PRELIMINARY ASSET-LIABILITY STUDY RESULTS

EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND

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OFFICE OF THE GENERAL TREASURER

HOPE

NEPC

ASSET/LIABILITY STUDY UPDATE

- **NEPC and State of RI Staff continue to make progress on the 2023 asset/liability.**

- **Recent notable updates:**
  - Final capital market assumptions adopted by SIC at April meeting
  - Discussion of experience study between NEPC and Staff held in May
  - Actuarial data received from GRS on 6/15/2023
  - NEPC delivers preliminary baseline output in July

- **Today's discussion provides an update on several topics:**
  - Updated study timeline
  - Review baseline output
  - Incorporation of scenario analysis
  - Discussion of portfolio risk metrics
  - Overview of implementation process, post A/L study

ASSET/LIABILITY STUDY TIMELINE

Step/Milestone	Timing
Asset/Liability Study Kickoff Discussion	February – COMPLETE
NEPC Coordinates with Plan Actuary on Data Needs	February – COMPLETE
Preliminary Capital Market Assumption Discussion	March – COMPLETE
Finalize Capital Market Assumptions	April – COMPLETE
NEPC Receives Actuarial Forecasts	June – COMPLETE
NEPC Prepares Baseline Forecast Results	July – COMPLETE
Discussion of Baseline Output and Scenario Analysis	**July – Today's Discussion**
Discuss Alternative Portfolios and Preliminary Findings	August SIC Meeting
NEPC and State of RI Staff Prepare Recommendation	August / September
Final Recommendation Delivered to SIC	September or October SIC Meeting
Portfolio Implementation Discussion	Post-A/L Study

Note: Timing is estimated and subject to change.

PRELIMINARY BASELINE OUTPUT

PRELIMINARY BASELINE OUTPUT

- **The following slides have deterministic and stochastic output across a number of different metrics including:**
  - Funded ratio projections
  - Contribution projections
  - Net cash flow projection

- **The results are broken out by State EEs and Teachers.**

- **All of the output assumes the portfolio is invested at the current policy target weights.**

- **In future asset/liability updates, we will compare results for the current policy target relative to alternative portfolio mixes.**
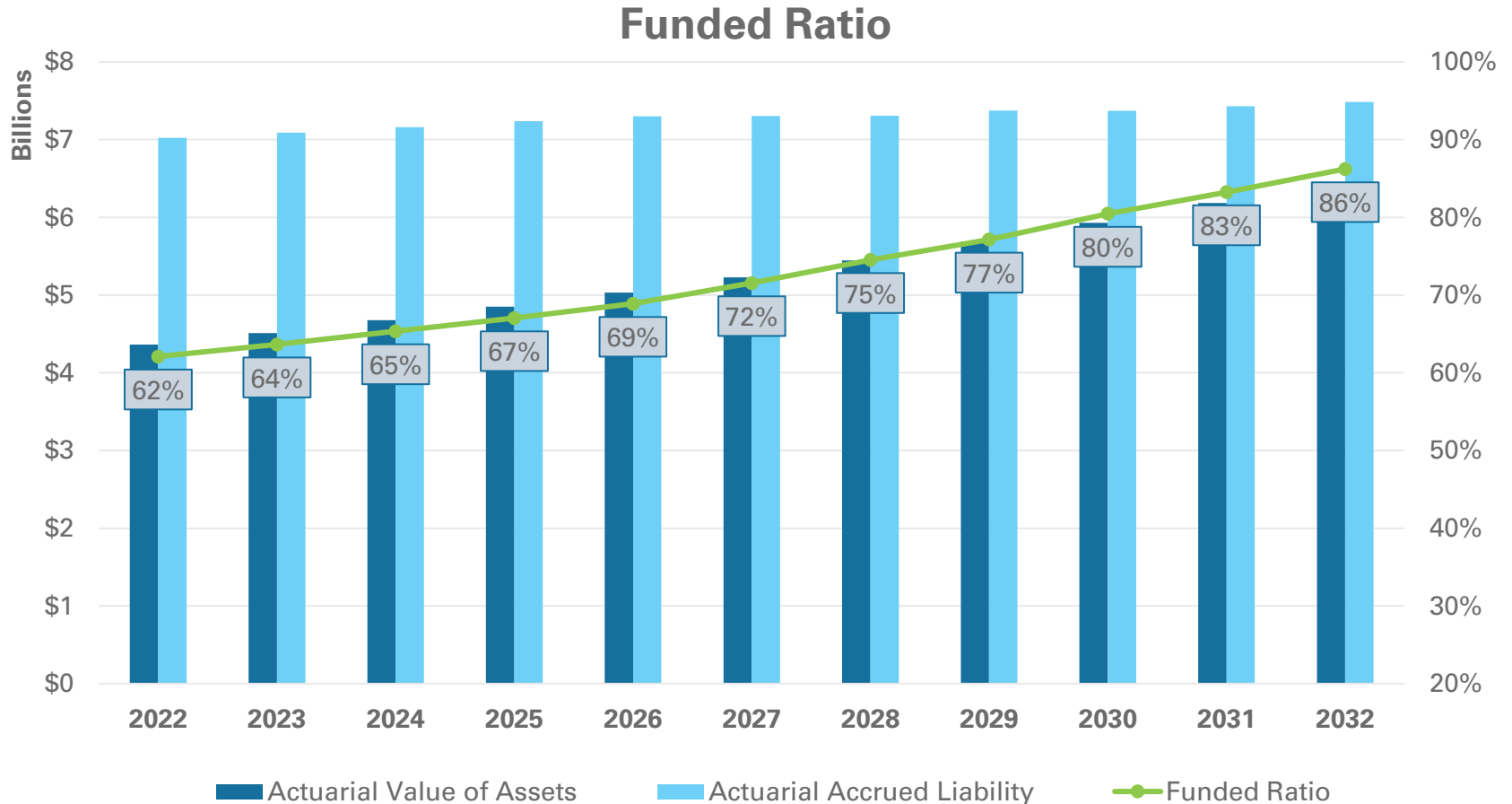
10-YEAR DETERMINISTIC FUNDED RATIO PROJECTION

EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND – STATE EEs

Funded Ratio

Legend: Actuarial Value of Assets · Actuarial Accrued Liability · Funded Ratio

10-YEAR DETERMINISTIC FUNDED RATIO PROJECTION

EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND – TEACHERS

Funded Ratio

Legend: Actuarial Value of Assets, Actuarial Accrued Liability, Funded Ratio
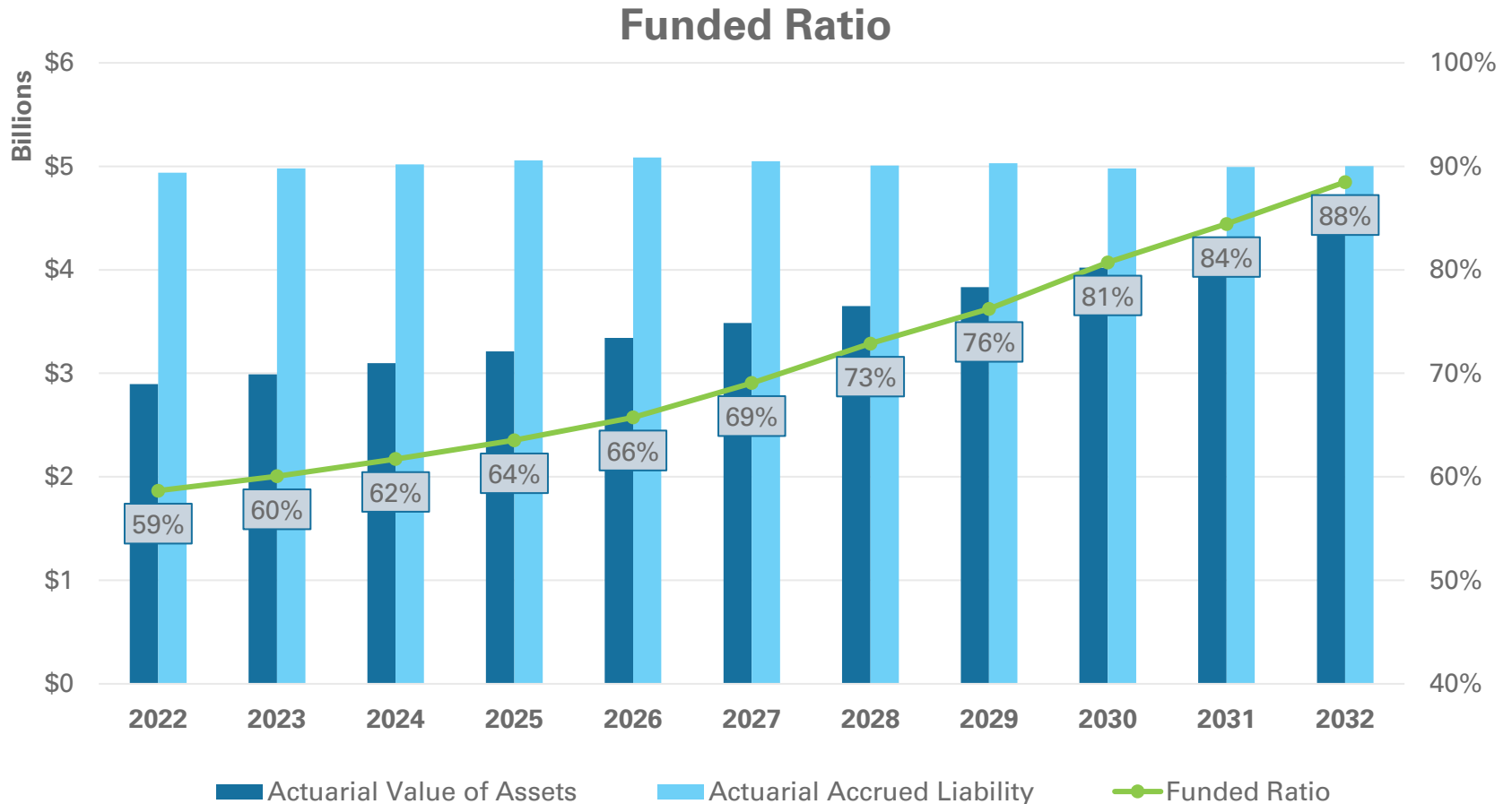
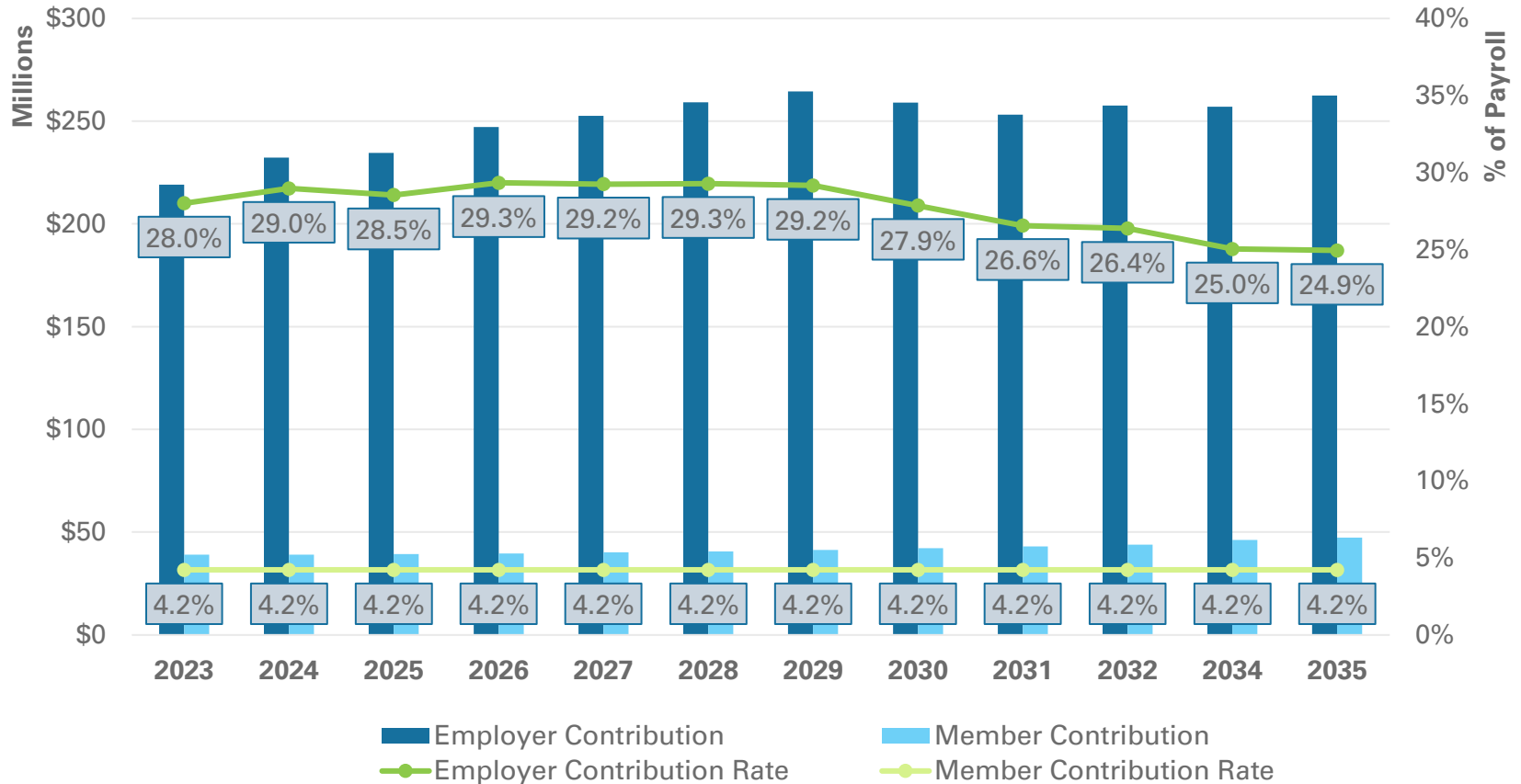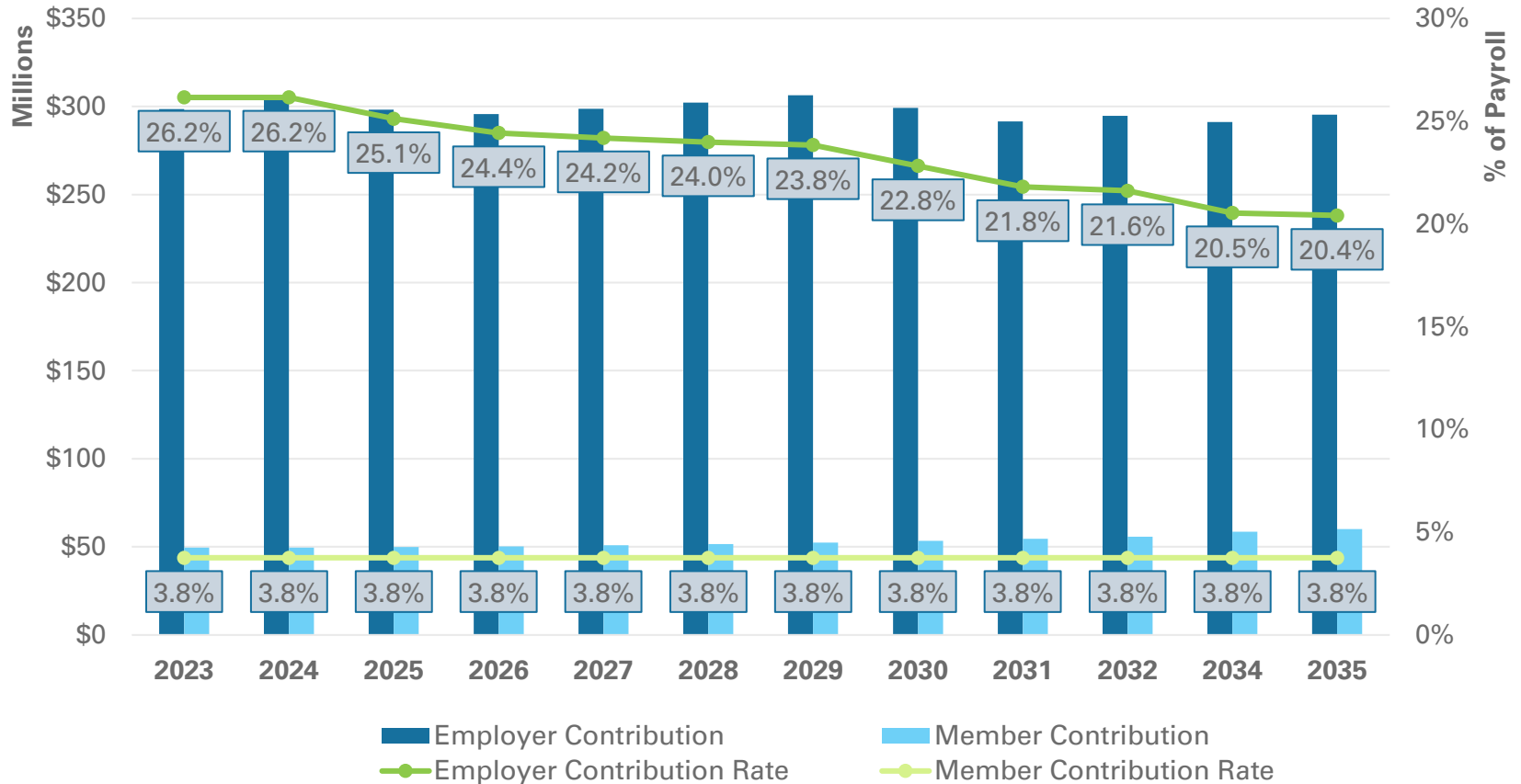# 10-YEAR DETERMINISTIC CONTRIBUTION PROJECTION

EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND – STATE EEs

Contributions

10-YEAR DETERMINISTIC CONTRIBUTION PROJECTION
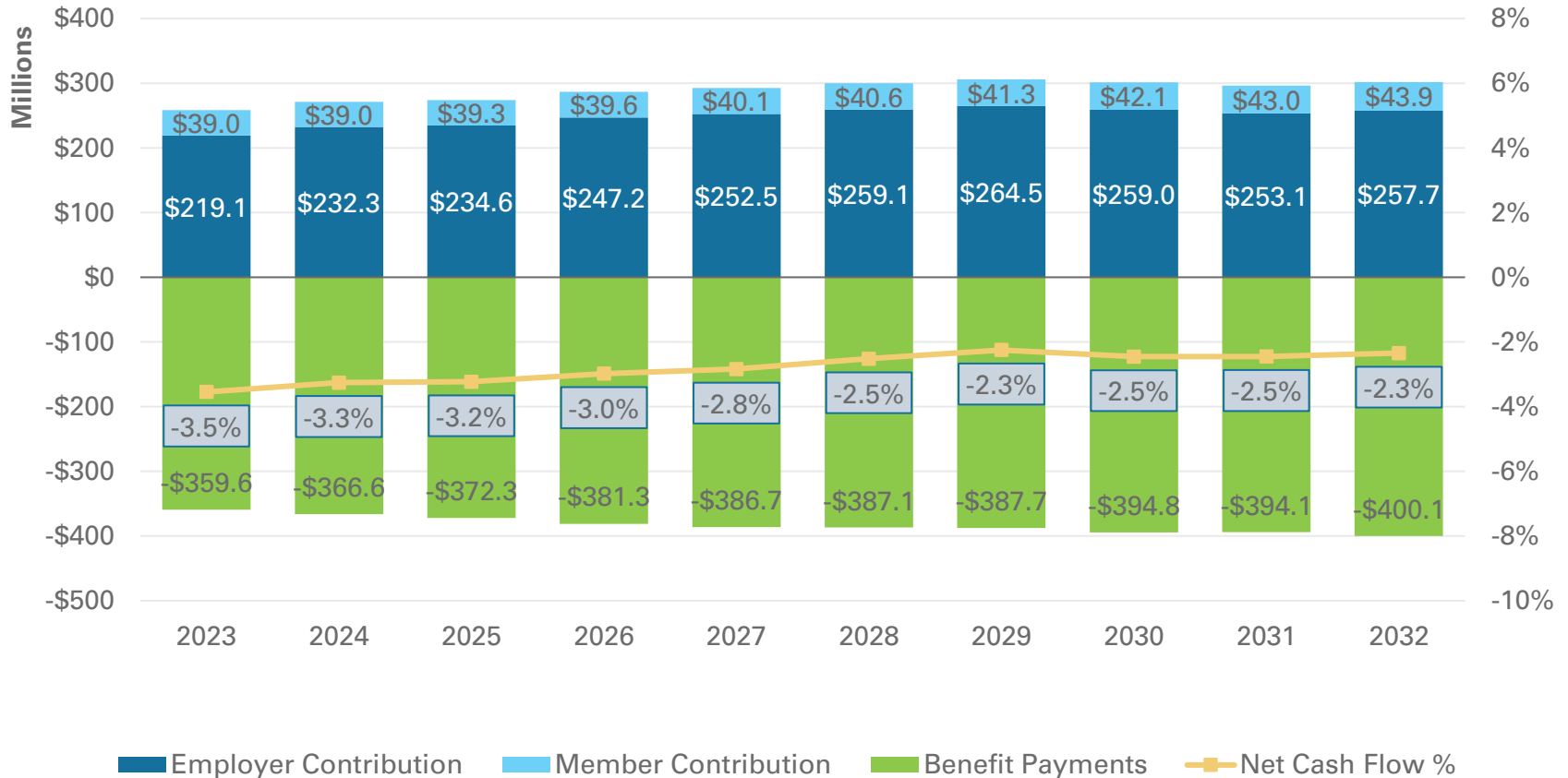
EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND – TEACHERS

Contributions

Legend: Employer Contribution, Member Contribution, Employer Contribution Rate, Member Contribution Rate

10-YEAR DETERMINISTIC NET CASH FLOW PROJECTION
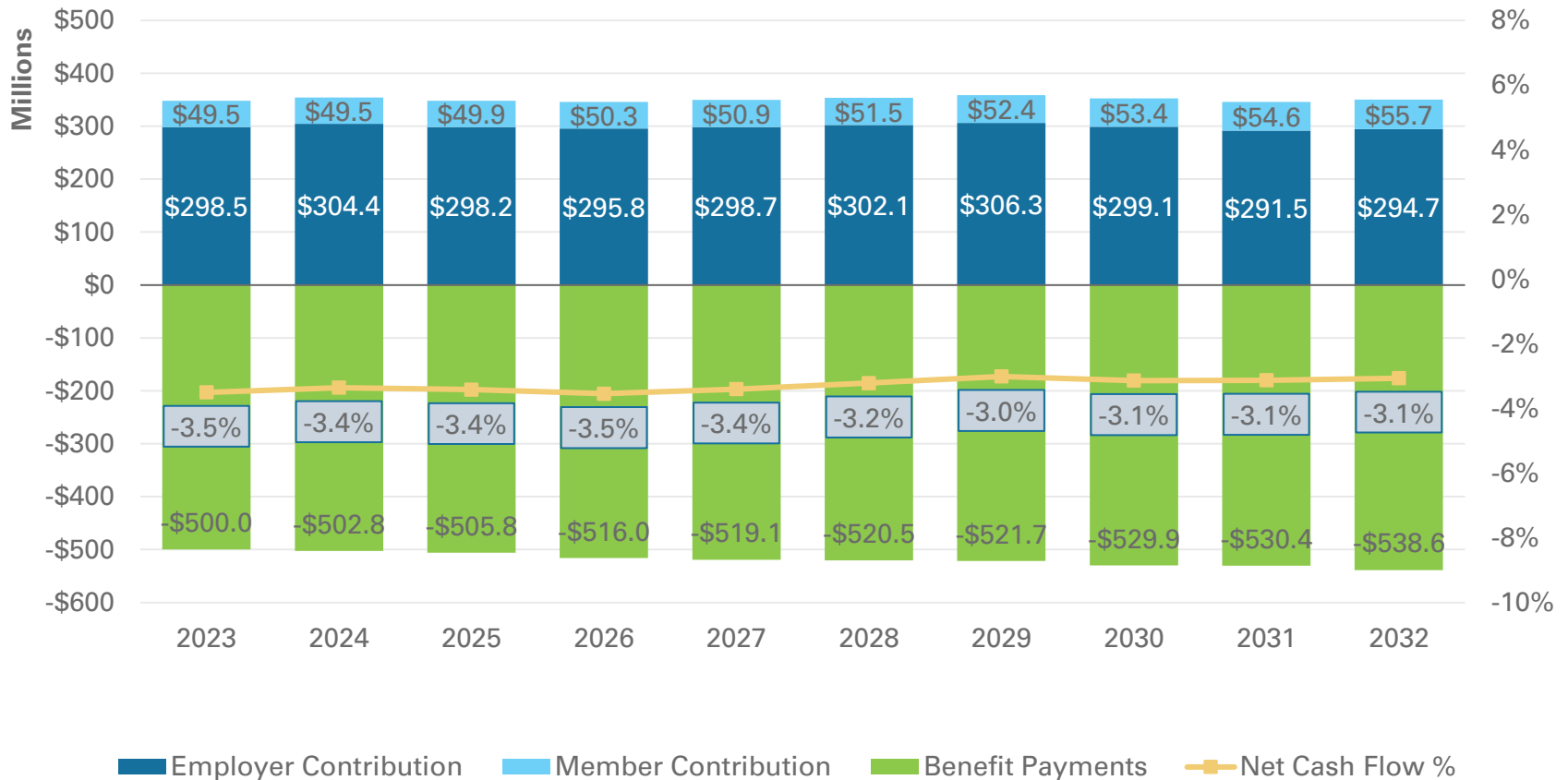
EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND – STATE EEs

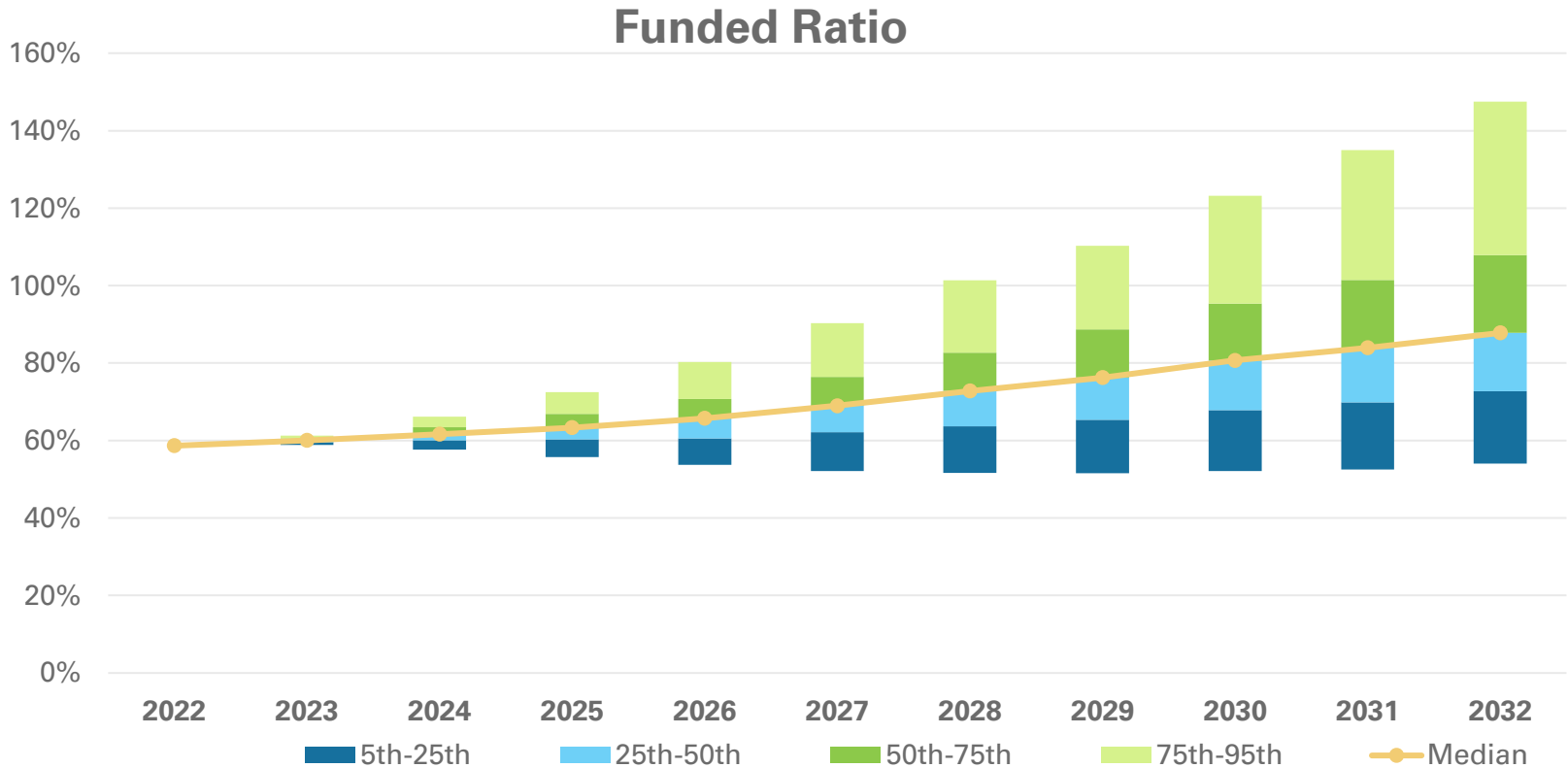Net Cash Flow

10-YEAR DETERMINISTIC NET CASH FLOW PROJECTION

EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND – TEACHERS

Net Cash Flow

10-YEAR STOCHASTIC FUNDED RATIO PROJECTION

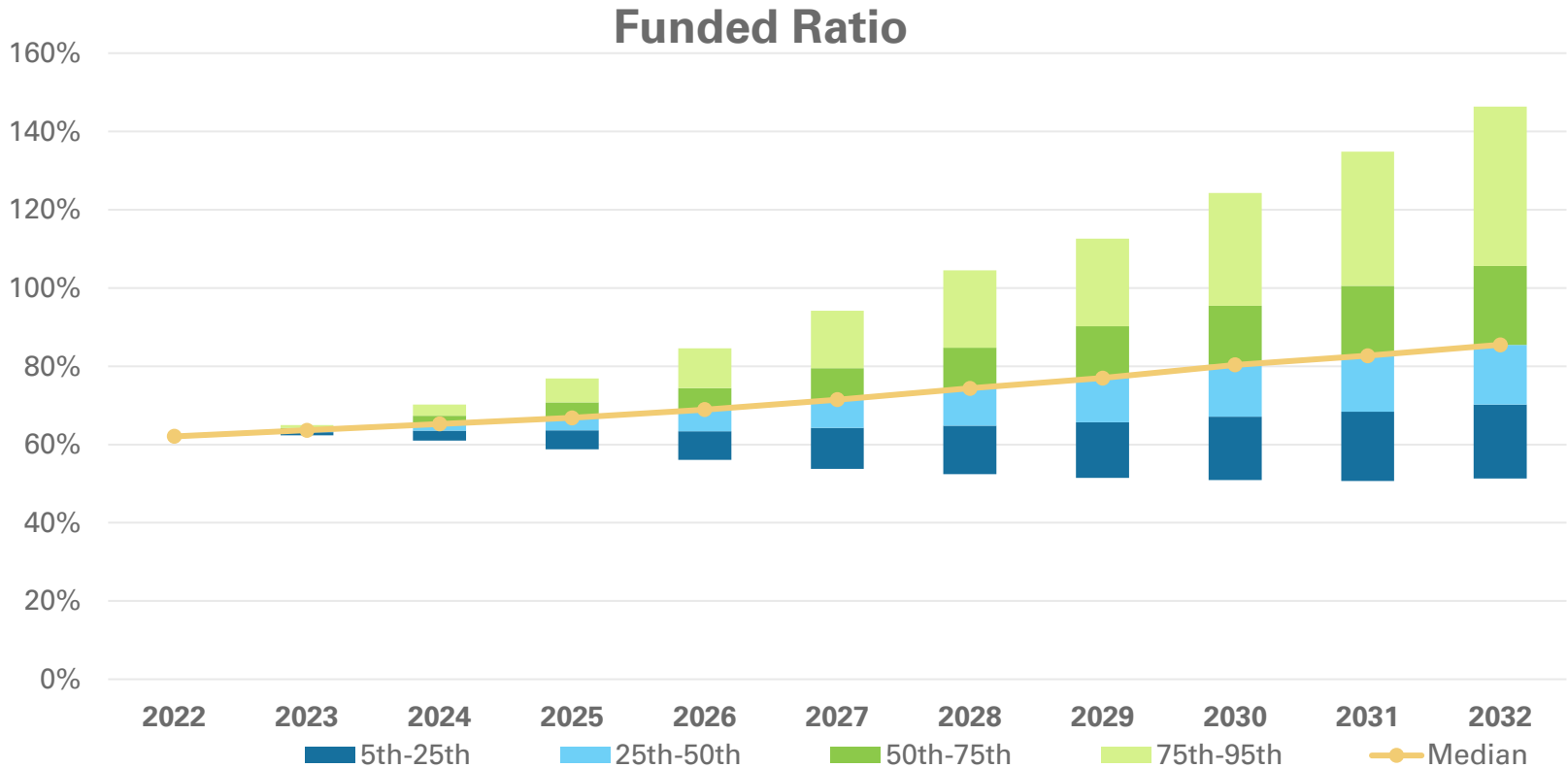EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND – STATE EEs

Funded Ratio

- **The probability of the funded ratio going below the 50% level in the next 10 years is 6.1%**

- **The probability of the funded ratio reaching the 100% level in the next 10 years is 34.2%**

10-YEAR STOCHASTIC FUNDED RATIO PROJECTION

EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND – TEACHERS

Funded Ratio

- **The probability of the funded ratio going below the 50% level in the next 10 years is 7.0%**

- **The probability of the funded ratio reaching the 100% level in the next 10 years is 31.8%**

10-YEAR STOCHASTIC CONTRIBUTION PROJECTION

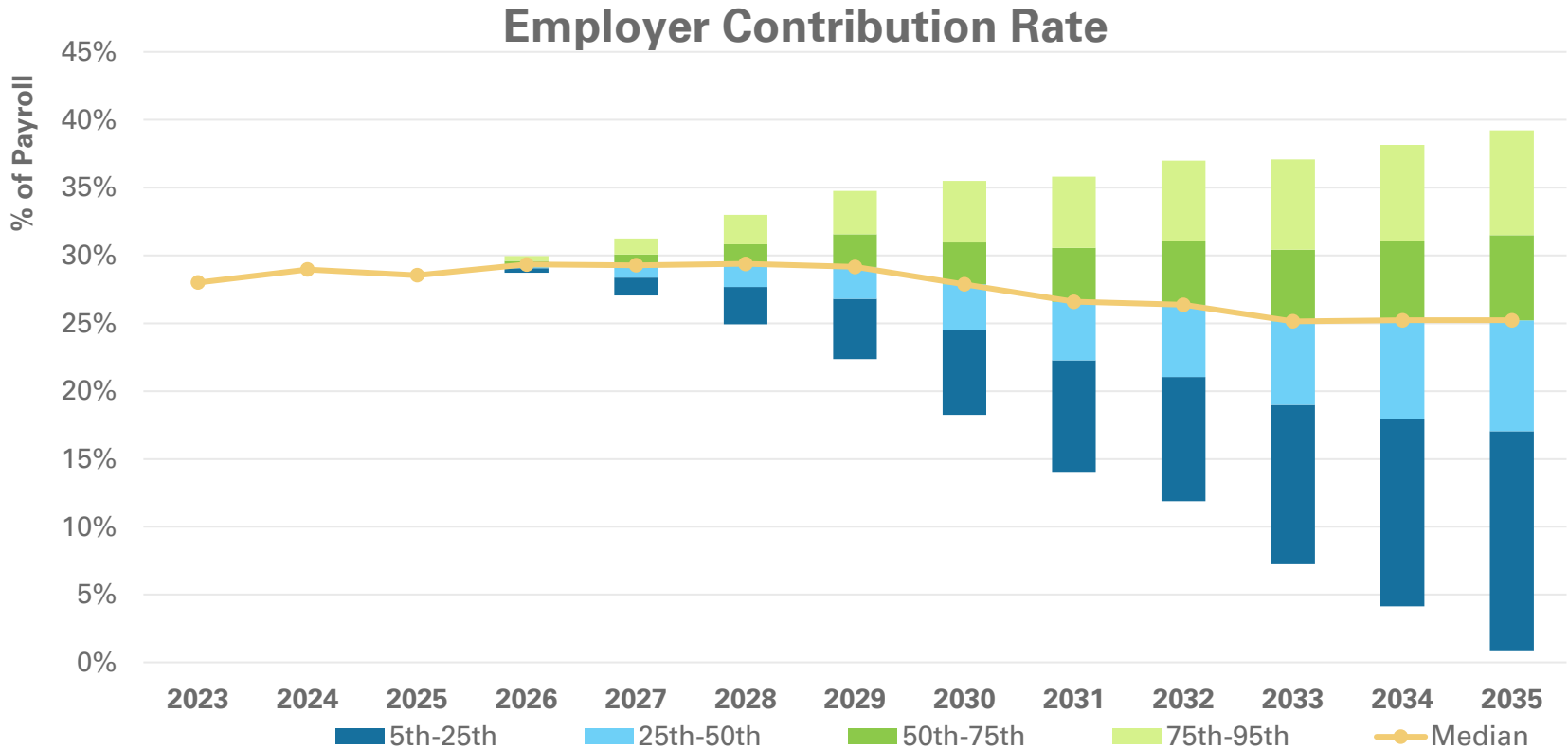EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND – STATE EEs

Employer Contribution Rate

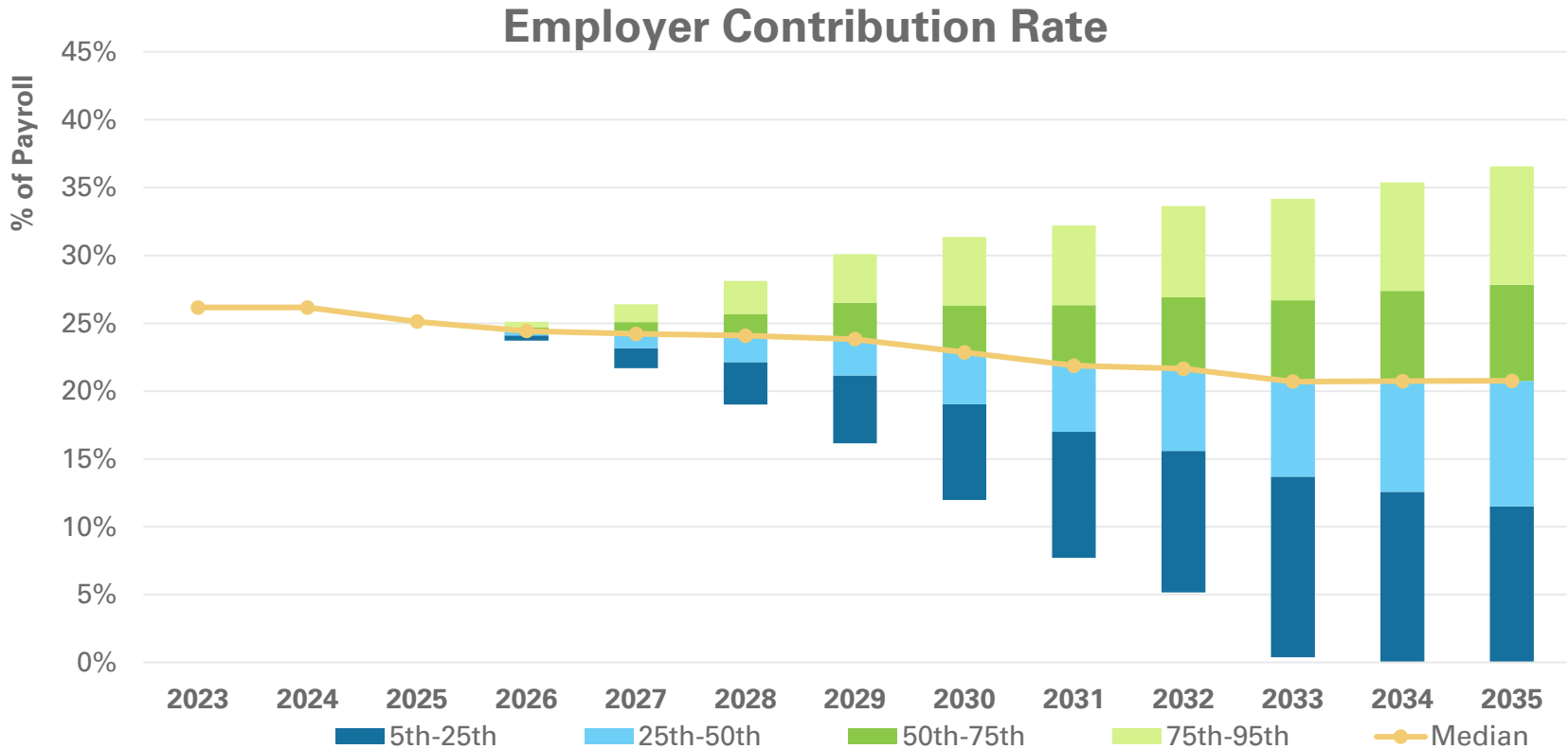Legend: 5th-25th, 25th-50th, 50th-75th, 75th-95th, Median

- **The probability of 2% increase in contribution rate in any given year in next 10 years is 23%**

10-YEAR STOCHASTIC CONTRIBUTION PROJECTION

EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND – TEACHERS

Employer Contribution Rate

- **The probability of 2% increase in contribution rate in any given year in next 10 years is 29%**

LIQUIDITY ANALYSIS

LIQUIDITY STRESS SCENARIO

EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND

Liquidity Analysis - Distressed Scenario
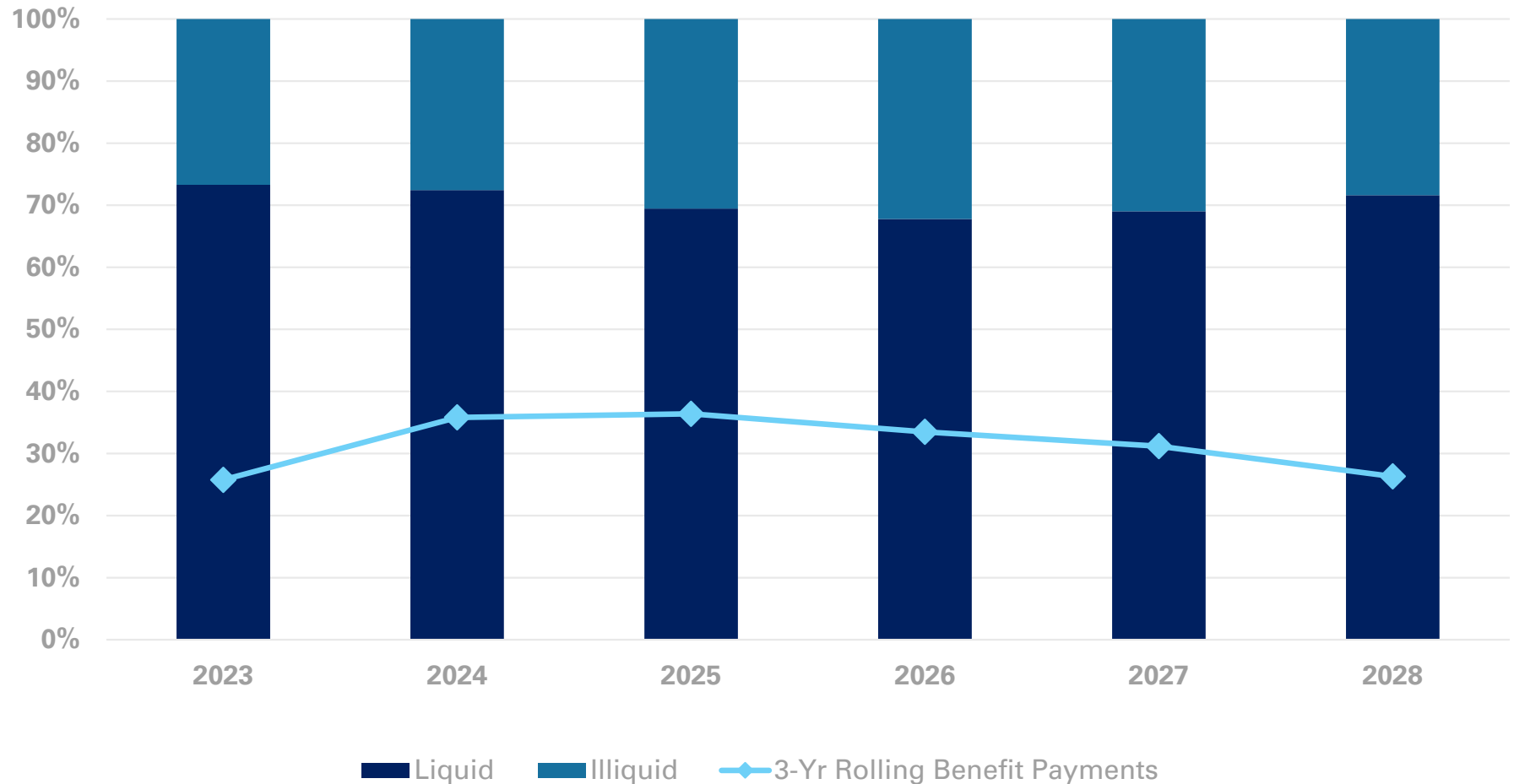
Notes: Distressed scenario reflects recession scenario returns with decreased private market distributions; Liquid and illiquid allocations are at the total fund level; 3-yr rolling benefit payments only reflect the State Employees' and Teachers plans

SCENARIO ANALYSIS & RISK DISCUSSION

SCENARIO ANALYSIS OVERVIEW

- As part of the 2023 asset/liability study, we have incorporated scenario analysis.

- NEPC scenario analysis is designed to highlight the impact of shifting economic and market regimes on the portfolio and potential asset allocation mixes.

- Risk asset returns are informed by credit returns which are based on changes in real rate, inflation, and credit spreads experienced across market regimes.

- The following slides provide baseline output and an overview of the different scenarios.

SCENARIO ANALYSIS: REGIME CHANGES

NEPC scenario analysis highlights the impact of shifting economic and market regimes on the portfolio and potential asset allocation mixes

– Risk asset returns are informed by credit returns which are based on changes in real rate, inflation, and credit spreads experienced across market regimes

Expansion
Informed by rising interest rates, moderately rising inflation, elevated positive real rates, spread tightening, and increasing growth

Stagflation
Informed by rising interest rates, rising inflation, depressed negative real rates, spread widening, and slowing growth

Overextension
Informed by rising interest rates, high inflation, negative real rates, spread tightening, and increasing growth

Recession
Informed by depressed interest rate levels, falling inflation, depressed positive real rates, spread widening and slowing growth

Depression
Informed by negative interest rates, deflation, severe credit defaults and downgrades, and negative growth

SCENARIO ANALYSIS: REGIME RETURNS

Expansion Scenario Return*

Cash: 2.7%
Treasuries: 5.4%
Long Treasuries: 8.5%
US TIPS: 5.1%
US IG Credit: 8.1%
High Yield Bonds: 8.0%
US Large-Cap Equity: 10.2%
Emerging Market Equity: 17.9%
Commodities: 12.1%

Depression Scenario Return*

Cash: 0.8%
Treasuries: 5.4%
Long Treasuries: 10.0%
US TIPS: 5.4%
US IG Credit: 7.0%
High Yield Bonds: 2.1%
US Large-Cap Equity: -8.1%
Emerging Market Equity: -22.8%
Commodities: 12.9%

Overextension Scenario Return*

Cash: 5.4%
Treasuries: 4.0%
Long Treasuries: 2.6%
US TIPS: 7.0%
US IG Credit: 4.7%
High Yield Bonds: 5.8%
US Large-Cap Equity: 2.3%
Emerging Market Equity: 4.5%
Commodities: 13.4%

Recession Scenario Return*

Cash: 1.2%
Treasuries: 5.0%
Long Treasuries: 8.5%
US TIPS: 4.8%
US IG Credit: 7.3%
High Yield Bonds: 8.2%
US Large-Cap Equity: -2.9%
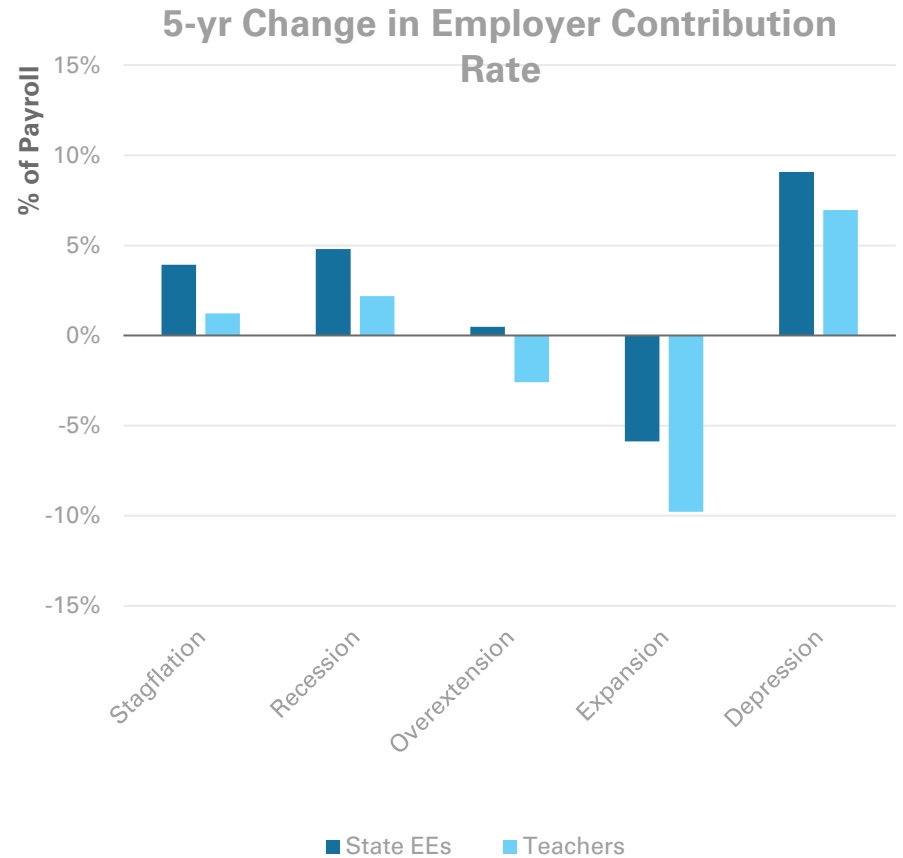Emerging Market Equity: -5.0%
Commodities: 11.2%

Stagflation Scenario Return*

Cash: 6.4%
Treasuries: 2.6%
Long Treasuries: -1.6%
US TIPS: 9.5%
US IG Credit: 3.1%
High Yield Bonds: 7.0%
US Large-Cap Equity: -2.4%
Emerging Market Equity: -3.9%
Commodities: 23.5%
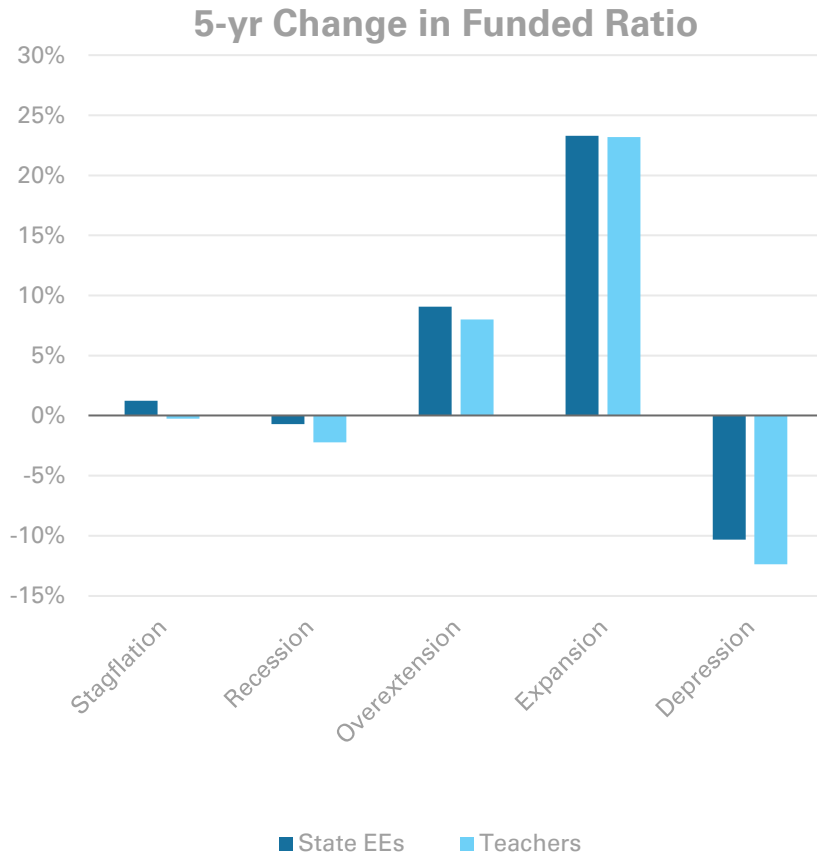
Scenario returns are a 5 year annualized returns

SCENARIO ANALYSIS

EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND

5-yr Change in Funded Ratio

State EEs   Teachers

5-yr Change in Employer Contribution Rate

State EEs   Teachers

PORTFOLIO RISK METRICS

- **When reviewing different portfolio mixes, it may be helpful to have quantitative risk constraints in mind.**

- **Below are the risk constraints used in the 2019 study.**

- **We recommend adopting a similar set of metrics for the 2023 study.**

2019 Risk Constraints

Achieve a more stable return path by managing and mitigating risks accordingly

- Limit the probability of funding level falling below 50% in next 5 years to ~15%

- Limit the probability of a 2% absolute increase in employer contribution rate (expressed as a percentage of payroll) to ~25% in any given year within next 10 years

- Within 90% confidence, maintain at least 3x the annual benefit payment amount in assets with daily/weekly liquidity profile in a recessionary scenario

IMPLEMENTATION OVERVIEW

IMPLEMENTATION PROCESS

- Once the asset / liability study has been completed and a new portfolio selected, we plan to focus on implementation across each of the underlying portfolio buckets.

- The implementation recommendations will take place over a series of discussions and will include input from NEPC, Cliffwater and Meketa.

- Across liquid markets, we plan to focus on selecting appropriate asset classes and managers within each bucket.

- For private markets, a pacing analysis will be conducted for each illiquid category (e.g., private equity, private real estate, etc.)

- Additionally, we also plan to review the liquidity profile of the plan across each bucket.

APPENDIX

ASSUMPTIONS AND METHODS

EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND

- **Deterministic and stochastic return projections are based on average capital market assumptions across three providers (see next slide for detail)**
  - Providers include NEPC, Meketa and Cliffwater
  - Reflects fiscal year to date return (7/1/2022—12/31/2022) of 1.89%

- **Asset-liability projections follow a roll-forward methodology based on the June 30, 2022 Actuarial Valuation Report produced by GRS**
  - Benefit payment and cash flow projections provided by GRS
  - Other than those described herein, all assumptions remain unchanged from the valuation
  - No experience gains or losses are assumed other than those attributed to investment experience

- **Employer contributions based on stated funded policy**
  - Net normal cost: benefit accrual less employee contribution
  - Layered amortization of unfunded liability

ERSRI FINAL ASSET CLASS ASSUMPTIONS

		Current Target	10-Year Arithmetic Returns				10-Year Geometric Return*	NEPC Expected Risk
			NEPC	Meketa	Cliffwater	Average		
Growth	Global Equity	40.0%	7.7%	10.1%	8.8%	8.9%	7.5%	18.1%
	Private Equity	12.5%	11.8%	12.5%	12.3%	12.2%	9.6%	25.7%
	Non-Core Real Estate	2.5%	6.7%	8.1%	12.5%	9.1%	7.7%	18.5%
	Private Growth	15.0%	10.9%	11.8%	12.3%	11.7%	9.5%	23.4%
	TOTAL GROWTH	55.0%	8.3%	10.6%	9.9%	9.6%	8.2%	18.9%
Income	Equity Options	2.0%	6.5%	7.4%	5.0%	6.3%	5.8%	11.1%
	Liquid Credit	3.0%	7.7%	8.5%	7.5%	7.9%	7.5%	9.5%
	EMD (Blended)	2.0%	7.9%	7.1%	7.1%	7.4%	6.7%	12.6%
	CLO Mezz/Equity	2.0%	6.1%	8.7%	7.1%	7.3%	7.1%	7.6%
	Private Credit	3.0%	9.4%	10.3%	9.6%	9.8%	9.2%	11.8%
	TOTAL INCOME	12.0%	7.7%	8.6%	7.5%	7.9%	7.5%	9.3%
Stability	Long Treasuries	5.0%	4.6%	4.9%	4.2%	4.6%	4.0%	11.8%
	Systematic Trend	5.0%	6.2%	5.3%	4.1%	5.2%	4.8%	9.3%
	CPC	10.0%	5.4%	5.1%	4.2%	4.9%	4.6%	7.8%
	Core Real Estate	4.0%	5.0%	4.9%	7.1%	5.7%	4.7%	15.0%
	Private Real Assets (ex-Real Estate)	4.0%	7.2%	7.8%	8.0%	7.7%	7.0%	12.4%
	Inflation Protection	8.0%	6.1%	6.4%	7.6%	6.7%	6.1%	11.8%
	Inv. Grade Fixed (ex-Treasuries)	6.5%	5.8%	5.3%	5.6%	5.6%	5.3%	7.7%
	Absolute Return	6.5%	6.9%	5.6%	5.3%	5.9%	5.6%	8.6%
	Strategic Cash	2.0%	4.0%	3.1%	2.5%	3.2%	3.2%	0.6%
	Volatility Protection	15.0%	6.0%	5.1%	5.0%	5.4%	5.2%	6.1%
	TOTAL STABILITY	33.0%	5.8%	5.4%	5.4%	5.5%	5.4%	6.5%
	TOTAL PORTFOLIO	100.0%	7.4%	8.6%	8.1%	8.1%	7.4%	12.9%

*10-Year Geometric Returns based on Average Arithmetic Return and NEPC Expected Risk.

NEPC

NEPC DISCLOSURES

Past performance is no guarantee of future results.

NEPC, LLC is an investment consulting firm. We provide asset-liability studies for certain clients but we do not provide actuarial services. Any projections of funded ratio or contributions contained in this report should not be used for budgeting purposes. We recommend contacting the plan's actuary to obtain budgeting estimates.

The goal of this report is to provide a basis for substantiating asset allocation recommendations. The opinions presented herein represent the good faith views of NEPC as of the date of this report and are subject to change at any time.

Information on market indices was provided by sources external to NEPC. While NEPC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained within.

The projection of liabilities in this report uses standard actuarial projection methods and does not rely on actual participant data. Asset and liability information was received from the plan's actuary, and other projection assumptions are stated in the report.

All investments carry some level of risk. Diversification and other asset allocation techniques do not ensure profit or protect against losses.