NORTH DAKOTA
RETIREMENT AND
INVESTMENT OFFICE
*Teachers' Fund for Retirement*
*State Investment Board*

North Dakota Teachers'
Fund for Retirement

# Actuarial Valuation as of July 1, 2022

**November 17, 2022**

Matt Strom, FSA, MAAA, EA, Senior Vice President and Actuary

*This document has been prepared by Segal for the benefit of the Board of Trustees of the North Dakota Teachers' Fund for Retirement and is not complete without the presentation provided at the November 17, 2022, meeting of the Board of Trustees.*





Segal

# Agenda

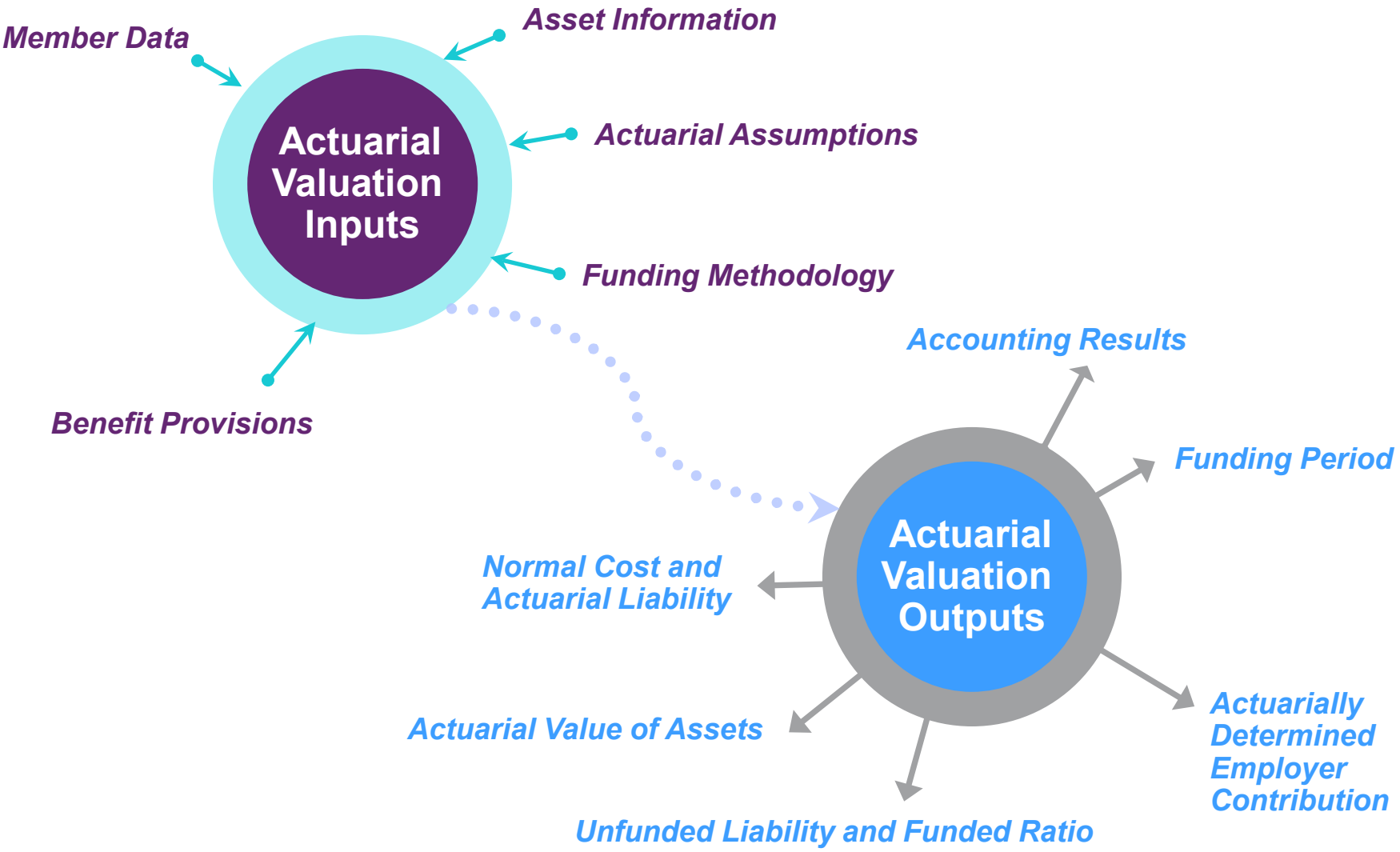
**Overview of Valuation Process**

**Valuation Results**

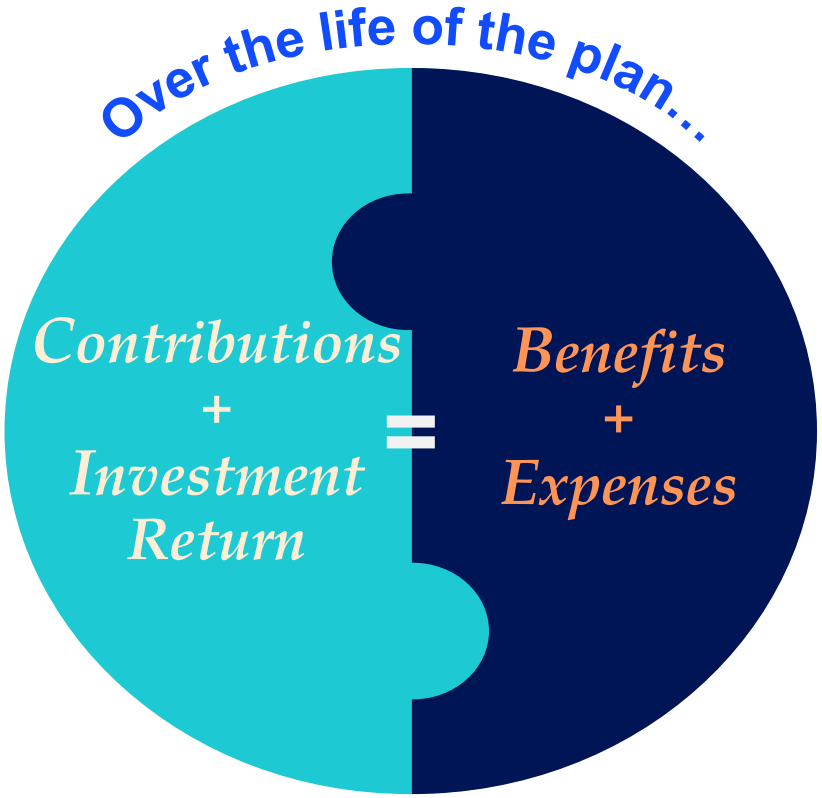
**Projections**

**Next Steps**

# The Valuation Process



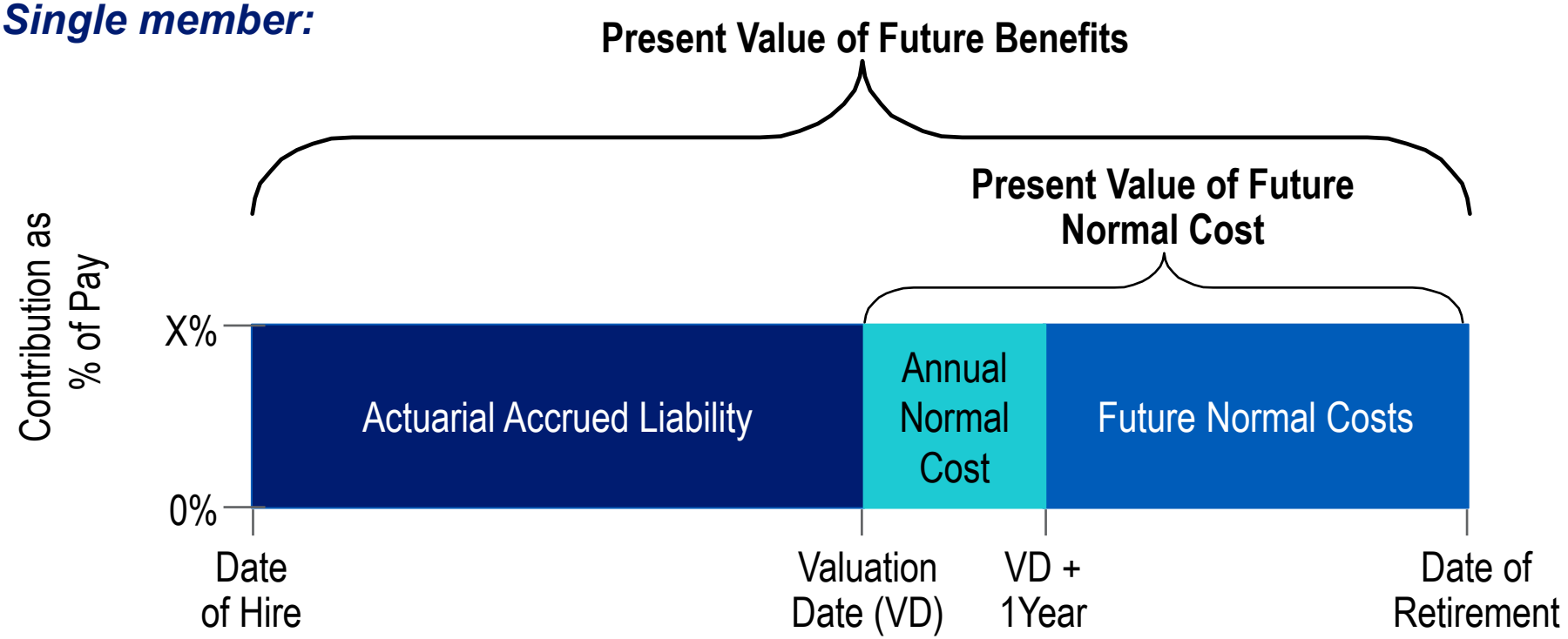
# Actuarial Balance




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

# Funding Process

***Single member:***

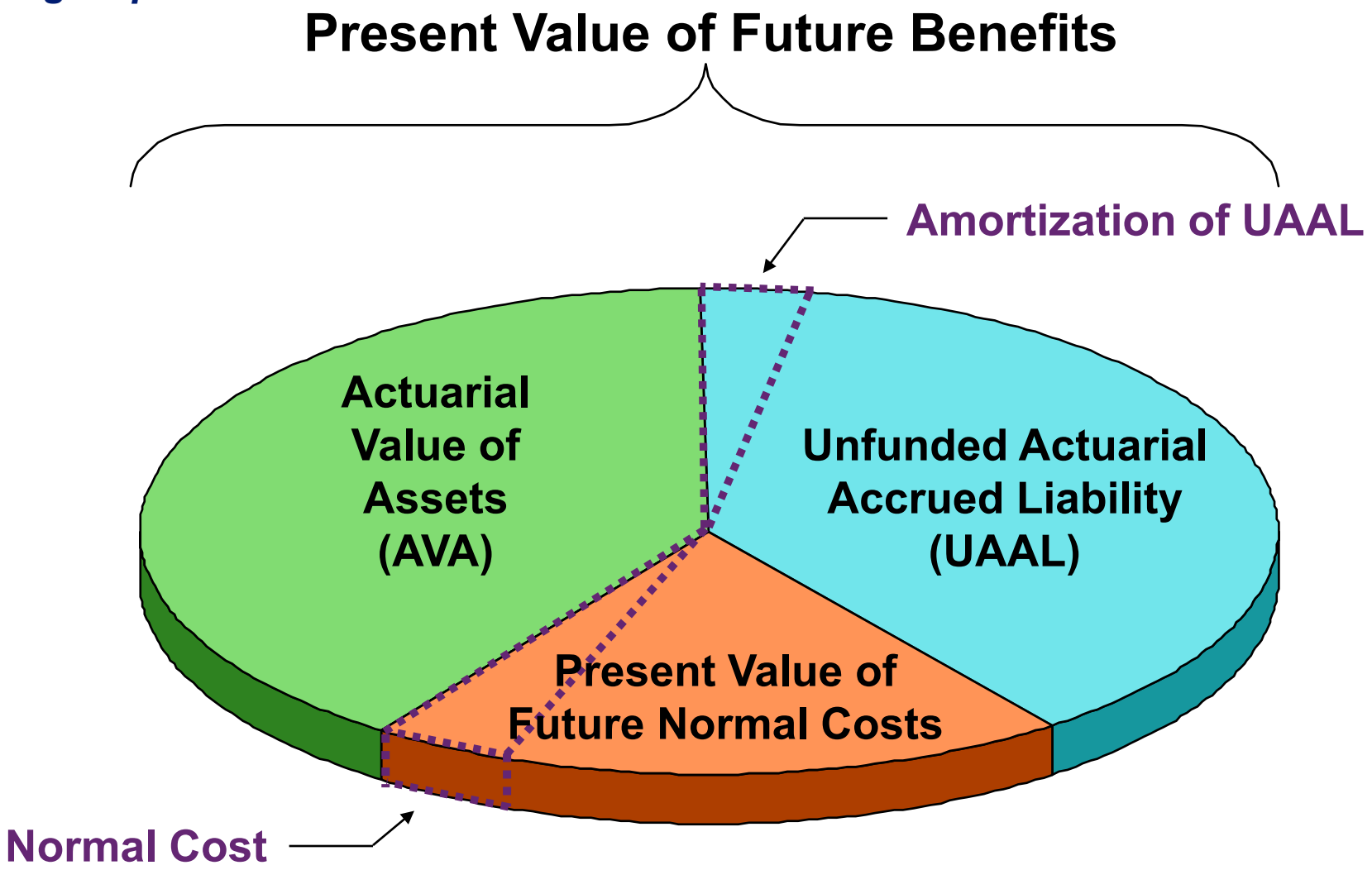



**Entry Age cost method: Allocates cost between past and future service**

- **Normal Cost:** Cost of annual benefit accrual as a level percent of salary
- **Actuarial Accrued Liability:** Represents accumulated value of past normal costs (or difference between total cost and present value of future normal costs)
- **Unfunded Actuarial Accrued Liability:** Actuarial accrued liability minus actuarial value of assets

# Actuarially Determined Contribution

***Entire group:***



# Actuarially Determined Contribution vs. Funding Period

## Actuarially Determined Contribution (ADC)

- Equal to the normal cost plus amortization of the unfunded actuarial accrued liability (UAAL)
- Funding policy components:
  - Asset valuation method
  - Actuarial cost method
  - Amortization method

## Funding Period or Effective Amortization Period

- Number of years that the UAAL is expected to be amortized based upon the fixed member and employer contribution rates
- Funding period is compared to the ADC's amortization period to assess the progress toward amortizing the unfunded accrued liability

The employer contribution rate is compared to the ADC as a measure of the adequacy of the employer (and member) rates.

# Actuarial Assumptions

## *Demographic*

- Retirement
- Disability
- Death in active service
- Withdrawal
- Death after retirement

## *Economic*

- Inflation: 2.30%
- Investment return: 7.25%
- Salary increases: 14.80% for new members to 3.80% for members over 30 years from hire
- Payroll growth: 3.25%

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.

# Actuarial Methods

### *Asset Valuation Method*

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

### *Actuarial Cost Method*

- Allocation of liability to past and future service
- TFFR uses the entry age cost method
  - Allocates cost of member's retirement benefit over expected career as a level % of salary
  - Most common cost method among public retirement systems
  - Required by GASB for financial statement reporting purposes

### *Amortization Method*

- Relies on two inputs:
  - Number of years to amortize the UAL
  - Level dollar or level percentage of payroll approach
- TFFR' amortization method:
  - Closed period ending on June 30, 2043
  - 21 years remaining
  - Payroll calculated to increase by 3.25% per year

# Summary of Valuation Highlights

## July 1, 2022, Actuarial Valuation

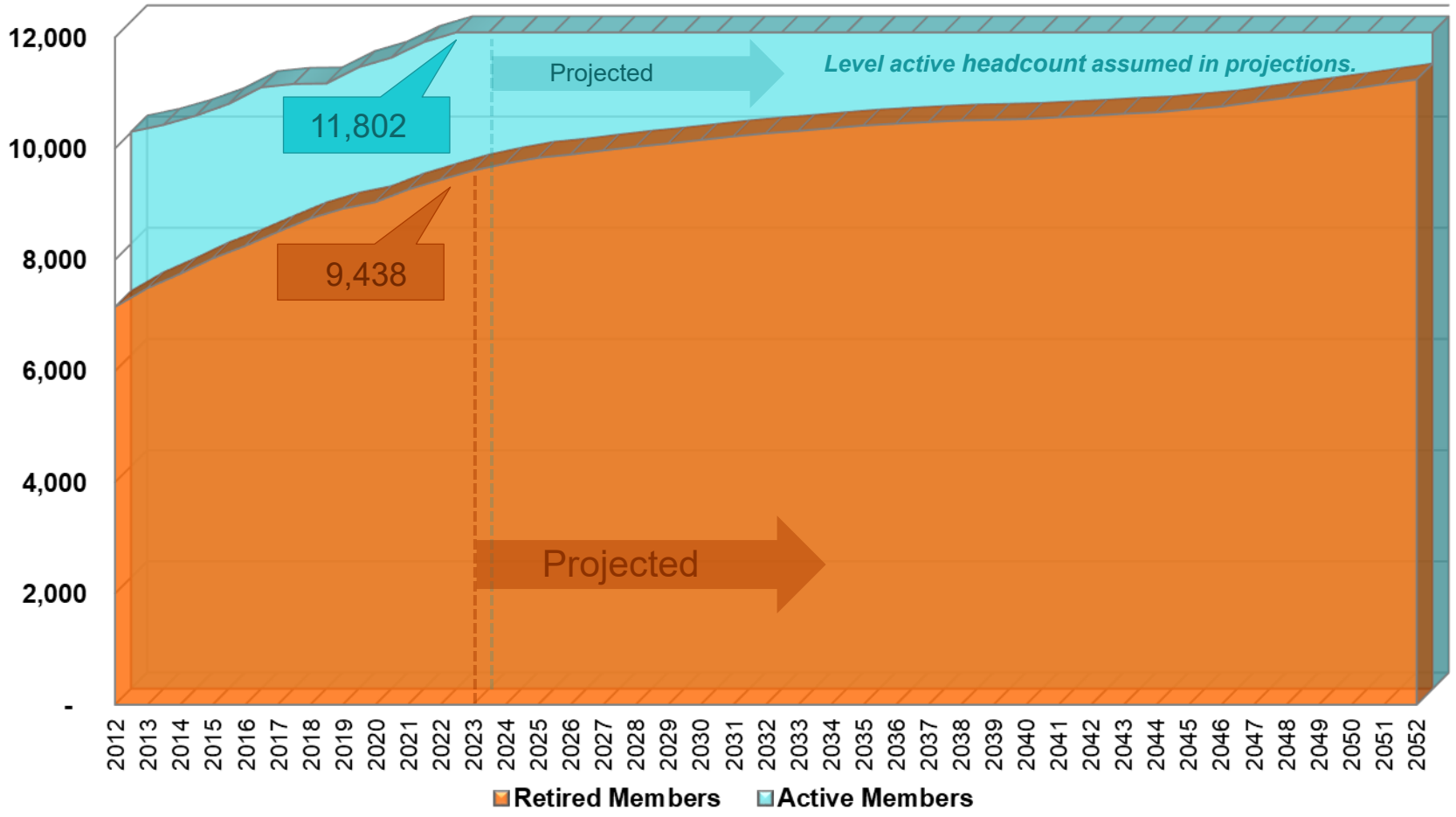
- The return on the fair value of assets for the year ending June 30, 2022, was **−6.1%***
  - Gradual recognition of deferred losses resulted in **7.4%** return on actuarial value of assets
- Funded ratio increased from 68.6% (as of 7/1/2021) to **69.9%** (as of 7/1/2022)
- Effective amortization period decreased from 21 years to 19 years
- Net impact on actuarially determined contribution (ADC) was a decrease from 12.37% of payroll to **12.12%** of payroll
  - Based on the employer contribution rate of 12.75%, the contribution margin has increased from 0.38% of payroll to 0.63% of payroll
- GASB Net Pension Liability increased from $1.05 billion as of 6/30/2021, to $1.46 billion as of 6/30/2022

* Based on Segal's calculation

# Membership

| | 2021 | 2022 | Change |
|---|---|---|---|
| **Active** | | | |
| • Number | 11,627 | 11,802 | +1.5% |
| • Payroll (annualized) | $749.4 mil | $766.1 mil | +2.2% |
| • Average Age | 41.4 years | 41.3 years | −0.1 years |
| • Average Service | 11.4 years | 11.3 years | −0.1 years |
| **Retirees and Beneficiaries** | | | |
| • Number | 9,262 | 9,438 | +1.9% |
| • Total Annual Benefits | $241.4 mil | $251.9 mil | +4.3% |
| • Average Monthly Benefit | $2,172 | $2,224 | +2.4% |

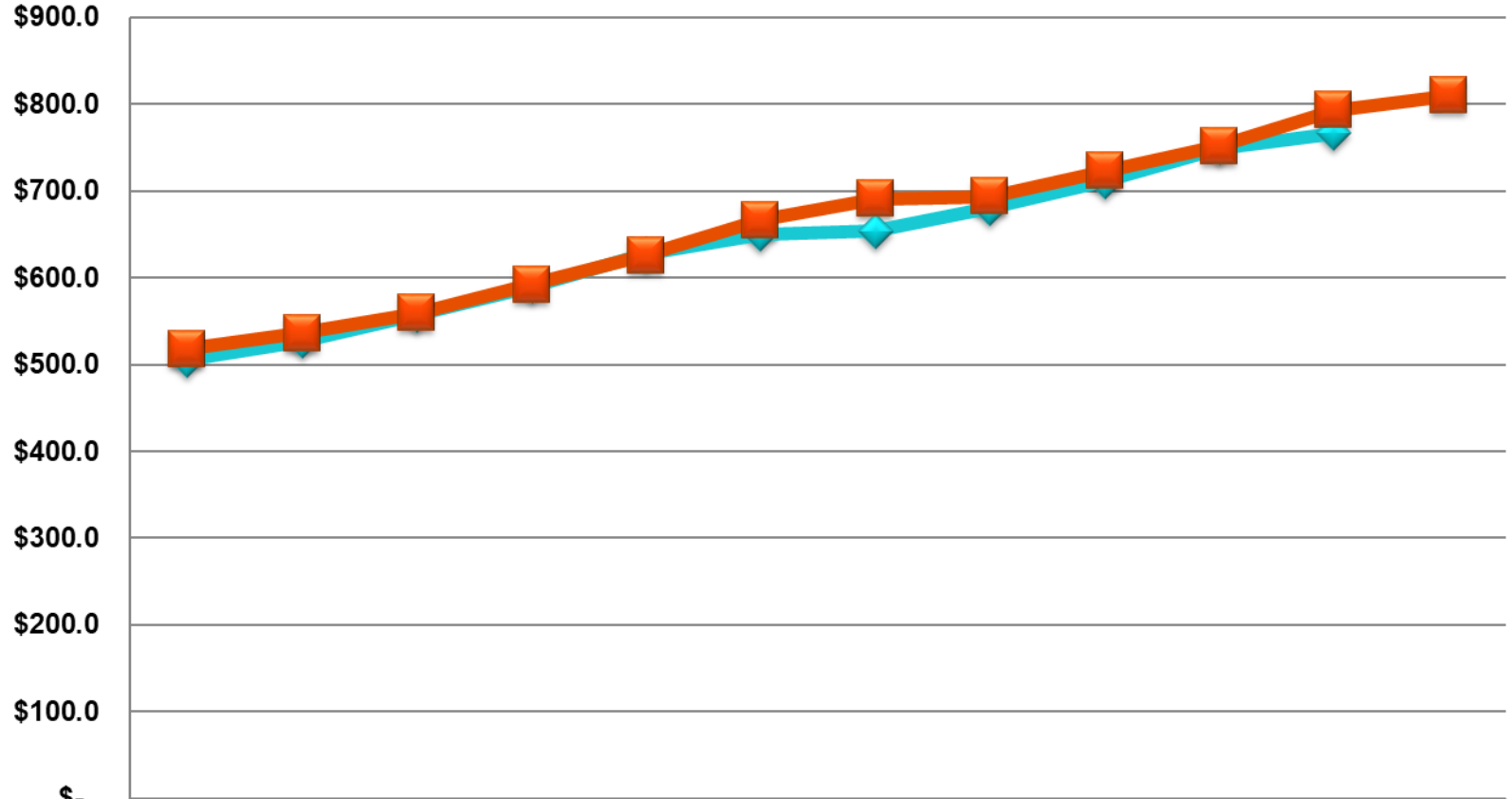
# Active and Retired Membership




**Since 2012, number of retirees and beneficiaries has increased 2.8% per year on average while the number of active members has increased 1.7% per year on average.**

# Active Payroll

*$ Millions*



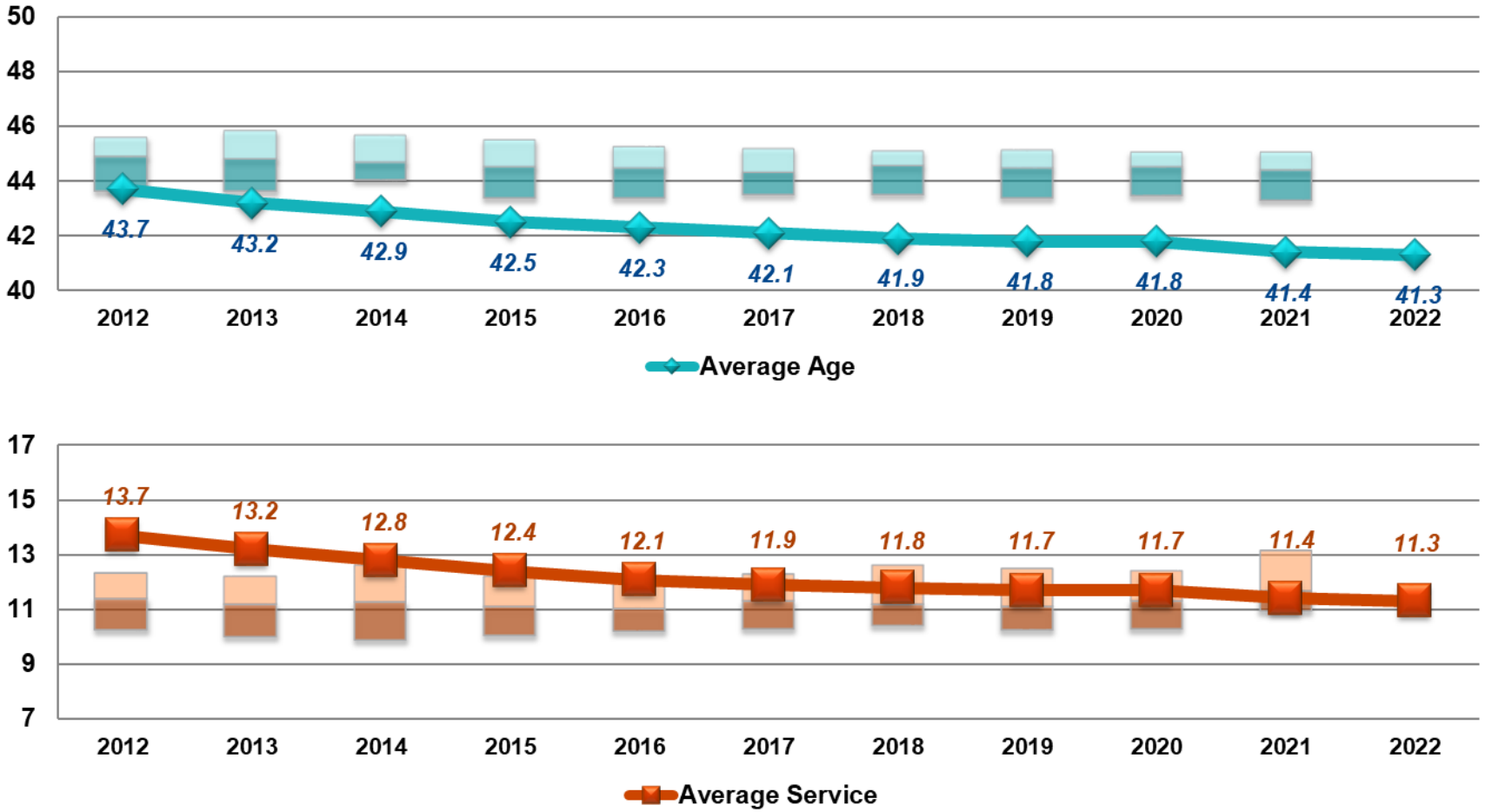

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Actual* | $505.3 | $526.7 | $557.2 | $589.8 | $627.0 | $650.1 | $653.5 | $680.5 | $711.0 | $749.4 | $766.1 | |
| Projected** | $518.2 | $535.9 | $559.4 | $592.3 | $625.8 | $666.4 | $690.4 | $693.7 | $723.2 | $751.7 | $792.7 | $810.0 |

***Annualized Total Payroll Supplied by System***

****Projected Payroll***

**Since 2012, active payroll has increased, on average, 4.2% per year.**

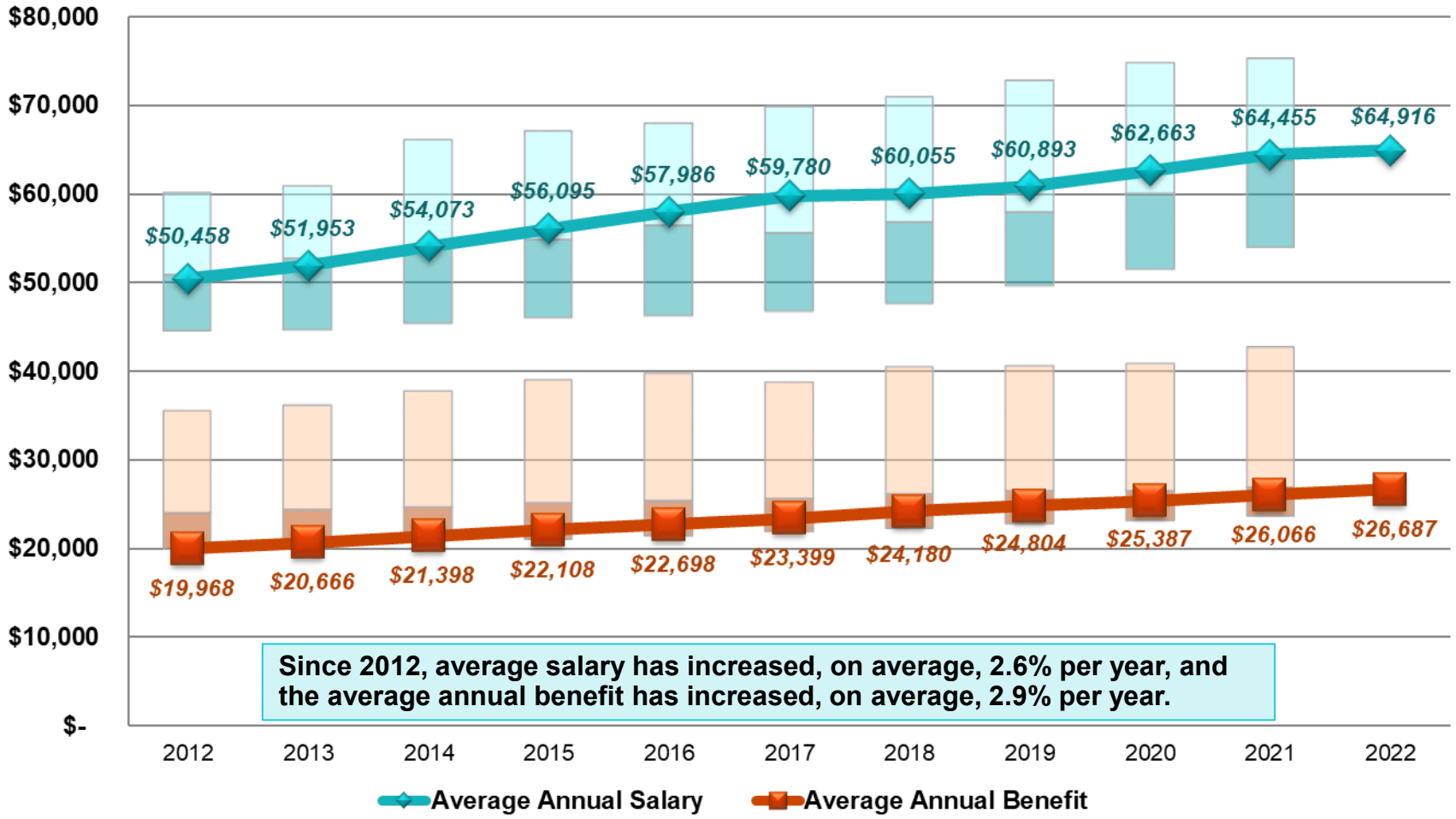
# Average Age and Service of Active Members




For context, historical data is compared to 38 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), where the middle line indicates the median.

* Public Plans Data. 2001-2021. Center for Retirement Research at Boston College, Mission Square Research Institute, and National Association of State Retirement Administrators.

# Average Salary and Average Benefit

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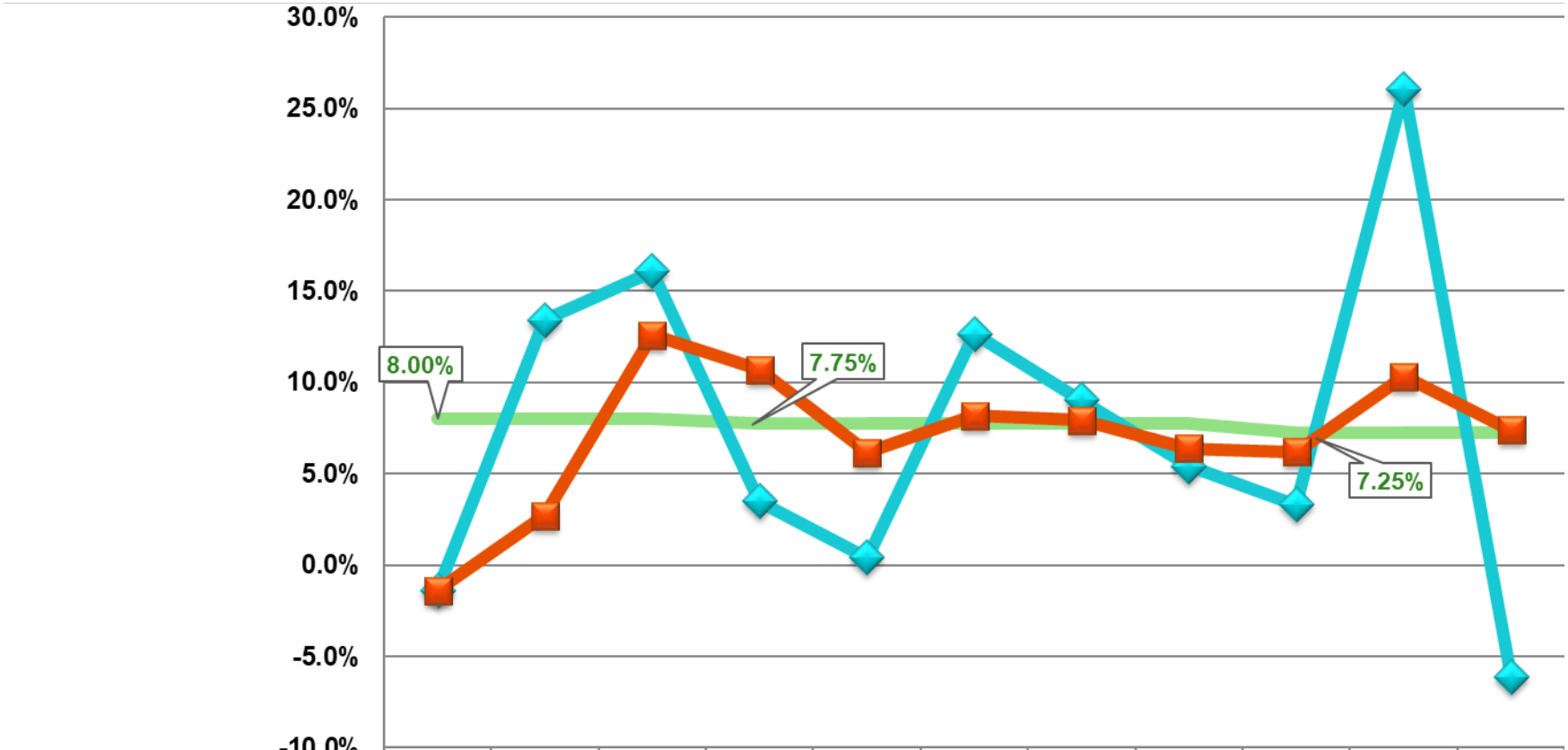
# Assets

- The fair value of assets decreased from $3.28 billion (as of 6/30/2021) to $3.02 billion (as of 6/30/2022)
  - Segal estimated the investment return at −6.1%, net of investment expenses
- The actuarial value of assets increased from $2.97 billion (as of 6/30/2021) to $3.13 billion (as of 6/30/2022)
  - Investment return of 7.4%, net of investment expenses
  - Compared to the return assumption of 7.25%
  - Actuarial value is 103.6% of fair value
  - There is a total of $109 million of deferred net investment losses that will be recognized in future years
- Average annual returns are:

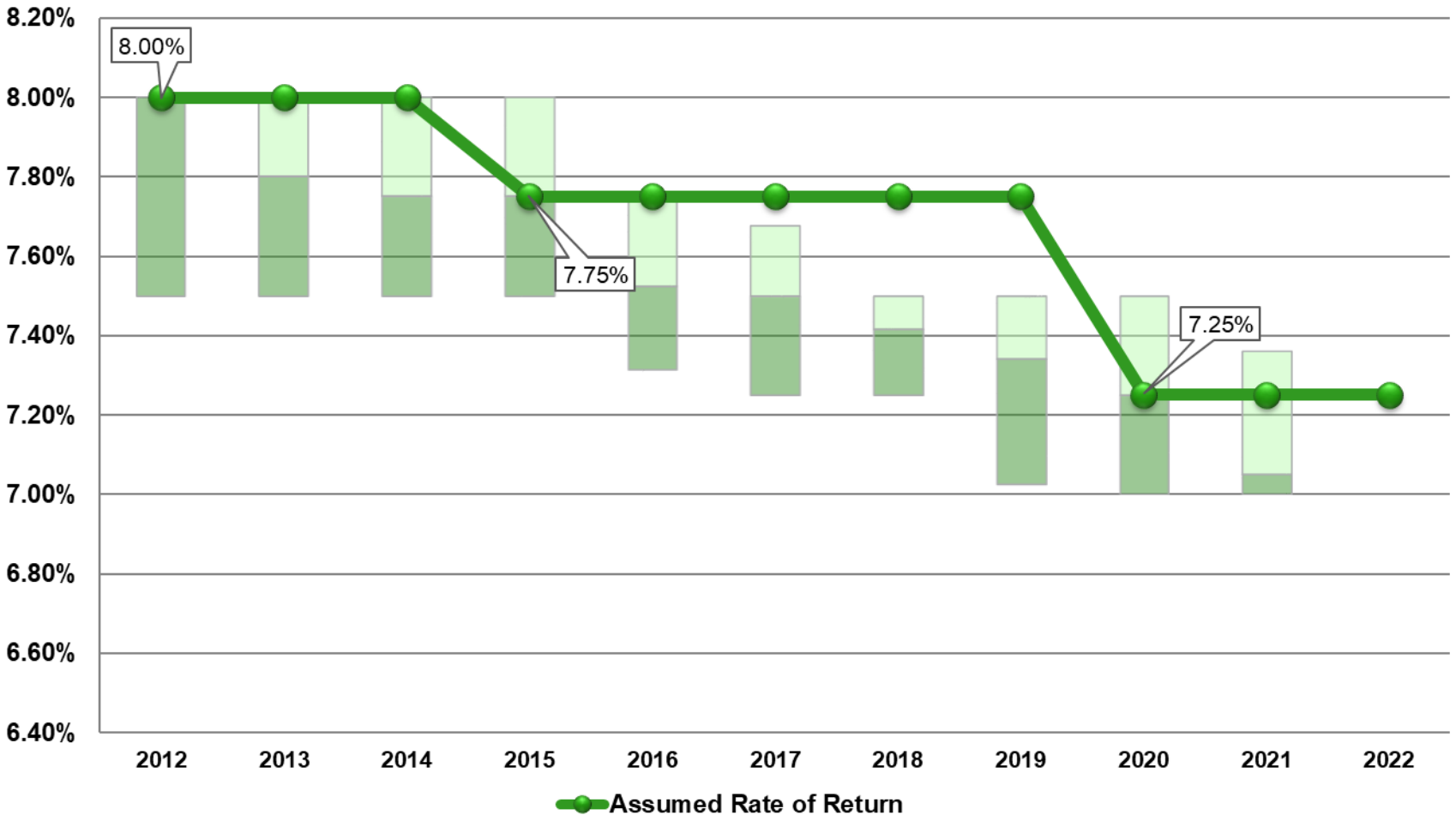
| | Fair Value | Actuarial Value |
|---|---|---|
| 10-year average | 8.0% | 7.8% |
| 20-year average | 7.0% | 5.9% |
| 30-year average | 7.3% | 7.2% |

# Asset Returns




| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Assumed Rate of Return | 8.00% | 8.00% | 8.00% | 7.75% | 7.75% | 7.75% | 7.75% | 7.75% | 7.25% | 7.25% | 7.25% |
| Fair Value of Assets | -1.4% | 13.4% | 16.1% | 3.5% | 0.4% | 12.6% | 9.0% | 5.4% | 3.3% | 26.1% | -6.1% |
| Actuarial Value of Assets | -1.4% | 2.7% | 12.6% | 10.7% | 6.2% | 8.2% | 7.9% | 6.4% | 6.2% | 10.3% | 7.4% |

# Investment Return Assumption

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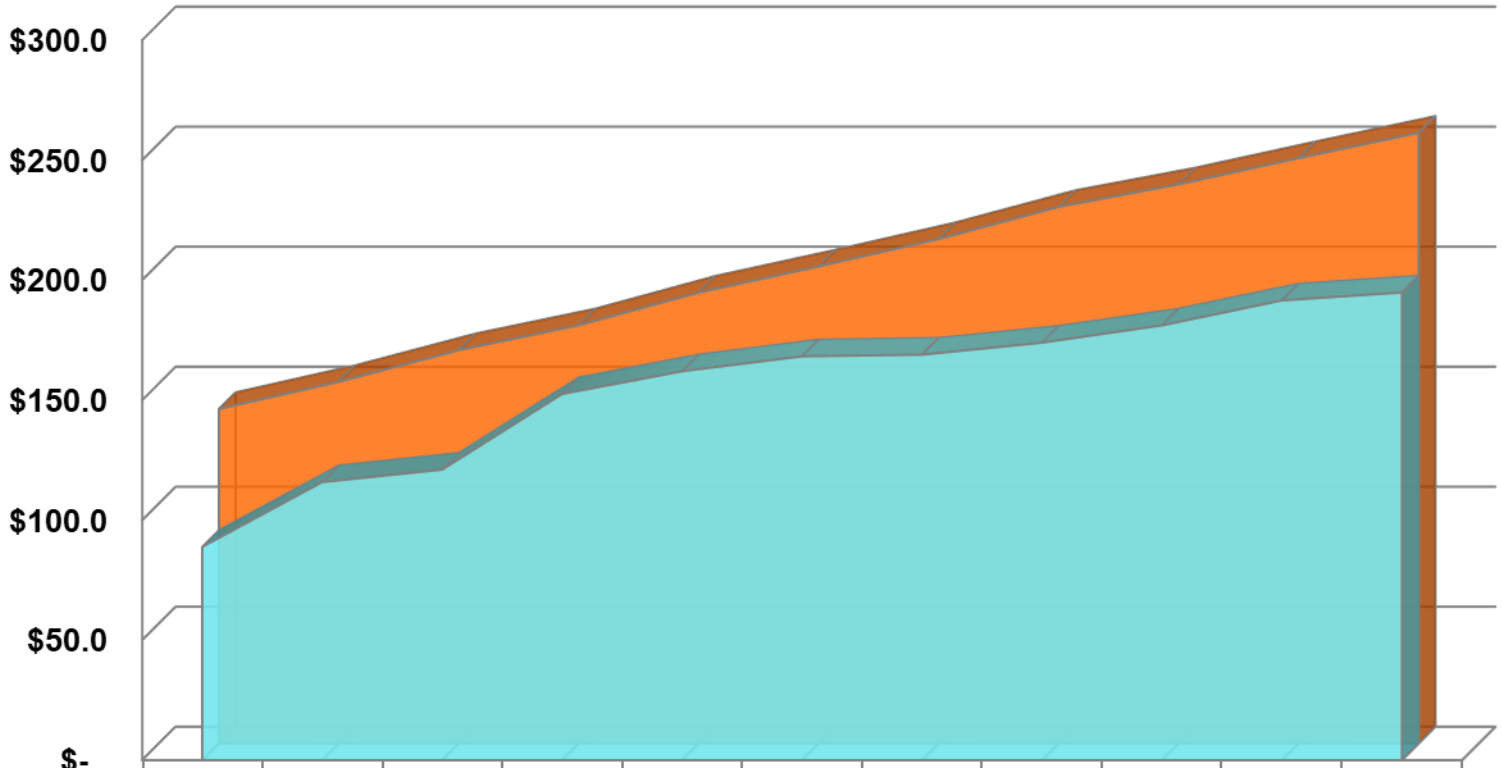
# Contributions vs. Benefits and Refunds

*$ Millions*

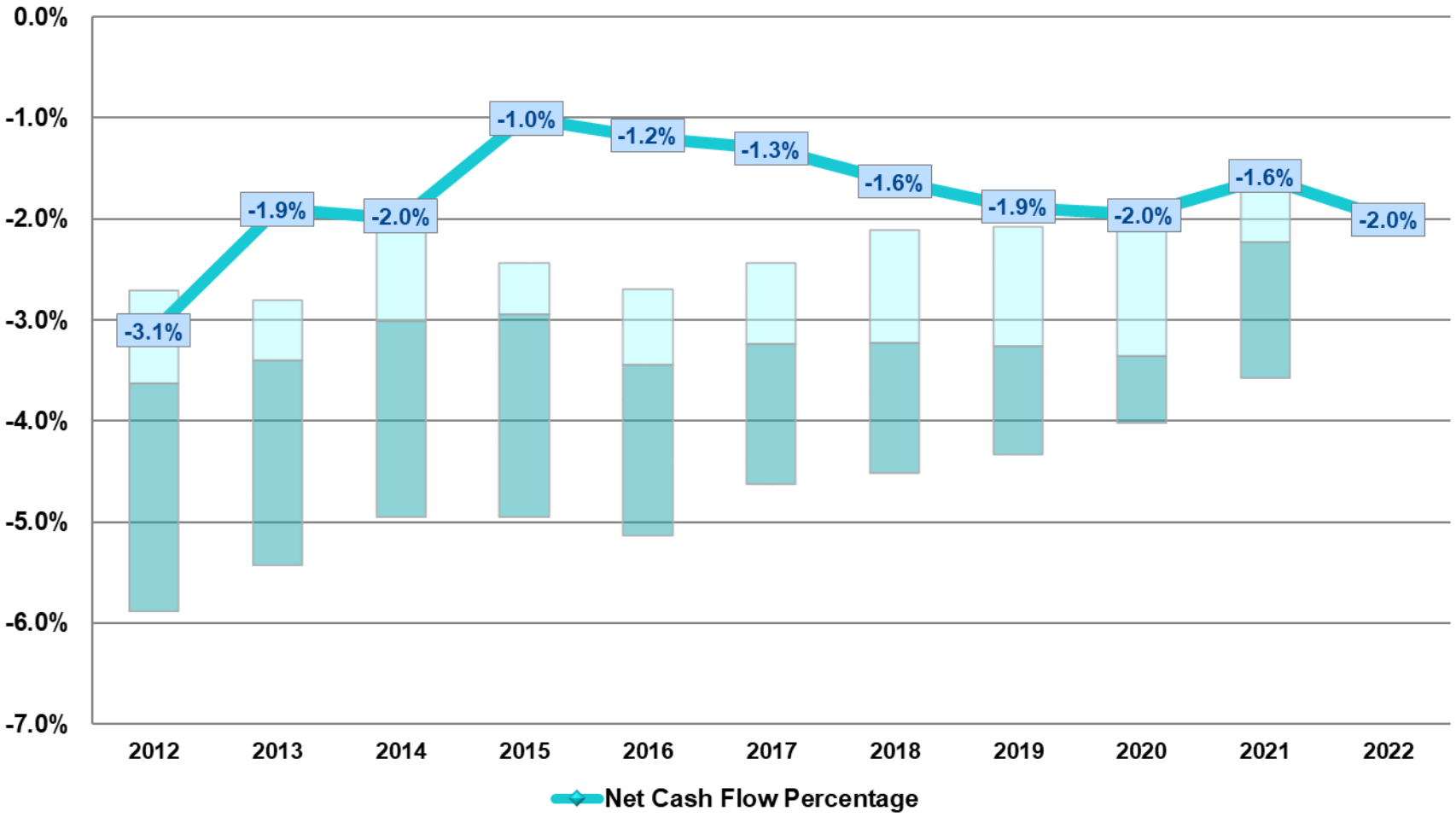



| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Contributions* | $88.8 | $115.8 | $121.0 | $152.5 | $162.0 | $168.2 | $168.9 | $173.9 | $181.1 | $191.5 | $194.8 |
| Benefits & Refunds** | $139.3 | $150.6 | $163.8 | $174.2 | $187.8 | $198.7 | $210.1 | $223.5 | $232.9 | $243.8 | $254.4 |

**** Includes member and employer contributions, and service purchases***

***** Includes administrative expenses***

# Net Cash Flow as a % of Fair Value

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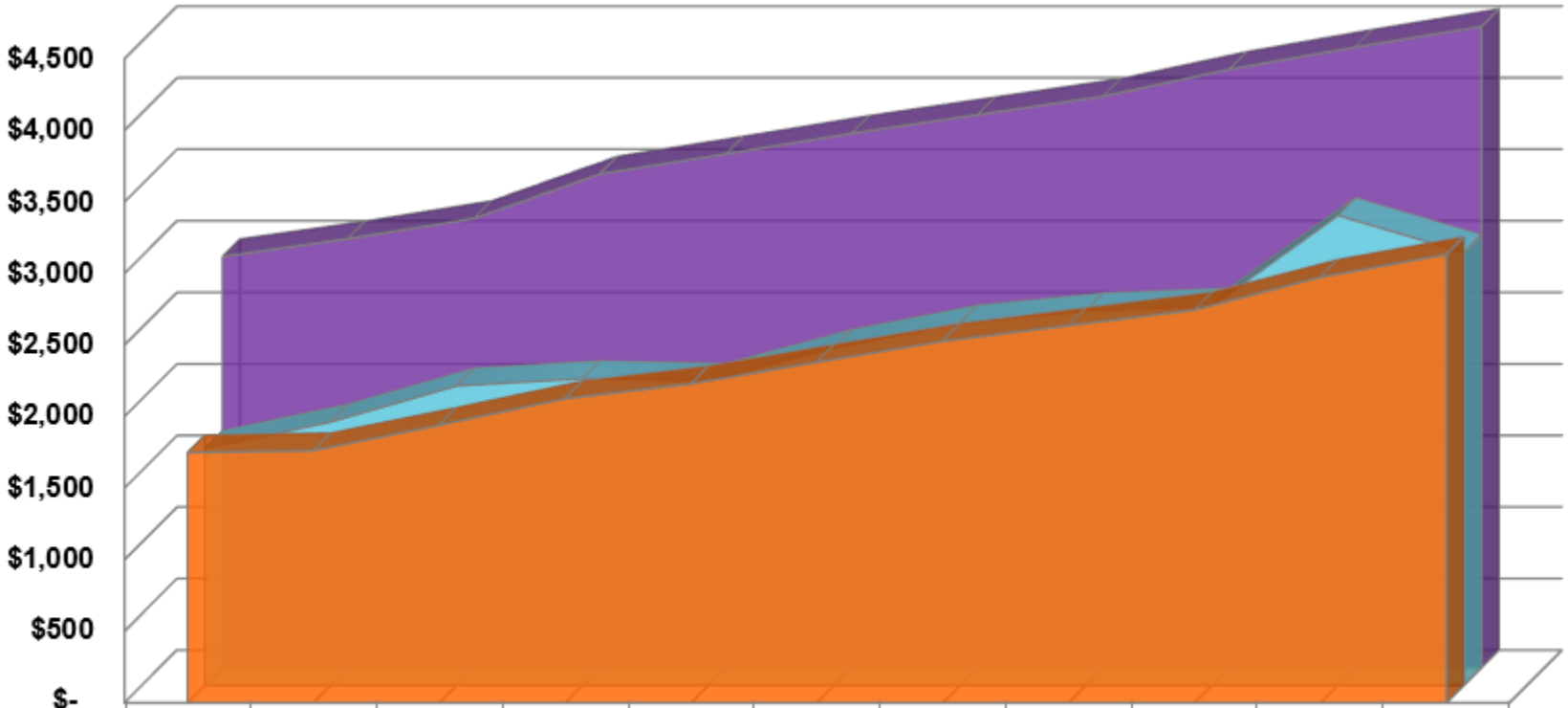
# Valuation Results ($ in millions)

| | July 1, 2021 | July 1, 2022 |
|---|---|---|
| Actuarial Accrued Liability: | | |
| • Active Members | $1,690 | $1,722 |
| • Inactive Members | 131 | 151 |
| • Retirees and Beneficiaries | 2,515 | 2,607 |
| Total | $4,336 | $4,480 |
| Actuarial Value of Assets | 2,974 | 3,133 |
| Unfunded Accrued Liability | $1,362 | $1,347 |
| Funded Ratio | 68.6% | 69.9% |
| | | |
| Fair Value of Assets (FVA) | 3,282 | 3,024 |
| Unfunded Accrued Liability, FVA Basis | $1,054 | $1,456 |
| Funded Ratio, FVA Basis | 75.7% | 67.5% |

Note: numbers may not add due to rounding

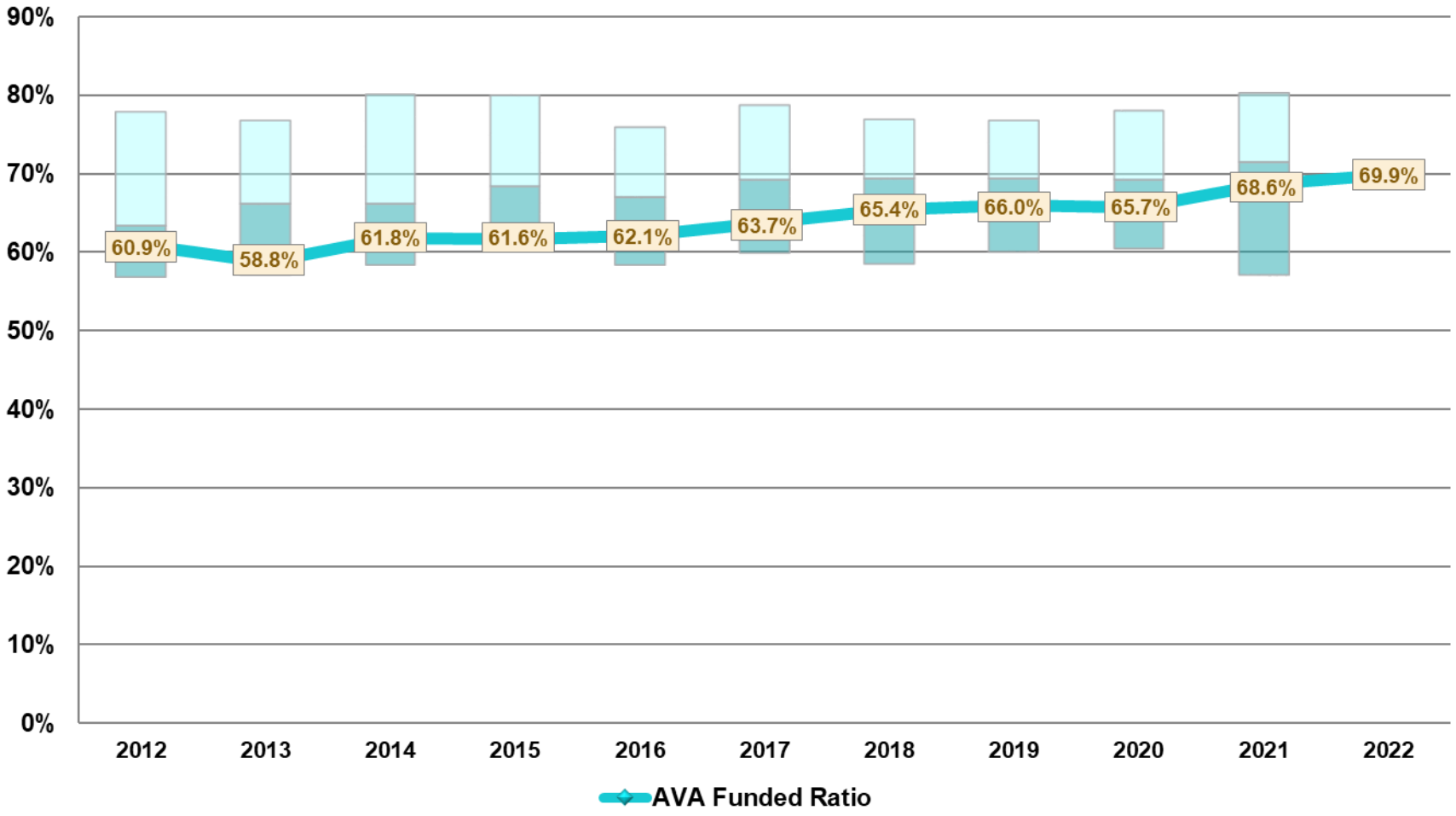
# Fair and Actuarial Values of Assets Compared to Actuarial Accrued Liability

*$ Millions*




| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AVA | $1,748 | $1,762 | $1,940 | $2,125 | $2,229 | $2,380 | $2,526 | $2,636 | $2,745 | $2,974 | $3,133 |
| FVA | $1,654 | $1,839 | $2,091 | $2,142 | $2,124 | $2,360 | $2,531 | $2,616 | $2,651 | $3,282 | $3,024 |
| AAL | $2,872 | $2,997 | $3,139 | $3,450 | $3,589 | $3,734 | $3,864 | $3,993 | $4,181 | $4,336 | $4,480 |

# Funded Ratio, AVA Basis

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# Five-Year History of Gain/(Loss)

| $ in thousands | July 1, 2022 | July 1, 2021 | July 1, 2020 | July 1, 2019 | July 1, 2018 |
|---|---|---|---|---|---|
| Investments | $5,486 | $83,839 | ($40,947) | ($34,821) | $4,586 |
| Admin expenses | 161 | (547) | 233 | (59) | 116 |
| Demographics | | | | | |
| • Turnover | ($1,859) | ($1,844) | ($3,380) | ($3,820) | ($1,696) |
| • Retirement | (4,117) | (6,175) | (606) | (1,286) | (3,038) |
| • Mortality | 5,490 | 5,879 | 9,680 | 9,738 | 6,945 |
| • Salary/service | 26,224 | 1,067 | 18,179 | 21,896 | 29,231 |
| • New entrants | (6,137) | (6,123) | (6,932) | (7,394) | (4,463) |
| • Miscellaneous | (10,426) | (513) | 4,463 | 5,006 | 1,584 |
| • Subtotal | $9,174 | ($7,709) | $21,403 | $24,139 | $28,564 |
| **Total** | **$14,821** | **$75,583** | **($19,311)** | **($10,742)** | **$33,266** |

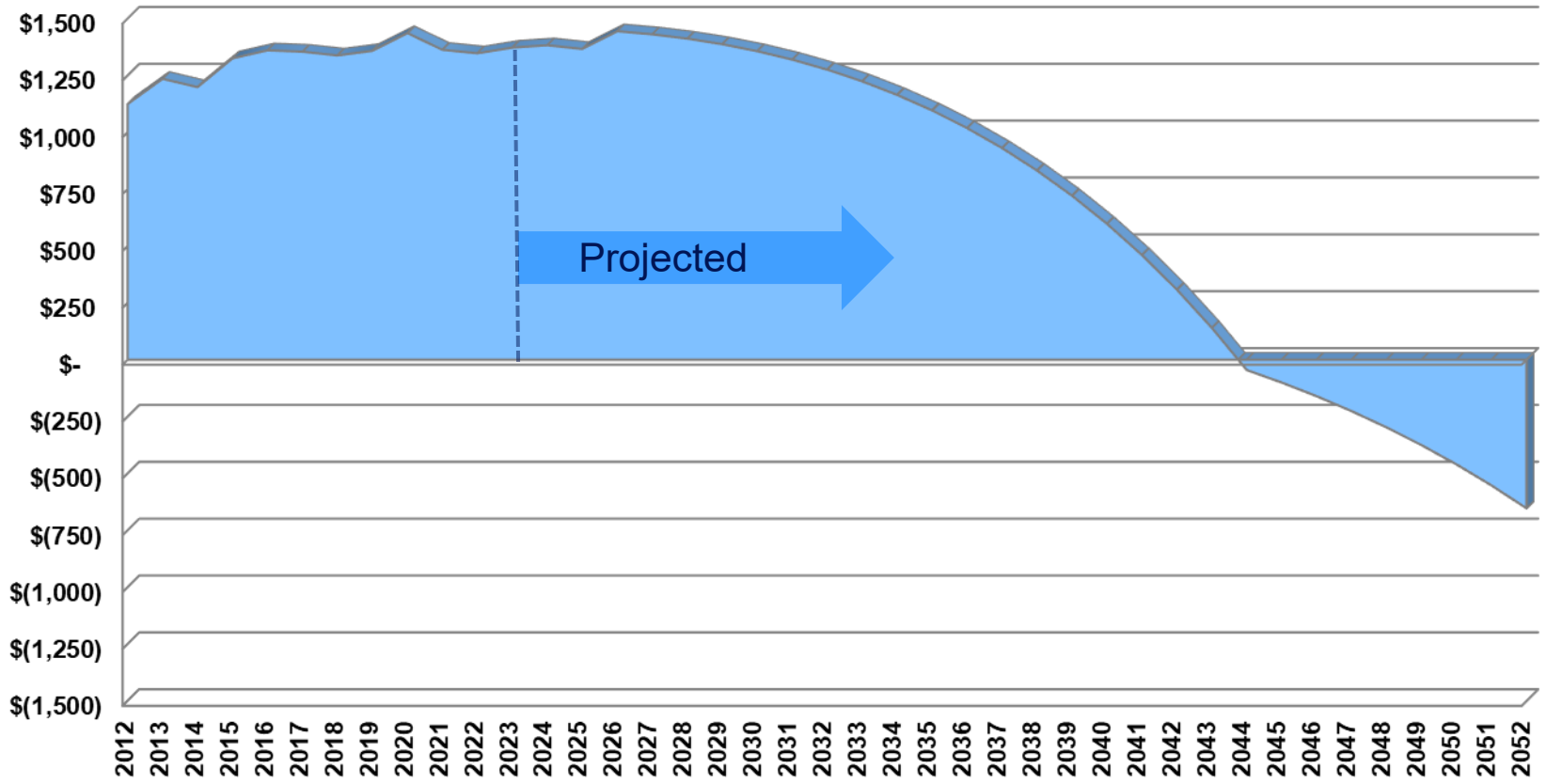
Note: numbers may not add due to rounding

# Actuarially Determined Contribution

| | For the Year Beginning | |
|---|---|---|
| | **July 1, 2021** | **July 1, 2022** |
| Normal Cost Rate | 12.41% | 12.19% |
| Member Rate | (11.75%) | (11.75%) |
| Employer Normal Cost Rate | 0.66% | 0.44% |
| Amortization of UAAL | 11.71% | 11.68% |
| Actuarially Determined Contribution | 12.37% | 12.12% |
| Statutory Employer Rate | 12.75% | 12.75% |
| Contribution Sufficiency/(Deficiency) | 0.38% | 0.63% |

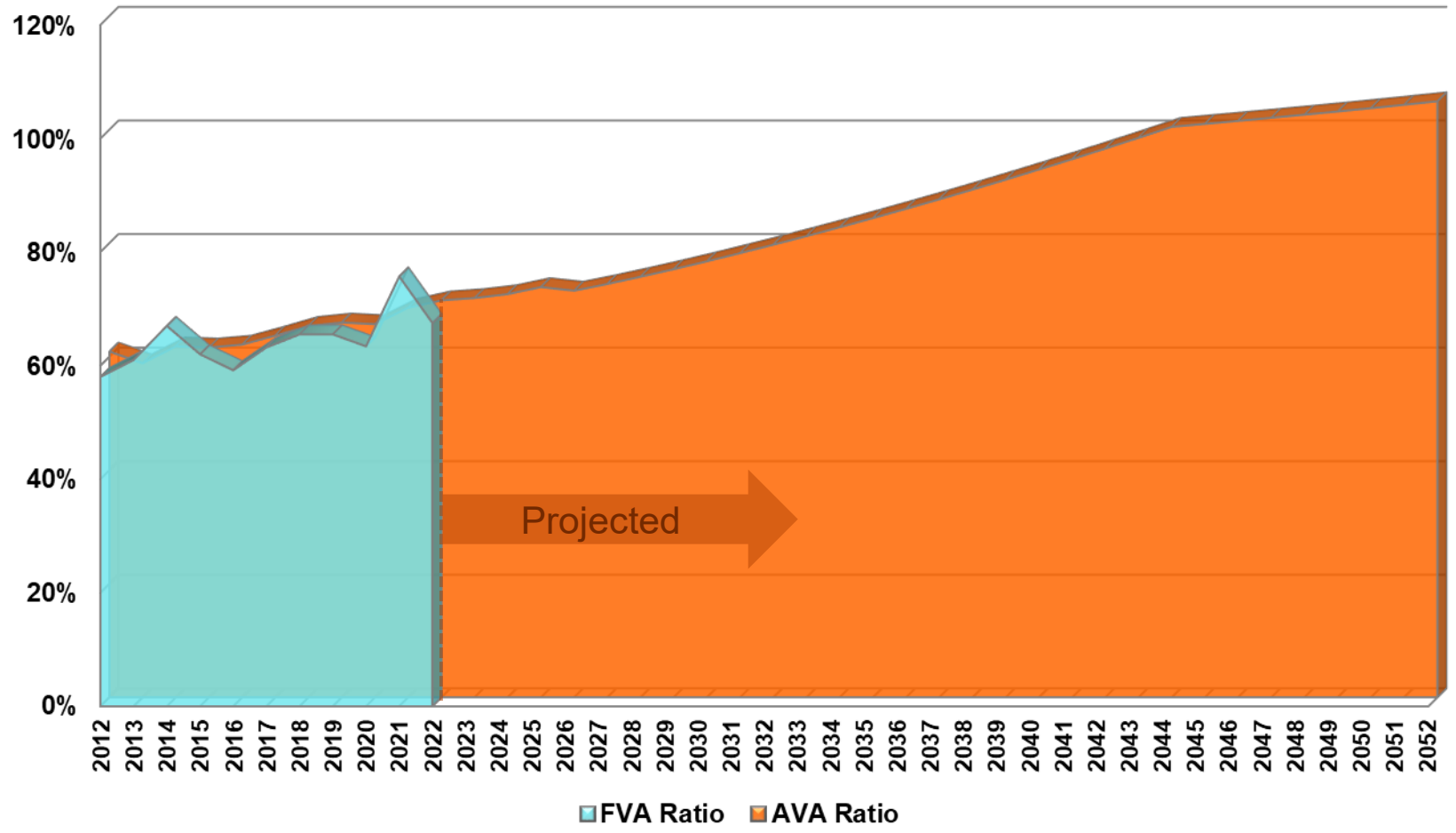
# Unfunded Actuarial Accrued Liability

*$ Millions*




*Projection based on all assumptions, including 7.25% investment return, realized as expected, and a level active headcount.*

# Funded Ratio

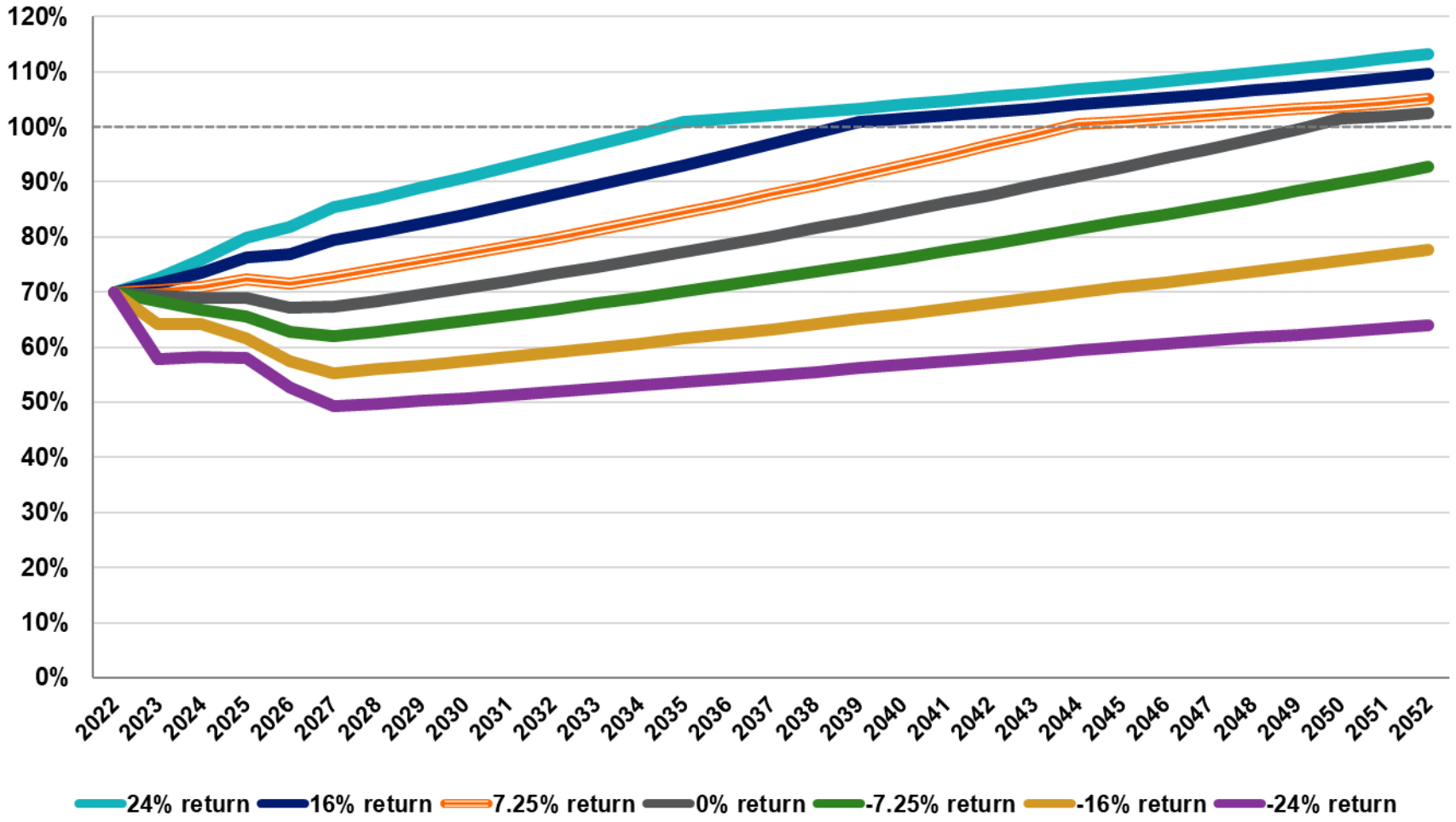



*Projection based on all assumptions, including 7.25% investment return, realized as expected, and a level active headcount.*

# Sensitivity Projection

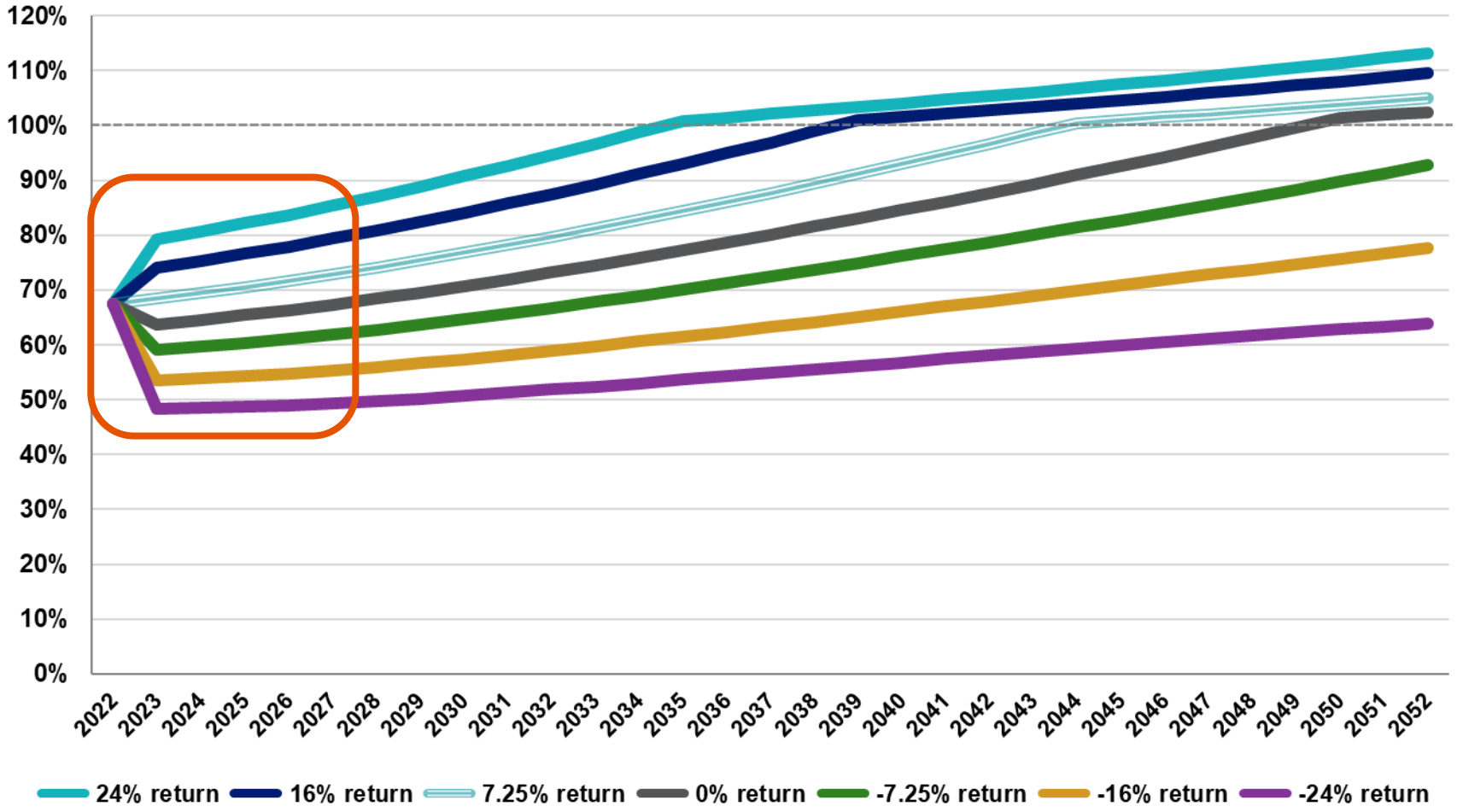
- Projections of estimated funded ratios for 30 years
  - Based on FY23 investment return scenarios ranging from −24% to +24%
  - Assumes Fund earns 7.25% per year in FY24 and each year thereafter
  - Additional projections assuming Fund earns 6.25% or 8.25% per year every year
  - Administrative expenses increase by 2.30% each year
  - All other experience is assumed to emerge as expected
- Includes contribution rates from HB 1134
  - Member rate is 11.75%
  - Employer rate is 12.75%
  - Member and Employer Contribution rates “sunset” back to 7.75% once the funded ratio reaches 100% (based on actuarial assets)

# Projected Funded Ratios (AVA Basis)



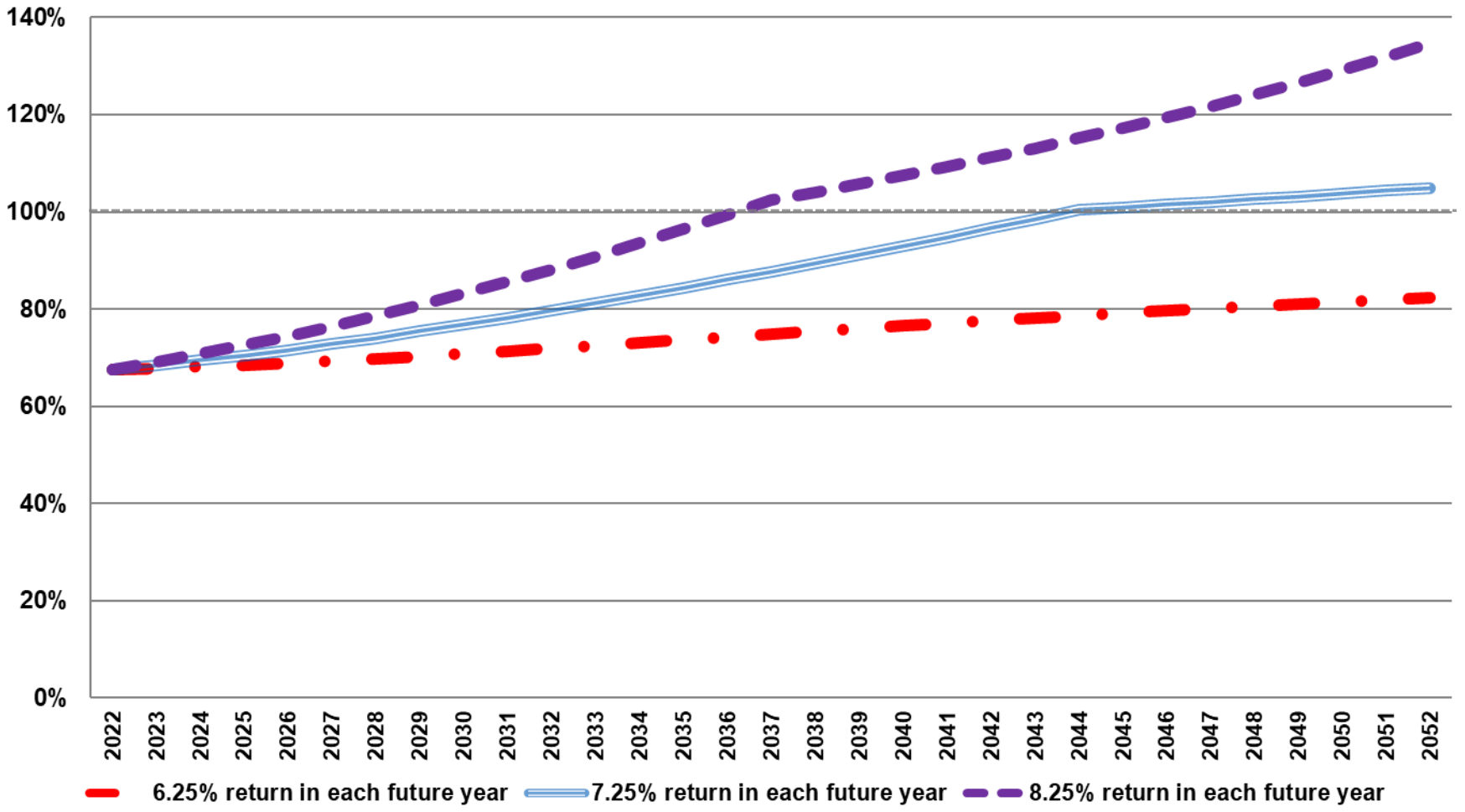

This sensitivity projection assumes one year (i.e., FY23) at each of the above returns, followed by assumed returns of 7.25% in each year thereafter, all other assumptions are met, and a level active headcount in all future years.

# Projected Funded Ratios (FVA Basis)




This sensitivity projection assumes one year (i.e., FY23) at each of the above returns, followed by assumed returns of 7.25% in each year thereafter, all other assumptions are met, and a level active headcount in all future years.

# Projected Funded Ratios (FVA Basis)
# Actual Returns +1% or -1% of Assumed




This sensitivity projection assumes that the Fund will earn either 6.25%, 7.25%, or 8.25% per year, each year in the future, beginning with FY23 , all other assumptions are met, and a level active headcount in all future years.

# Next Steps

- Policy score based on 2021 valuation is +9
  - From April 21, 2022, presentation
- Update Policy score based on 2022 valuation and updated capital market assumption basis
  - Present in Q1 2023

# Appendix

## Items

- Additional Asset Information
- Projection Results in Tabular Format
- GASB Accounting Information
- Glossary

# Fair Value of Assets ($ in millions)

| | Fiscal Year Ending June 30, 2021 | Fiscal Year Ending June 30, 2022 |
|---|---|---|
| Beginning of Year | $2,651 | $3,282 |
| Contributions: | | |
| • Employer | 98 | 100 |
| • Member | 91 | 92 |
| • Service Purchases | 3 | 2 |
| • Total | 192 | 195 |
| Benefits, Refunds and Expenses | (244) | (254) |
| Investment Income (net) | 684 | (199) |
| End of Year | $3,282 | $3,024 |
| Rate of Return | 26.07% | −6.11% |

Note: numbers may not add due to rounding

# Actuarial Value of Assets ($ in millions)

| | |
|---|---|
| 1. Fair Value of Assets as of June 30, 2021 | $3,282 |
| 2. Cash Flow Items for FYE June 30, 2022 | (60) |
| 3. Expected Return | 236 |
| 4. Expected Fair Value of Assets (1) + (2) + (3) | $3,458 |
| 5. Actual Fair Value of Assets on June 30, 2022 | 3,024 |
| 6. Excess/(Shortfall) for FYE June 30, 2022 (5) – (4) | (435) |

**Excess/(Shortfall) Returns:**

| Year | Initial Amount | Deferral % | Unrecognized Amount |
|---|---|---|---|
| 2022 | ($435) | 80% | ($348) |
| 2021 | 494 | 60% | 296 |
| 2020 | (115) | 40% | (46) |
| 2019 | (59) | 20% | (12) |
| 2018 | 30 | 0% | 0 |
| 7. Total | | | ($109) |

| | |
|---|---|
| 8. Actuarial Value of Assets as of June 30, 2022 (5) – (7) | $3,133 |
| Actuarial Value of Assets as a % of Fair Value of Assets | 103.6% |

Note: numbers may not add due to rounding

# Projected Funded Ratios (AVA Basis)

| Valuation Year | 24% for FY2023 | 16% for FY2023 | 7.25% for FY2023 | 0% for FY2023 | −7.25% for FY2023 | −16% for FY2023 | −24% for FY2023 |
|---|---|---|---|---|---|---|---|
| **2022** | 70% | 70% | 70% | 70% | 70% | 70% | 70% |
| **2023** | 72% | 71% | 70% | 69% | 68% | 64% | 58% |
| **2024** | 76% | 74% | 71% | 69% | 67% | 64% | 58% |
| **2025** | 80% | 76% | 72% | 69% | 66% | 62% | 58% |
| **2026** | 82% | 77% | 72% | 67% | 63% | 57% | 53% |
| **2027** | 85% | 79% | 73% | 67% | 62% | 55% | 49% |
| **2032** | 95% | 88% | 80% | 73% | 67% | 59% | 52% |
| **2037** | 102% | 97% | 88% | 80% | 72% | 63% | 55% |
| **2042** | 105% | 103% | 97% | 88% | 79% | 68% | 58% |
| **2047** | 109% | 106% | 102% | 96% | 85% | 73% | 61% |
| **2052** | 113% | 110% | 105% | 102% | 93% | 78% | 64% |

This sensitivity projection assumes one year (i.e., FY23) at each of the above returns, followed by assumed returns of 7.25% in each year thereafter, all other assumptions are met, and a level active headcount in all future years.

# Projected Funded Ratios (FVA Basis)

| Valuation Year | 24% for FY2023 | 16% for FY2023 | 7.25% for FY2023 | 0% for FY2023 | −7.25% for FY2023 | −16% for FY2023 | −24% for FY2023 |
|---|---|---|---|---|---|---|---|
| **2022** | 68% | 68% | 68% | 68% | 68% | 68% | 68% |
| **2023** | 79% | 74% | 68% | 64% | 59% | 53% | 48% |
| **2024** | 81% | 75% | 69% | 65% | 60% | 54% | 48% |
| **2025** | 82% | 77% | 70% | 65% | 60% | 54% | 49% |
| **2026** | 84% | 78% | 72% | 66% | 61% | 55% | 49% |
| **2027** | 85% | 79% | 73% | 67% | 62% | 55% | 49% |
| **2032** | 95% | 88% | 80% | 73% | 67% | 59% | 52% |
| **2037** | 102% | 97% | 88% | 80% | 72% | 63% | 55% |
| **2042** | 105% | 103% | 97% | 88% | 79% | 68% | 58% |
| **2047** | 109% | 106% | 102% | 96% | 85% | 73% | 61% |
| **2052** | 113% | 110% | 105% | 102% | 93% | 78% | 64% |

This sensitivity projection assumes one year (i.e., FY23) at each of the above returns, followed by assumed returns of 7.25% in each year thereafter, all other assumptions are met, and a level active headcount in all future years.

# Projected Funded Ratios (FVA Basis)
# Actual Returns +1% or -1% of Assumed

| Valuation Year | 6.25% Return in Each Future Year | 7.25% Return in Each Future Year | 8.25% Return in Each Future Year |
|---|---|---|---|
| **2022** | 68% | 68% | 68% |
| **2023** | 68% | 68% | 69% |
| **2024** | 68% | 69% | 71% |
| **2025** | 68% | 70% | 73% |
| **2026** | 69% | 72% | 74% |
| **2027** | 69% | 73% | 76% |
| **2032** | 72% | 80% | 88% |
| **2037** | 75% | 88% | 102% |
| **2042** | 78% | 97% | 111% |
| **2047** | 80% | 102% | 122% |
| **2052** | 82% | 105% | 135% |

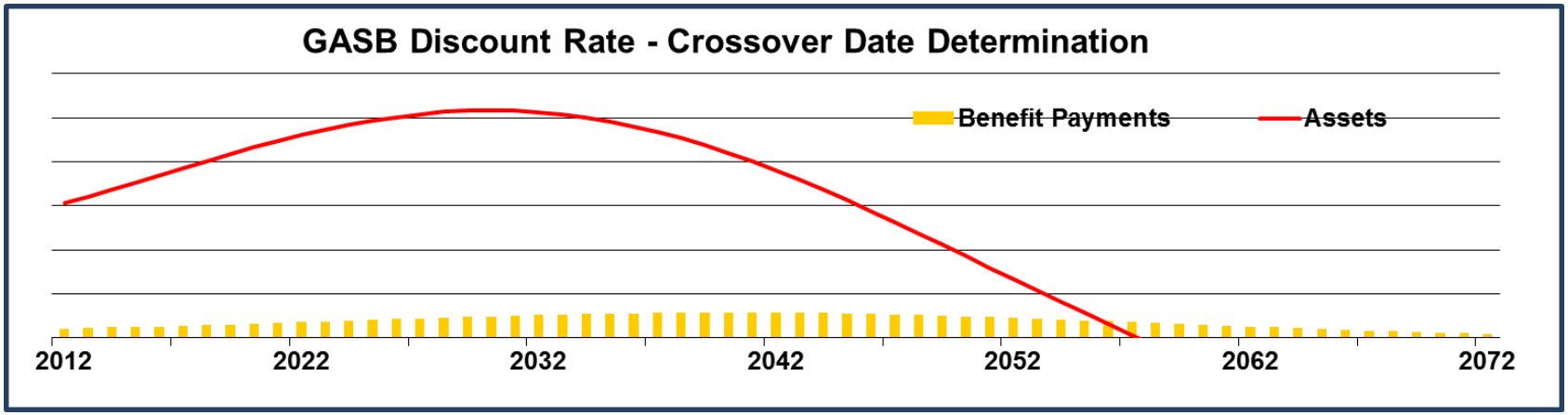
This sensitivity projection assumes that the Fund will earn either 6.25%, 7.25%, or 8.25% per year, each year in the future, beginning with FY23, all other assumptions are met, and a level active headcount in all future years.

# GASB Discount Rate

- Determined annually based on a projection of benefit payments and assets
  - Benefit payment projection is for current members
  - Asset projection is based on expected investment return assumption (7.25%) and contributions on behalf of current members
- If projected assets are always sufficient to pay projected benefit payments, the GASB discount rate is equal to the expected investment return assumption
- If not, a blended discount rate must be used
  - For projected benefit payments that are covered by projected assets, the expected return assumption is used
  - For projected benefit payments that are not covered by projected assets, the 2-year AA/Aa tax-exempt municipal bond index is used (3.54%).
    - The date at which projected assets are not sufficient to cover projected benefit payments is called the “crossover date”

# GASB Discount Rate

- As an example, the graph below shows the crossover occurring in 2058 for a hypothetical plan.




- Determination if a plan has a crossover date depends on
  - The Fund's current funded ratio
  - Projected future contributions and benefit payments
  - Expected investment return
- As of July 1, 2022, TFFR does not have a crossover date

# Net Pension Liability ($ in millions)

| Collective TFFR | June 30, 2021 | June 30, 2022 |
|---|---|---|
| Total Pension Liability at 7.25% | $4,336 | $4,480 |
| Fiduciary Net Plan Position (i.e., FVA) | 3,282 | 3,024 |
| Net Pension Liability (NPL) | 1,054 | 1,456 |
| **Sensitivity to changes in discount rate** | | |
| • 1% decrease at 6.25% | $1,582 | $2,000 |
| • Current discount rate at 7.25% | 1,054 | 1,456 |
| • 1% increase at 8.25% | 615 | 1,005 |

# Reconciliation of Collective Net Pension Liability

| ($ in millions) | Total Pension Liability | Plan Fiduciary Net Position | Net Pension Liability |
|---|---|---|---|
| **Balance as of June 30, 2021** | $4,336 | $3,282 | $1,054 |
| **Changes for the year** | | | |
| Service cost | 92 | | 92 |
| Interest | 312 | | 312 |
| Difference between expected and actual experience | (9) | | (9) |
| Contributions – employer | | 100 | (100) |
| Contributions – member | | 92 | (92) |
| Contributions – purchased service credit and other | | 2 | (2) |
| Net investment income | | (199) | 199 |
| Benefit payments and refunds of contributions | (252) | (252) | - |
| Administrative expense | | (3) | 3 |
| Changes of assumptions | - | | - |
| Change of benefit terms | - | | - |
| **Net changes** | 144 | (258) | 402 |
| **Balance as of June 30, 2022** | $4,480 | $3,024 | $1,456 |

Note: numbers may not add due to rounding

# Collective Pension Expense ($ in millions)

| | Year ending June 30, 2021 | Year ending June 30, 2022 |
|---|---|---|
| Service cost | $87 | $92 |
| Interest on the total pension liability | 301 | 312 |
| Projected earning on plan investments | (190) | (236) |
| Contributions – member | (91) | (92) |
| Contributions – purchased service credit and other | (3) | (2) |
| Administrative expense | 3 | 3 |
| Current year of recognition of: | | |
| • Change of assumptions | 32 | 7 |
| • Difference between expected and actual experience | (12) | (13) |
| • Difference between projected and actual earning on pension plan investments | (91) | 17 |
| • Change of benefit terms | 0 | 0 |
| **Total pension expense** | $37 | $89 |

Note: numbers may not add due to rounding

# Glossary

**Actuarial Accrued Liability For Actives:** The equivalent of the accumulated Normal Costs allocated to the years before the valuation date.

**Actuarial Accrued Liability For Pensioners:** The single-sum value of lifetime benefits to existing pensioners. This sum takes account of life expectancies appropriate to the ages of the pensioners and the interest that the sum is expected to earn before it is entirely paid out in benefits.

**Actuarial Cost Method:** A procedure allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability that are used to determine the Actuarially Determined Contribution.

**Actuarial Gain or Actuarial Loss:** A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two actuarial valuation dates. Through the Actuarial Assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., the plan's assets earn more than projected, salary increases are less than assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the Actuarial Assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results yield in actuarial liabilities that are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period

**Actuarially Equivalent:** Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.

**Actuarial Present Value (APV):** The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. Each such amount or series of amounts is adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.), multiplied by the probability of the occurrence of an event (such as survival, death, disability, termination of employment, etc.) on which the payment is conditioned, and discounted according to an assumed rate (or rates) of return to reflect the time value of money.

# Glossary

**Actuarial Present Value of Future Plan Benefits:** The Actuarial Present Value of benefit amounts expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age, anticipated future compensation, and future service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would be provide sufficient assets to pay all projected benefits and expenses when due.

**Actuarial Valuation:** The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial Valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB, such as the ADC and the NPL.

**Actuarial Value of Assets (AVA):** The value of the plan's assets as of a given date, used by the actuary for valuation purposes. This may be the fair or market value of plan assets, but commonly plans use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.

**Actuarially Determined:** Values that have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.

**Actuarially Determined Contribution (ADC):** The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation. The ADC consists of the Employer Normal Cost and the Amortization Payment.

**Amortization Method:** A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization Payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.

# Glossary

**Amortization Payment:** The portion of the pension plan contribution, or ADC, that is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

**Assumptions or Actuarial Assumptions:** The estimates on which the cost of a plan is calculated including:

(a) Investment return - the rate of investment yield that the plan will earn over the long-term future;

(b) Mortality rates - the death rates of employees and pensioners; life expectancy is based on these rates;

(c) Retirement rates - the rate or probability of retirement at a given age;

(d) Turnover rates - the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement;

(e) Salary increase rates - the rates of salary increase due to inflation and productivity growth

**Closed Amortization Period:** A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Funding Period and Open Amortization Period.

**Decrements:** Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or termination.

**Defined Benefit Plan:** A retirement plan in which benefits are defined by a formula applied to the member's compensation and/or years of service.

**Defined Contribution Plan:** A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.

**Employer Normal Cost:** The portion of the Normal Cost to be paid by the employers. This is equal to the Normal Cost less expected member contributions.

# Glossary

**Experience Study:** A periodic review and analysis of the actual experience of a plan that may lead to a revision of one or more Actuarial Assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the actuary.

**Funded Ratio:** The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a fair value funded ratio, using the fair value of assets (FVA), rather than the AVA.

**Funding Period or Amortization Period:** The term "Funding Period" is used in two ways. First, it is the period used in calculating the Amortization Payment as a component of the ADC. Second, it is a calculated item: the number of years in the future that will theoretically be required to amortize (i.e., pay off or eliminate) the Unfunded Actuarial Accrued Liability, based on the statutory employer contribution rate, and assuming no future actuarial gains or losses.

**GASB:** Governmental Accounting Standards Board.

**GASB 67 and GASB 68:** Governmental Accounting Standards Board Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67 sets the rules for the systems themselves.

**Investment Return:** The rate of earnings of a plan from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the plan's assets. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.

**Margin:** The difference, whether positive or negative, between the statutory employer contribution rate and the Actuarially Determined Contribution.

**Net Pension Liability (NPL):** The Net Pension Liability is equal to Total Pension Liability minus Plan Fiduciary Net Position.

# Glossary

**Normal Cost:** That portion of the Actuarial Present Value of pension plan benefits and expenses allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits that are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated. Under the entry age normal cost method, the Normal Cost is intended to be the level cost (when expressed as a percentage of pay) needed to fund the benefits of a member from hire until ultimate termination, death, disability, or retirement.

**Open Amortization Period:** An Open Amortization Period is one that is used to determine the Amortization Payment, but which does not change over time. If the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period with level percentage of payroll is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never decrease, but will become smaller each year, in relation to covered payroll, if the Actuarial Assumptions are realized.

**Plan Fiduciary Net Position:** GASB term for the fair value of assets.

**Total Pension Liability (TPL):** The actuarial accrued liability based on the blended discount rate as described in GASB 67/68.

**Unfunded Actuarial Accrued Liability (UAAL):** The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.

**Valuation Date or Actuarial Valuation Date:** The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.

# Caveats

*This presentation is based on the results of the July 1, 2022, actuarial valuation performed for the Board of Trustees of the North Dakota Teachers' Fund for Retirement. The 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.*