

Historical Look at PERS and TRS Assumed Rate of Return & Actual Performance **2.0**

Dan Villa, Executive Director

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Past Performance

	Cumulative Return
FY2023	8.50%
FY2022	-4.31%
FY2021	27.72%
FY2020	2.71%
FY2019	5.71%
FY2018	8.84%
FY2017	11.94%
FY2016	2.07%
FY2015	4.58%
FY2014	17.17%
FY2013	13.04%
FY2012	2.41%
FY2011	21.79%
FY2010	12.87%
FY2009	-20.68%
FY2008	-4.86%
FY2007	17.96%
FY2006	9.07%
FY2005	8.13%
FY2004	13.43%
FY2003	6.61%
FY2002	-7.29%
FY2001	-5.08%
FY2000	7.93%
FY1999	12.08%
FY1998	16.63%
FY1997	19.63%
FY1996	12.60%
FY1995	16.33%

Time Horizon	Cumulative Return
1 Year	5.94%
3 Year	18.72%
5 Year	48.15%
10 Year	108.18%
20 Year	280.96%
Inception to Date	788.80%

Assumed Rate of Return	Date	Annualized Rate of Return
7.3%	7/01/2022	7.69%
7.65%/		7.74%/
7.5% (TRS only)	7/1/2018	7.76%
7.75%	7/1/2004	8.93%
8%	7/1/1985	-

Consistent with Investment Objectives, Pension Fund Returns Have Met Assumed Rates of Returns as Set by the Pension Boards Over Time

Capital Market Assumptions

2023 vs. 2024 Capital Market Assumptions

Asset Class	2023		2024		Change (2024 - 2023)	
	Nominal Return	Risk (St. Dev.)	Nominal Return	Risk (St. Dev.)	Nominal Return	Risk (St. Dev.)
Large/Mid Cap US	6.75%	16.00%	6.50%	16.00%	-0.25%	0.00%
Small Cap US	7.25%	19.00%	7.00%	19.00%	-0.25%	0.00%
Intl Large/Mid Equity	8.50%	17.00%	8.25%	17.00%	-0.25%	0.00%
Intl Dev'd Small Cap	9.25%	20.00%	9.00%	20.00%	-0.25%	0.00%
Emerging Markets	11.25%	25.00%	11.25%	25.00%	0.00%	0.00%
US Agg Bonds	4.00%	5.00%	4.00%	5.00%	0.00%	0.00%
Emerging Debt-Hard	7.50%	10.00%	7.00%	10.00%	-0.50%	0.00%
Emerging Debt-Local	6.50%	11.50%	6.00%	11.50%	-0.50%	0.00%
TIPS	4.00%	5.50%	4.00%	5.50%	0.00%	0.00%
High Yield	7.25%	10.50%	7.00%	10.50%	-0.25%	0.00%
Bank Loans	6.50%	8.50%	6.50%	9.00%	0.00%	0.50%
Core Real Estate	5.75%	12.50%	5.75%	12.50%	0.00%	0.00%
Global REITs	7.75%	21.00%	7.75%	21.00%	0.00%	0.00%
Funds of Hedge Funds	5.00%	9.50%	5.00%	9.50%	0.00%	0.00%
GTAA	6.00%	9.00%	5.75%	9.00%	-0.25%	0.00%
Private Credit	8.00%	13.00%	8.00%	13.00%	0.00%	0.00%
Private Equity	10.00%	22.00%	9.75%	22.00%	-0.25%	0.00%
Commodities	6.00%	17.50%	6.25%	17.50%	0.25%	0.00%
US Inflation	2.50%	2.50%	2.50%	2.50%	0.00%	0.00%

2022 vs. 2023 Capital Market Assumptions

Asset Class	2022		2023		Change (2023 - 2022)	
	Nominal Return	Risk (St. Dev.)	Nominal Return	Risk (St. Dev.)	Nominal Return	Risk (St. Dev.)
Large/Mid Cap US	5.75%	16.00%	6.75%	16.00%	1.00%	0.00%
Small Cap US	6.25%	19.00%	7.25%	19.00%	1.00%	0.00%
Intl Large/Mid Equity	7.50%	17.00%	8.50%	17.00%	1.00%	0.00%
Intl Dev'd Small Cap	8.00%	20.00%	9.25%	20.00%	1.25%	0.00%
Emerging Markets	10.25%	25.00%	11.25%	25.00%	1.00%	0.00%
US Agg Bonds	2.50%	5.00%	4.00%	5.00%	1.50%	0.00%
Emerging Debt-Hard	6.00%	10.00%	7.50%	10.00%	1.50%	0.00%
Emerging Debt-Local	5.75%	11.50%	6.50%	11.50%	0.75%	0.00%
TIPS	2.00%	5.50%	4.00%	5.50%	2.00%	0.00%
High Yield	5.50%	10.00%	7.25%	10.50%	1.75%	0.50%
Bank Loans	5.00%	8.00%	6.50%	8.50%	1.50%	0.50%
Core Real Estate	6.00%	12.50%	5.75%	12.50%	-0.25%	0.00%
Global REITs	6.50%	21.00%	7.75%	21.00%	1.25%	0.00%
Funds of Hedge Funds	4.25%	9.50%	5.00%	9.50%	0.75%	0.00%
GTAA	5.00%	9.00%	6.00%	9.00%	1.00%	0.00%
Private Credit	7.25%	13.00%	8.00%	13.00%	0.75%	0.00%
Private Equity	9.00%	22.00%	10.00%	22.00%	1.00%	0.00%
Commodities	5.50%	17.50%	6.00%	17.50%	0.50%	0.00%
US Inflation	2.50%	2.50%	2.50%	2.50%	0.00%	0.00%

2022 vs. 2021 Capital Market Assumptions

Asset Class	2021		2022		Change (2021 - 2022)	
	Nominal Return	Risk (St. Dev.)	Nominal Return	Risk (St. Dev.)	Nominal Return	Risk (St. Dev.)
Large/Mid Cap US	6.00%	16.00%	5.75%	16.00%	-0.25%	0.00%
Small Cap US	6.50%	19.00%	6.25%	19.00%	-0.25%	0.00%
Intl Large/Mid Equity	7.50%	17.00%	7.50%	17.00%	0.00%	0.00%
Dev'd Small Cap	8.00%	20.00%	8.00%	20.00%	0.00%	0.00%
Emerging Markets	10.00%	25.00%	10.25%	25.00%	0.25%	0.00%
US Agg Bonds	2.00%	5.00%	2.50%	5.00%	0.50%	0.00%
EMD Hard	5.00%	10.00%	6.00%	10.00%	1.00%	0.00%
EMD Local	5.00%	11.50%	5.75%	11.50%	0.75%	0.00%
TIPS	1.50%	5.50%	2.00%	5.50%	0.50%	0.00%
High Yield	4.75%	10.00%	5.50%	10.00%	0.75%	0.00%
Bank Loans	4.75%	8.00%	5.00%	8.00%	0.25%	0.00%
Core Real Estate	5.75%	12.50%	6.00%	12.50%	0.25%	0.00%
Global REITs	6.75%	21.00%	6.50%	21.00%	-0.25%	0.00%
Funds of Hedge Funds	4.25%	9.50%	4.25%	9.50%	0.00%	0.00%
GTAA	5.00%	9.00%	5.00%	9.00%	0.00%	0.00%
Private Credit	6.75%	13.00%	7.25%	13.00%	0.50%	0.00%
Private Equity	8.75%	22.00%	9.00%	22.00%	0.25%	0.00%
Commodities	5.00%	17.50%	5.50%	17.50%	0.50%	0.00%
US Inflation	2.00%	1.50%	2.50%	2.50%	0.50%	-1.00%

2021 vs. Q1 2020 Capital Markets Assumptions

Asset Class	2020 Q1		2021		Change (2020Q1 - 2020)	
	Nominal Return	Risk (St. Dev.)	Nominal Return	Risk (St. Dev.)	Nominal Return	Risk (St. Dev.)
Large/Mid Cap US	7.25%	16.00%	6.00%	16.00%	-1.25%	0.00%
Small Cap US	8.50%	19.00%	6.50%	19.00%	-2.00%	0.00%
Intl Large/Mid Equity	9.00%	17.00%	7.50%	17.00%	-1.50%	0.00%
Dev'd Small Cap	10.00%	20.00%	8.00%	20.00%	-2.00%	0.00%
Emerging Markets	11.25%	25.00%	10.00%	25.00%	-1.25%	0.00%
US Agg Bonds	2.50%	5.00%	2.00%	5.00%	-0.50%	0.00%
EMD Hard	7.00%	10.00%	5.00%	10.00%	-2.00%	0.00%
EMD Local	5.75%	11.50%	5.00%	11.50%	-0.75%	0.00%
TIPS	2.50%	5.50%	1.50%	5.50%	-1.00%	0.00%
High Yield	7.50%	10.00%	4.75%	10.00%	-2.75%	0.00%
Bank Loans	7.00%	8.00%	4.75%	8.00%	-2.25%	0.00%
Core Real Estate	5.75%	12.50%	5.75%	12.50%	0.00%	0.00%
Global REITs	7.50%	21.00%	6.75%	21.00%	-0.75%	0.00%
Funds of Hedge Funds	4.75%	9.50%	4.25%	9.50%	-0.50%	0.00%
GTAA	5.50%	9.00%	5.00%	9.00%	-0.50%	0.00%
Private Equity	10.00%	22.00%	8.75%	22.00%	-1.25%	0.00%
Commodities	5.00%	17.50%	5.00%	17.50%	0.00%	0.00%
US Inflation	2.00%	1.50%	2.00%	1.50%	0.00%	0.00%

Capital Market Assumptions

Use of capital market assumptions as a proxy for investment return expectations is wrong and misleading.

1. Does not take tactical or manager selection into account.
2. Does not share the same time horizon.
3. Infers an absolute numerical outcome when that is not the intent of the exercise.

Asset Allocation History (Pension)

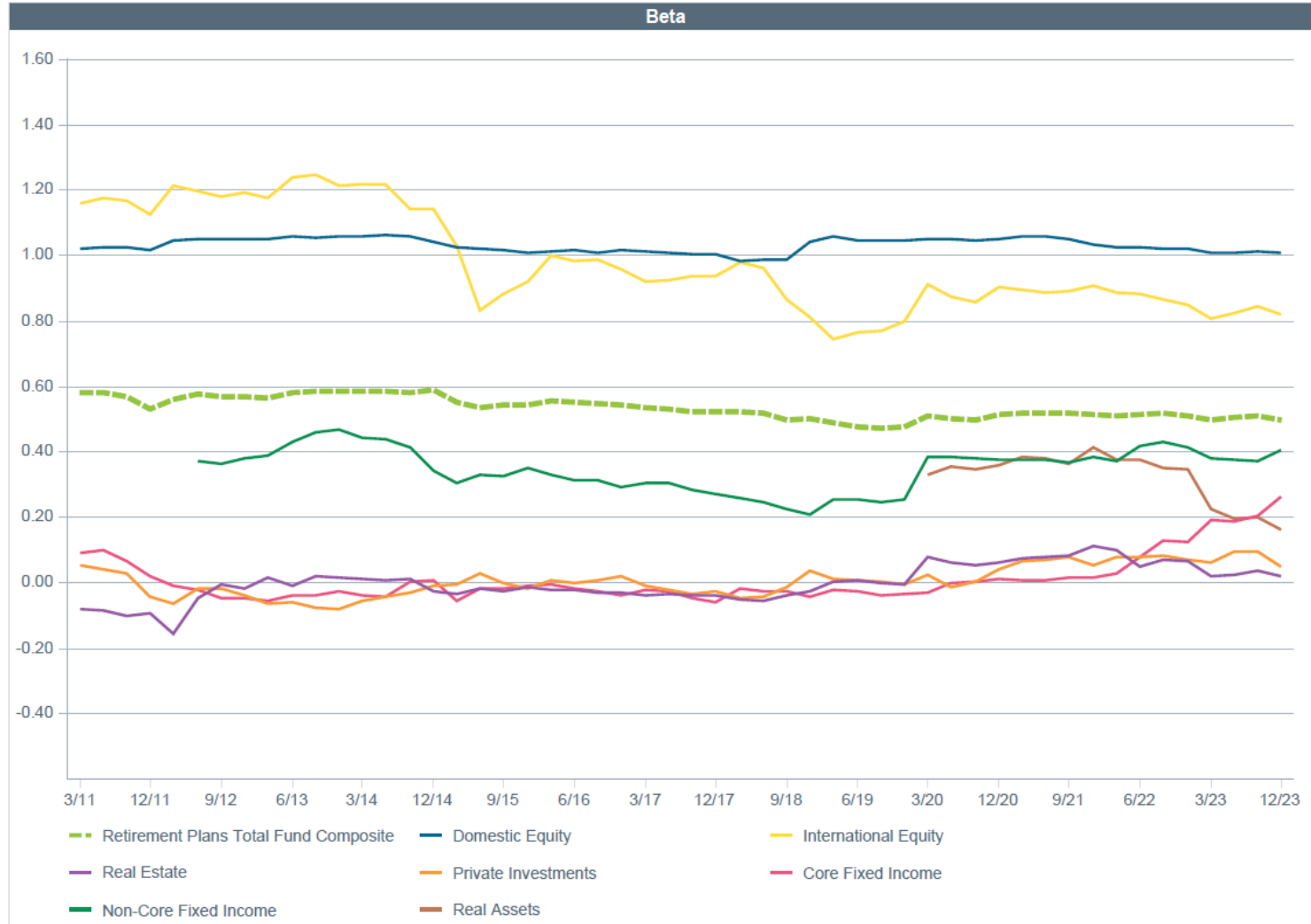
	2022 Asset Allocation	2021 Asset Allocation	2020 Asset Allocation	2019 Asset Allocation
Asset Classes				
Domestic Equity Range	(23% - 35%)	(24% - 36%)	(24% - 36%)	(24% - 36%)
Approved Midpoint	29.0%	30.0%	30.0%	30.0%
International Equity Range	(10% - 20%)	(12% - 22%)	(12% - 22%)	(11% - 21%)
Approved Midpoint	15.0%	17.0%	17.0%	16.0%
Private Investments Range	(12% - 20%)	(11% - 19%)	(11% - 19%)	(11% - 17%)
Approved Midpoint	16.0%	15.0%	15.0%	14.0%
Real Estate Range	(7% - 15%)	(6% - 14%)	(5% - 13%)	(5% - 13%)
Approved Midpoint	11.0%	10.0%	9.0%	9.0%
Real Assets Range	(3% - 9%)	(2% - 8%)	(2% - 8%)	(1% - 7%)
Approved Midpoint	6.0%	5.0%	5.0%	4.0%
Core Fixed Income Range	(9% - 19%)	(9% - 19%)	(10% - 20%)	(15% - 25%)
Approved Midpoint	14.0%	14.0%	15.0%	20.0%
Non-Core Fixed Income Range	(5% - 9%)	(5% - 9%)	(4% - 8%)	(3% - 7%)
Approved Midpoint	7.0%	7.0%	6.0%	5.0%
Cash Equivalents Range	(0% - 5%)	(0% - 5%)	(0% - 6%)	(0% - 4%)
Approved Midpoint	2.0%	2.0%	3.0%	2.0%
Total of Midpoints	100.0%	100.0%	100.0%	100.0%

* In 2020, renamed the Natural Resources Asset Class to Real Assets (Commodities, Infrastructure, TIPS)

Did the Board “Risk Up”

Montana Board of Investments vs. S&P 500 Index (Cap Wtd)

36 Months Rolling Periods As of December 31, 2023



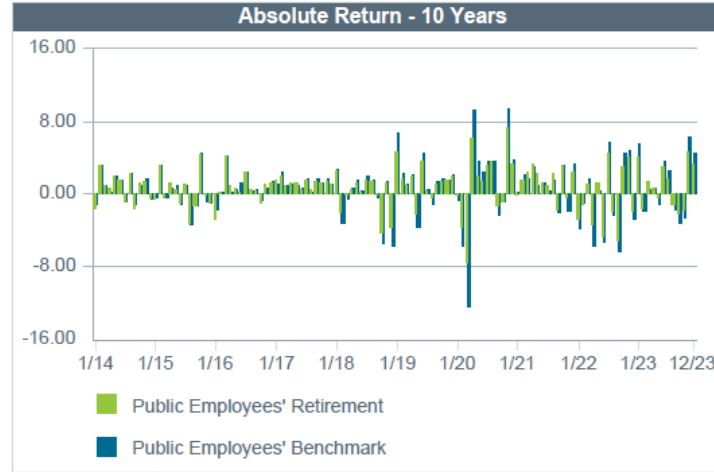
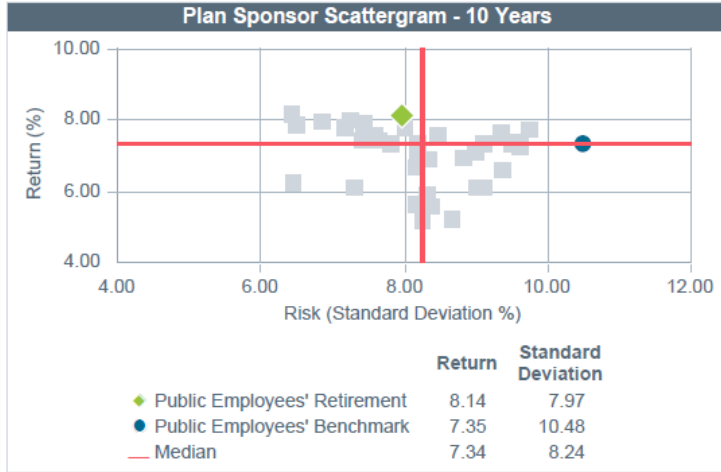
No, investment risk is less today than it was in 2011.

The objective of the Total Fund Beta is to measure the aggregate level of non-diversifiable or systematic equity risk exposure of the Montana Retirement Plans. The Total Fund Beta is calculated using the S&P 500 (Cap Wtd) as the benchmark and is based on monthly periodicity. It represents a measure of the sensitivity of the total fund to movements of the S&P 500 (Cap Wtd) over the preceding three year period.

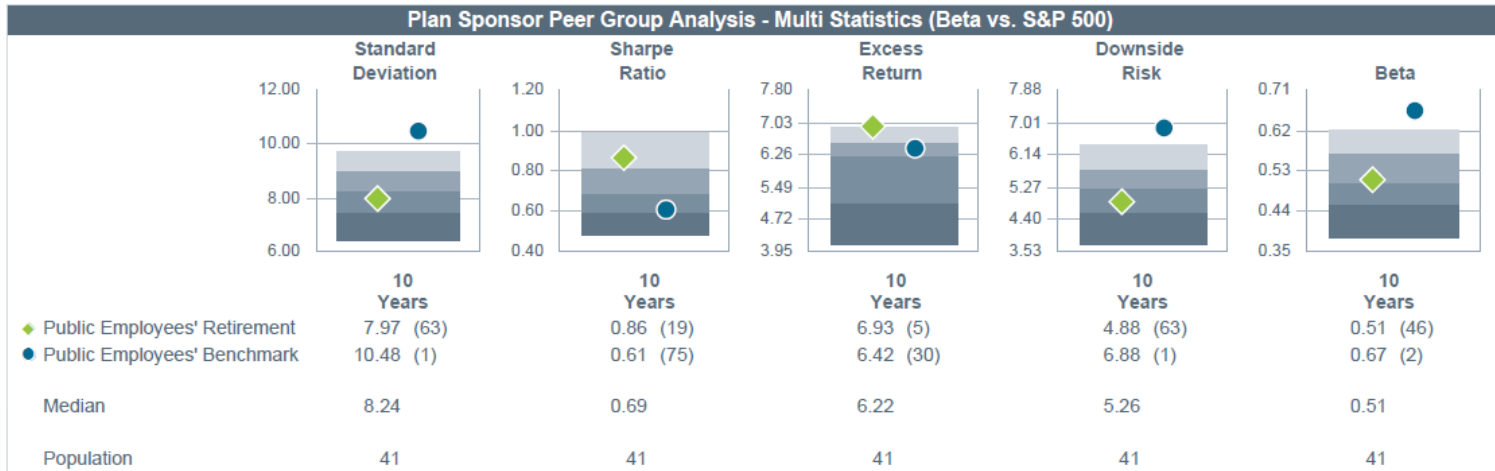
Did the Board “Risk Up”

Montana Board of Investments
Public Employees' Retirement vs. All Public Plans (>\$5B) (Custom PG)

As of December 31, 2023



No, the Board has achieved returns in excess of peers with less risk over a ten-year period.



Performance shown is gross of fees. Calculation is based on monthly periodicity. Parentheses contain percentile ranks.

Investment Cost to Returns

Current DB Asset Mix Is Less Costly Than DC Asset Mix

Plan	Expense Ratio
Defined Benefit	.1%
Defined Contribution Target Date Funds	.37%

What does this mean?

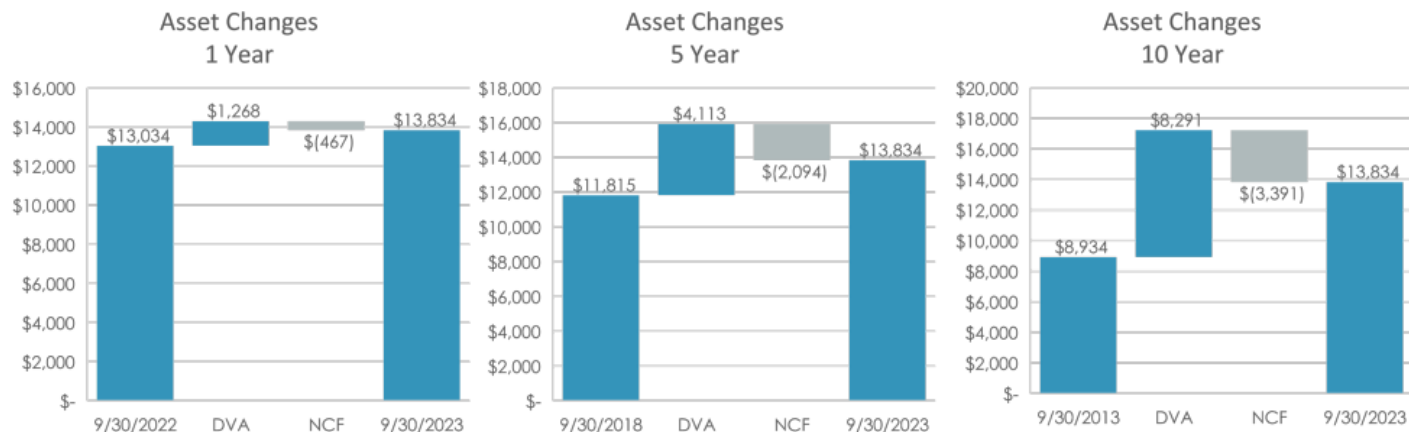
Over a 30-year working career, the average state employee will pay an additional \$55,912.95 in fees in the DC plan vs the DB plan.

This does NOT include fees charged after the employee retires.

Investment Income

Current DB Contributions and Income Have Grown Trust Balance

CIO Update Pension Net Performance

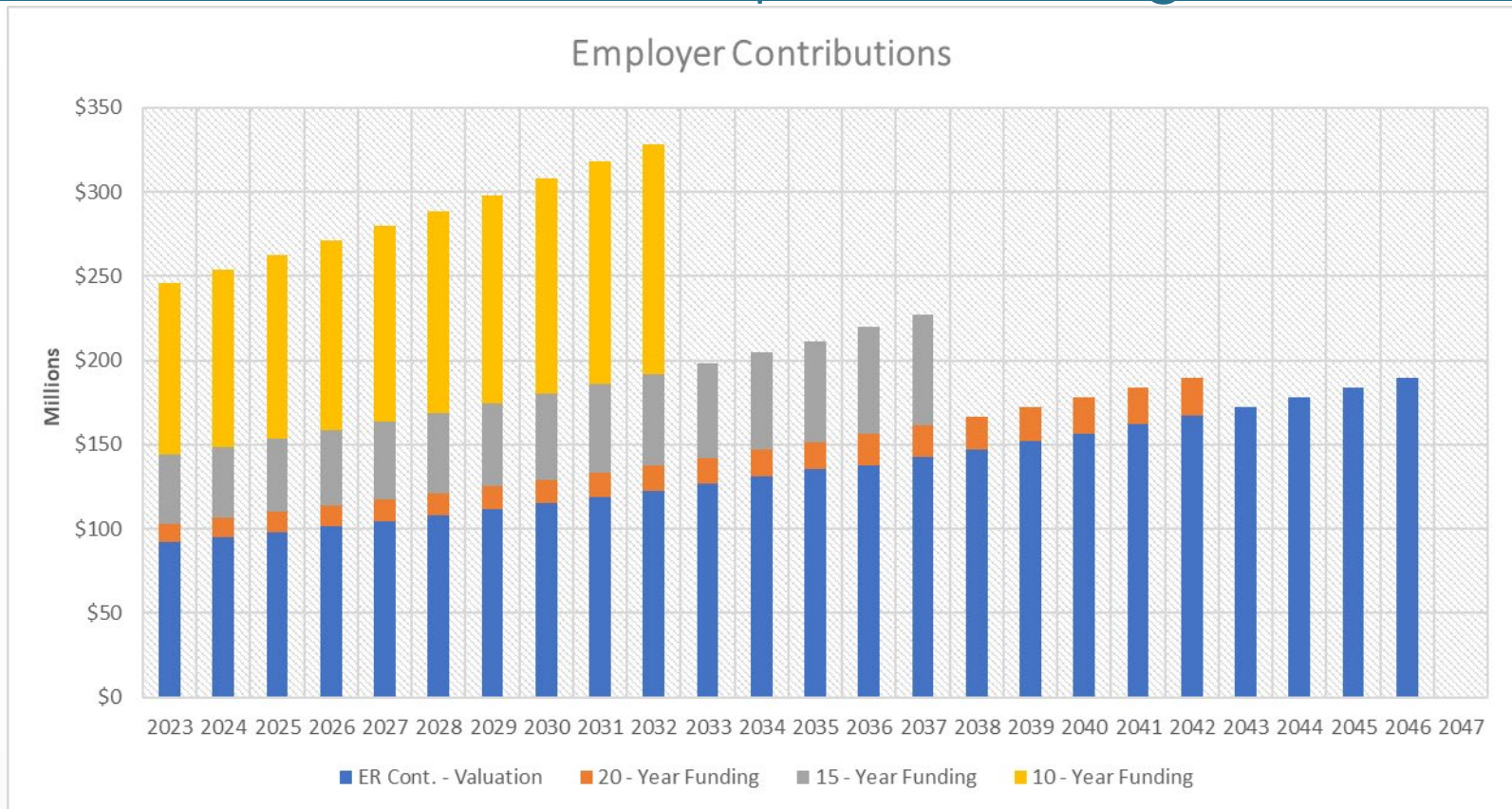


- Dollar Value Added – The total dollar return of the portfolio including income and capital gains
- Net Cash Flow - The total dollar amount distributed from portfolio assets to meet the deficit of contributions minus distributions
 - A grey bar indicates an aggregate net outflow by all plans even though some plans may have experienced net inflows
 - Though aggregates are shown, each plan is independent and not able to rely on other plans to meet their respective liabilities

Amortization Period Changes

Artificial Amortization Period Inversely Correlates to Property and Income Taxes

(The lower the amortization period, the higher the taxes)



How Can You Help?

“A well done is better than well said.”

- Benjamin Franklin

Suggestion: Help us achieve results.

- Help reduce costs, not increase them.
- Ensure contributions are made by those who owe them to maintain corpus and eliminate subsidies.
- Don't add complications and their costs.
- Help achieve efficiencies of scale.
- Trust Montanans.

In Summary

Montana's pension systems are more financially sound today than at any time this century.

Montana's pension systems are meeting or exceeding their assumed rate of return hurdle.

Montana has lower risk and higher returns than peers.

Montana's pension trust funds are growing in value, nearly \$5 billion over the last 10 years.

Montana's defined benefit system has lower costs than the defined contribution system.

Montana's constitution requires pension systems to take action immediately if the systems do not amortize as required by law.