Teachers' Retirement System of the State of Illinois

Summary Review of Preliminary June 30, 2023 Actuarial Valuation

October 27, 2023 / Matthew Strom, Senior Vice President and Actuary / David Nickerson, Actuary

6325456 / 04786

Segal

Agenda

Overview of the Valuation Process

Summary of Valuation Highlights

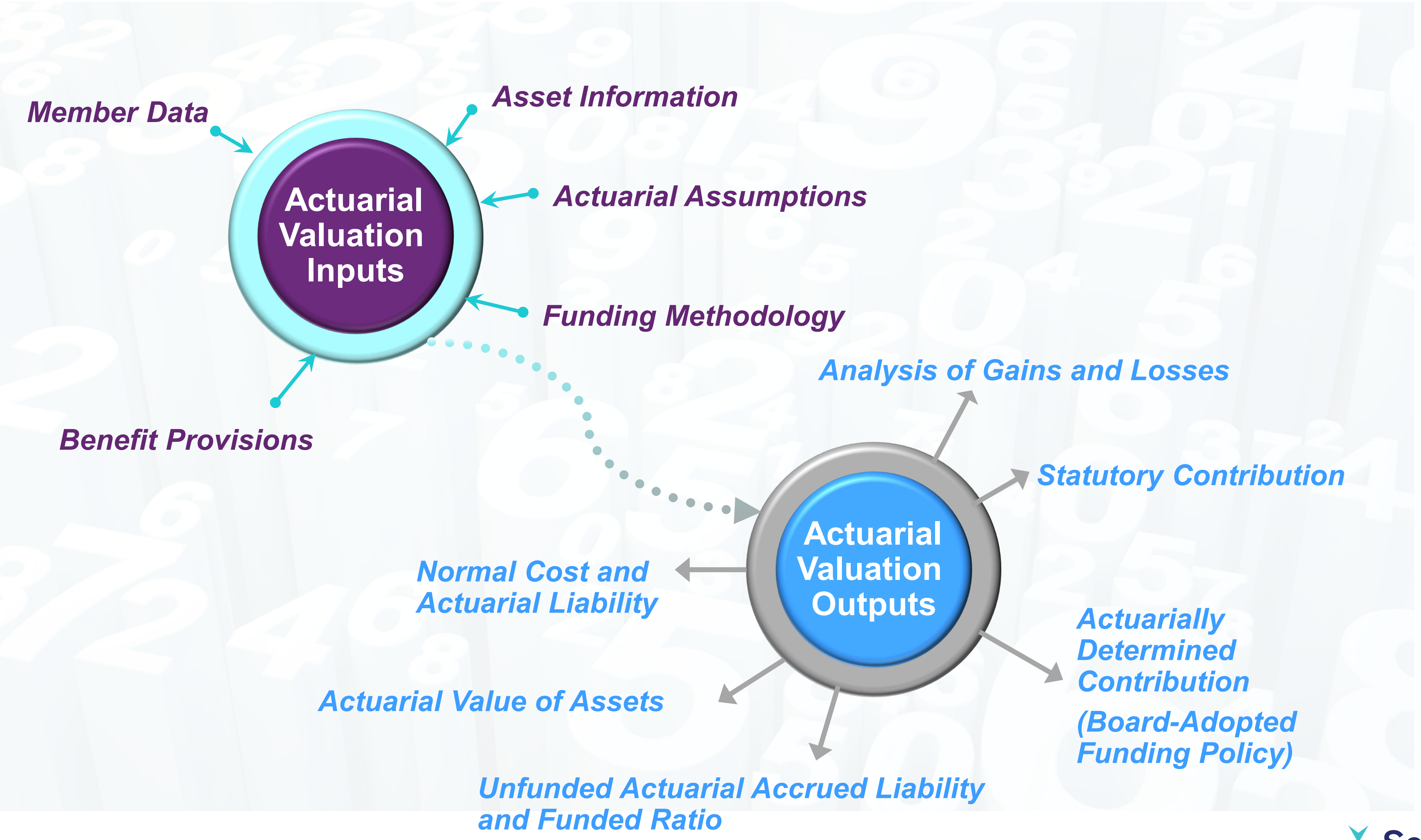
Membership and Demographics

Valuation Results

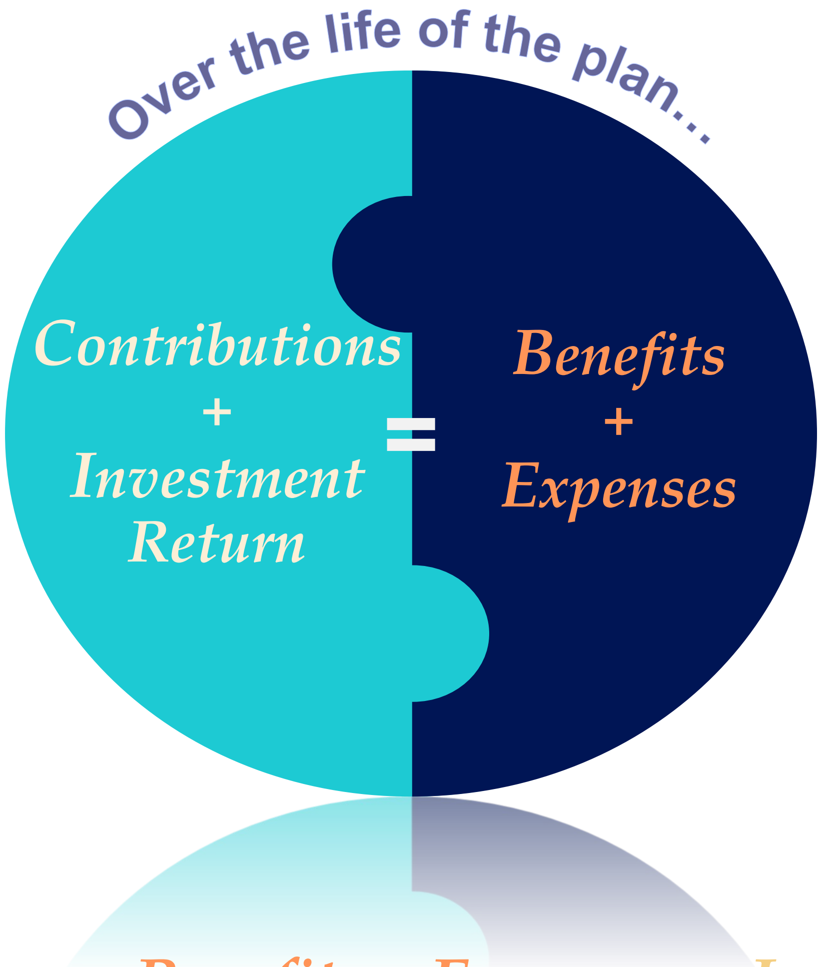
Sensitivity Projections

Appendix

The Valuation Process



Actuarial Balance



Or: *Contributions* = *Benefits* + *Expenses* – *Investment Return*

Actuarial Assumptions

Demographic

- Retirement
- Disability
- Withdrawal
- Mortality

Economic*

- Inflation: 2.50%
- Investment return: 7.00%
- Salary increases: 8.75% for new members to 3.75% for members with 20+ years of service
- Payroll growth: Based on open group projection with level active population and new entrants similar to newly hired employees

Actuaries make assumptions as to when and why a member will leave active service and estimate the amount and duration of the pension benefits paid.

*Economic assumptions are reviewed annually, most recently at the August 2023 Board meeting

Actuarial Methods

Asset Valuation Method

- Investment gains and losses recognized over a number of years
- TRS recognizes 20% of the difference between expected and actual returns in the current year (a 5-year smoothing period)
- A 20% market value corridor is applied – actuarial value of assets must fall within 80% to 120% of market value

Actuarial Cost Method

- Allocation of liability to past and future service
- TRS uses the Projected Unit Credit cost method for the **Statutory Contribution**
  - Current year's cost based on value of benefit earned that year, using projected salary
  - Results in back-loading of normal cost
- Entry Age Normal used for the **Board-Adopted Actuarial Funding Policy**
  - Allocates cost of member's benefit over expected career as a level % of salary
  - Commonly used method

Amortization Method

- **Statutory Contribution**
  - No explicit method to amortize the UAAL; the total contribution less the normal cost is the payment toward the UAAL
- **Board-Adopted Actuarial Funding Policy**
  - Layered amortization with new UAAL amortized over 20 years
  - Amortization payments increase at the rate of future State revenue growth, assumed to be 2%

Actuarially Determined vs. Statutory Contribution

The Actuarially Determined Contribution is compared to the Statutory Contribution as a measure of the inadequacy of the Statutory Contribution.

Actuarially Determined Contribution (Board-Adopted Actuarial Funding Policy)

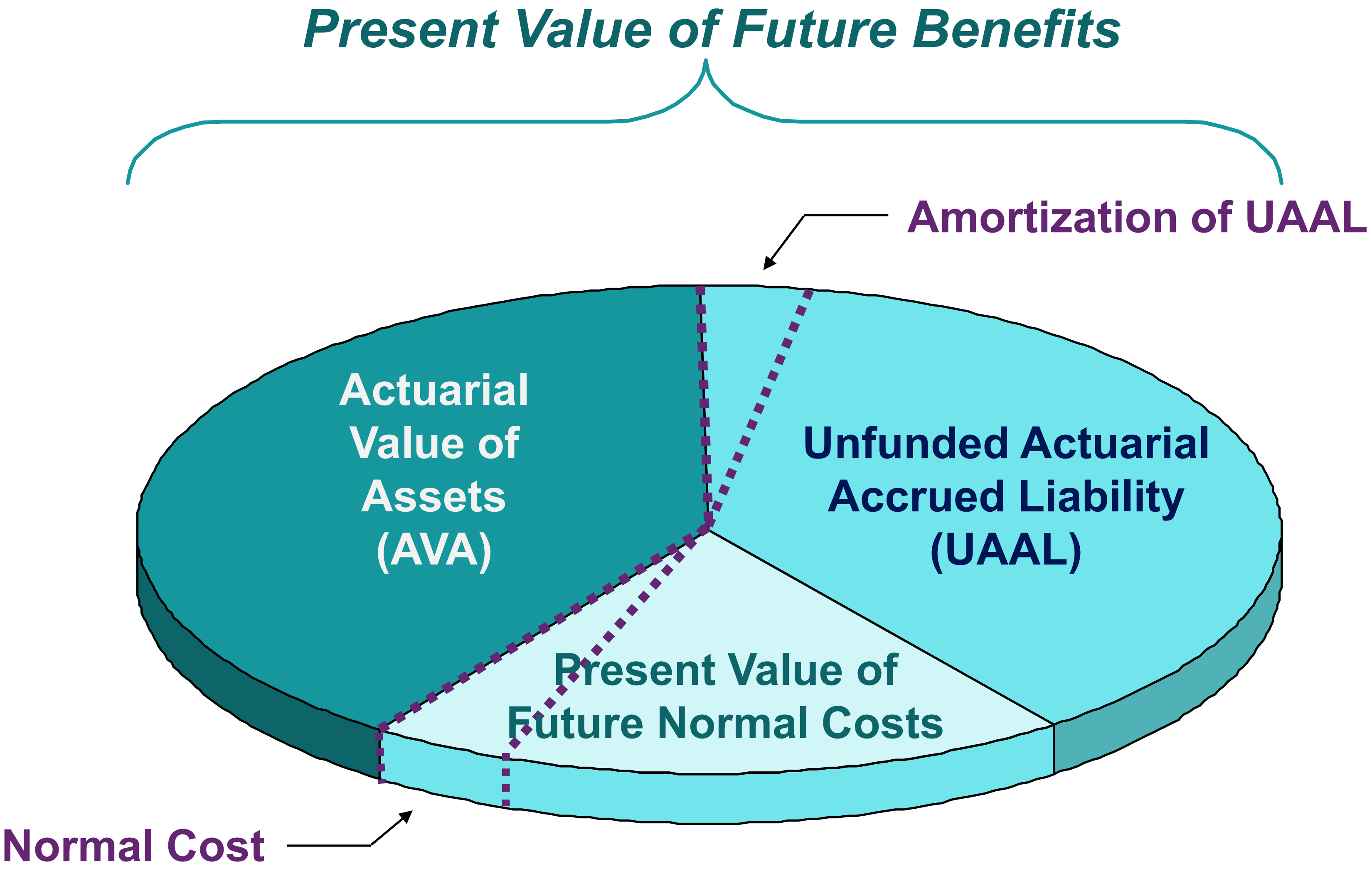
- Equal to the normal cost plus amortization of the unfunded actuarial accrued liability (UAAL)
- Benefits:
  - Entry age normal cost method
  - 100% funding target
  - Reflects appropriate tier of benefits of those in TRS, not those to be hired

Statutory Contribution under Illinois Funding Policy

- Equal to amount determined as a level percentage of payroll necessary to achieve a projected funded percentage of 90% by 2045
- Shortcomings:
  - Projected unit credit cost method
  - 90% funding target
  - Reflects effect of Tier 2 provisions for members who have not yet been hired

Actuarially Determined Contribution

Entire group:



Summary of Valuation Highlights

- ***State Contribution***
  - Required State contribution for fiscal 2025 is **$6.20 billion**, a 2.65% increase from the fiscal 2024 contribution of $6.04 billion
  - The fiscal 2025 State contribution under the Board-Adopted Actuarial Funding Policy is **$10.11 billion**
    - Statutory contribution is approximately 61% of the Board funding policy amount
    - The $3.91 billion contribution shortfall increases future contribution requirements
- ***Asset Experience***
  - Fair value of assets returned **7.09%*** for year the ending June 30, 2023
    - Gradual recognition of deferred gains and losses resulted in a **6.95%** return on actuarial assets, compared to 7.00% expected
    - Loss on actuarial value of assets is $29.4 million
    - Total deferred investment gain as of June 30, 2023, is $2.4 million
  - This valuation reflects an additional one-time contribution of $115,215,500 appropriated to TRS during fiscal 2023 per Public Act 102-0698
- ***Demographic Experience***
  - Demographic and liability experience resulted in a loss of $688.0 million, or 0.5% of actuarial accrued liability

* Based on Segal's calculation, which involves simplified mid-year cash flow timing

Summary of Valuation Highlights (continued)

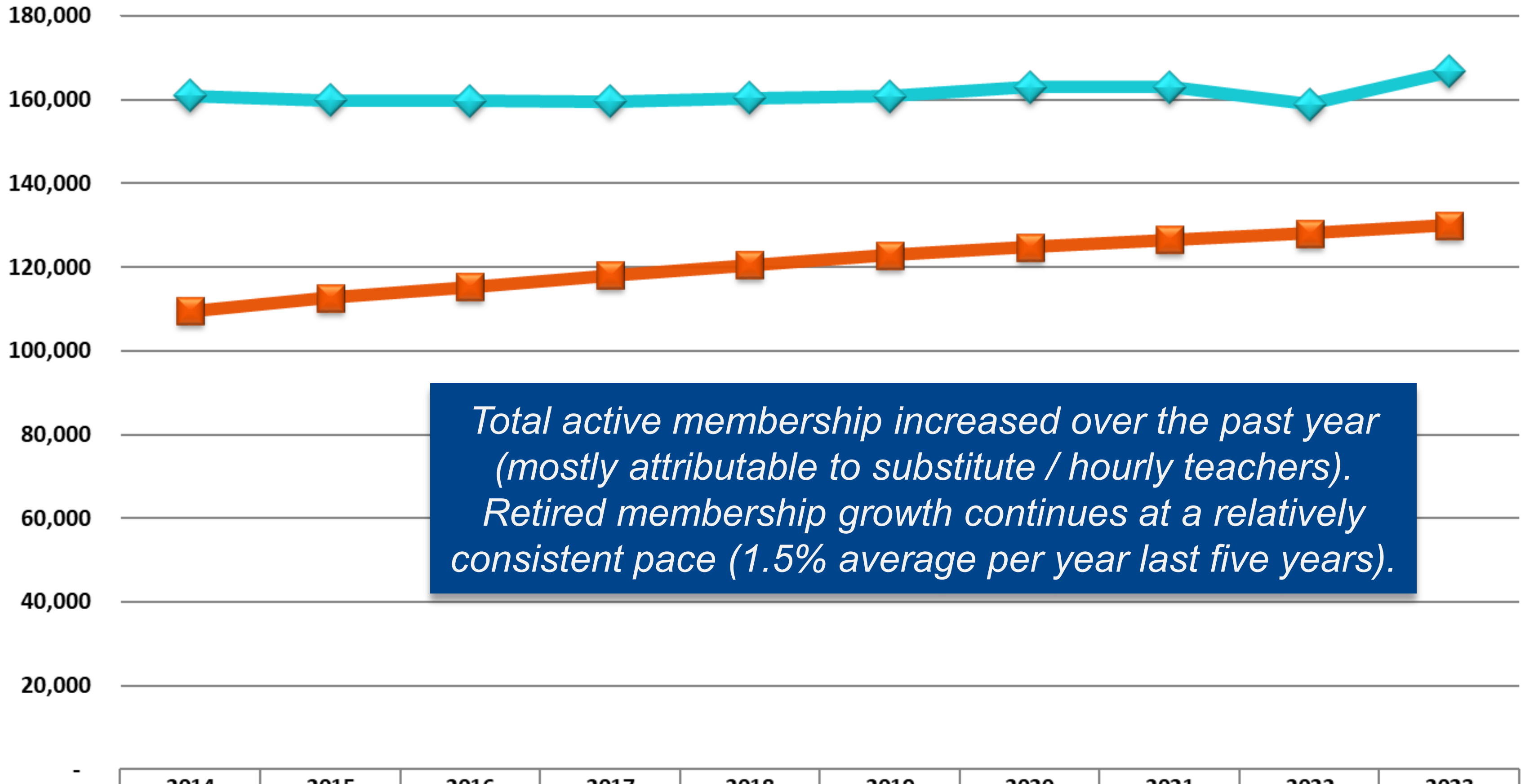
- ***Funded Percentage***
  - Funded ratio based on the actuarial value of assets increased from 43.8% in 2022 to **44.8%** in 2023
- ***Unfunded Actuarial Accrued Liability (UAAL)***
  - The actuarial accrued liability increased from $143.5 billion (as of June 30, 2022) to **$148.4 billion** (as of June 30, 2023)
  - The actuarial value of assets increased from $62.9 billion (as of June 30, 2022) to **$66.5 billion** (as of June 30, 2023)
  - The UAAL increased from $80.6 billion to **$81.9 billion**
    - $1.3 billion increase results from net experience loss ($0.7 billion) and loss from inadequate State contributions ($0.6 billion)
- ***Buyout Experience***
  - Based on the August 14, 2023, report provided by TRS staff, there have been **$750 million** of buyout payments paid since the commencement of the AAI and IV buyout programs through June 30, 2023
  - Approximately $717 million and $412 million of liability has been settled as a result of the AAI and IV buyout experience, respectively
  - The required State contribution for fiscal 2025 is approximately $130 million lower due as a result of the buyout programs

Membership

June 30 Valuation Date	2023	2022	Change
Total Actives			
Tier 1			
• Number	104,124	105,590	−1.4%
• Payroll (annualized)	$8.612 bil	$8.510 bil	+1.2%
• Average Age	47.8 years	47.1 years	+0.7 years
• Average Service	16.6 years	16.3 years	+0.3 years
Tier 2			
• Number	62,590	53,315	+17.4%
• Payroll (annualized)	$2.886 mil	$2.353 mil	+18.6%
• Average Age	34.9 years	34.1 years	+0.8 years
• Average Service	3.9 years	3.8 years	+0.1 years
Retirees and Beneficiaries			
• Number	130,051	128,116	+1.5%
• Total Annual Benefits	$7.765 bil	$7.478 bil	+3.8%
• Average Monthly Benefit	$4,976	$4,864	+2.3%

Member data used in the valuation is as of the prior valuation date.

Active and Retired Membership

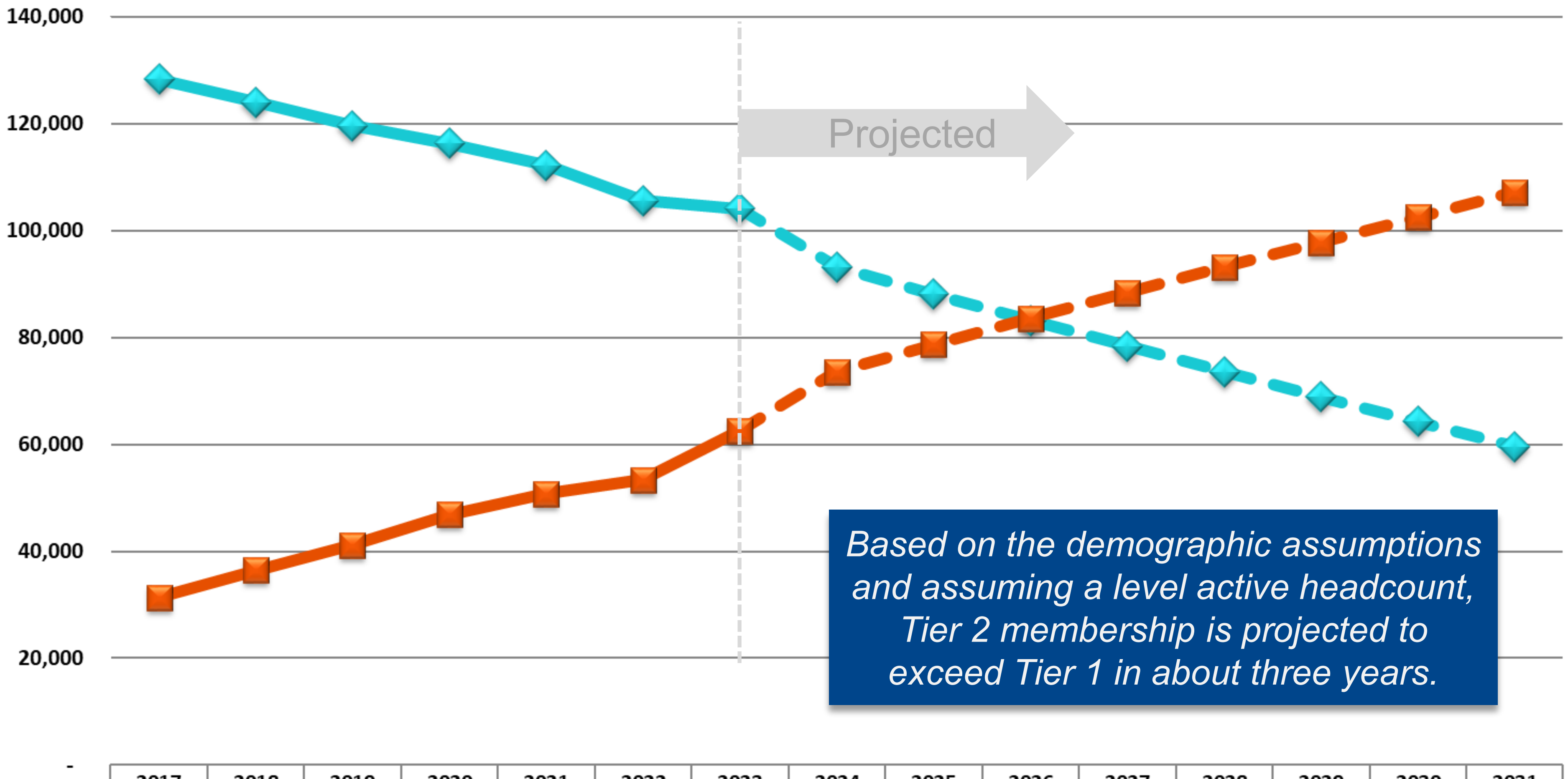


Total active membership increased over the past year (mostly attributable to substitute / hourly teachers). Retired membership growth continues at a relatively consistent pace (1.5% average per year last five years).

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Active Members	160,990	159,836	159,684	159,585	160,425	160,752	163,075	162,949	158,905	166,714
Retirees & Beneficiaries	109,448	112,682	115,273	117,990	120,453	122,895	124,791	126,594	128,116	130,051

Active member and annuitant data used in the valuation is as of the prior valuation date.

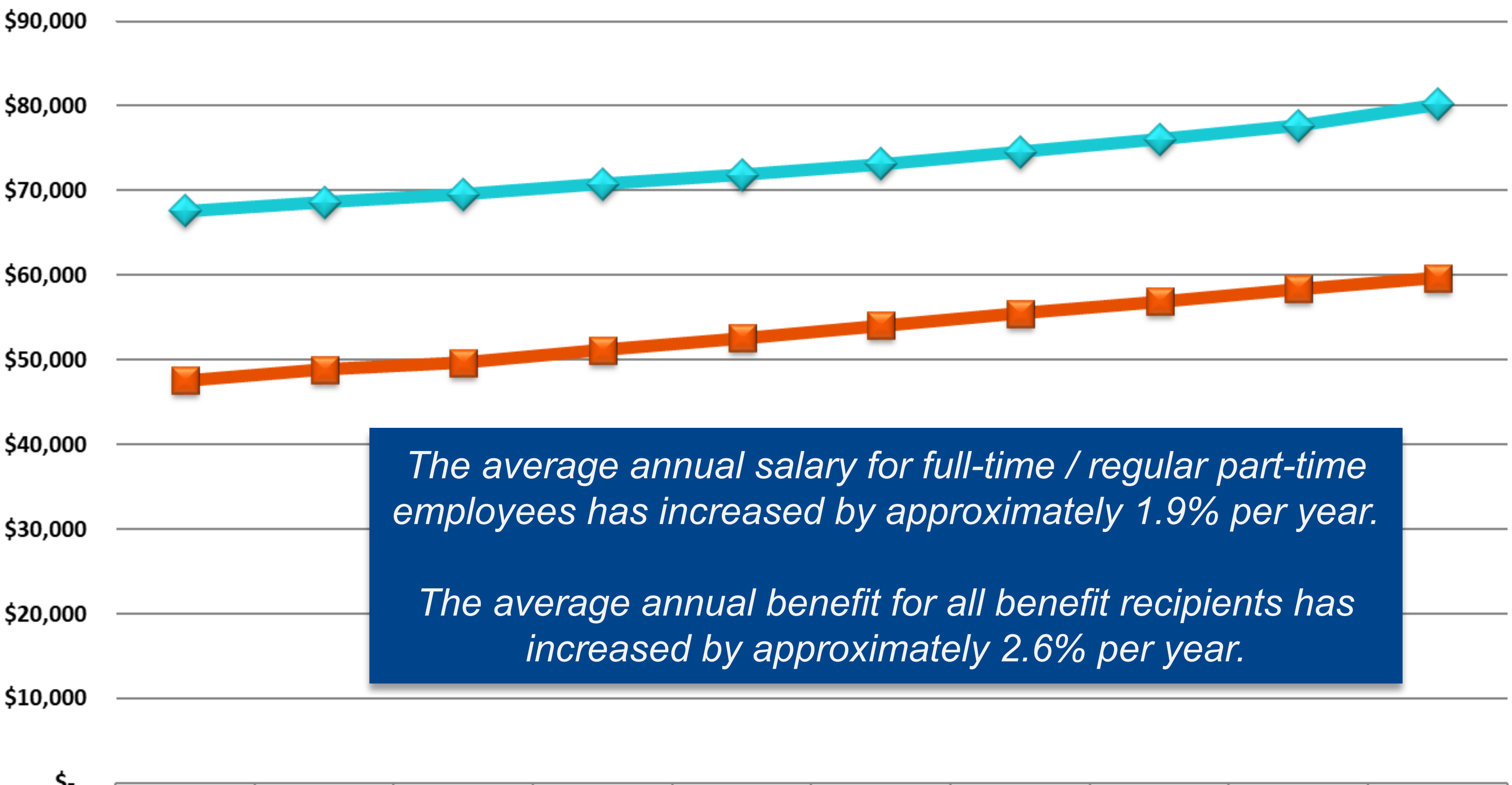
Projection of Active Membership by Tier



	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Tier 1	128,262	123,933	119,572	116,261	112,214	105,590	104,124	93,125	88,066	83,174	78,372	73,574	68,904	64,235	59,579
Tier 2	31,323	36,492	41,180	46,814	50,735	53,315	62,590	73,589	78,648	83,540	88,342	93,140	97,810	102,479	107,135

Active member data used in the valuation is as of the prior valuation date.
Dashed lines represent a projection of membership, assuming total active count remains at the current level

Average Salary and Average Benefit



	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Average Annual Salary	$67,613	$68,581	$69,576	$70,789	$71,845	$73,106	$74,550	$76,061	$77,674	$80,143
Average Annual Benefit	$47,552	$48,861	$49,692	$51,132	$52,605	$54,030	$55,513	$56,919	$58,366	$59,707

The average annual salary for full-time / regular part-time employees has increased by approximately 1.9% per year.

The average annual benefit for all benefit recipients has increased by approximately 2.6% per year.

Average salaries shown are for full-time / regular part-time employees only

Assets

- The fair value of assets increased from $62.8 billion (as of June 30, 2022) to **$66.5 billion** (as of June 30, 2023)
  - Segal determined the investment return was 7.09%, net of investment expenses
- The actuarial value of assets – which smoothes unexpected investment gains and losses over five years – increased from $62.9 billion (as of June 30, 2022) to **$66.5 billion** (as of June 30, 2023)
  - Return of 6.95%, net of investment expenses
  - Actuarial value is 100.0% of fair value
  - There is a total of $2.4 million of deferred investment gains that will be recognized in future years
- Average annual returns are:

	Fair Value	Actuarial Value
5-year average	7.0%	7.1%
10-year average	7.6%	8.1%
15-year average	6.4%	6.3%
20-year average	7.4%	7.3%

As noted in our August 15, 2023, presentation, the current investment return assumption of 7.00% results in a confidence level greater than 50% of meeting or exceeding 7.00%.

Assets

Fair Value of Assets as of June 30 (in millions)

	2023	2022
Beginning of Year	$62,834	$64,213
Contributions		
• State	$6,009*	$5,867
• Employers	125	121
• Members	1,109	1,072
• Total	$7,243	$7,060
Benefits Paid	(7,967)	(7,669)
Administrative Expenses	(32)	(27)
Investment Income (net)	4,427	(743)
End of Year	$66,505	$62,834
Rate of Return	7.1%	−1.2%

* Includes an additional, one-time contribution of $115,215,500 appropriated to TRS during fiscal year 2023 per Public Act 102-0698

Assets

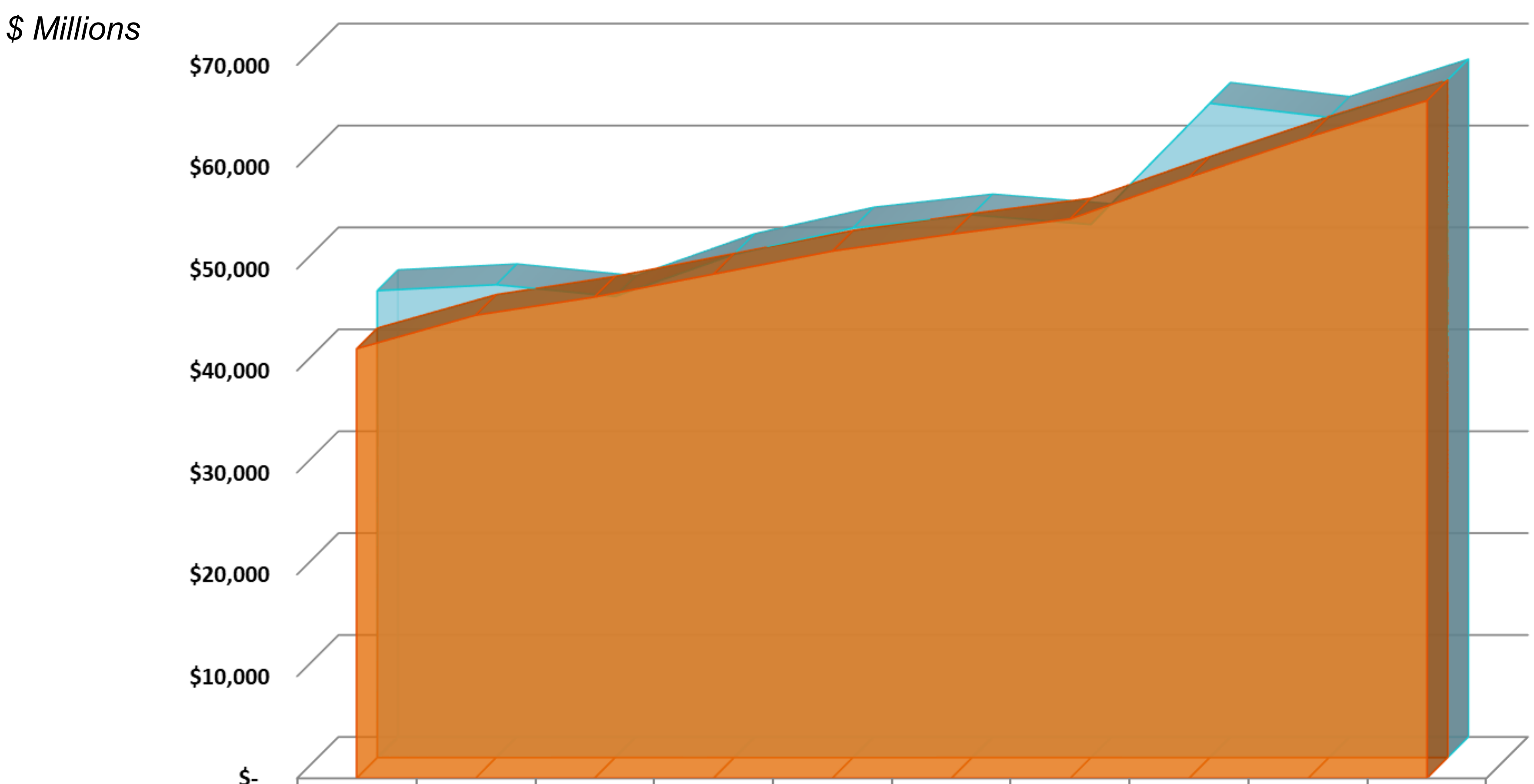
Actuarial Value of Pension Assets* (in millions)

Fair Value of Pension Assets as of June 30, 2023			$66,505
Gain or (Loss) on Assets	Original Amount	% Deferred	Deferred Amount
Year Ended June 30, 2023	$55	80%	$44
Year Ended June 30, 2022	(5,216)	60%	(3,130)
Year Ended June 30, 2021	9,424	40%	3,770
Year Ended June 30, 2020	(3,410)	20%	(682)
Year Ended June 30, 2019	(974)	0%	0
Total			$2
Actuarial Value as of June 30, 2023			$66,502
Actuarial Value as a Percent of Fair Value			100.0%
Rate of Return			6.95%

** Includes value of Pension Obligation Bonds (POB)*

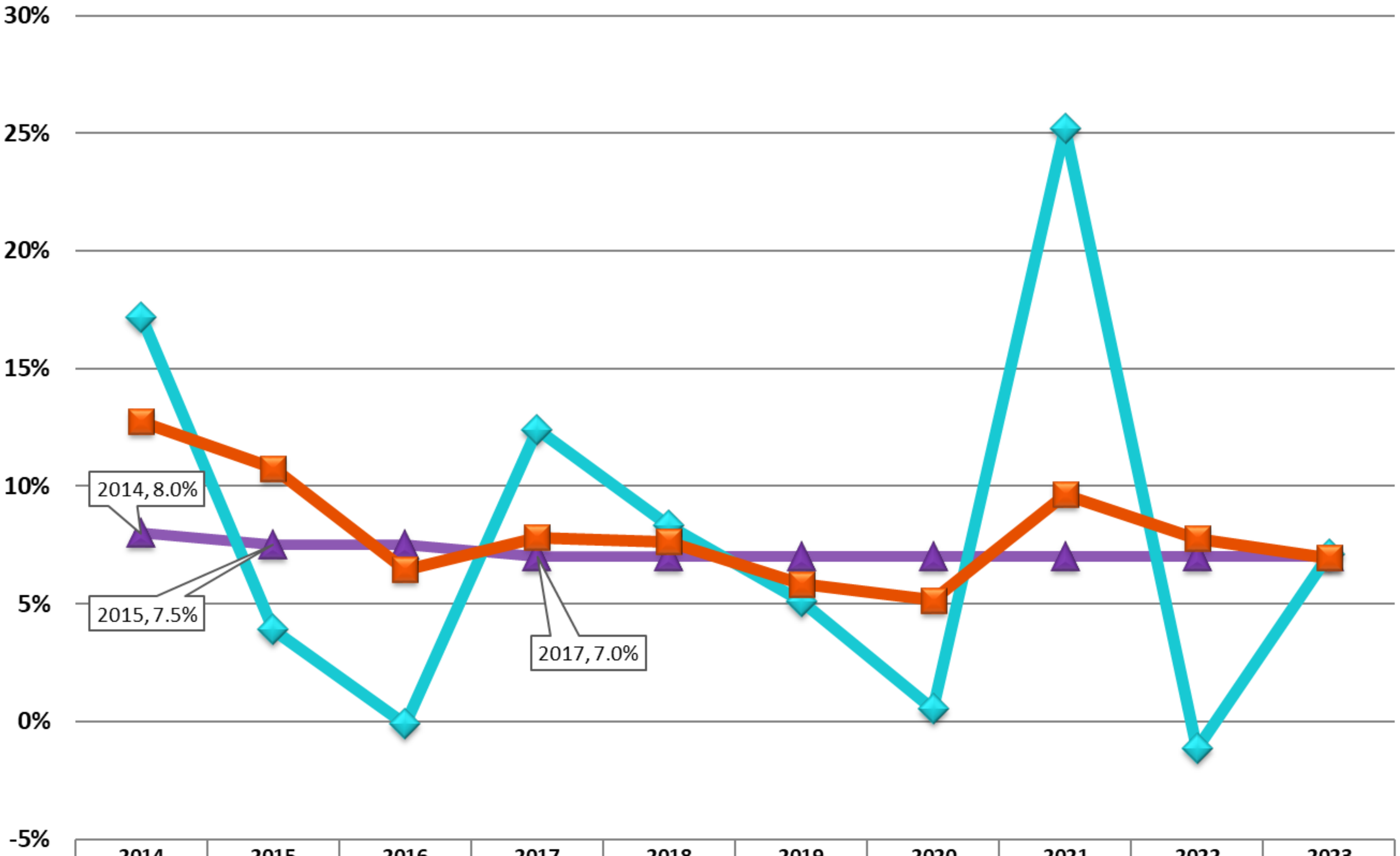
Note: Totals may not add to the dollar due to rounding

Fair and Actuarial Values of Assets



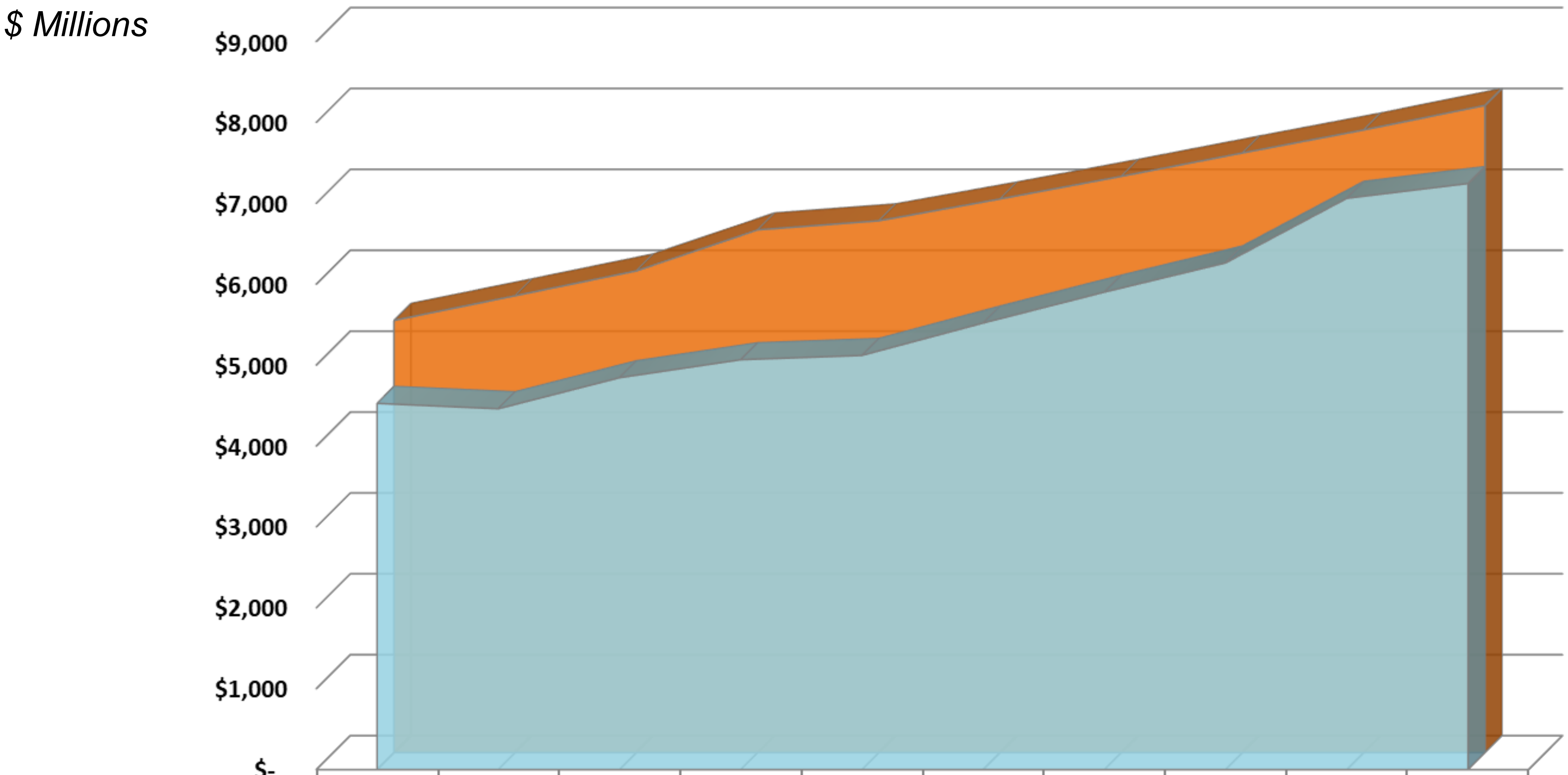
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Actuarial Value of Assets	$42,151	$45,435	$47,222	$49,468	$51,731	$53,391	$54,891	$58,980	$62,910	$66,502
Fair Value of Assets	$45,824	$46,407	$45,251	$49,376	$51,970	$53,262	$52,316	$64,213	$62,834	$66,505

Asset Returns



	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Assumed Rate of Return	8.0%	7.5%	7.5%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
Fair Value of Assets	17.2%	3.9%	-0.1%	12.4%	8.3%	5.1%	0.5%	25.2%	-1.2%	7.1%
Actuarial Value of Assets	12.8%	10.8%	6.5%	7.8%	7.6%	5.8%	5.2%	9.7%	7.8%	7.0%

Contributions vs Disbursements

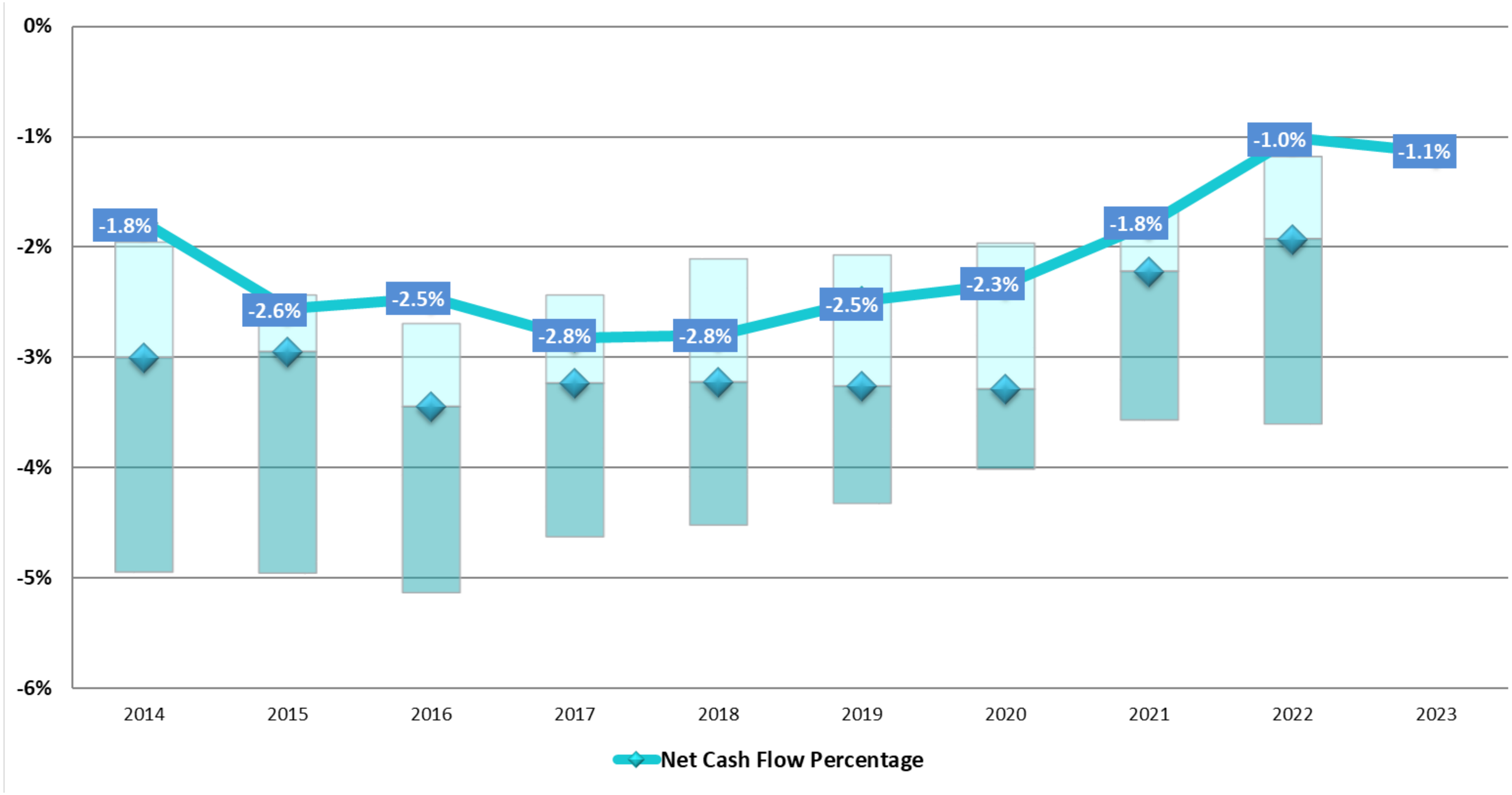


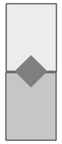
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Contributions*	$4,525	$4,459	$4,842	$5,065	$5,118	$5,519	$5,901	$6,262	$7,060	$7,243
Benefits & Refunds**	$5,342	$5,647	$5,954	$6,461	$6,573	$6,843	$7,123	$7,412	$7,696	$7,999

* *Includes member, employer and state contributions*

** *Includes benefit payments, refunds and administrative expenses*

Net Cash Flow as a % of Market Value





For context, historical data is compared to 39 systems in the Public Plans Data* that primarily cover teachers. The top marker represents the 2nd quartile (50th to 75th percentile) and the lower marker represents the 3rd quartile (25th to 50th percentile), and the diamond indicates the median.

* Public Plans Data. 2001-2022. Center for Retirement Research at Boston College, MissionSquare Research Institute, and National Association of State Retirement Administrators.

Valuation Results

Comparison of current year to prior year (in millions)

	June 30, 2023	June 30, 2022
Actuarial Accrued Liability:		
• Active Members	$51,461	$48,738
• Retirees and Beneficiaries	92,516	90,535
• Inactive Members with Deferred Benefits	4,421	4,251
Total	$148,398	$143,524
Actuarial Assets	66,502	62,910
Unfunded Actuarial Accrued Liability	$81,896	$80,613
Funded Ratio	44.8%	43.8%

Note: Totals may not add to the dollar due to rounding

Valuation Results

Summary of State Contribution for Fiscal Year (in $ millions)

	Statutory Contribution	Board-Adopted Actuarial Funding Policy
FY 2025	$6,204	$10,106
FY 2024	$6,043	$9,590

The difference between the FY 2025 Statutory and the Board-Adopted Actuarial Funding Policy Contribution is $3,902, or, in other words, the Statutory Contribution is 61% of the Board-Adopted Actuarial Funding Policy Contribution

Valuation Results

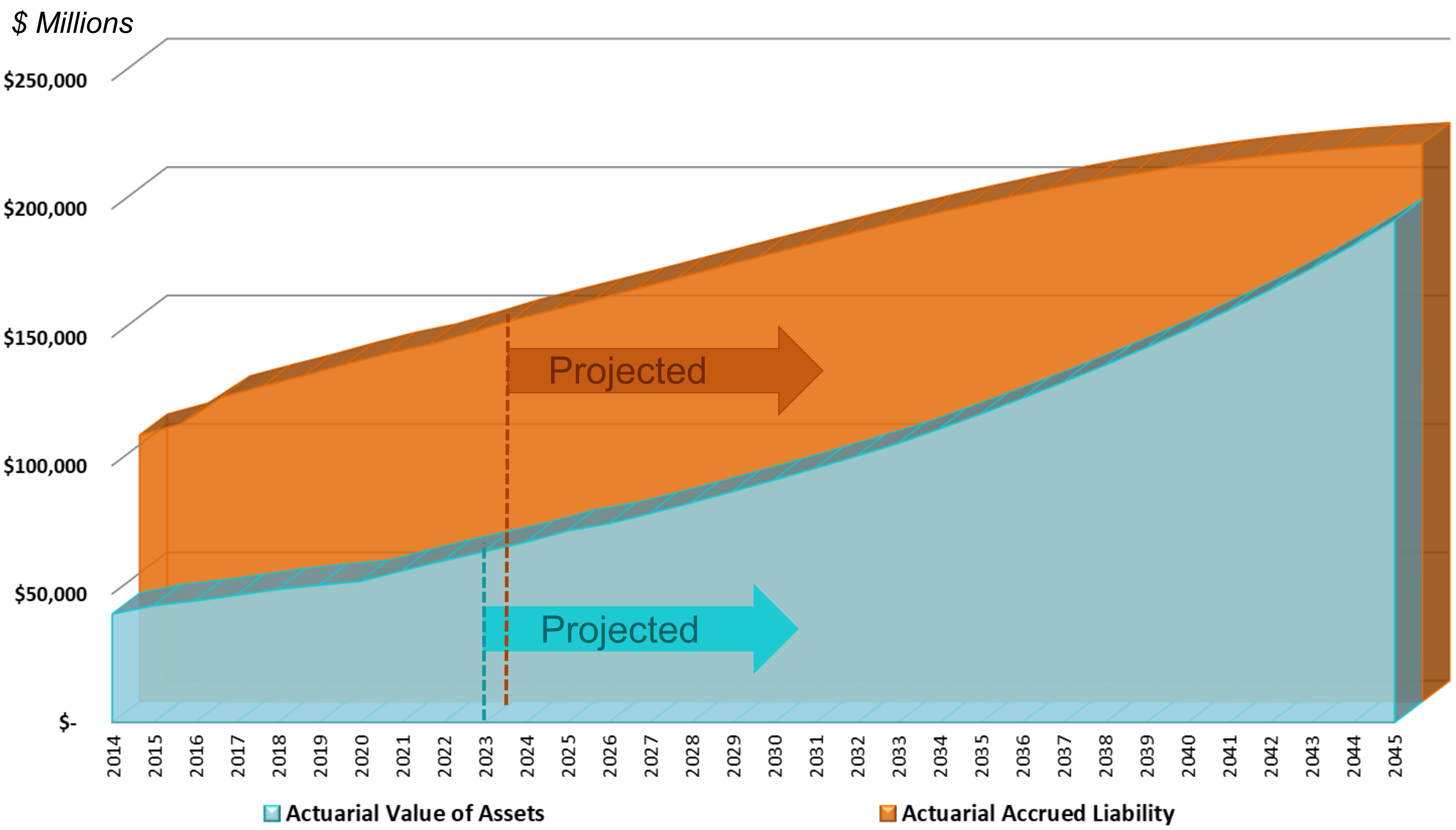
Reconciliation of State Statutory Funding Plan Contribution from Fiscal Year 2024 to 2025 (in millions)

	Statutory Funding Contribution
FY 2024 State Contribution	$6,043
Expected Increase	204
Investment Gain (FVA Basis)	(1)
All Other Net Actuarial Factors*	(42)
FY 2025 State Contribution	$6,204

** The combination of greater than assumed active headcount salary increases during 2022 (which lowers State contribution requirements in the short term but results in higher contributions in the long term) and the one-time additional contribution of $115M per Public Act 102-0698.*

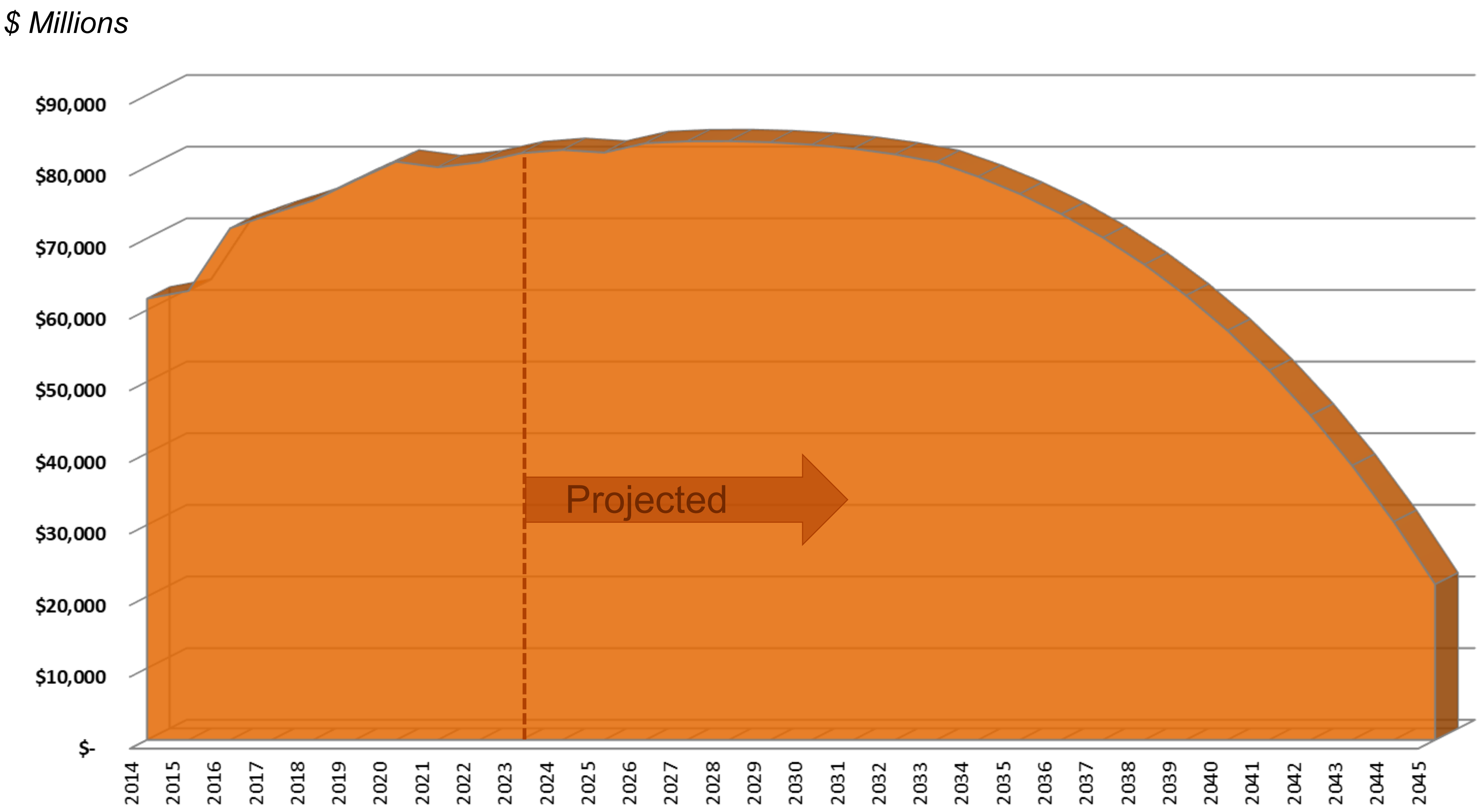
Note that results in the table above could be observed to be slightly different based upon the order that the factors are observed. For this purpose, we have performed this reconciliation in the order as shown above.

Assets and Liabilities



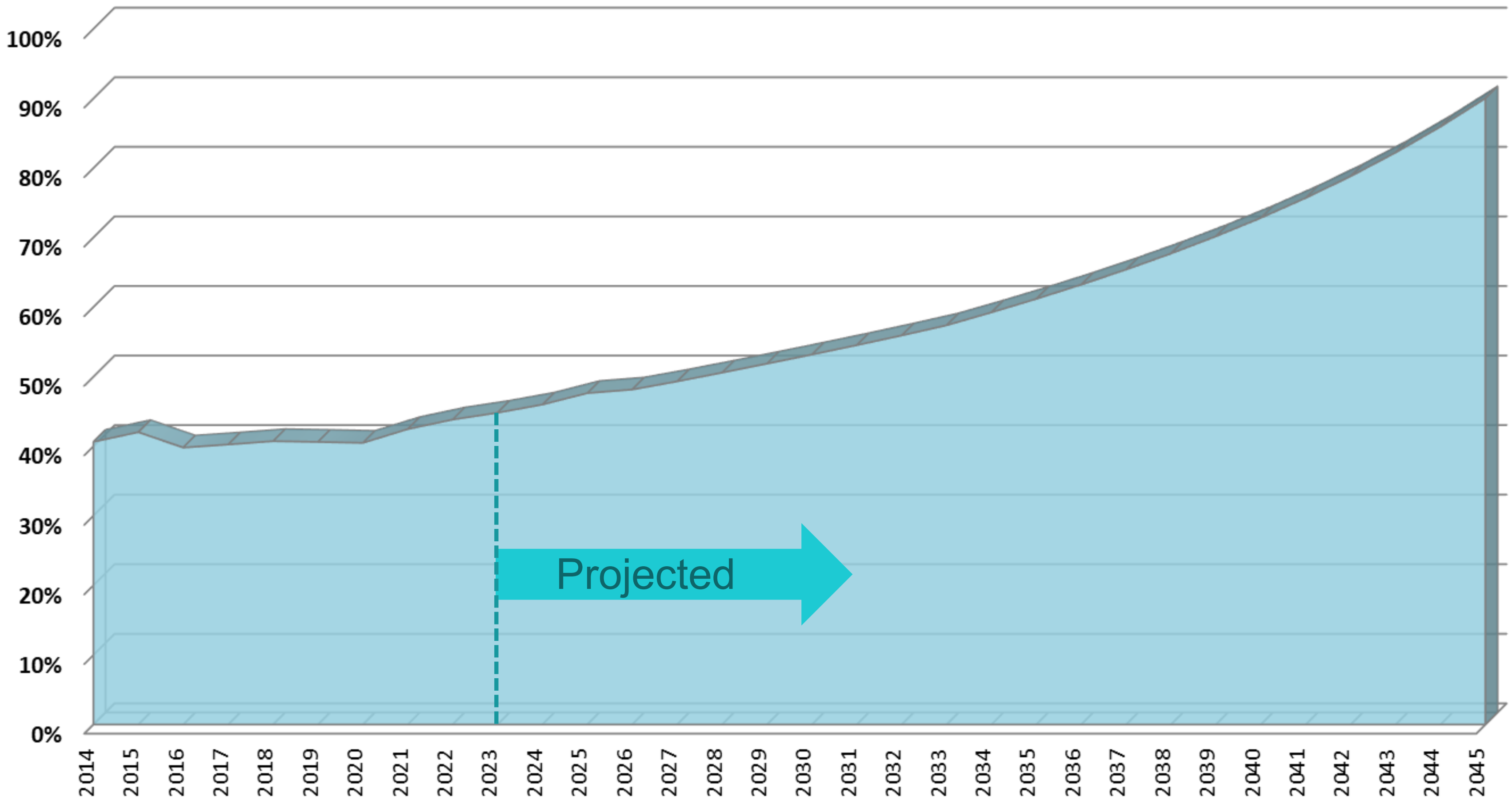
Projected results are based on current assumptions used for the June 30, 2023, valuation, including a level active population.

Unfunded Actuarial Accrued Liability



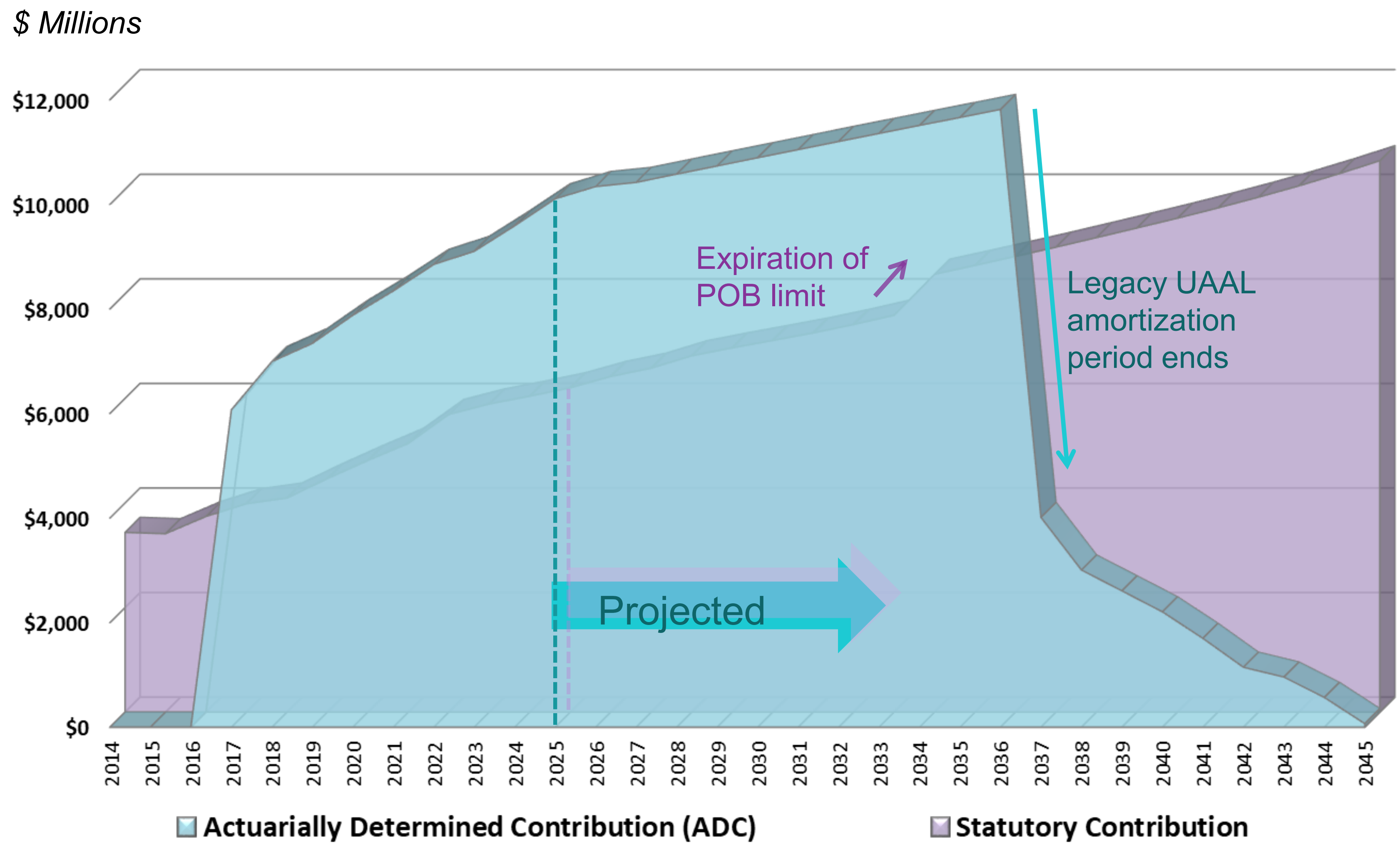
Projected results are based on current assumptions used for the June 30, 2023, valuation, including a level active population.

Funded Ratio



Projected results are based on current assumptions used for the June 30, 2023 valuation, including a level active population.

State Contributions

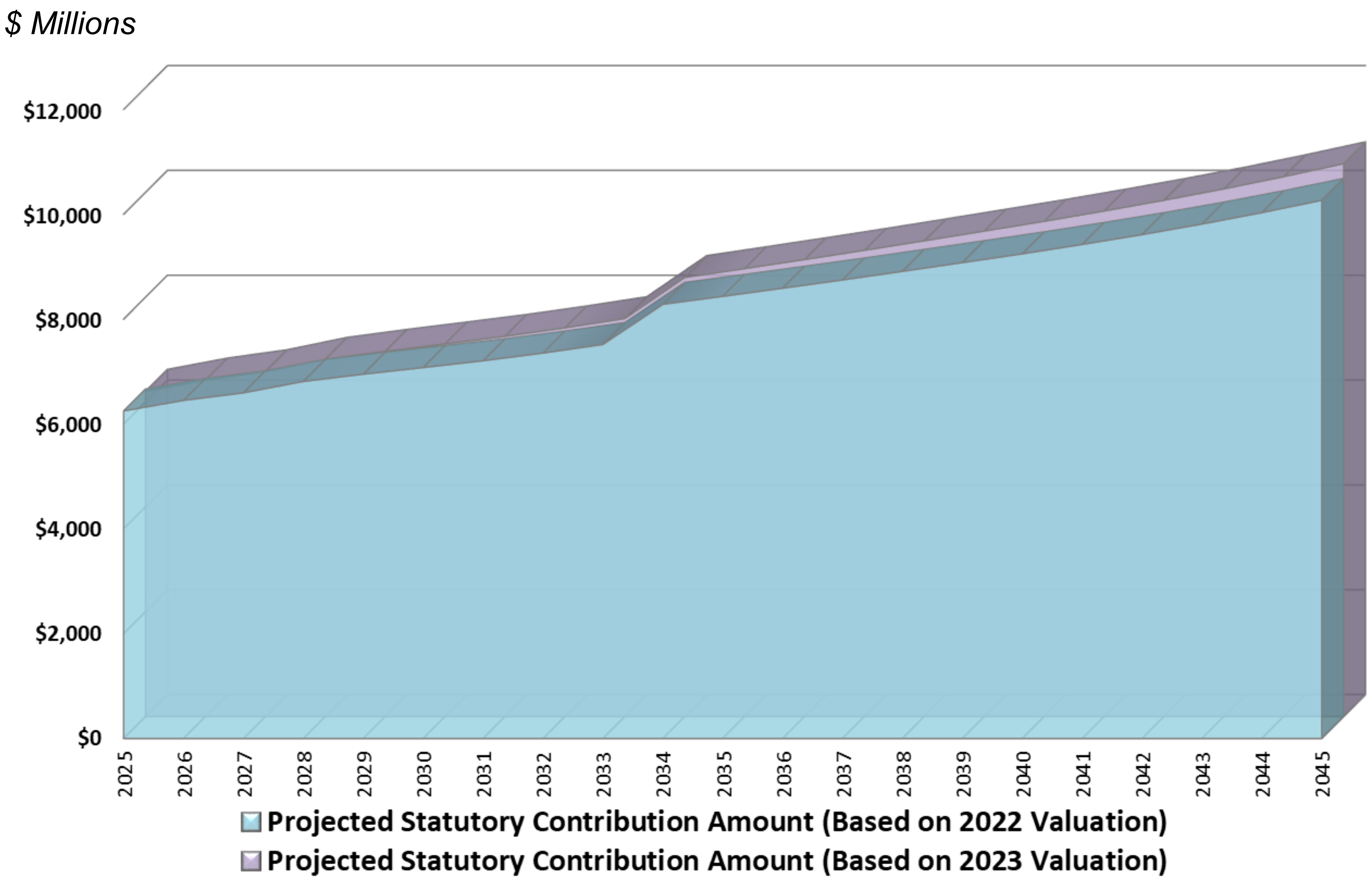


Note: The Board-Adopted Actuarial Funding Policy is the ADC

- The cumulative Statutory contribution from FY 2025 through FY 2045 is $175 billion
- The cumulative ADC contribution from FY 2025 through FY 2045 is $148 billion

Projected results are based on current assumptions used for the June 30, 2023, valuation, including a level active population.

Current Year vs. Prior Year Valuation



Projected results are based on assumptions used for the respective June 30, 2022 and June 30, 2023 valuations, including a level active population.

Summary of GASB Accounting Results

GASB Information as of June 30 ($ in millions)

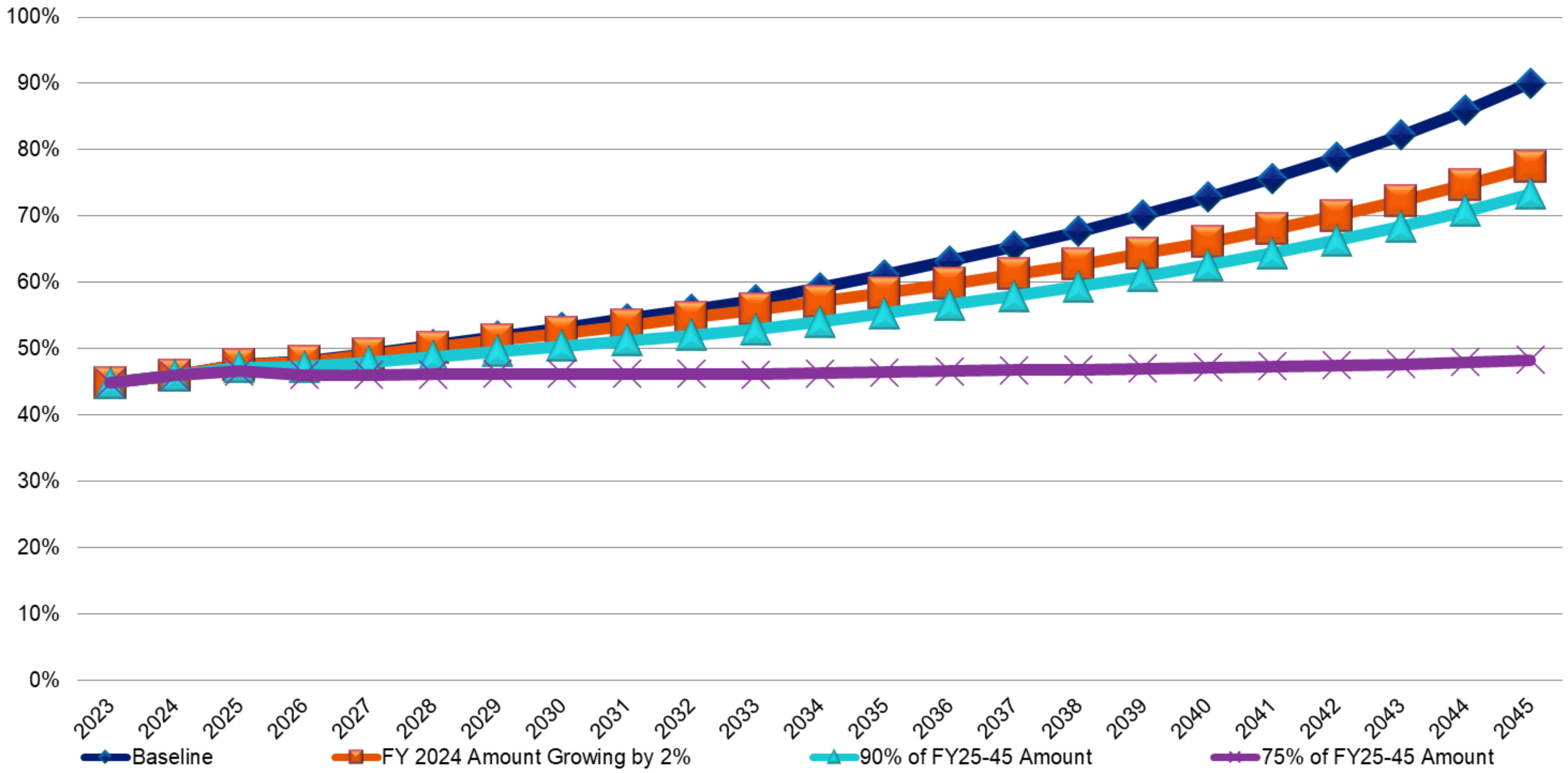
	2023	2022
Long-Term Expected Rate of Return	7.00%	7.00%
Municipal Bond Index	3.65%	3.54%
Single Equivalent Discount Rate	7.00%	7.00%
Total Pension Liability	$151,485	$146,674
Plan Fiduciary Net Position	66,505	62,834
Net Pension Liability	$84,981	$83,840
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	43.9%	42.8%
Total Pension Expense	$7,060	$6,349

Note: Totals may not add to the dollar due to rounding

Sensitivity Projections

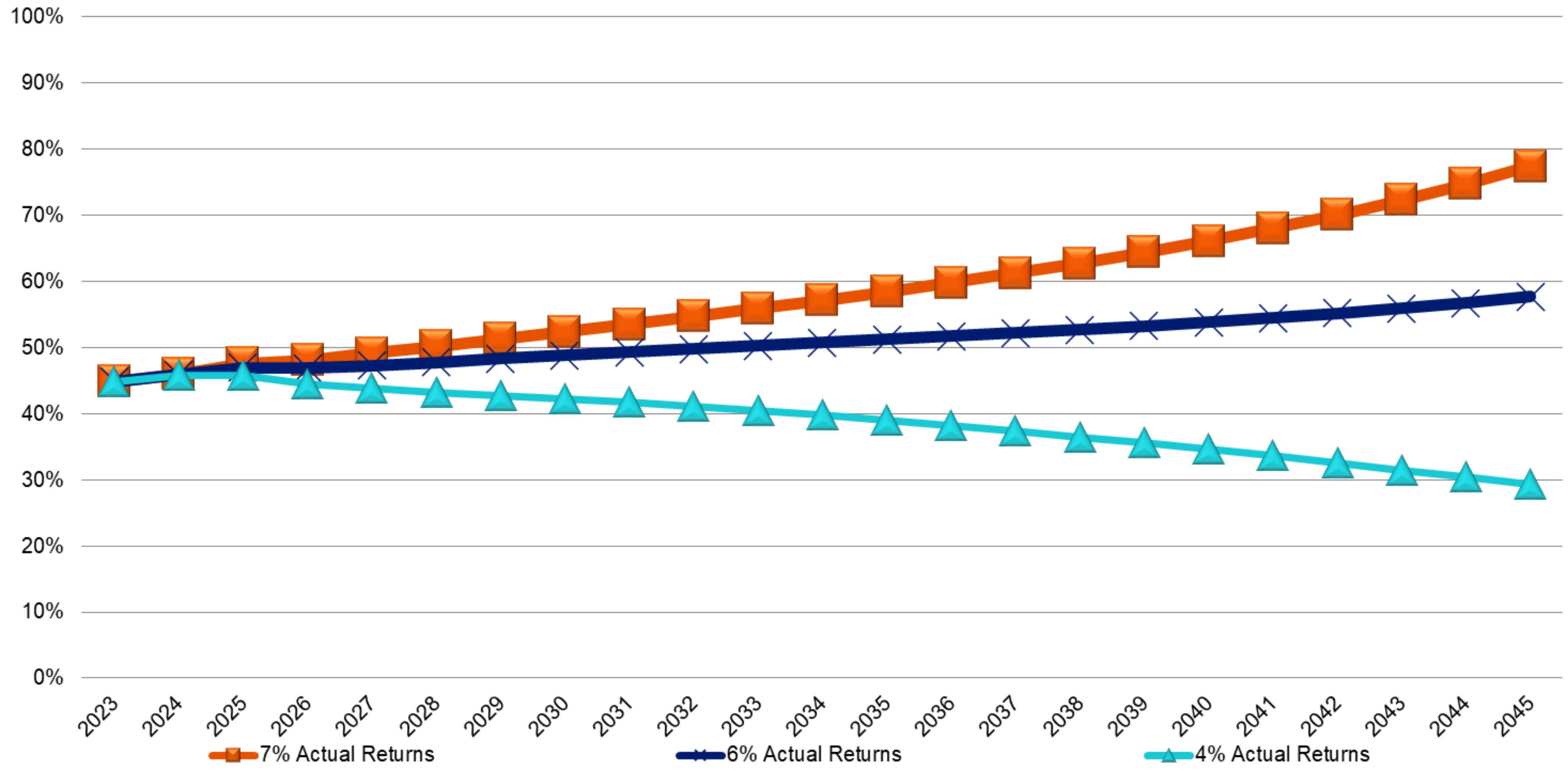
- The projected Statutory State contributions are determined based on an underlying assumption that the State will contribute the required amounts for all future years
  - The required contribution amounts are projected to increase by 2.7% per year, on average, for the period FY 2024 through FY 2045
  - The estimated increase in future State revenue growth, used in determining the Actuarially Determined Contribution, is 2.00% per year
  - Baseline projections of State contributions are also based on future investment returns of 7.00% per year
- To test the sensitivity of this assumption, we created projections based on the following contribution scenarios:
  - The FY 2024 amount is contributed, and future contributions increase by 2%
  - 90% of the FY 2025-2045 amounts are contributed
  - 75% of the FY 2025-2045 amounts are contributed
- We also tested the sensitivity of the 7.00% return assumption by creating projections based on the State contribution scenario of the FY 2024 amount increasing by 2% using the following actual investment returns in each future year:
  - Actual returns of 6% per year
  - Actual returns of 4% per year
- Projected results reflect an assumed level active population through FY 2045

Sensitivity Projection #1



- If the FY 2024 State contribution is made, and future contributions increase by 2%, TRS is projected to remain solvent, but the funded ratio is projected to be 77% in 2045
- If 90% of the FY 2025-2045 State contributions are made, the funded ratio is projected to be 73% in 2045
- If 75% of the FY 2025-2045 State contributions are made, the funded ratio is projected to be 48% in 2045

Sensitivity Projection #2



- If the FY 2024 State contribution is made, future contributions increase by 2%, and actual investment returns are 6% rather than 7%, the funded ratio is projected to be 58% in 2045
- If the FY 2024 State contribution is made, future contributions increase by 2%, and actual investment returns are 4% rather than 7%, the funded ratio is projected to be 29% in 2045

Low-Default-Risk Obligation Measure

- Beginning with the June 30, 2023 actuarial valuation, disclosure of a Low-Default-Risk Obligation Measure (LDROM) is required.
- The LDROM will be calculated using the same methodology and assumption used to determine the Actuarial Accrued Liability (AAL) used for determining the Board-Adopted Actuarially Determined Contribution, except for the discount rate.
- The LDROM is required to be calculated using "*a discount rate…derived from low-default-risk fixed income securities whose cash flows are reasonably consistent with the pattern of benefits expected to be paid in the future*."
  - The discount rate that Segal selected for this purpose is the Bond Buyer General Obligation 20-year Municipal Bond Index Rate (3.65% as of June 30, 2023).
- As of June 30, 2023, the LDROM for TRS is $236.0 billion.
  - The difference between the System's AAL of $151.5 billion and the LDROM can be thought of as the increase in the AAL if the entire portfolio were invested in low-default-risk securities.
  - Alternatively, this difference could also be viewed as representing the expected savings from investing in the System's diversified portfolio compared to investing only in low-default-risk securities.

Appendix

- FY 2025 State Contribution Certification Exhibit A
- FY 2025 THIS Fund Certification Exhibit B

Exhibit A

Summary of State Contributions under Illinois Pension Code and Board-Adopted Actuarial Funding Policy	Fiscal Year 2025
1. Based on Statutory Funding Plan	
Total State Contribution for fiscal year 2025:	
a. Benefit Trust Reserve*:	
i. 49.90% of membership payroll	$ 6,386,047,520
ii. Minus School Districts Contributions:	
(0.58% of membership payroll)	(74,231,158)
(6% FAS cap increases)	(6,945,300)
(10.34% of membership payroll above the Governor's salary)	(3,241,402)
iii. Minus Federal Funds Contribution	
(10.34% of membership payroll from federal funds)	(26,467,247)
iv. Minus phase-in of the effect of assumption changes	(71,540,000)
v. State Contribution	$ 6,203,622,413
b. Guaranteed Minimum Annuity Reserve	300,000
c. Total State Contribution (current law)	$ 6,203,922,413
2. Based on Board-Adopted Actuarial Funding Policy**	
a. Benefit Trust Reserve*:	
i. Normal cost plus amortization	$10,216,459,865
ii. Minus School Districts Contributions	
(0.58% of membership payroll)	(74,231,158)
(6% FAS cap increases)	(6,945,300)
(10.34% of membership payroll above the Governor's salary)	(3,241,402)
iii. Minus Federal Funds Contribution	
(10.34% of membership payroll from federal funds)	(26,467,247)
iv. State Contribution	$10,105,574,758
b. Guaranteed Minimum Annuity Reserve	300,000
c. Total State Contribution	$10,105,874,758
3. Total Normal Cost and Employer Normal Cost Rate for Fiscal Year 2025	
a. Total Normal Cost Rate (including administrative expenses)	19.34%
b. Member Rate	-9.00%
c. Employer Normal Cost Rate	10.34%
4. Federal Contribution Rate (Employer Normal Cost Rate, per PA 100-0340)	10.34%

* Expected fiscal year 2025 membership payroll is $12,798,475,469

** Board-Adopted Actuarial Funding Policy is based on the entry age normal actuarial cost method, current asset valuation method and an amortization policy as follows:
- 20-year closed amortization of Unfunded Actuarial Accrued Liability (UAAL) beginning with Fiscal Year 2017
- Use layered amortization, with new UAAL after Fiscal Year 2017 being amortized over 20 years regardless of source
- Amortization payment increase at the rate of future State revenue growth (assumed to be 2.0%)
- Minimum total contribution is no less than the normal cost in any given year

Exhibit B

Teacher Health Insurance Security Fund Contribution Amount to be Certified by the Board for Fiscal Year 2025	Fiscal Year 2025
Expected State Contribution for Fiscal Year 2025 to THIS Fund:	
1. Fiscal Year 2025 membership payroll:	
a. Total	$ 12,798,475,469
b. Minus members who do not contribute to THIS Fund	(70,357,823)
c. Members who do contribute to THIS Fund	$ 12,728,117,646
2. Member contribution rate (actual, from CMS)	Waiting for CMS
3. Matching State contribution: 1.c. x 2.	Waiting for CMS
4. Adjustment to THIS Fund for underestimating Fiscal Year 2023 member THIS Fund contributions	(737,156)
5. Total THIS Fund State contribution*	Waiting for CMS

* This certification does not include other State contributions to THIS Fund, which are not part of the statutory certification requirement.

- Illinois Statute requires the TRS Board to certify the THIS Fund State contribution amount by November 15 each year
- State contribution amount is based on the projected fiscal 2025 payroll from the June 30, 2023 valuation

ASOP 4 – LDROM

- The LDROM is a calculation assuming a plan's assets are invested in an all-bond portfolio, generally lowering expected long-term investment returns. The discount rate that Segal selected for this purpose is the rate we would use to determine the discount rate for valuing reported public pension plan liabilities in accordance with Governmental Accounting Standards when plan assets are projected to be insufficient to make projected benefit payments, and the 20-year period reasonably approximates the duration of such plans (3.65% as of June 30, 2023).
- ASOP 4 requires commentary to help the intended user understand the significance of the LDROM with respect to the funded status of the plan, plan contributions, and the security of participant benefits. In general, if plan assets were invested exclusively in low-default-risk securities, the funded status would be lower and the Board-Adopted Actuarially Determined Contribution would be higher. While investing in a portfolio with low-default-risk securities may be more likely to reduce investment volatility and the volatility of employer contributions, it also may be more likely to result in higher employer contributions or lower benefits.

Caveats

This presentation is based on the preliminary results of the June 30, 2023, actuarial valuation performed for the Board of Trustees of the Teachers' Retirement System of the State of Illinois . The preliminary actuarial valuation report has information on the plan provisions, data, methods and assumptions used in the valuation. Use of the information in this presentation is subject to the caveats described in that document. The measurements in this presentation may not be appropriate for purposes other than those described in the actuarial valuation report.

Segal valuation results are based on proprietary actuarial modeling software. The actuarial valuation models generate a comprehensive set of liability and cost calculations that are presented to meet regulatory, legislative and client requirements. Deterministic cost projections are based on our proprietary forecasting model. Our Actuarial Technology and Systems unit, comprised of both actuaries and programmers, is responsible for the initial development and maintenance of these models. The models have a modular structure that allows for a high degree of accuracy, flexibility and user control. The client team programs the assumptions and the plan provisions, validates the models and reviews test lives and results, under the supervision of the responsible actuary.