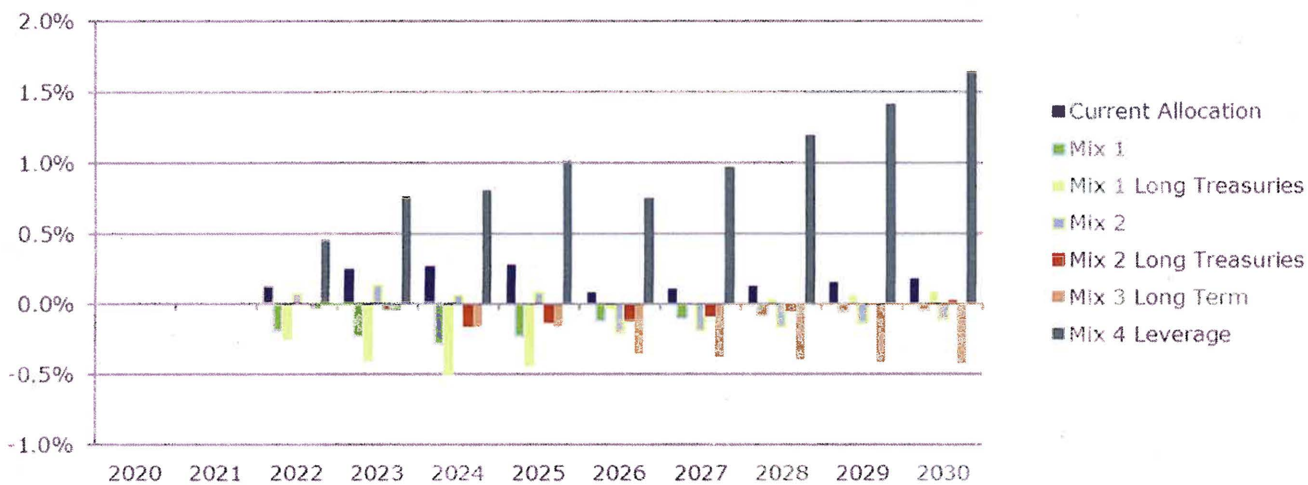
- **The Funded Status decreases the least for the Current Allocation in the Stagflation scenario and increases the most for Mix 4 Leverage under a Recession**

ECONOMIC SCENARIOS: FUNDED STATUS CHANGE FROM POLICY TARGET

Expansion
Informed by four years of a rising economic growth and a rising inflation regime followed by a year of rising growth and a falling inflation



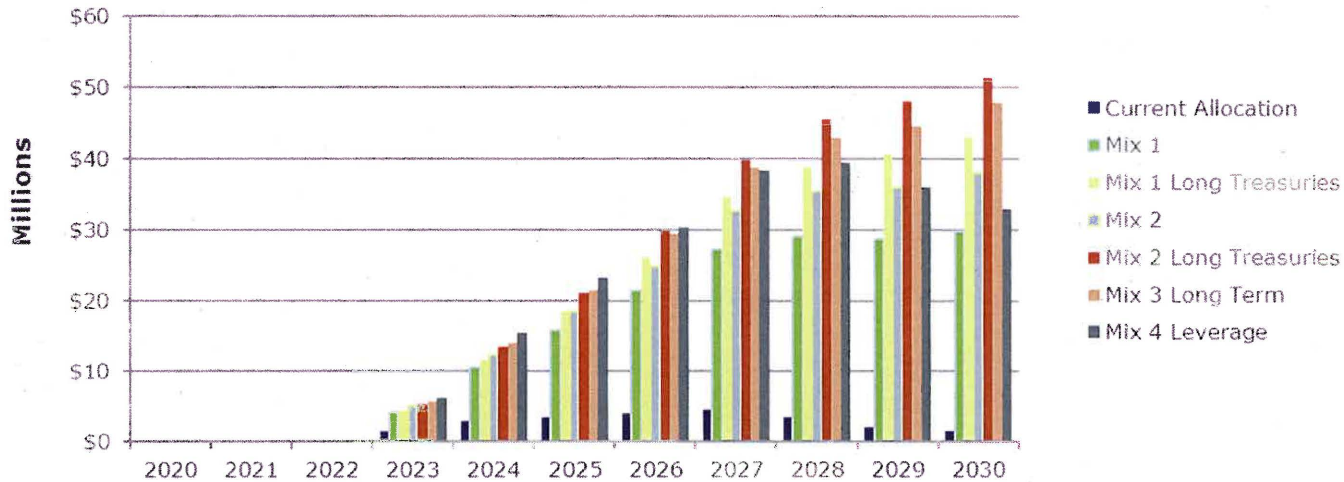
Overextension
Informed by three years of a rising economic growth and a rising inflation regime followed by a year of economic growth and inflation in balance, and a final year of falling growth and inflation



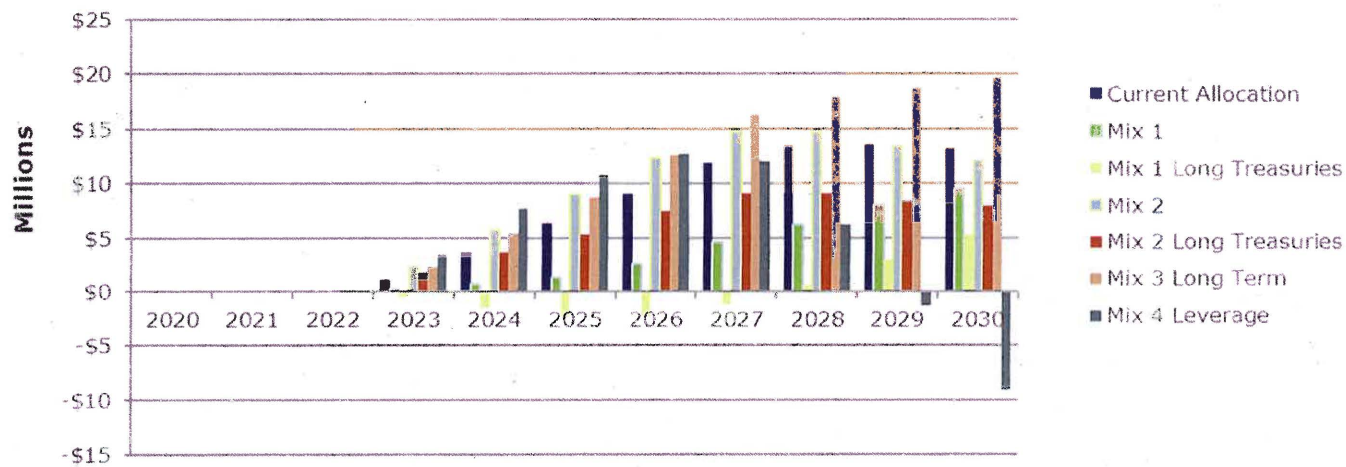
- **The Funded Status is projected to be substantially higher for Mix 4 Leverage under Expansion and Overextension economic scenarios**

ECONOMIC SCENARIOS: CONTRIBUTIONS CHANGE FROM POLICY TARGET

Stagflation
Informed by two years of a falling economic growth and a rising inflation regime, followed by two years of rising growth and inflation and a final year of falling growth and rising inflation



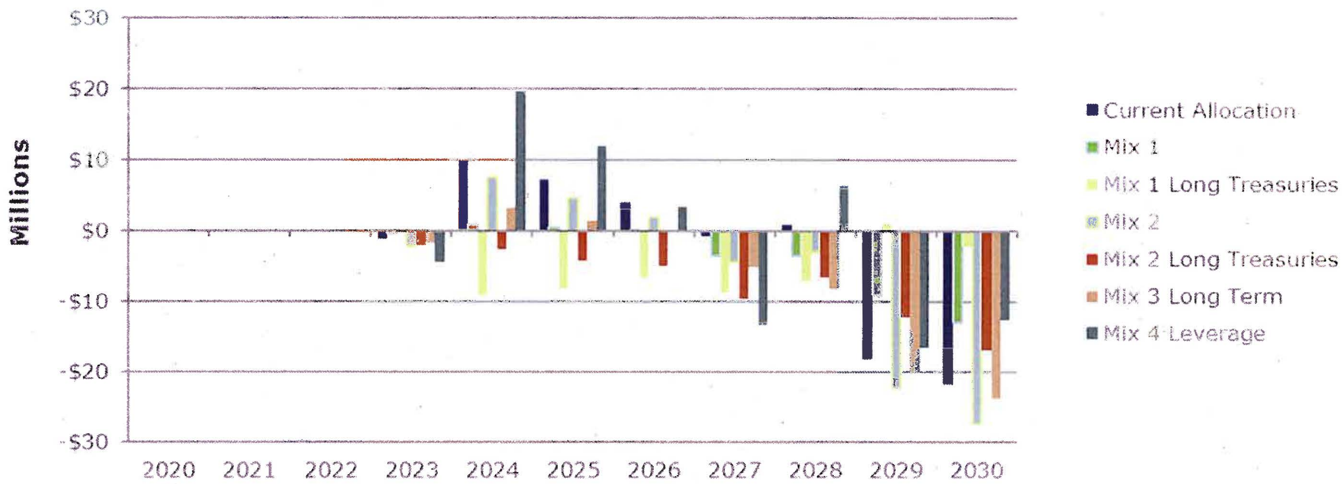
Recession
Informed by three years of a falling economic growth and a falling inflation regime followed by two years of an economic growth recovery and rising inflation



- **Contributions are increased the least for the Current Allocation under Stagflation scenario and decreased the most for Mix 4 Leverage under Recession scenario**

ECONOMIC SCENARIOS: CONTRIBUTIONS CHANGE FROM POLICY TARGET

Expansion
Informed by four years of a rising economic growth and a rising inflation regime followed by a year of rising growth and a falling inflation



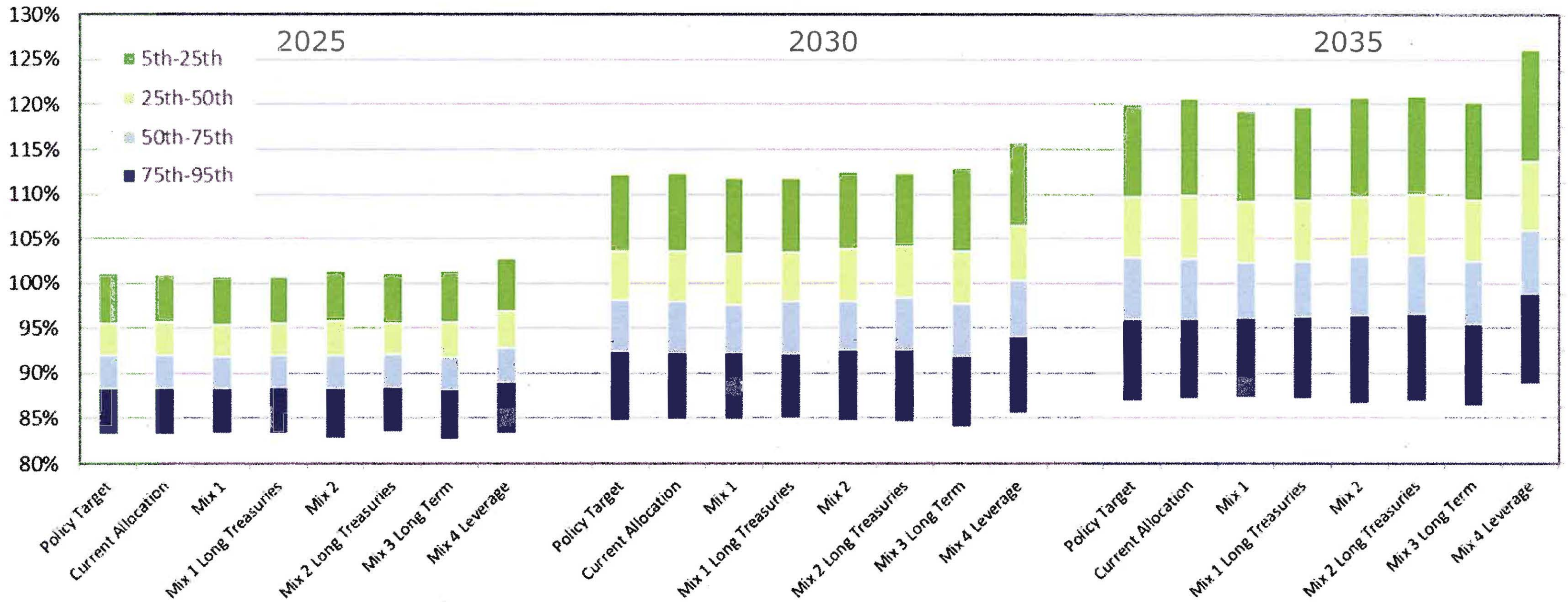
Overextension
Informed by three years of a rising economic growth and a rising inflation regime followed by a year of economic growth and inflation in balance, and a final year of falling growth and inflation

- **Contributions are decreased the most for Mix 4 Leverage under Overextension economic scenario**

NEPC

STOCHASTIC ANALYSIS

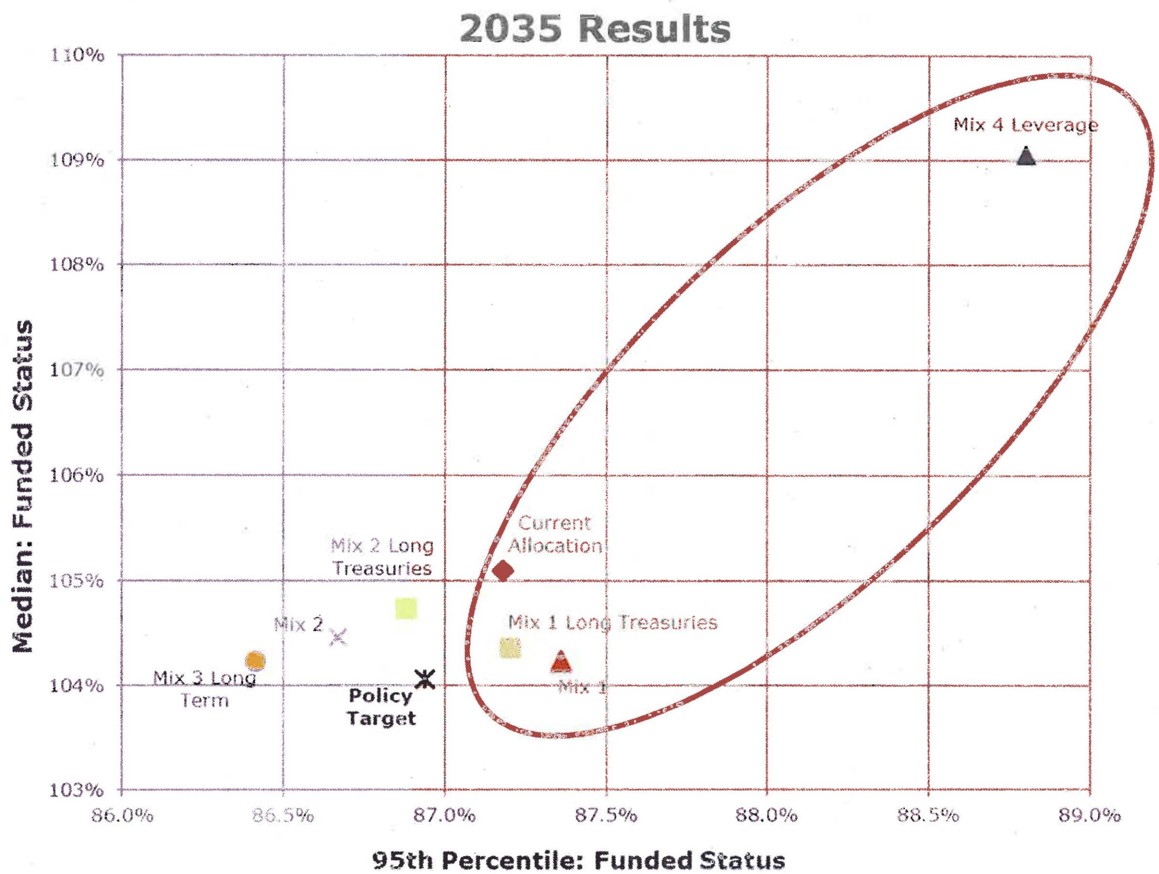
STOCHASTIC ANALYSIS FUNDED STATUS



- **Important to look at the median (50th percentile) and overall range of outcomes**
- **Mix 4 Leverage results in the highest funded status at the median in 5, 10 and 15 years**
- **Mix 2 and Mix 4 Leverage have a higher median funded status, as well as more protection against worst case scenarios (95th percentile) compared to the current Policy Target**

Note: Analysis uses NEPC's long-term assumptions for expected return for each allocation

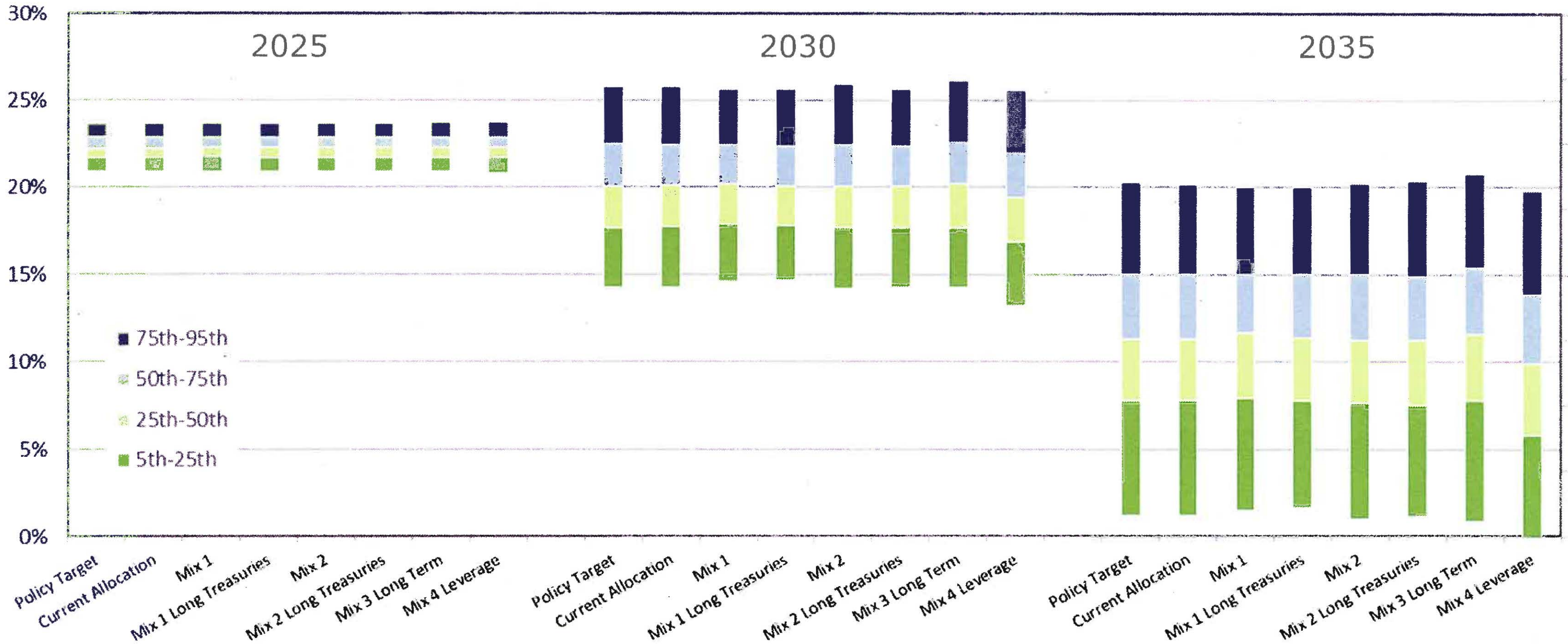
STOCHASTIC ANALYSIS FUNDED STATUS



- **Looking at the results from year 2035, Mix 4 Leverage results in a higher median funded status than the current Policy Target, AND a higher worst case scenario (95th percentile) funded status**
- **Both Mix 1 allocations reduce downside risk while maintaining funded status**

Note: Analysis uses NEPC's long-term assumptions for expected return for each allocation

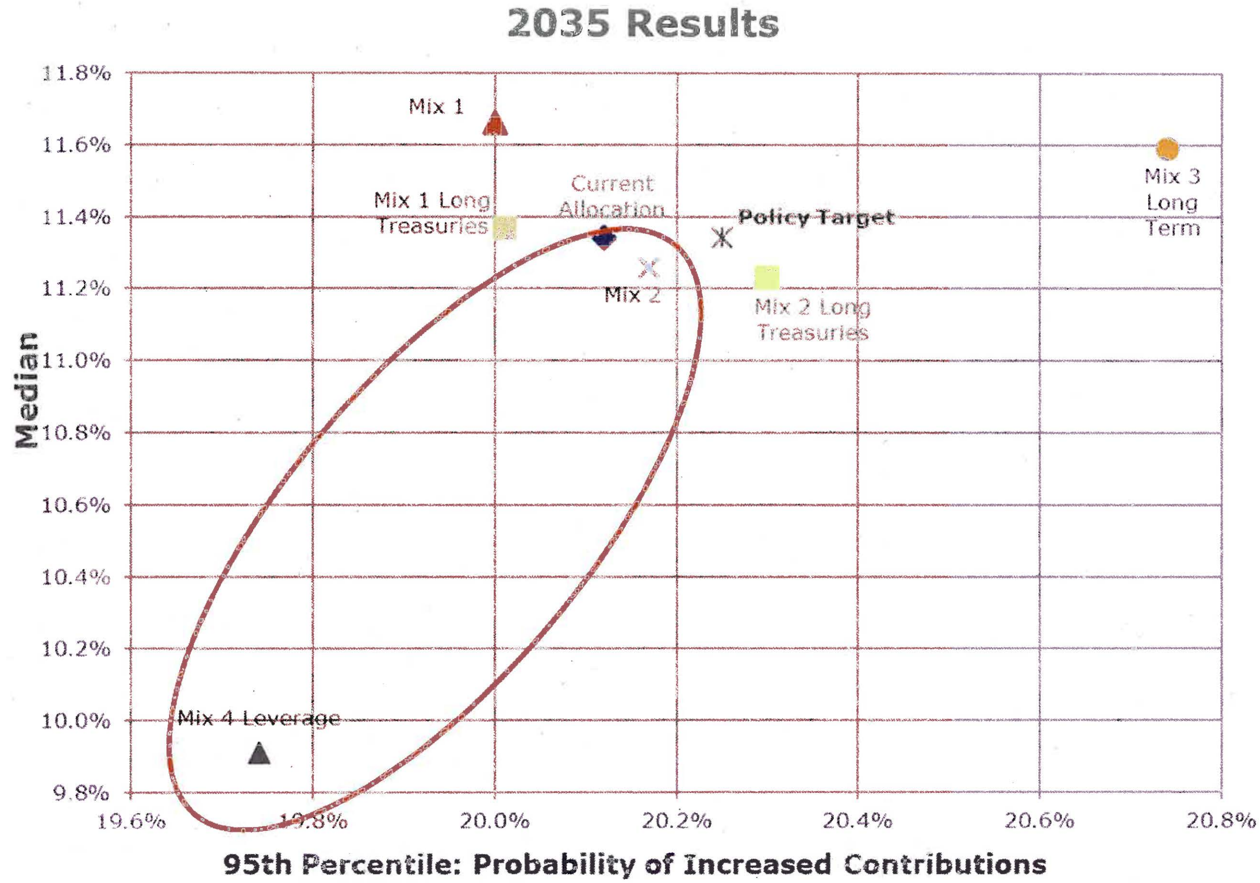
STOCHASTIC ANALYSIS
EMPLOYER CONTRIBUTION RATE



- **Most of the mixes have similar results, changes have a small effect in general**
- **Mix 4 Leverage has the lowest contributions at the median and at the 95th percentile**
- **The higher the excess returns, the more often Supplemental COLAs will be paid, thus increasing employer contributions, up to a point**
  - After that point, the higher expected return is able to cover the additional liabilities from the COLAs and funded status increases

Note: Analysis uses NEPC's long-term assumptions for expected return for each allocation

STOCHASTIC ANALYSIS EMPLOYER CONTRIBUTION RATE



- **Looking at the results from year 2035, both the Mix 2 and Mix 4 Leverage allocations result in a lower median contribution rate than the current Policy Target, AND a lower worst case scenario (95th percentile)**

Note: Analysis uses NEPC's long-term assumptions for expected return for each allocation

CONCLUSIONS

- **The System's funded status has fallen 5% over the last year, but is projected to increase over the next ten years if investment expectations are met**

- **The current Policy Target allocation is not expected to meet the long-term expected return of 7.4% over the next ten years due to near term headwinds**
  - However, the Current Policy allocation is expected to exceed 7.4% on a 30-year basis
  - NEPC expectations average 7.1% over the next 10 years and 8.1% over 30 years

- **Supplemental COLAs increase liabilities and employer contributions if investment gains exceed the expected actuarial return**

- **Proposed asset allocation changes improve risk-adjusted returns**
  - Continue to build the public and private equity portfolios to improve returns
  - Reduce real assets and absolute return allocations
  - Consider addition of GTAA and Long Treasuries to protect against market volatility
  - Explore the use of leverage to increase exposure to equity markets

- **Mix 4 Leverage outperforms all other alternative asset allocation mixes with expected 10-year return of 7.4% vs. 7.1% and 30-year return of 8.5% vs. 8.1% for all other mixes**

- **Next Steps**
  - Select Asset Allocation Targets
  - Approve Targets/Ranges/Benchmarks
  - Further research and education on leverage

APPENDIX

DETERMINISTIC PROJECTIONS - ASSUMPTIONS AND METHODOLOGY

- **Deterministic projections use the Current Target allocation and NEPC's base case scenario assumptions for investment returns**

- **Liability calculations follow a roll-forward methodology based on the July 1, 2019 actuarial valuation by Cheiron**
  - Accrued Liability and Normal Cost rolled forward annually, adjusted for benefit payment changes
  - Discount rate is assumed to remain at 7.4% each year
  - Benefit payments as projected by the plan's actuary

- **Actual asset returns through May 31, 2020 (1.3%) were used, with 0% return assumed for June 2020, and NEPC 2020 asset class assumptions were used after June 30, 2020**
  - NEPC's 10 year return of 7.1% for Medium-Term expectations
  - NEPC's 30 year return of 8.1% for Long-Term expectations

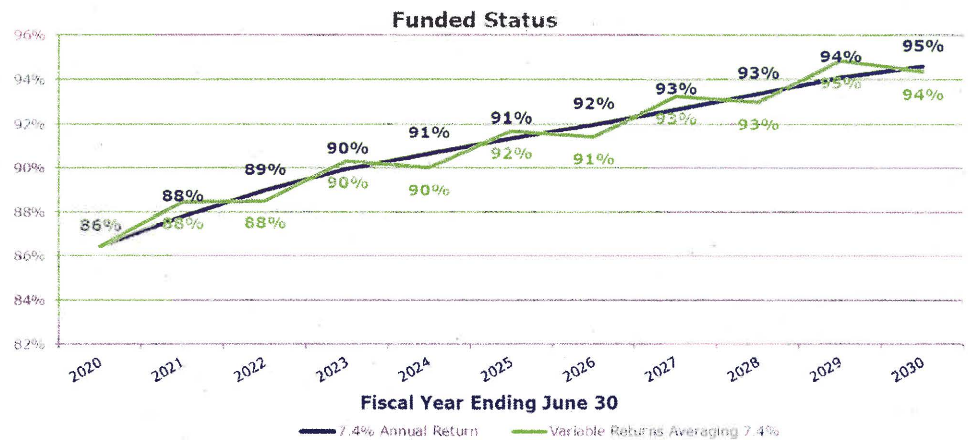
- **Contributions based on calculations in the plan's funding formula**
  - Employer normal cost plus amortization of unfunded liability and various gain and loss bases
  - Future asset gains and losses are amortized over 20 years
  - Salary scale is assumed to remain at the 2019 assumed rate of 3.5%
  - Cost sharing percentages are applied to the contribution percentage using "Group 1" rates

- **Cost of Living Increases (COLAs)**
  - Basic COLAs are assumed for 90% of retirees at a 2% increase per year
  - Supplemental COLAs are applied when there are "excess earnings" above the expected 7.4% return on actuarial value of assets, less the Basic COLA amount
  - Pre-1997 retirees receive a supplemental COLA when funded status is above 100%
  - Future Supplemental COLA increases to liabilities are amortized over 5 years

SUPPLEMENTAL COLA: CASE STUDY

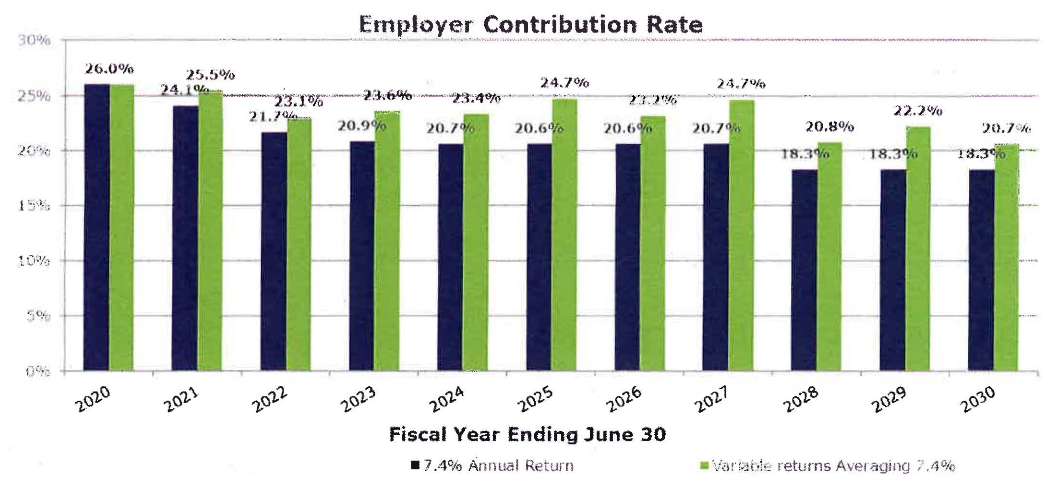
Scenario 1: Plan returns 7.4% every year for 10 years

Scenario 2: Plan average annual return is 7.4% over 10 years, alternating annual returns of 6.0% and 9.1%



- **Scenario 2 funded status is more variable, but the two scenarios have similar funded status at the end of ten years**
- **Scenario 2 results in an increase in employer contributions of up to 4% of payroll annually**

- **Supplemental COLA's would be given every other year, permanently increasing liabilities**
- **Liability increases are amortized over 5 years, while investment gains are amortized over 20 years**



Based on NEPC's 2020 10-year return assumptions

STOCHASTIC FUNDED STATUS RESULTS

2025	Policy Target	Current Allocation	Mix 1	Mix 1 Long Treasuries	Mix 2	Mix 2 Long Treasuries	Mix 3 Long Term	Mix 4 Leverage
5th	101.2%	101.0%	100.8%	100.7%	101.4%	101.1%	101.4%	102.8%
25th	96.1%	96.0%	95.9%	95.6%	95.9%	96.2%	96.0%	97.2%
Median	92.4%	92.3%	92.4%	92.1%	92.2%	92.5%	92.3%	93.3%
75th	88.8%	88.5%	88.8%	88.5%	88.4%	89.0%	88.3%	89.4%
95th	83.2%	83.2%	83.4%	83.3%	82.8%	83.4%	82.7%	83.4%

2030	Policy Target	Current Allocation	Mix 1	Mix 1 Long Treasuries	Mix 2	Mix 2 Long Treasuries	Mix 3 Long Term	Mix 4 Leverage
5th	112.2%	112.3%	111.8%	111.7%	112.5%	112.4%	112.9%	115.8%
25th	104.5%	104.9%	104.4%	104.5%	104.8%	104.6%	105.1%	107.4%
Median	98.8%	99.1%	99.1%	98.7%	99.3%	98.6%	99.3%	101.1%
75th	93.2%	93.5%	93.4%	93.2%	93.4%	92.9%	93.3%	94.9%
95th	84.7%	84.8%	84.9%	84.9%	84.8%	84.6%	84.0%	85.6%

2035	Policy Target	Current Allocation	Mix 1	Mix 1 Long Treasuries	Mix 2	Mix 2 Long Treasuries	Mix 3 Long Term	Mix 4 Leverage
5th	120.1%	120.7%	119.3%	119.7%	120.8%	121.0%	120.3%	126.2%
25th	111.0%	111.9%	110.6%	110.7%	111.1%	111.4%	111.3%	116.2%
Median	104.1%	105.1%	104.2%	104.4%	104.5%	104.7%	104.2%	109.1%
75th	97.3%	98.0%	97.5%	97.6%	97.8%	97.9%	97.4%	101.3%
95th	86.9%	87.2%	87.4%	87.2%	86.7%	86.9%	86.4%	88.8%