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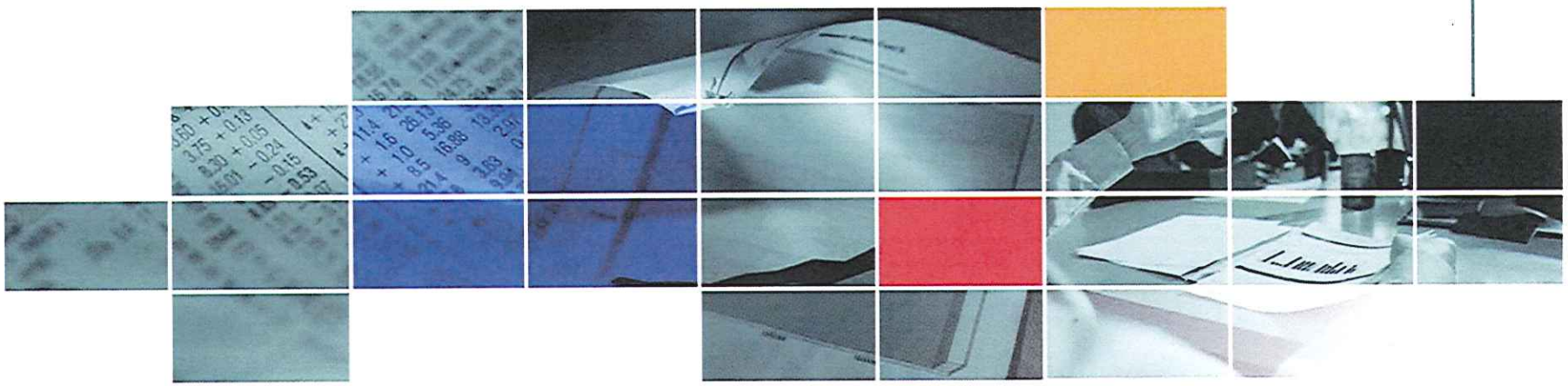
Kentucky Employee Retirement System Asset/Liability Studies

Overview and Summary Presentation to the Kentucky Program Review and Investigations Committee

July 8th, 2010

Presented by

Jim Voytko and Tony Johnson



KERS Asset/Liability Studies

Asset Liability Studies Covered

- KERS Non-Hazardous Pension Plan
- KERS Hazardous Pension Plan
- KERS Non-Hazardous Insurance Plan
- KERS Hazardous Insurance Plan

Note: This presentation is only a partial summary of the full Asset/Liability Studies submitted to the KERS Board. The complete versions of these studies contain important background information and caveats important to a complete understanding of the issues addressed.

KERS Asset/Liability Studies

Contributors

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KERS Asset/Liability Studies

Our Goals Today

1. **Compare for each plan the "side by side" forecast for both the plan's assets (driven by investment strategy in the form of a specific asset allocation) and plan liabilities.**

2. **Examine the potential consequences for the key future financial metrics for each plan – including asset levels, funding ratios, plan liquidity, and contributions.**

3. **Frame issues for the Committee and the Board involving decisions made today and in the next several years that can have material effects on the financial health of the plans studied in the years to come.**

KERS Asset/Liability Studies

What is an Asset/Liability Study?

- **Investment programs do not exist in a vacuum. They seek to satisfy one or more investment objectives.**
- **The purpose of an Asset/Liability Study is to examine how well alternative investment strategies (i.e., differing asset allocations) address the objectives served by the fund - the fund "liabilities".**
- **In doing so, it creates an important "guidepost" for the actual asset allocation for the fund; the asset allocation chosen by the fund's fiduciaries will likely reflect the nature of the liabilities but also numerous other factors including risk preferences, liquidity, implementation constraints, etc.**
- **For the KERS Asset Liability Studies, we assume the objectives are:**
  - Fund all participants' benefits over time.
  - Assure sufficient liquidity to pay benefits at all times.
  - Foster a stable contribution stream consistent with objectives 1 and 2
  - Achieve adequate returns without accepting unnecessary or imprudent levels of risk

KERS Asset/Liability Studies

An Asset/Liability Study is not...

- **An actuarial study of the KERS liabilities**
  - That is the purview of the Fund's actuary.
- **A prescription for plan benefits**
  - That is the purview of the legislature.
- **An assessment of the affordability of contribution levels**
  - That is the purview of the elected officials and their constituents.
- **The sole determinant of the final asset allocation adopted for the Fund**
  - There are a number of factors, including insights from an Asset/Liability Study, which will bear on the optimal asset allocation.

KERS Non-Hazardous Pension Plan

- Deterministic Analysis
- Stochastic Analysis

KERS Asset/Liability Studies

The Critical Role of House Bill 1

- **Per House Bill 1, future State contributions for Non-Hazardous Pension Plan will be (as a percentage of the Annual Required Contribution):**

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Non-Hazardous	44%	48%	53%	57%	61%	65%	69%	73%	77%	81%	85%	89%	93%	97%	100%

KERS Non-Hazardous Pension

Deterministic Analysis

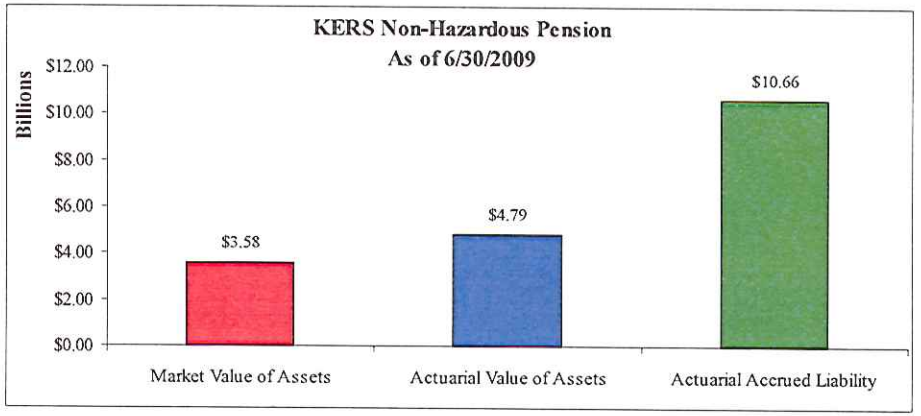
- **This section provides an analysis of the Plan's assets, liabilities, funded status, and benefit payments based on a fixed set of future assumptions.**

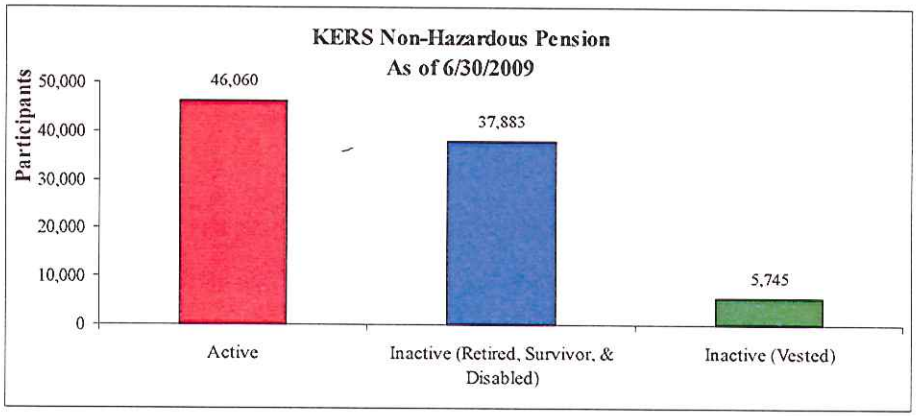
- **Essentially, it assumes investments returns are guaranteed.**

KERS Non-Hazardous Pension

Deterministic Analysis – Current Status

Valuation Date	June 30, 2009
Market Value of Assets (MVA)	$3,584,196,429
Actuarial Value of Assets (AVA)	$4,794,611,365
Actuarial Accrued Liability (AAL)	$10,658,549,532
Actuarial Funded Ratio (AVA/AAL)	45%
Market Value Funded Ratio (MVA/AAL)	34%
Active Participants	46,060
Inactive (Retired, Survivor, & Disabled) Participants Retirees and Beneficiaries	37,883
Inactive (Other) Participants Vested	5,745





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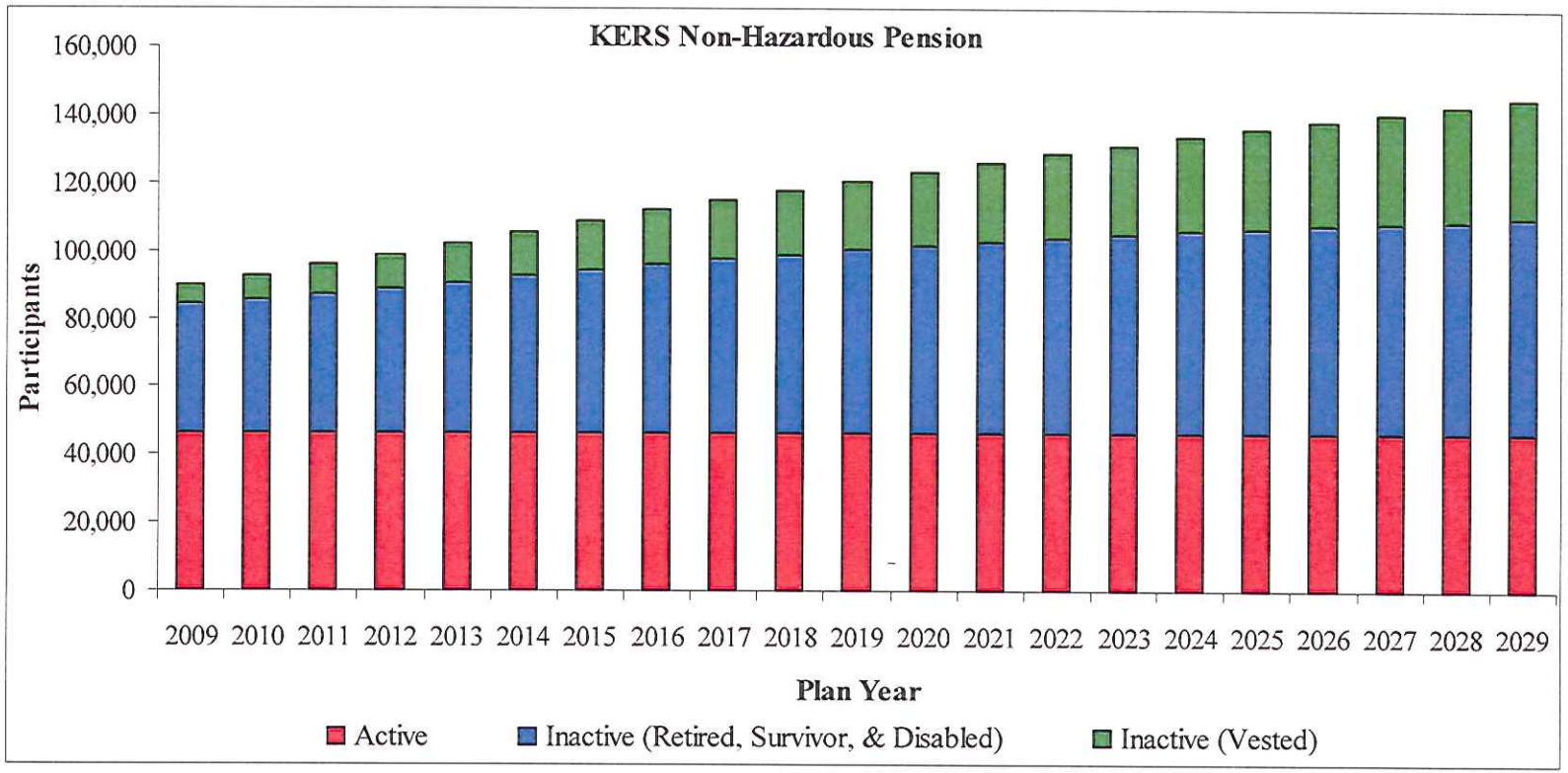
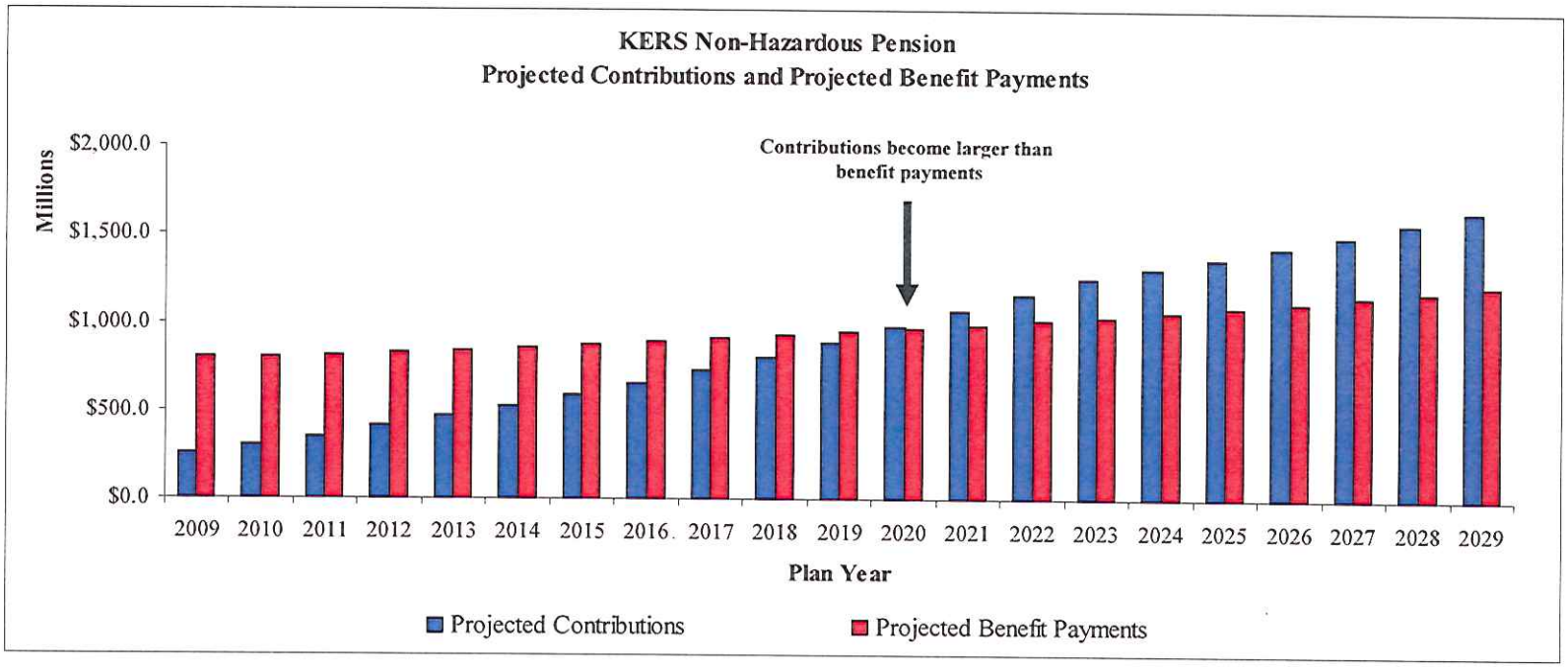
KERS Non-Hazardous Pension

Deterministic Analysis - Demographics



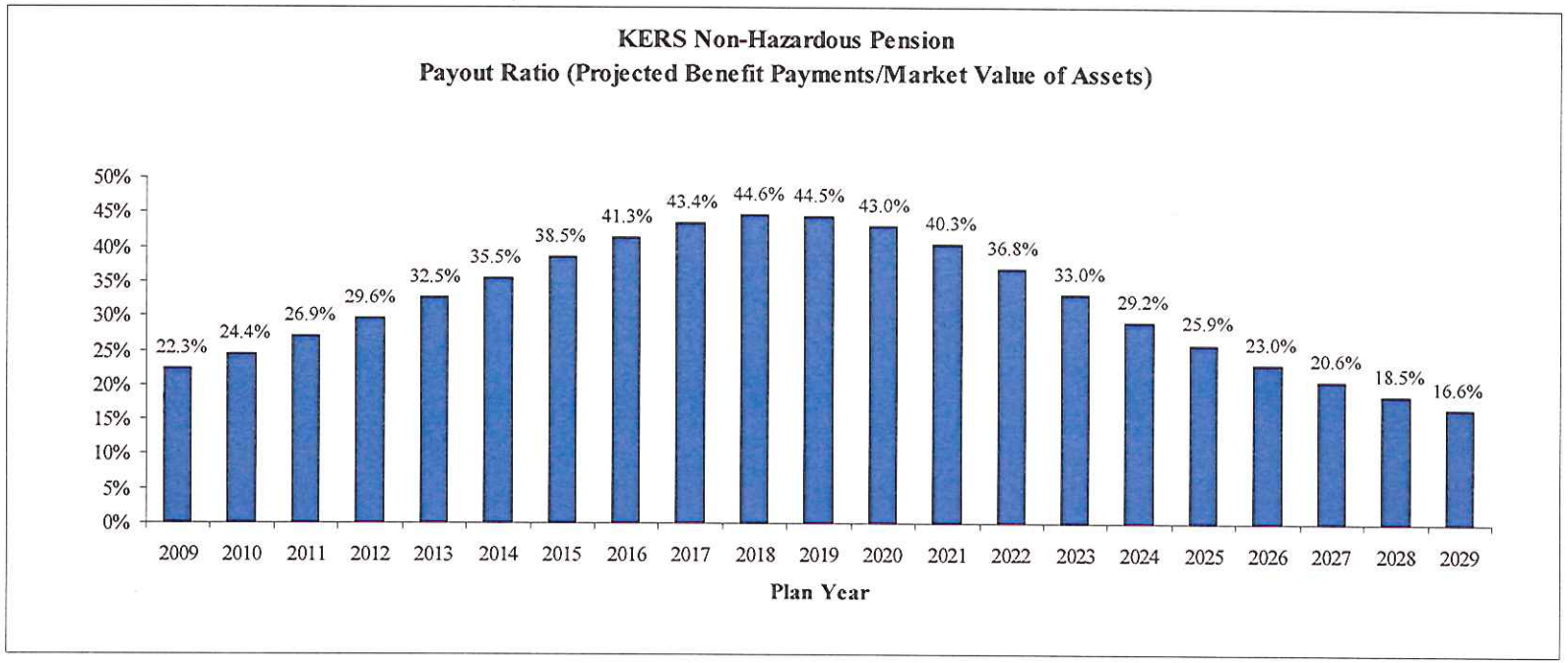
KERS Non-Hazardous Pension

Deterministic Analysis – Benefits and Contributions



KERS Non-Hazardous Pension

Deterministic Analysis – Payout Ratio



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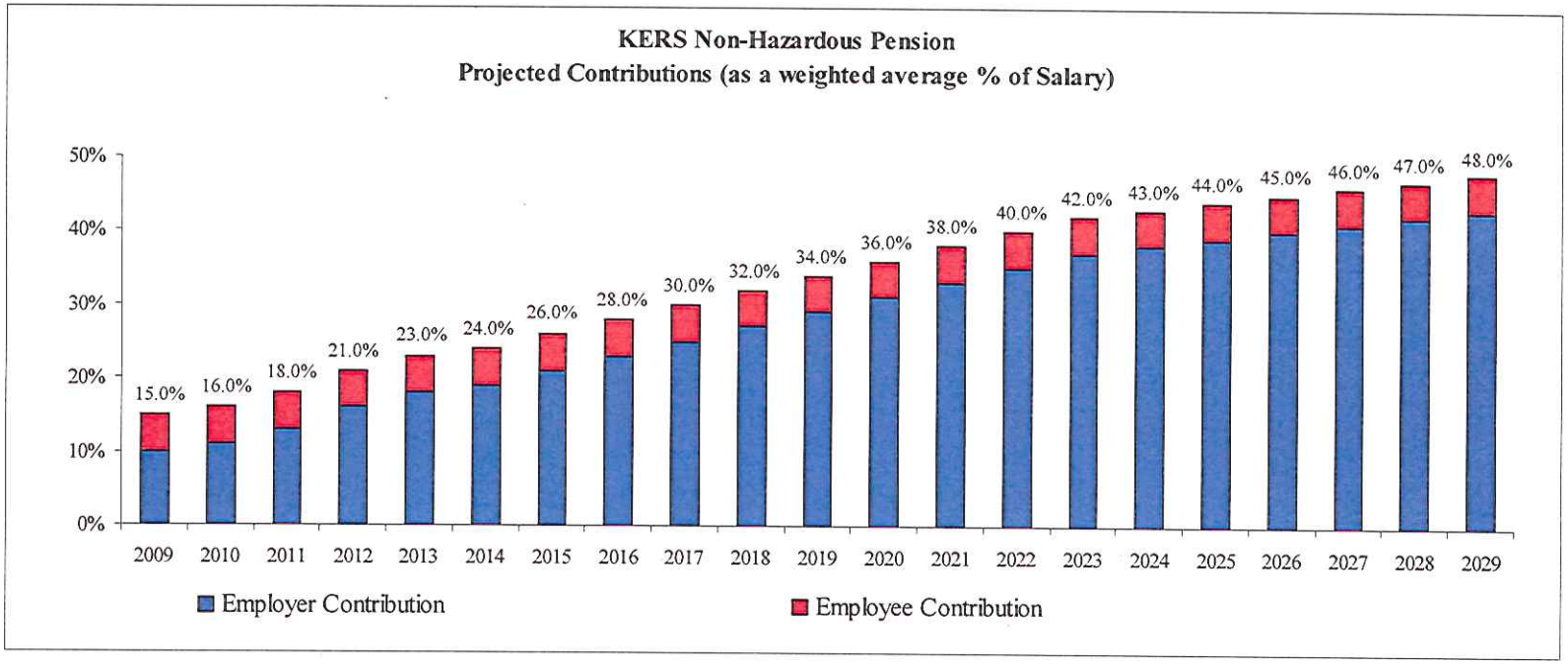
KERS Non-Hazardous Pension

Deterministic Analysis – Contributions



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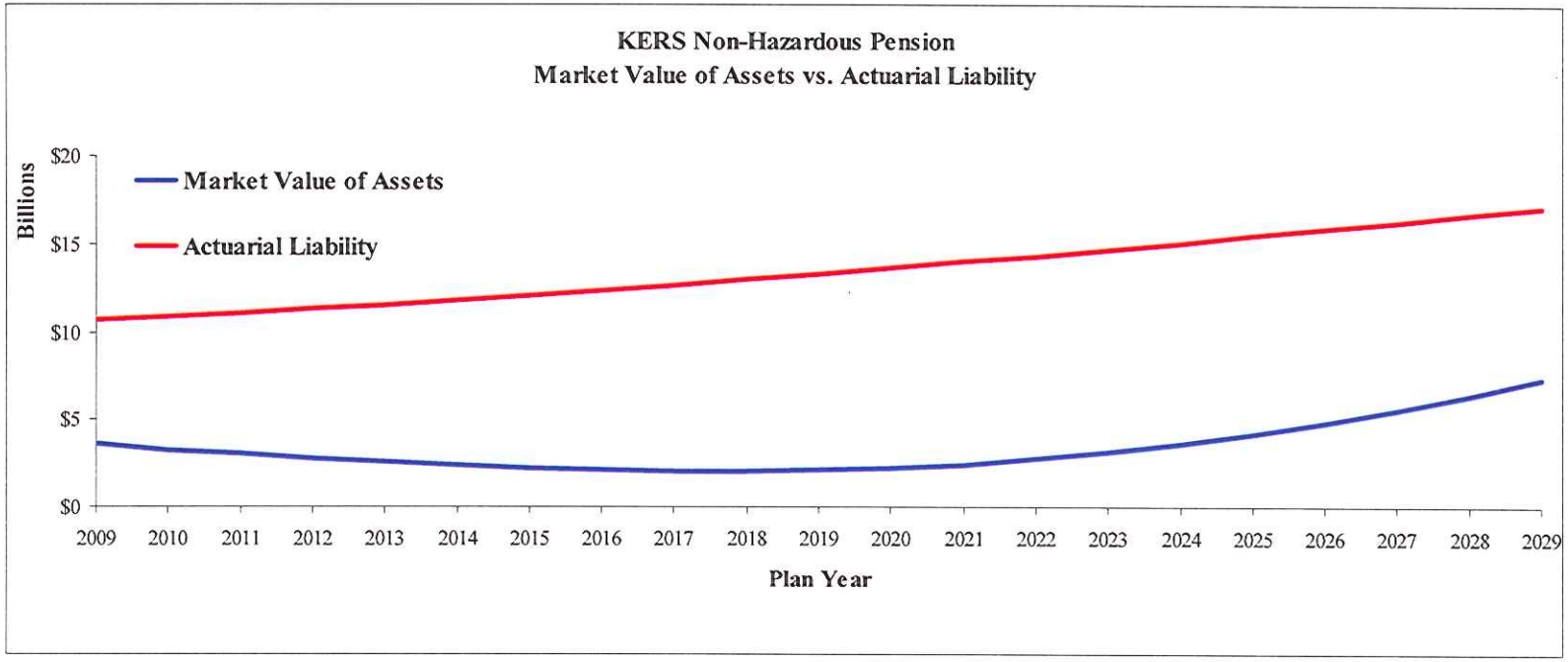
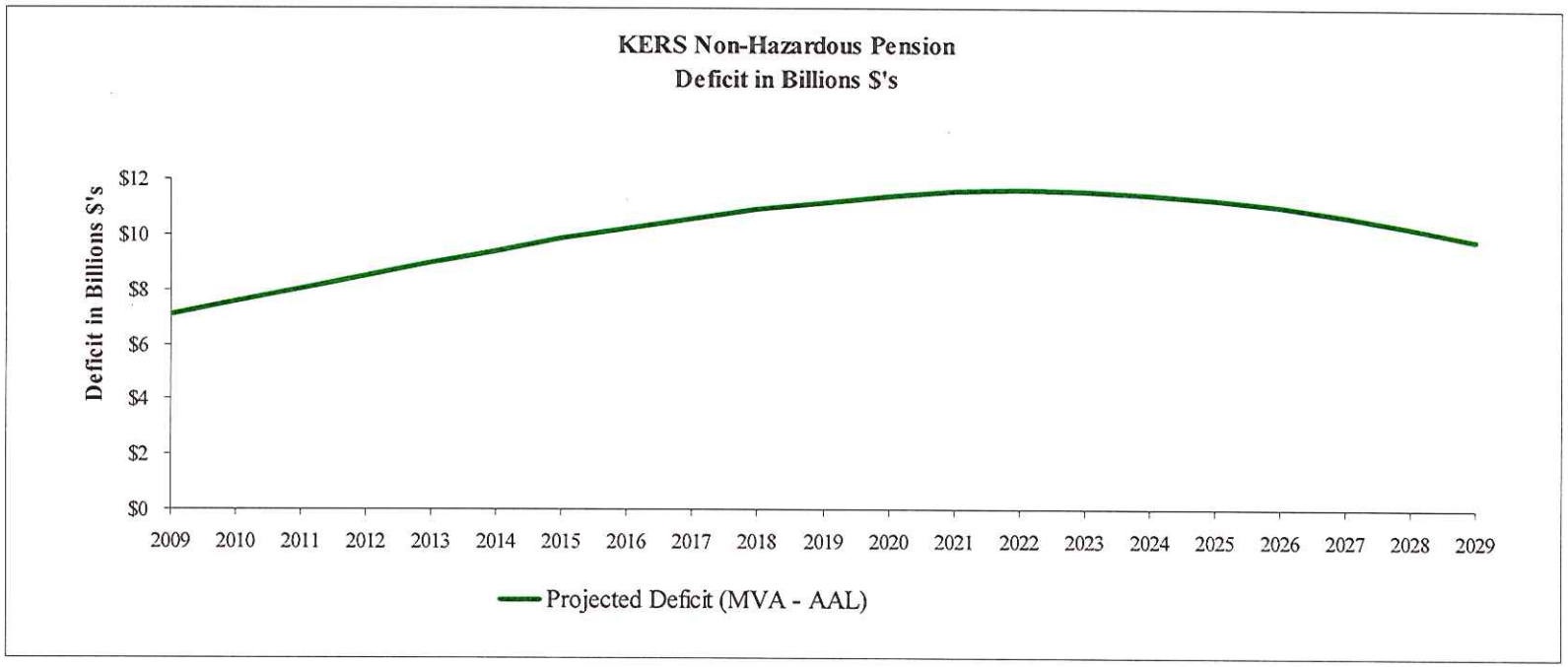
KERS Non-Hazardous Pension

Deterministic Analysis – Liabilities/Market Value



KERS Non-Hazardous Pension

Deterministic Analysis – Deficit



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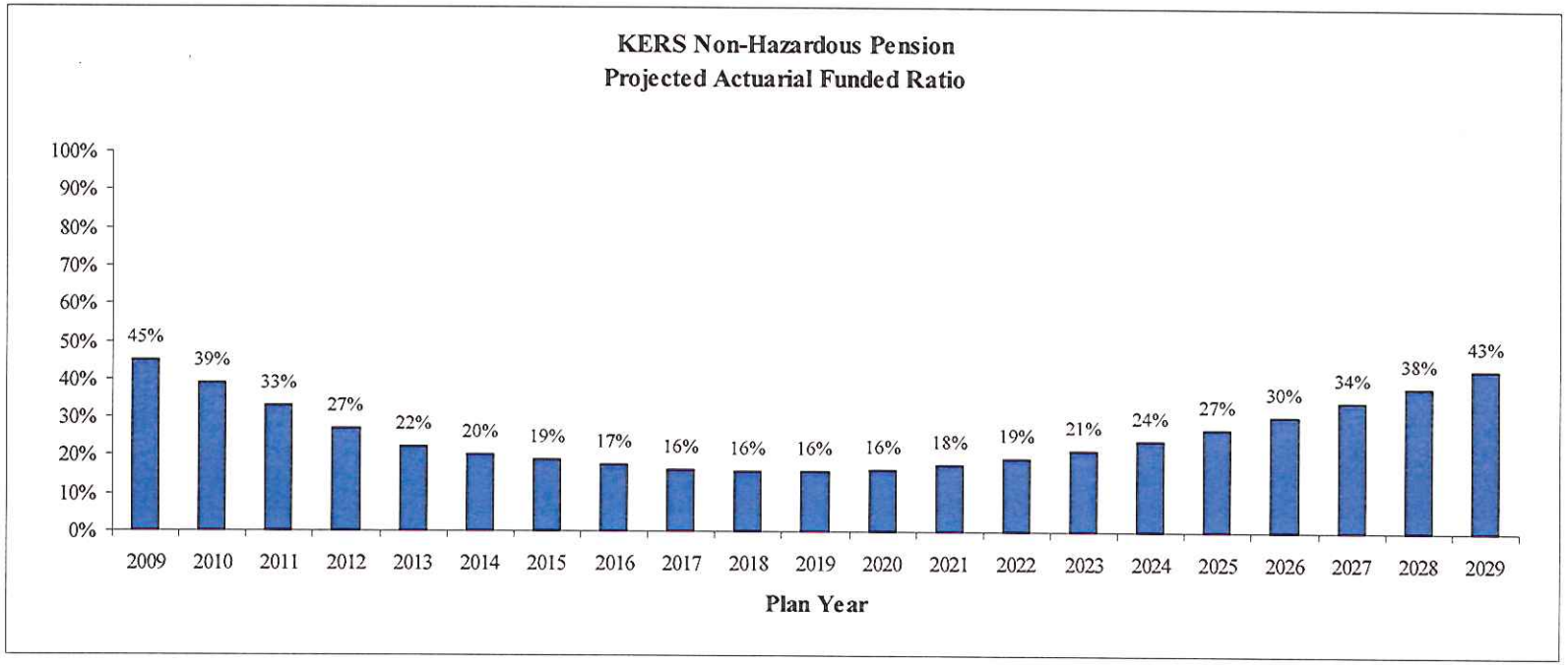
KERS Non-Hazardous Pension

Deterministic Analysis – Actuarial Funded Ratio



KERS Non-Hazardous Pension

Stochastic Analysis

- **This section provides an analysis of the Plan's assets, liabilities, funded status, and benefit payments based on expected asset returns and inflation, and their expected volatility. Using Monte Carlo Simulation technique, both asset and liabilities are assumed to vary stochastically, linked together by changes in inflation.**

- **It assumes investments returns are uncertain.**

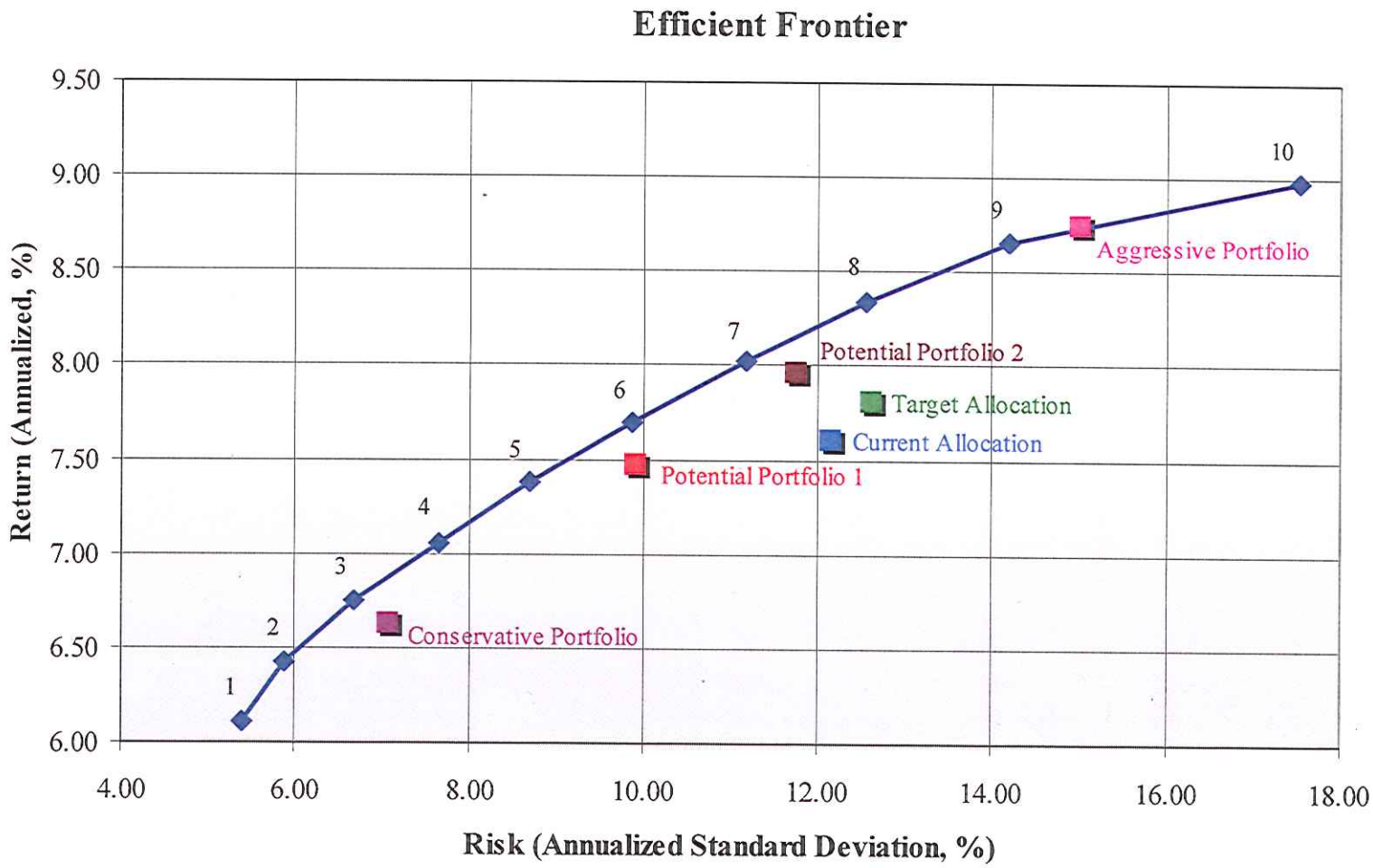
KERS Non-Hazardous Pension

Stochastic Analysis – Pursuing Uncertain Returns

Asset Class	Current Allocation	Target Allocation	Conservative Portfolio	Potential Portfolio 1	Potential Portfolio 2	Aggressive Portfolio
Broad US Equity	27.2%	30.0%	10.0%	14.0%	18.0%	17.0%
Broad Int'l Equity	26.4%	22.0%	5.0%	12.0%	18.0%	30.0%
Emerging Markets	0.0%	5.0%	3.0%	3.0%	4.0%	10.0%
Core Fixed Income	21.5%	10.0%	43.0%	15.0%	10.0%	5.0%
Non-US Fixed Income UH	0.0%	5.0%	9.0%	10.0%	5.0%	1.0%
High Yield	0.0%	5.0%	5.0%	8.0%	5.0%	2.0%
TIPS	10.4%	5.0%	0.0%	0.0%	0.0%	0.0%
Real Estate - Core	0.5%	5.0%	5.0%	5.0%	7.0%	5.0%
Absolute Return	0.0%	0.0%	5.0%	10.0%	10.0%	10.0%
Private Equity	12.0%	7.0%	7.0%	10.0%	12.0%	15.0%
Commodities - Broad	0.0%	5.0%	0.0%	0.0%	0.0%	0.0%
Real Return	0.0%	0.0%	8.0%	12.0%	10.0%	5.0%
Cash Equivalents	2.0%	1.0%	0.0%	1.0%	1.0%	0.0%
Expected Return	**7.62%**	**7.82%**	**6.64%**	**7.49%**	**7.97%**	**8.76%**
Expected Risk	**12.14%**	**12.59%**	**7.05%**	**9.90%**	**11.72%**	**14.98%**

KERS Non-Hazardous Pension

Stochastic Analysis – Efficient Frontier



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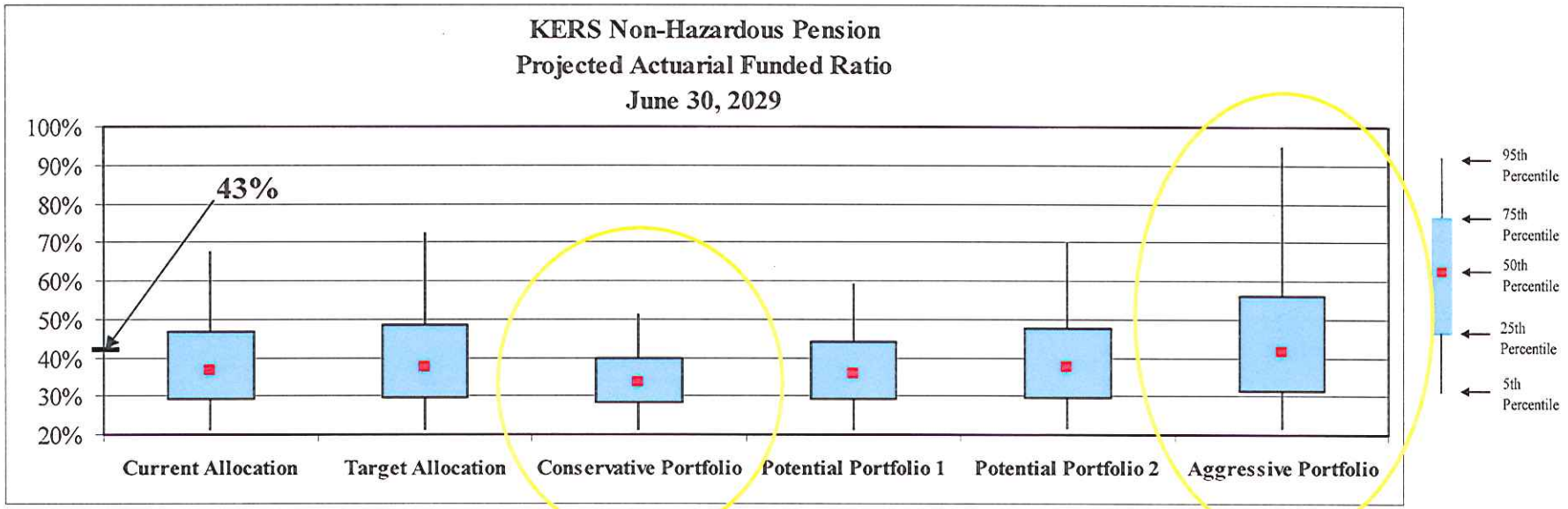
KERS Non-Hazardous Pension

Stochastic Analysis – Possible Long Term Outcomes



	Current Allocation		Target Allocation		Conservative Portfolio		Potential Portfolio 1		Potential Portfolio 2		Aggressive Portfolio	
	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio
5th Percentile	$10,465.3	21.4%	$10,387.7	21.5%	$10,316.7	21.3%	$10,248.5	21.5%	$10,271.4	21.6%	$10,357.2	21.9%
25th Percentile	$9,520.5	29.2%	$9,453.0	29.6%	$9,649.0	28.2%	$9,500.2	29.1%	$9,386.1	29.8%	$9,224.3	31.5%
50th Percentile	$8,733.9	36.8%	$8,649.8	37.6%	$9,152.1	33.6%	$8,870.7	35.7%	$8,591.5	37.7%	$8,125.6	41.5%
75th Percentile	$7,590.3	47.0%	$7,378.2	48.6%	$8,590.3	39.9%	$8,057.8	44.2%	$7,498.0	47.7%	$6,308.4	56.1%
95th Percentile	$4,633.4	67.7%	$4,066.9	72.5%	$7,438.5	51.0%	$6,064.6	59.2%	$4,561.9	69.6%	$836.7	94.7%

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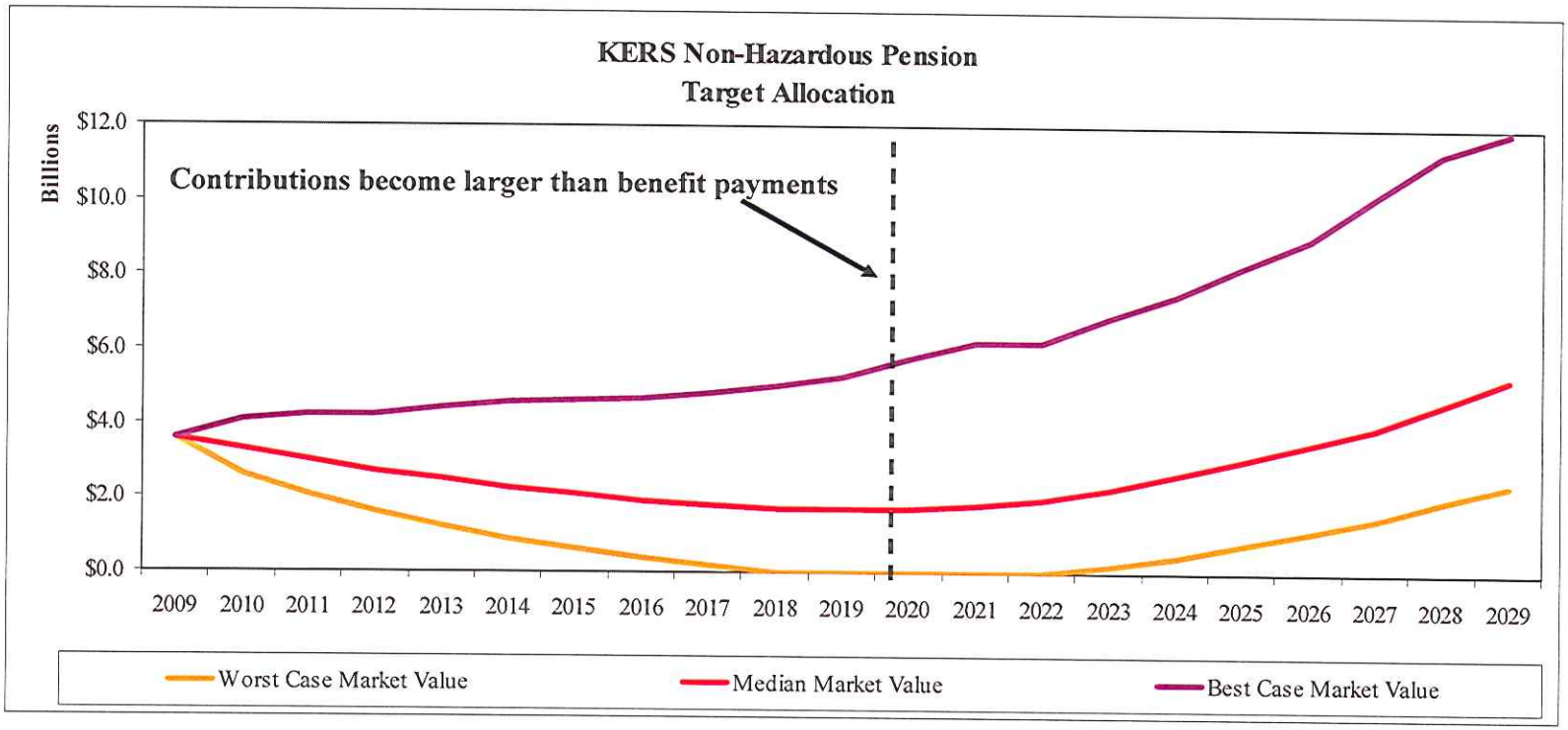
KERS Non-Hazardous Pension

Stochastic Analysis – Drawing Inferences

	Funded Ratio in Year 20		
	50th	**5th**	**95th**
Current Allocation	36.8%	21.4%	67.7%
Target Allocation	37.6%	21.5%	72.5%
Conservative Portfolio	33.6%	21.3%	51.0%
Potential Portfolio 1	35.7%	21.5%	59.2%
Potential Portfolio 2	37.7%	21.6%	69.6%
Aggressive Portfolio	41.5%	21.9%	94.7%
Deterministic	*42.8%*	*N/A*	*N/A*

KERS Non-Hazardous Pension

A Special Challenge Between Now and the Long Term



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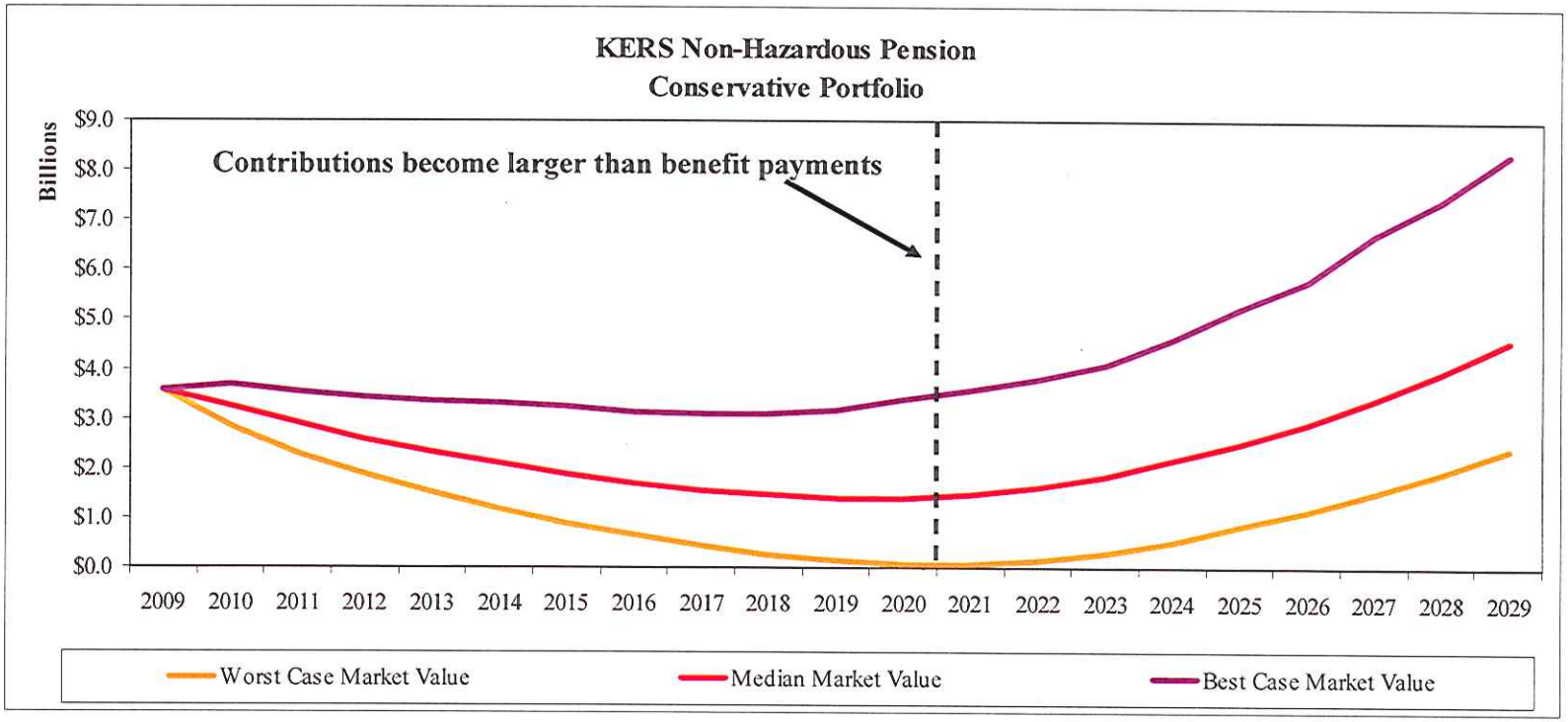
KERS Non-Hazardous Pension

A Special Challenge Between Now and the Long Term



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KERS Non-Hazardous Pension

Combining the Long Term and the Path to It

	Funded Ratio in Year 20			Worst Case Scenario
	50th	5th	95th	
Current Allocation	36.8%	21.4%	67.7%	Insufficient assets to cover benefit payments by 2019
Target Allocation	37.6%	21.5%	72.5%	Insufficient assets to cover benefit payments by 2019
Conservative Portfolio	33.6%	21.3%	51.0%	Sufficient assets but funding ratio drops as low as 0.6%
Potential Portfolio 1	35.7%	21.5%	59.2%	Sufficient assets but funding ratio drops as low as 0.3%
Potential Portfolio 2	37.7%	21.6%	69.6%	Insufficient assets to cover benefit payments by 2020
Aggressive Portfolio	41.5%	21.9%	94.7%	Insufficient assets to cover benefit payments by 2018
Deterministic	*42.8%*	*N/A*	*N/A*	*N/A*

KERS Hazardous Pension Plan

- Deterministic Analysis
- Stochastic Analysis

KERS Asset/Liability Studies

The Critical Role of House Bill 1

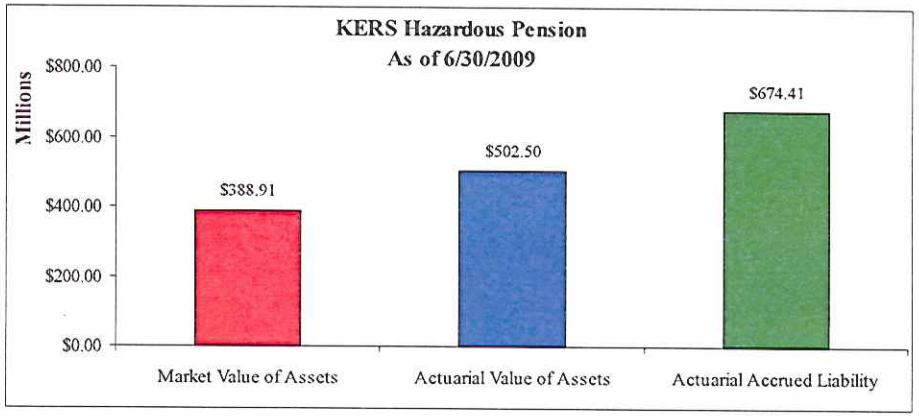
- **Per House Bill 1, future State contributions for Hazardous Pension Plan will be (as a percentage of the Annual Required Contribution):**

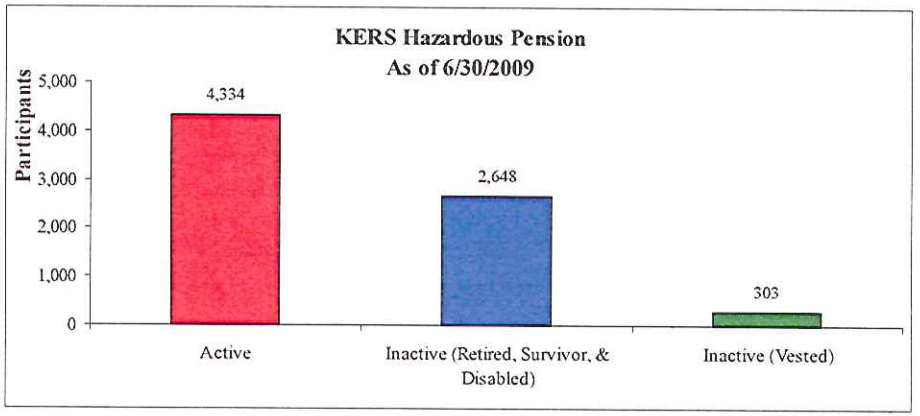
	2010	2011	2012	2013	2014	2015	2016	2017	2018
Hazardous	76%	79%	83%	86%	89%	92%	95%	98%	100%

KERS Hazardous Pension

Deterministic Analysis – Current Status

Valuation Date	June 30, 2009
Market Value of Assets (MVA)	$388,913,374
Actuarial Value of Assets (AVA)	$502,503,286
Actuarial Accrued Liability (AAL)	$674,411,780
Actuarial Funded Ratio (AVA/AAL)	75%
Market Value Funded Ratio (MVA/AAL)	58%
Active Participants	4,334
Inactive (Retired, Survivor, & Disabled) Participants Retirees and Beneficiaries	2,648
Inactive (Other) Participants Vested	303





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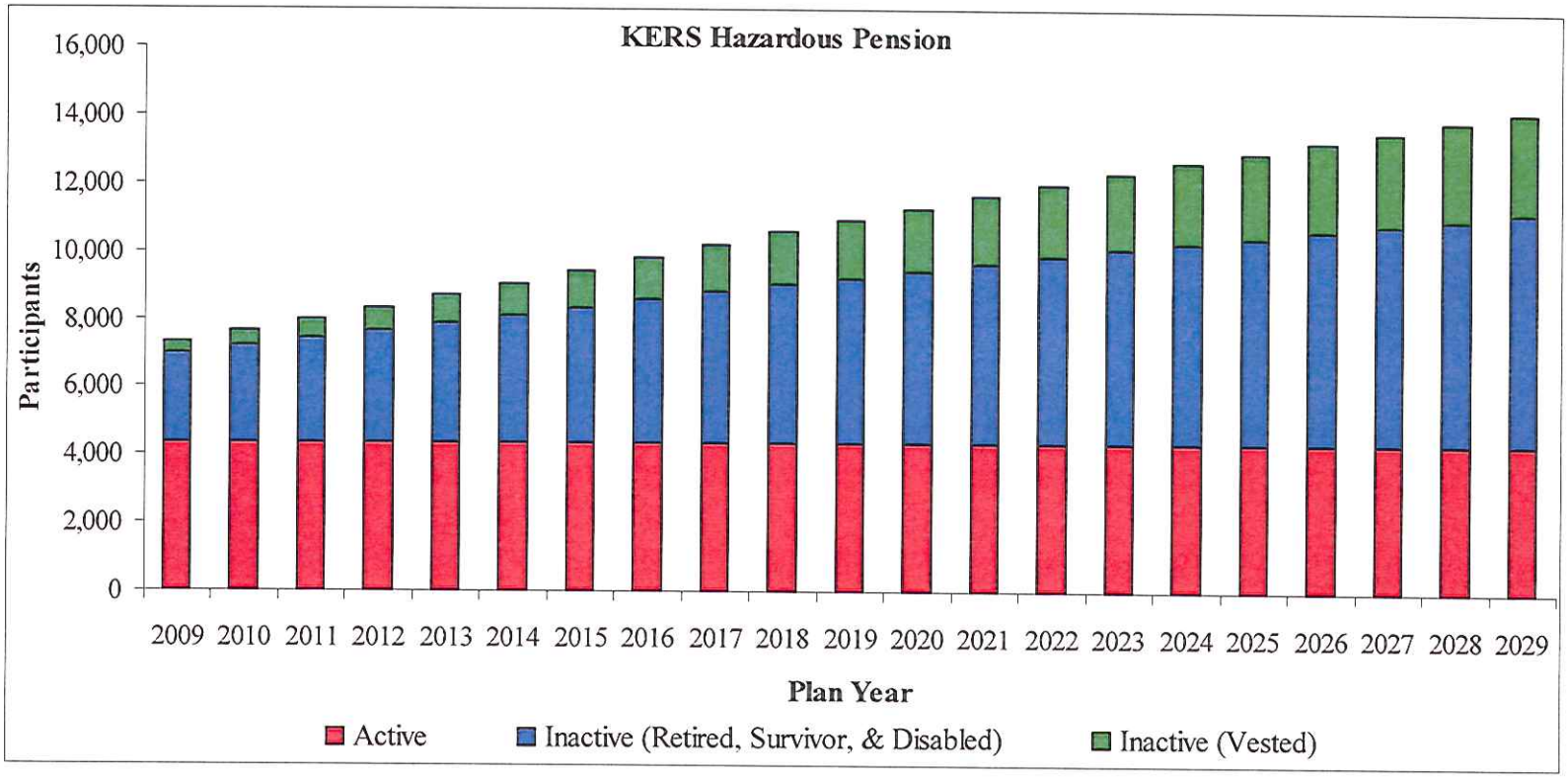
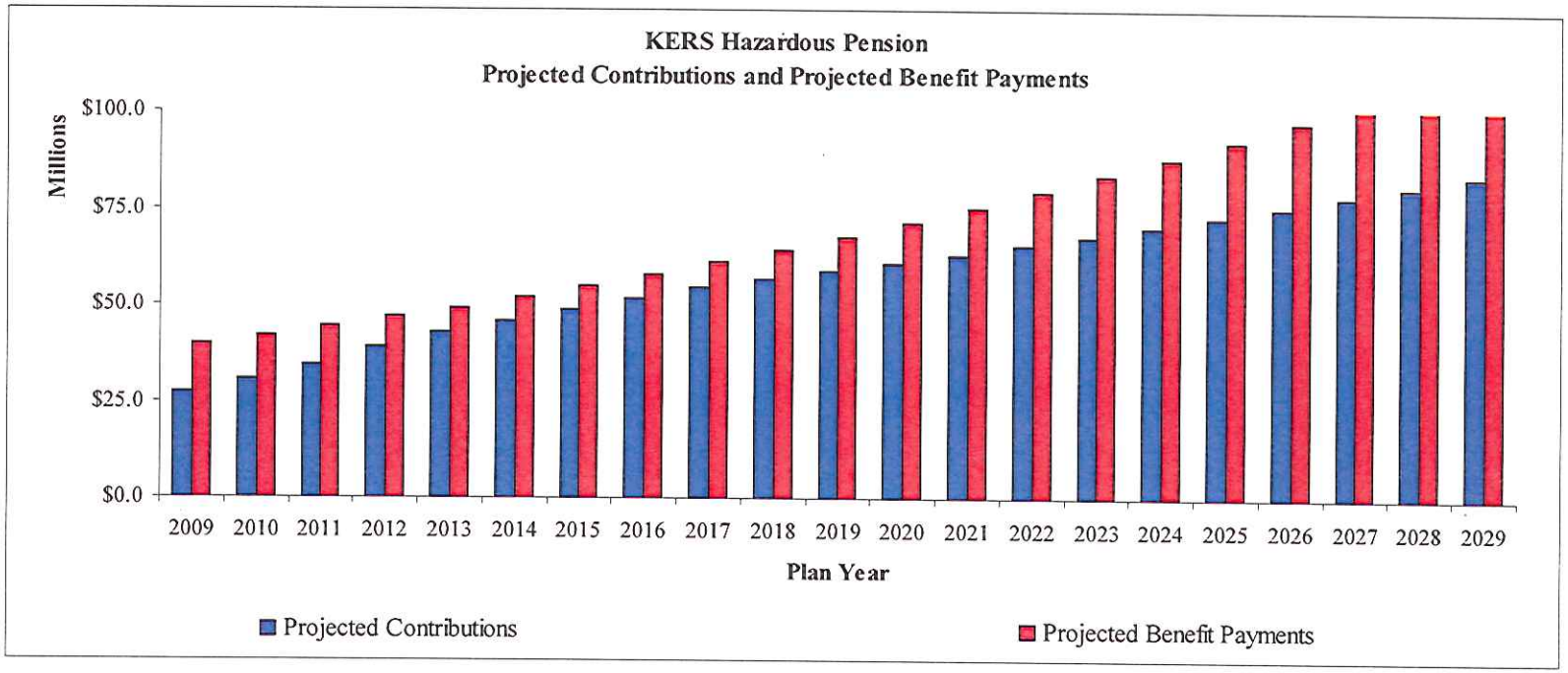
KERS Hazardous Pension

Deterministic Analysis - Demographics



KERS Hazardous Pension

Deterministic Analysis – Benefits and Contributions



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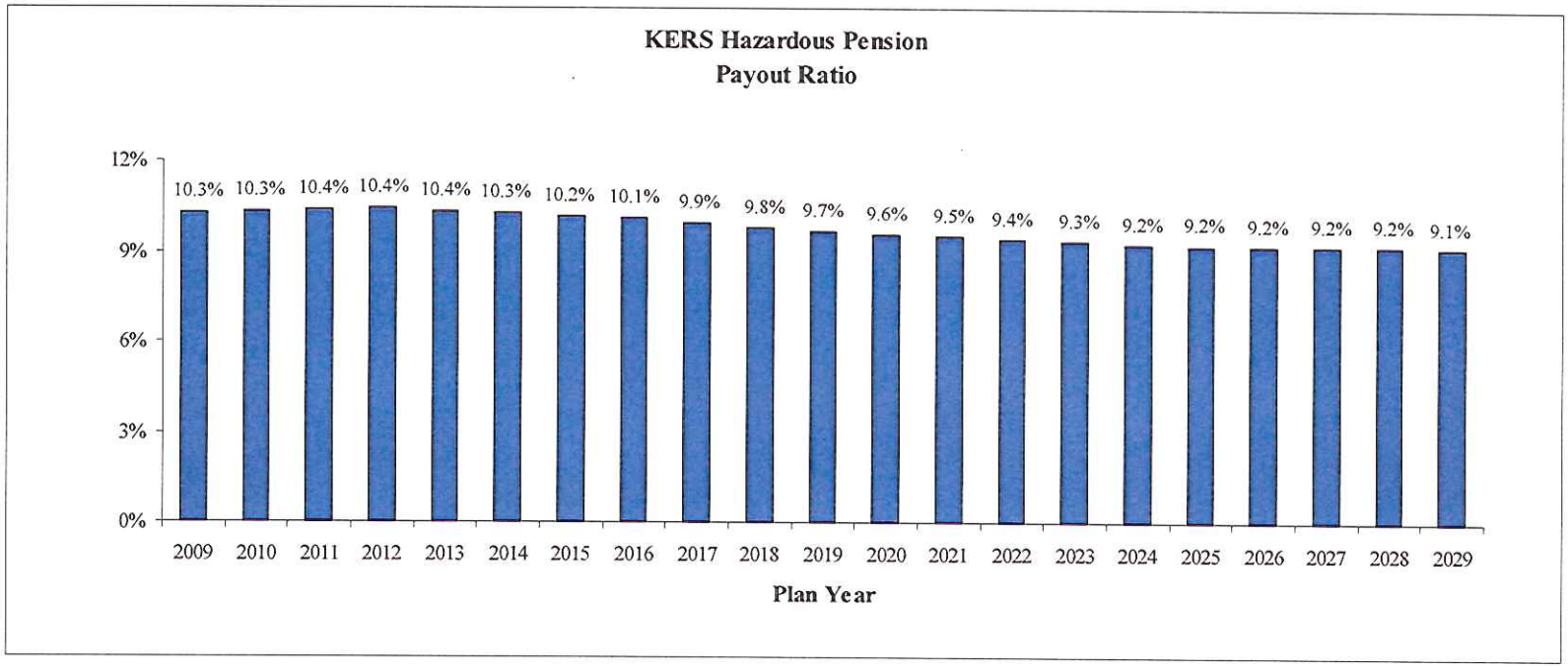
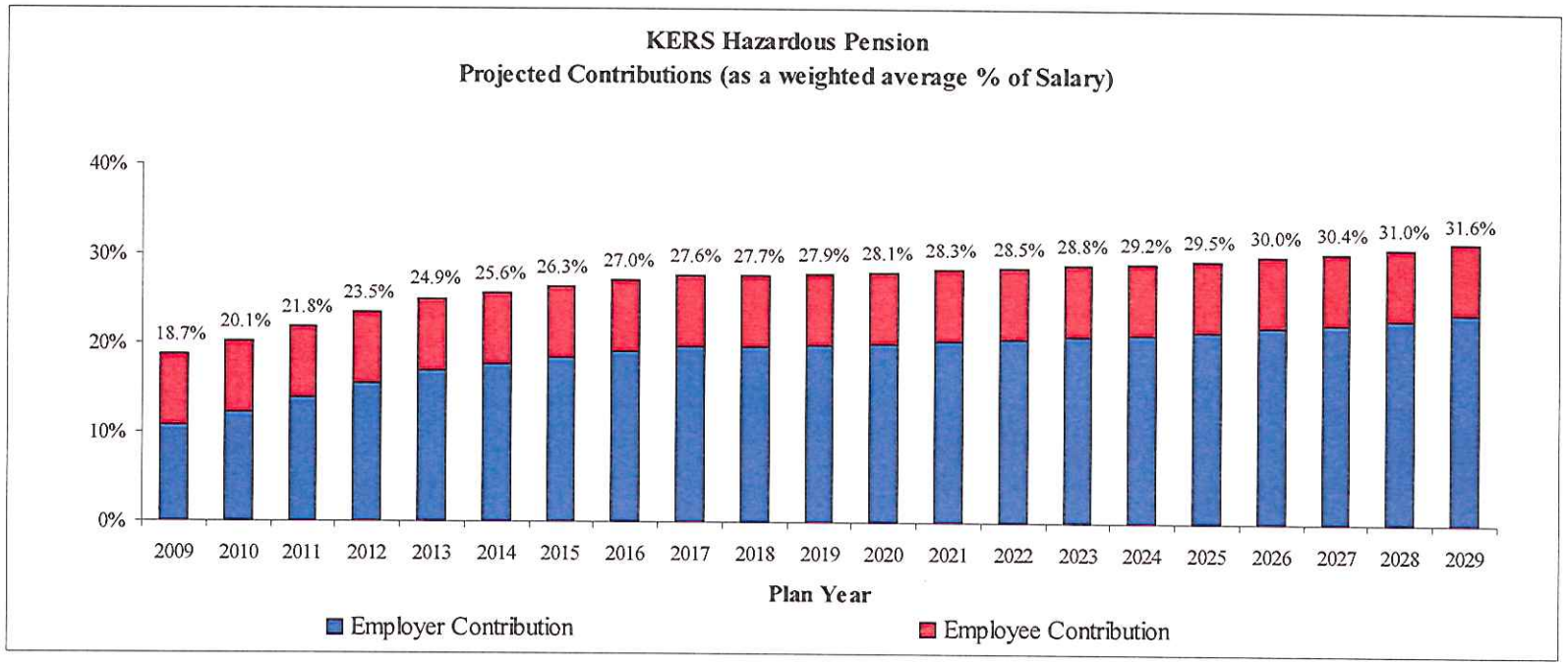
KERS Hazardous Pension

Deterministic Analysis – Payout Ratio



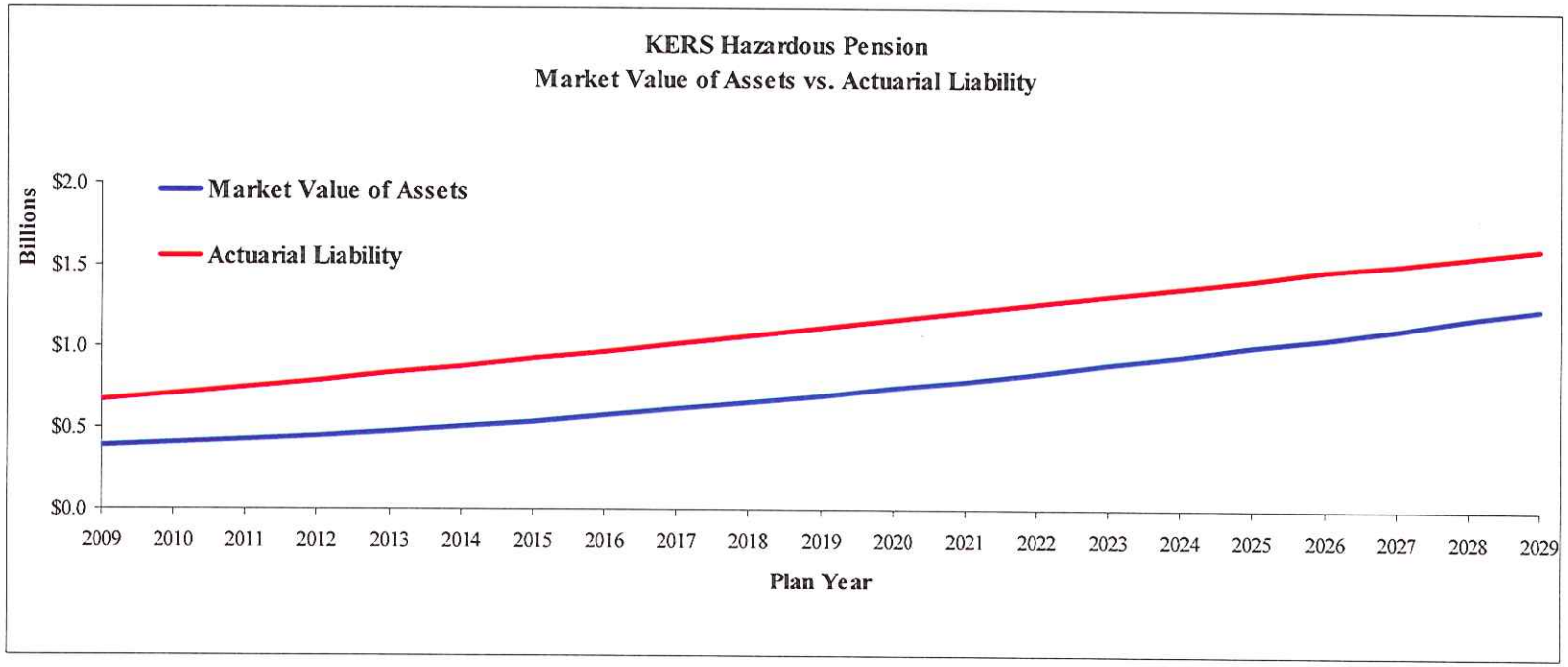
KERS Hazardous Pension

Deterministic Analysis – Contributions



KERS Hazardous Pension

Deterministic Analysis – Liabilities/Market Value



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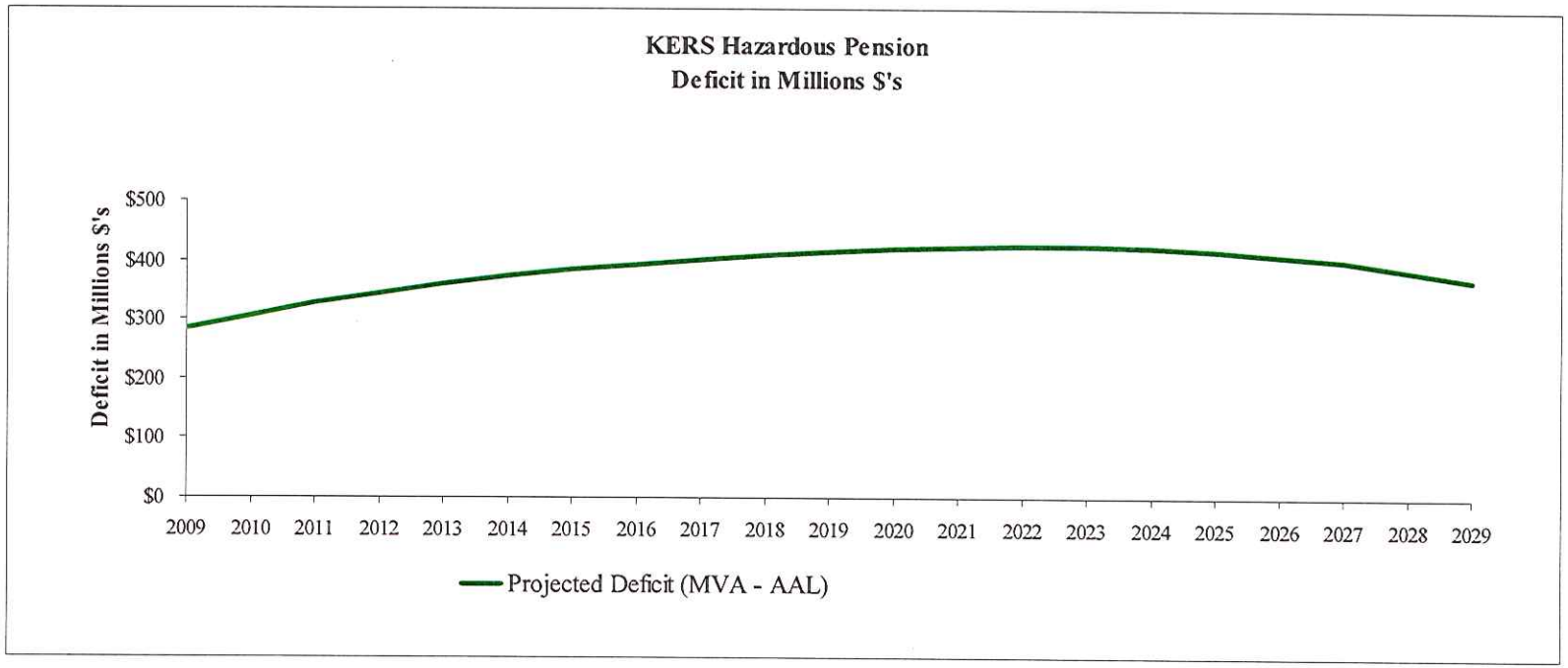
KERS Hazardous Pension

Deterministic Analysis – Deficit



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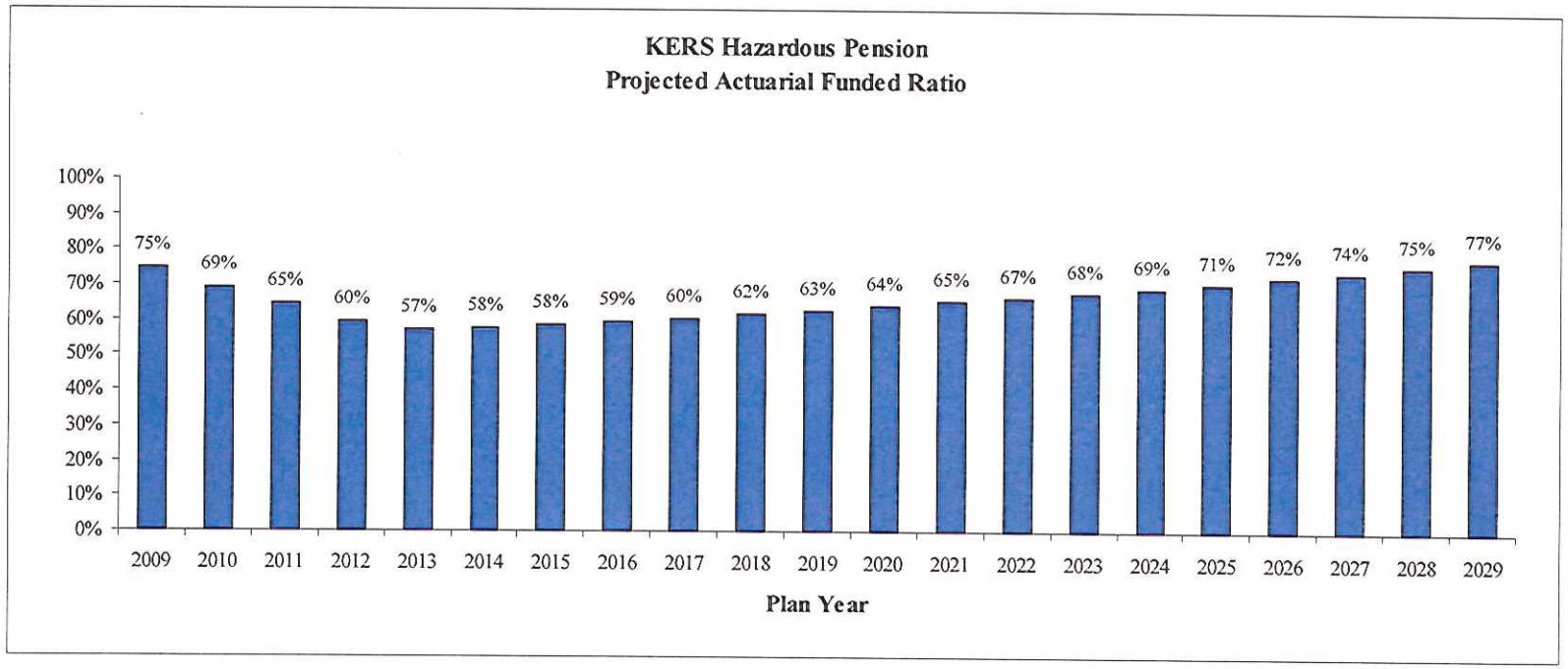
KERS Hazardous Pension

Deterministic Analysis – Actuarial Funded Ratio



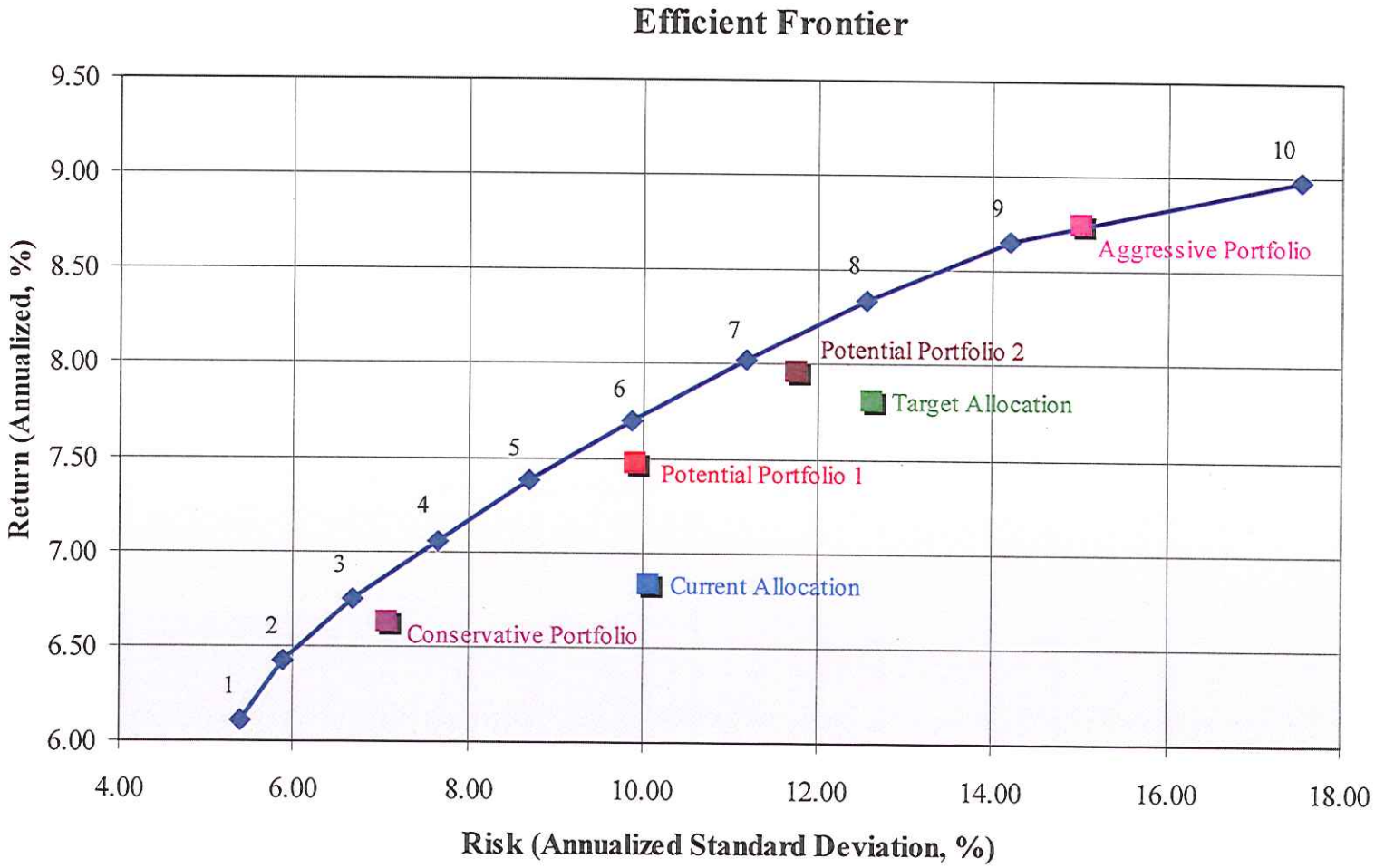
KERS Hazardous Pension

Stochastic Analysis – Pursuing Uncertain Returns

Asset Class	Current Allocation	Target Allocation	Conservative Portfolio	Potential Portfolio 1	Potential Portfolio 2	Aggressive Portfolio
Broad US Equity	22.6%	30.0%	10.0%	14.0%	18.0%	17.0%
Broad Int'l Equity	19.7%	22.0%	5.0%	12.0%	18.0%	30.0%
Emerging Markets	0.0%	5.0%	3.0%	3.0%	4.0%	10.0%
Core Fixed Income	19.4%	10.0%	43.0%	15.0%	10.0%	5.0%
Non-US Fixed Income UH	0.0%	5.0%	9.0%	10.0%	5.0%	1.0%
High Yield	0.0%	5.0%	5.0%	8.0%	5.0%	2.0%
TIPS	6.4%	5.0%	0.0%	0.0%	0.0%	0.0%
Real Estate - Core	0.9%	5.0%	5.0%	5.0%	7.0%	5.0%
Absolute Return	0.0%	0.0%	5.0%	10.0%	10.0%	10.0%
Private Equity	11.2%	7.0%	7.0%	10.0%	12.0%	15.0%
Commodities - Broad	0.0%	5.0%	0.0%	0.0%	0.0%	0.0%
Real Return	0.0%	0.0%	8.0%	12.0%	10.0%	5.0%
Cash Equivalents	19.8%	1.0%	0.0%	1.0%	1.0%	0.0%
Expected Return	**6.84%**	**7.82%**	**6.64%**	**7.49%**	**7.97%**	**8.76%**
Expected Risk	**10.04%**	**12.59%**	**7.05%**	**9.90%**	**11.72%**	**14.98%**

KERS Hazardous Pension

Stochastic Analysis – Efficient Frontier



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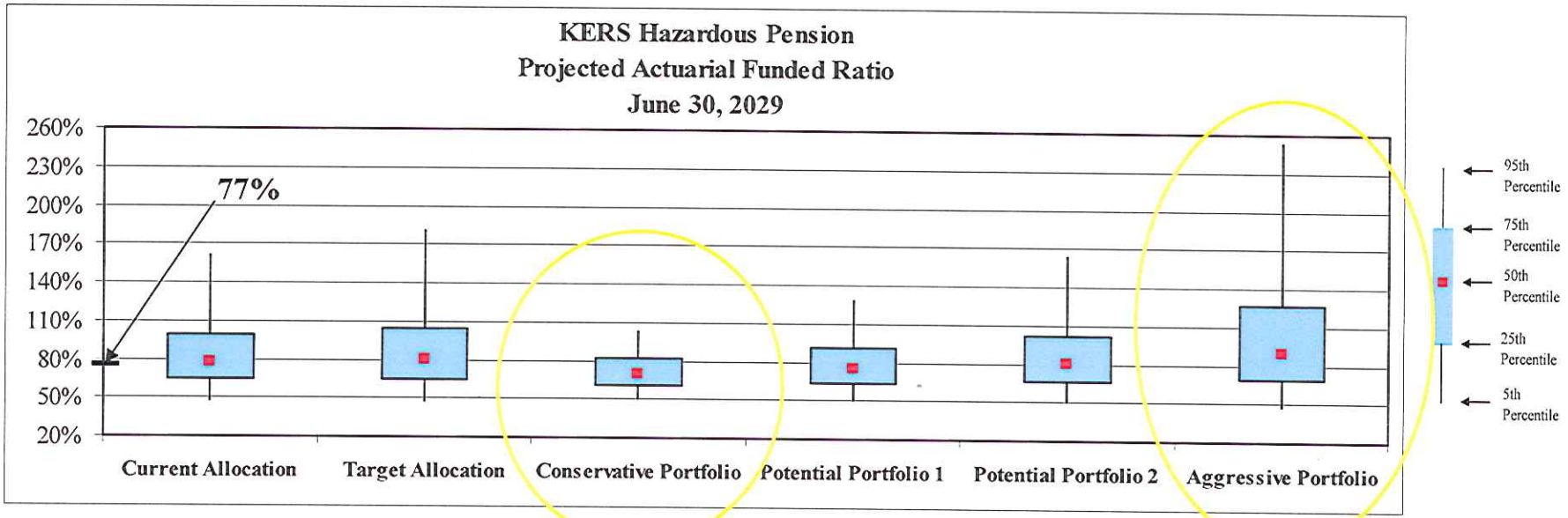
KERS Hazardous Pension

Stochastic Analysis – Possible Long Term Outcomes



	Current Allocation		Target Allocation		Conservative Portfolio		Potential Portfolio 1		Potential Portfolio 2		Aggressive Portfolio	
	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio
5th Percentile	$635.1	47.2%	$631.5	47.4%	$593.8	50.4%	$598.5	50.1%	$609.0	49.8%	$627.8	48.2%
25th Percentile	$445.3	64.4%	$437.5	64.6%	$476.7	61.4%	$443.1	64.1%	$419.1	66.2%	$384.4	69.4%
50th Percentile	$273.4	78.6%	$243.3	80.8%	$377.1	70.5%	$305.8	75.8%	$242.2	81.1%	$118.5	90.5%
75th Percentile	$5.0	99.6%	($54.6)	104.0%	$244.7	81.9%	$109.3	91.7%	($26.0)	102.0%	($354.2)	126.3%
95th Percentile	($835.5)	161.5%	($1,074.4)	180.6%	($35.4)	102.6%	($364.5)	128.0%	($863.5)	163.3%	($2,159.2)	253.7%

KERS Hazardous Pension

Stochastic Analysis – Drawing Inferences

	Funded Ratio in Year 20			Payout Ratios		
	50th	5th	95th	Year 20 Median	2009-2029	
					Peak	Trough
Current Allocation	78.6%	47.2%	161.5%	9.6%	19.2%	4.3%
Target Allocation	80.8%	47.4%	180.6%	9.3%	19.3%	4.0%
Conservative Portfolio	70.5%	50.4%	102.6%	11.0%	18.0%	6.9%
Potential Portfolio 1	75.8%	50.1%	128.0%	10.1%	18.1%	5.6%
Potential Portfolio 2	81.1%	49.8%	163.3%	9.3%	18.4%	4.3%
Aggressive Portfolio	90.5%	48.2%	253.7%	8.2%	19.1%	2.7%
Deterministic	*77.2%*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*

KERS Non-Hazardous Insurance Plan

- Deterministic Analysis
- Stochastic Analysis

KERS Asset/Liability Studies

The Critical Role of House Bill 1

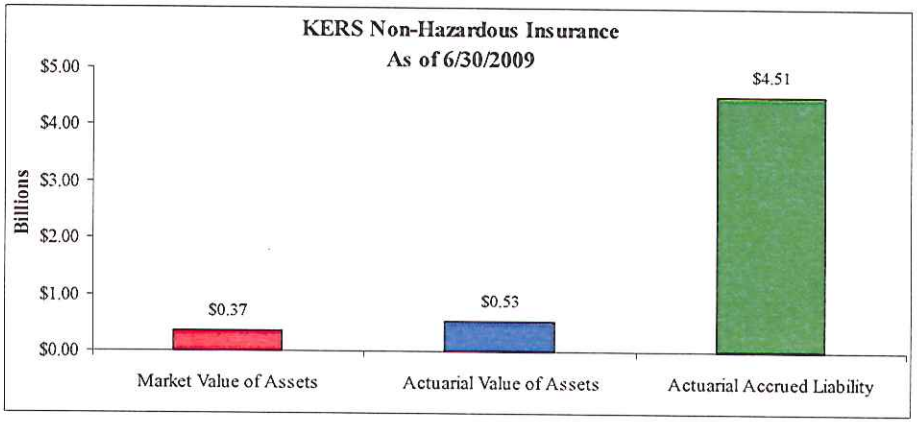
- **Per House Bill 1, future State contributions for Non-Hazardous Insurance Plan will be (as a percentage of the Annual Required Contribution):**

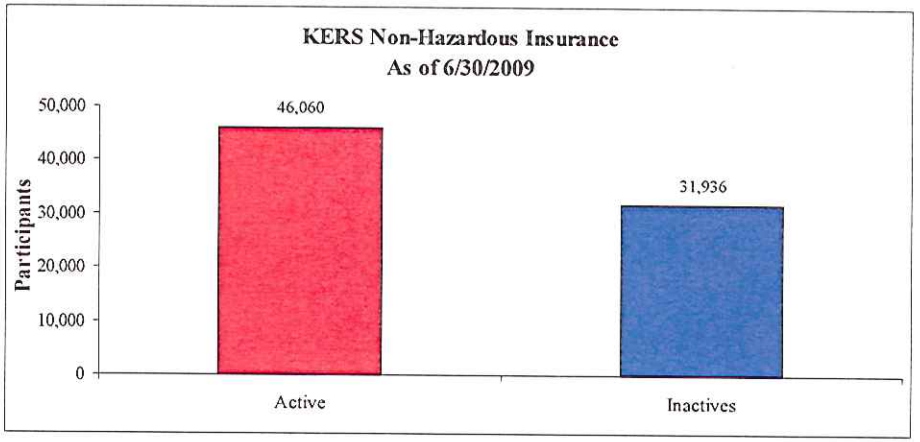
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Non-Hazardous	44%	48%	53%	57%	61%	65%	69%	73%	77%	81%	85%	89%	93%	97%	100%

KERS Non-Hazardous Insurance

Deterministic Analysis – Current Status

Valuation Date	**June 30, 2009**
Market Value of Assets (MVA)	**$365,771,088**
Actuarial Value of Assets (AVA)	**$534,172,581**
Actuarial Accrued Liability (AAL)	**$4,507,325,571**
Actuarial Funded Ratio (AVA/AAL)	**12%**
Market Value Funded Ratio (MVA/AAL)	**8%**
Active Participants	**46,060**
Inactive Participants Retirees and Beneficiaries	**31,936**





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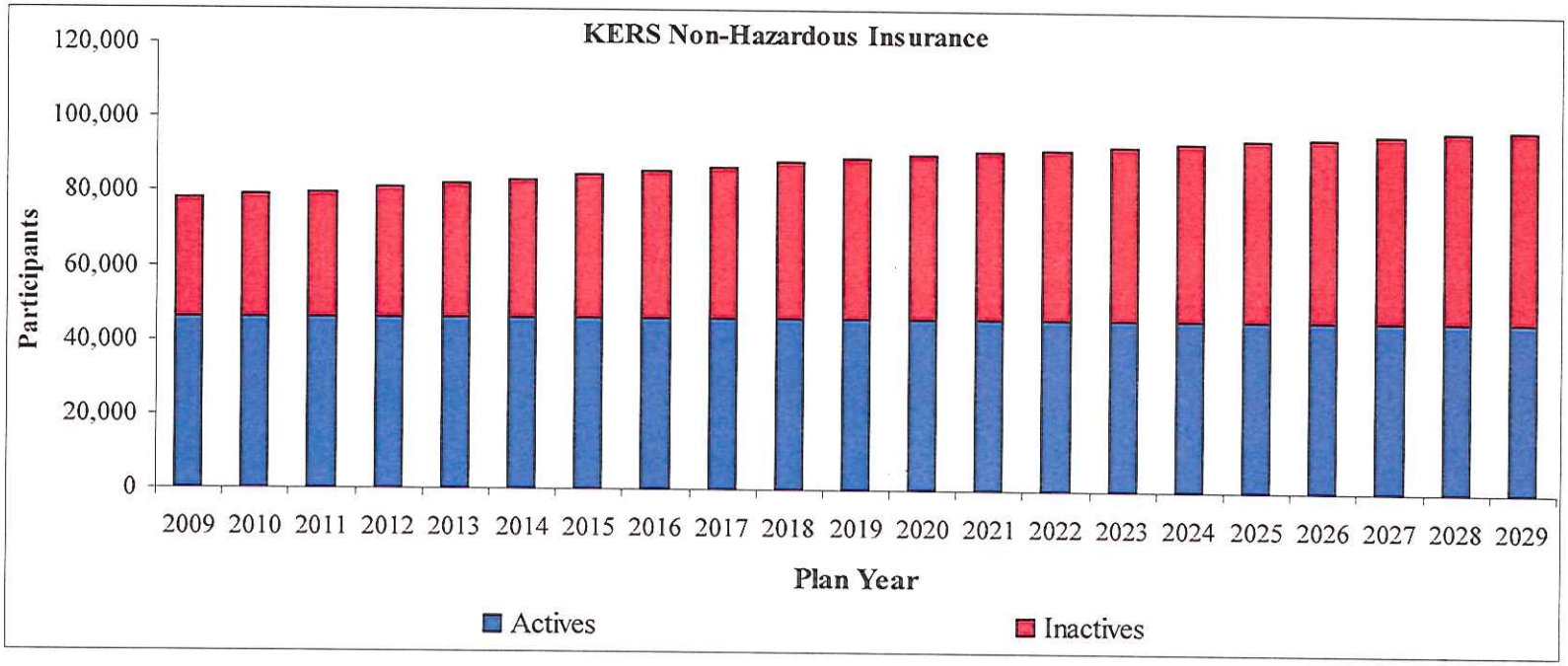
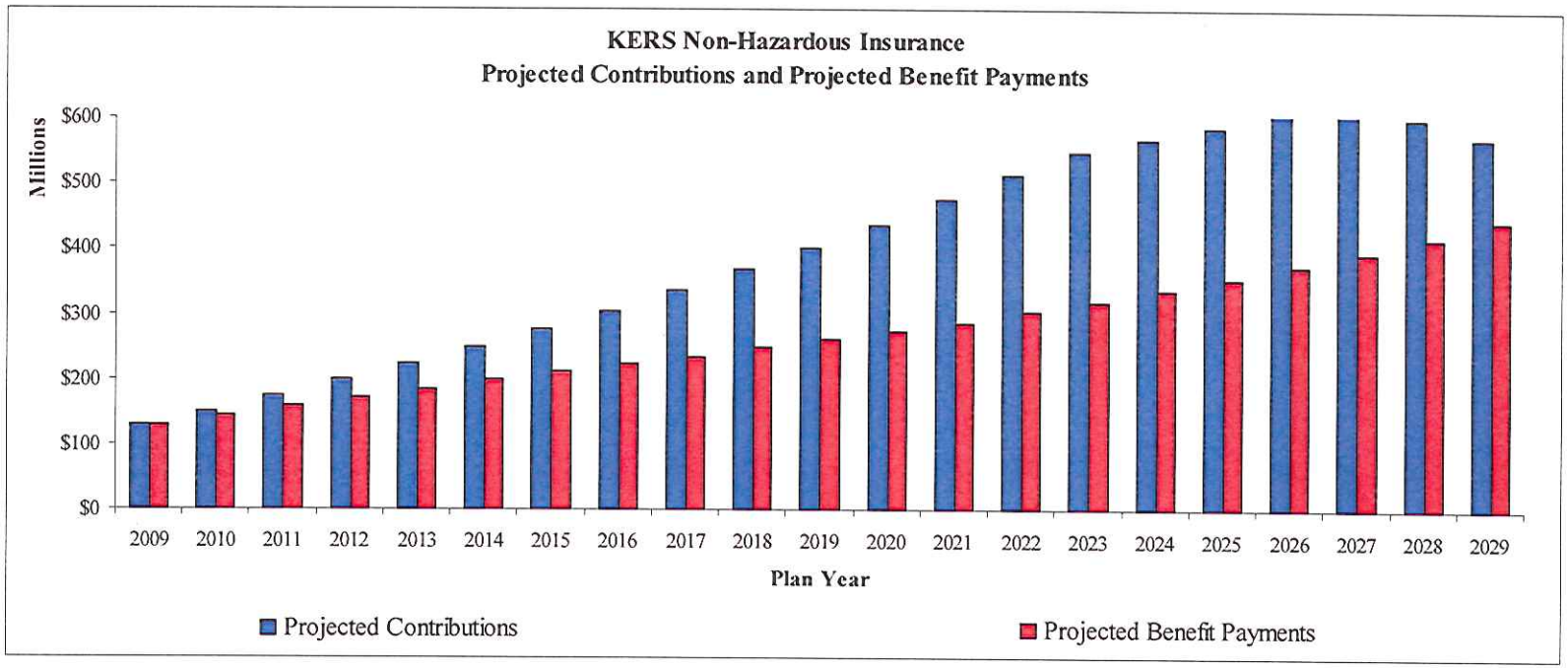
KERS Non-Hazardous Insurance

Deterministic Analysis - Demographics



KERS Non-Hazardous Insurance

Deterministic Analysis – Benefits and Contributions



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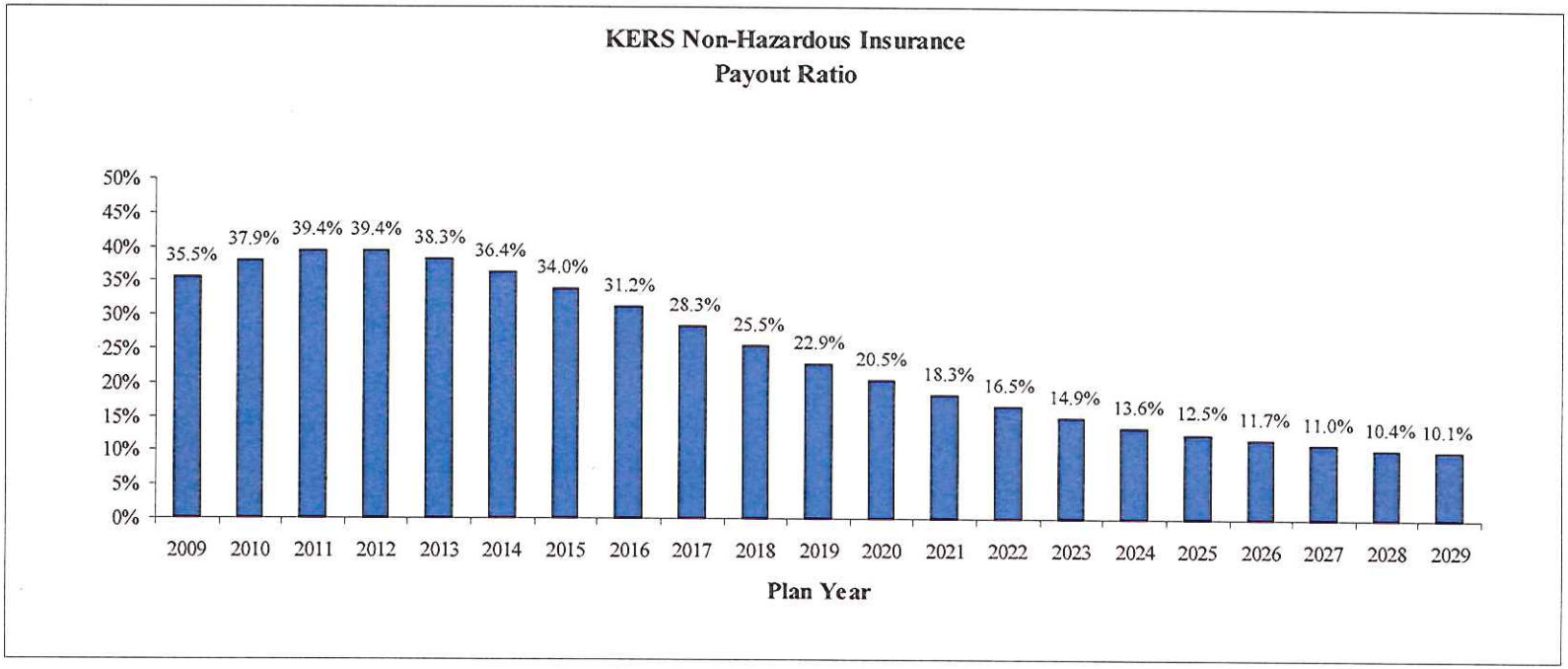
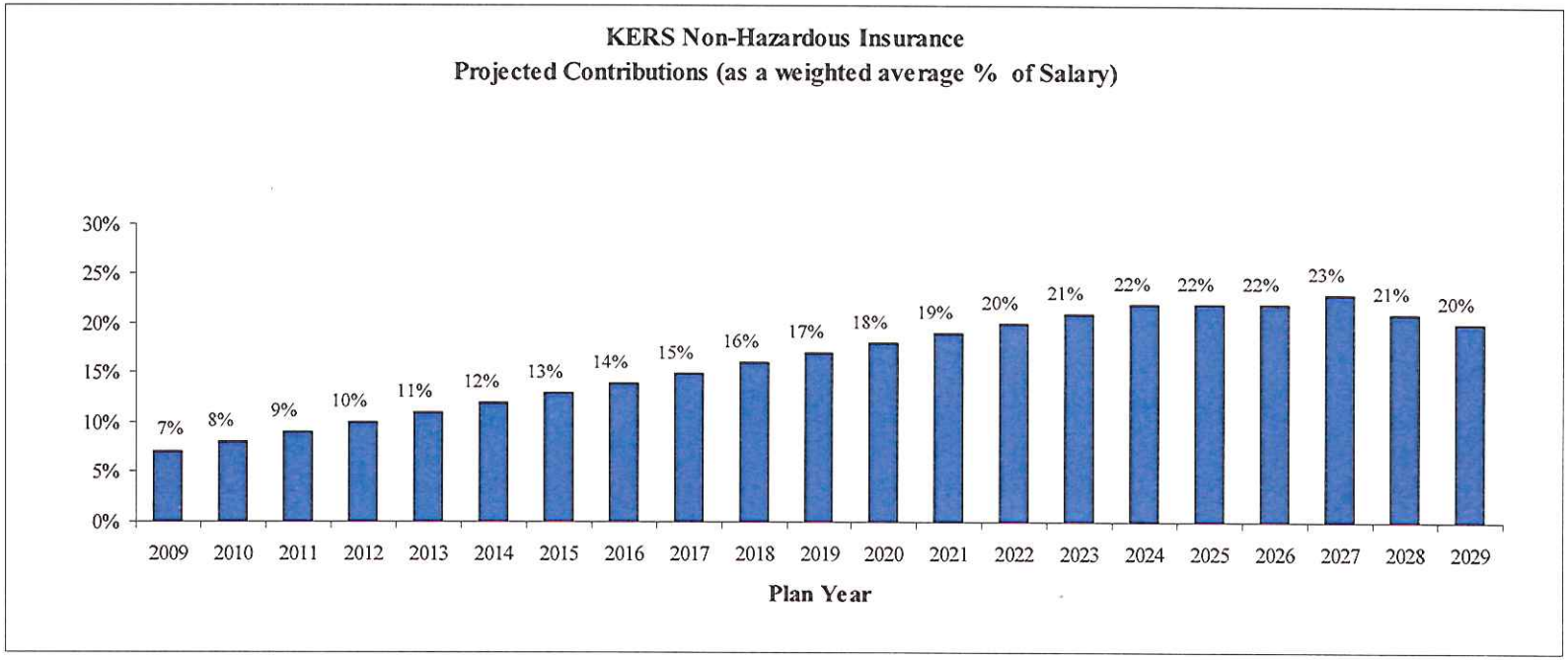
KERS Non-Hazardous Insurance

Deterministic Analysis – Payout Ratio



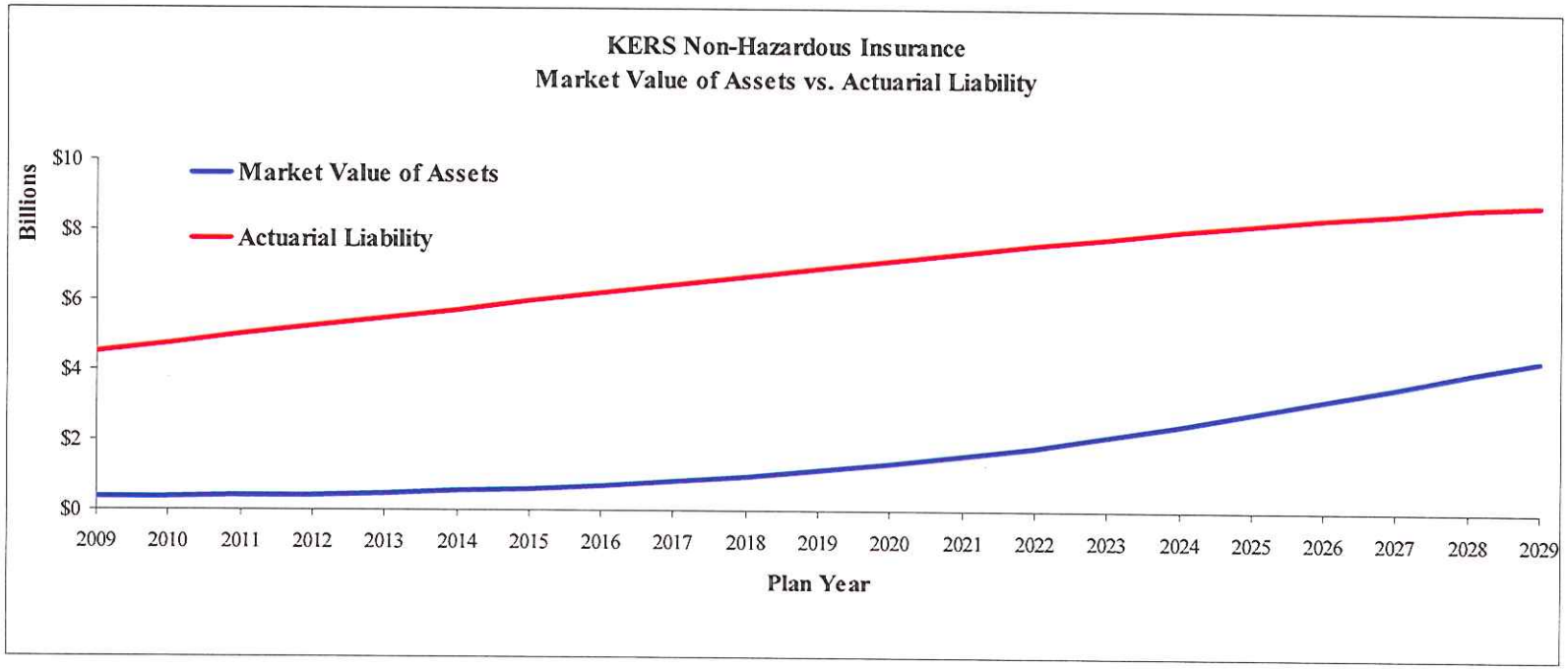
KERS Non-Hazardous Insurance

Deterministic Analysis – Contributions



KERS Non-Hazardous Insurance

Deterministic Analysis – Liabilities/Market Value



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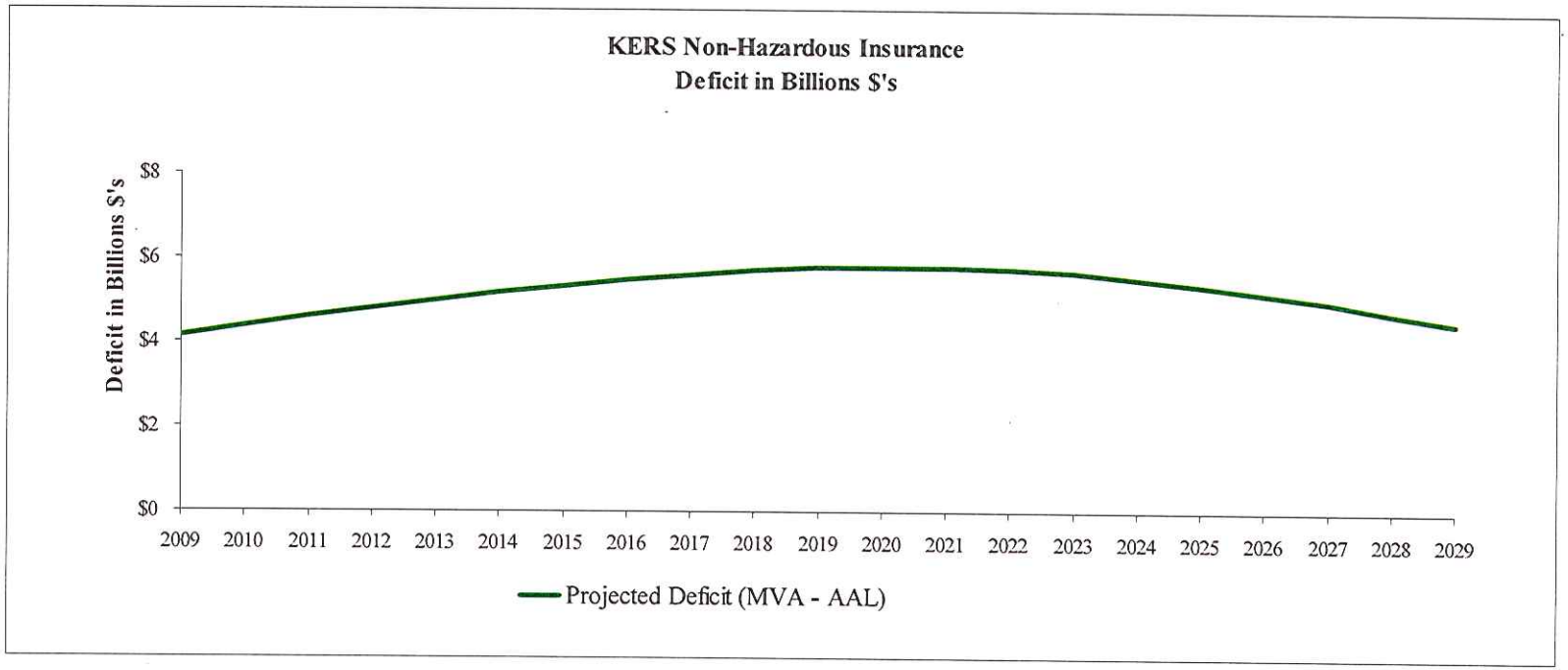
KERS Non-Hazardous Insurance

Deterministic Analysis – Deficit



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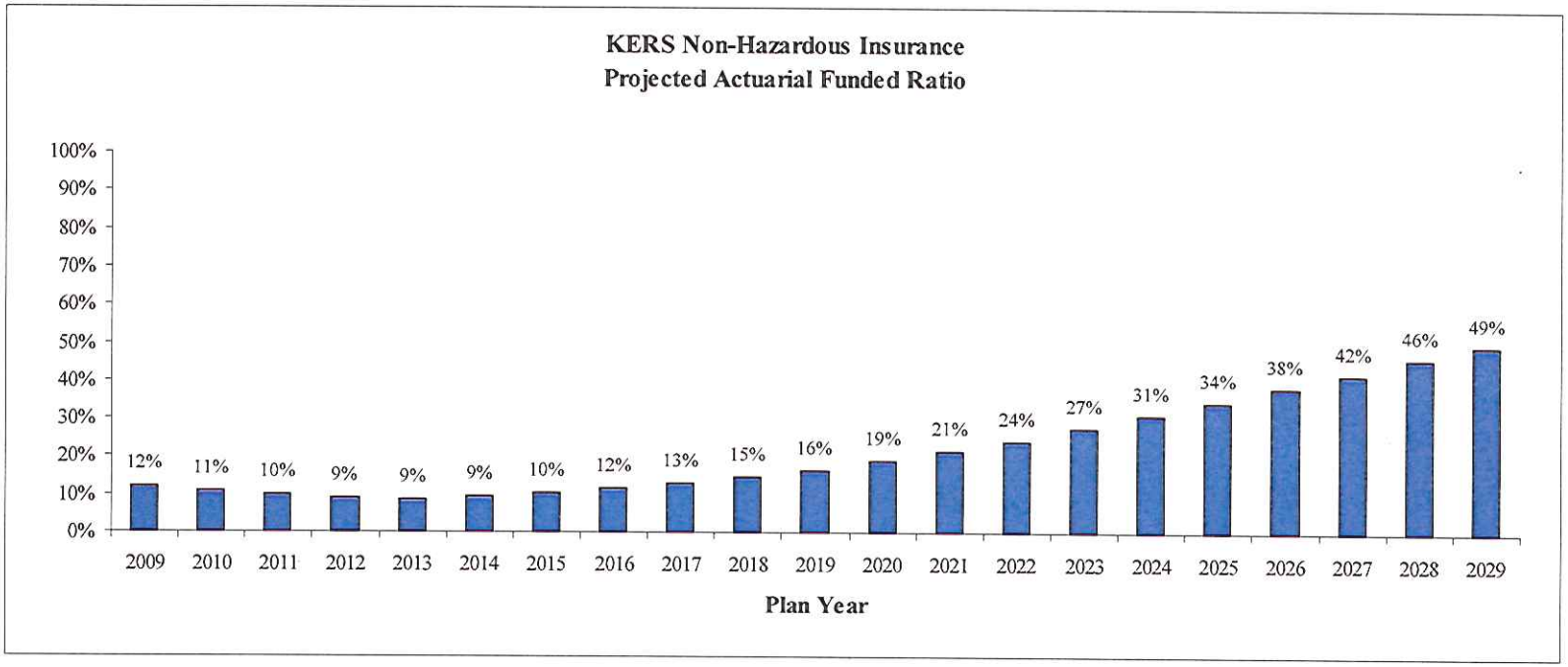
KERS Non-Hazardous Insurance

Deterministic Analysis – Actuarial Funded Ratio



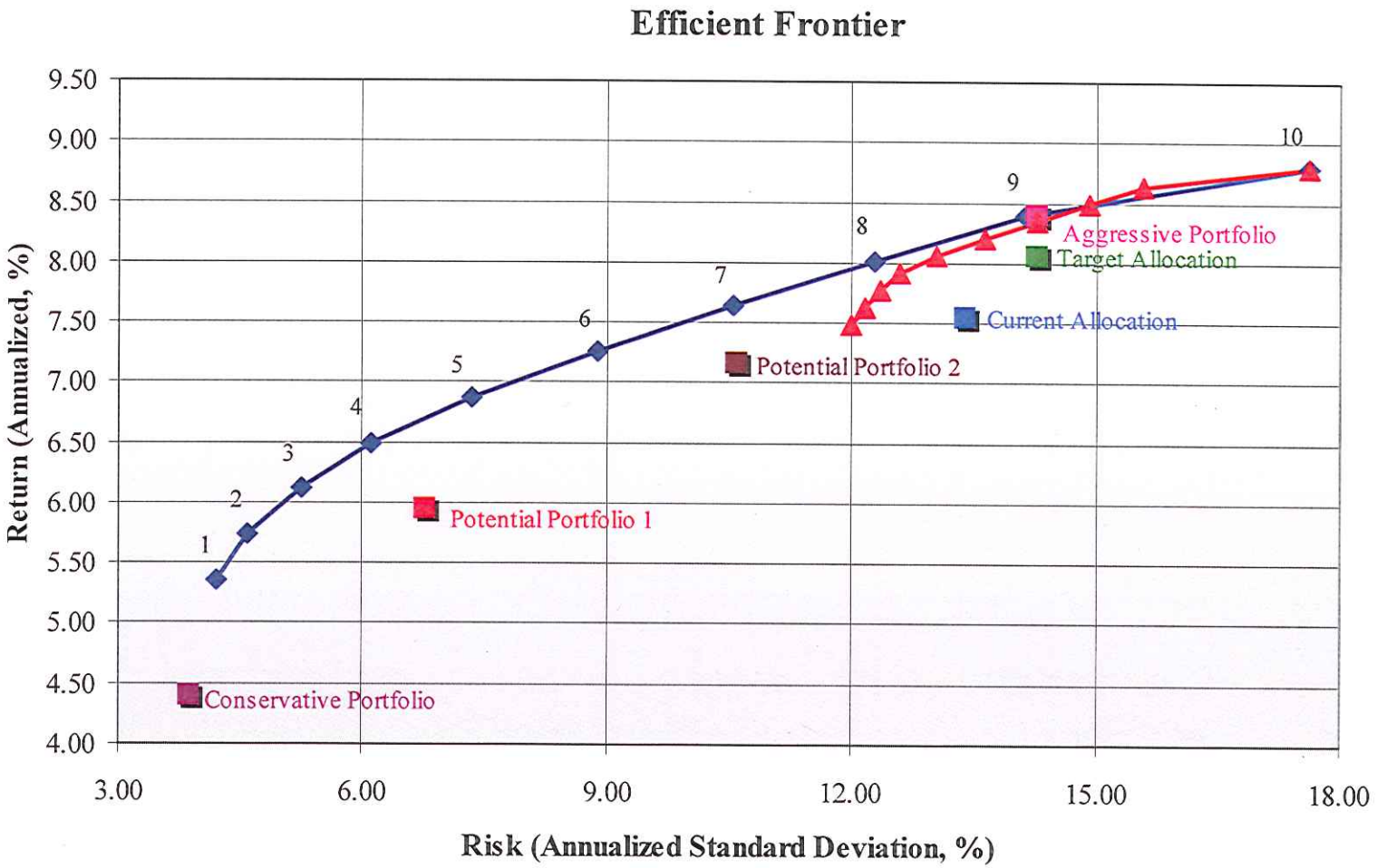
KERS Non-Hazardous Insurance

Stochastic Analysis – Pursuing Uncertain Returns

Asset Class	Current Allocation	Target Allocation	Conservative Portfolio	Potential Portfolio 1	Potential Portfolio 2	Aggressive Portfolio
Broad US Equity	28.1%	40.0%	0.0%	15.0%	28.0%	30.0%
Broad International Equity	39.0%	30.0%	0.0%	15.0%	27.0%	30.0%
Core Fixed Income	0.0%	0.0%	45.0%	30.0%	15.0%	0.0%
High Yield Fixed Income	0.0%	0.0%	0.0%	0.0%	0.0%	10.0%
TIPS	10.5%	12.0%	10.0%	15.0%	15.0%	0.0%
Low Duration Fixed Income	0.0%	0.0%	45.0%	15.0%	0.0%	0.0%
Real Estate - Core	0.2%	5.0%	0.0%	0.0%	0.0%	5.0%
Absolute Return	0.0%	0.0%	0.0%	0.0%	10.0%	10.0%
Private Equity	8.0%	10.0%	0.0%	0.0%	0.0%	10.0%
Real Return	0.0%	0.0%	0.0%	10.0%	5.0%	5.0%
Cash Equivalents	14.2%	3.0%	0.0%	0.0%	0.0%	0.0%
Expected Return	**7.56%**	**8.08%**	**4.41%**	**5.96%**	**7.18%**	**8.41%**
Expected Risk	**13.37%**	**14.24%**	**3.85%**	**6.76%**	**10.57%**	**14.26%**

KERS Non-Hazardous Insurance

Stochastic Analysis – Efficient Frontier



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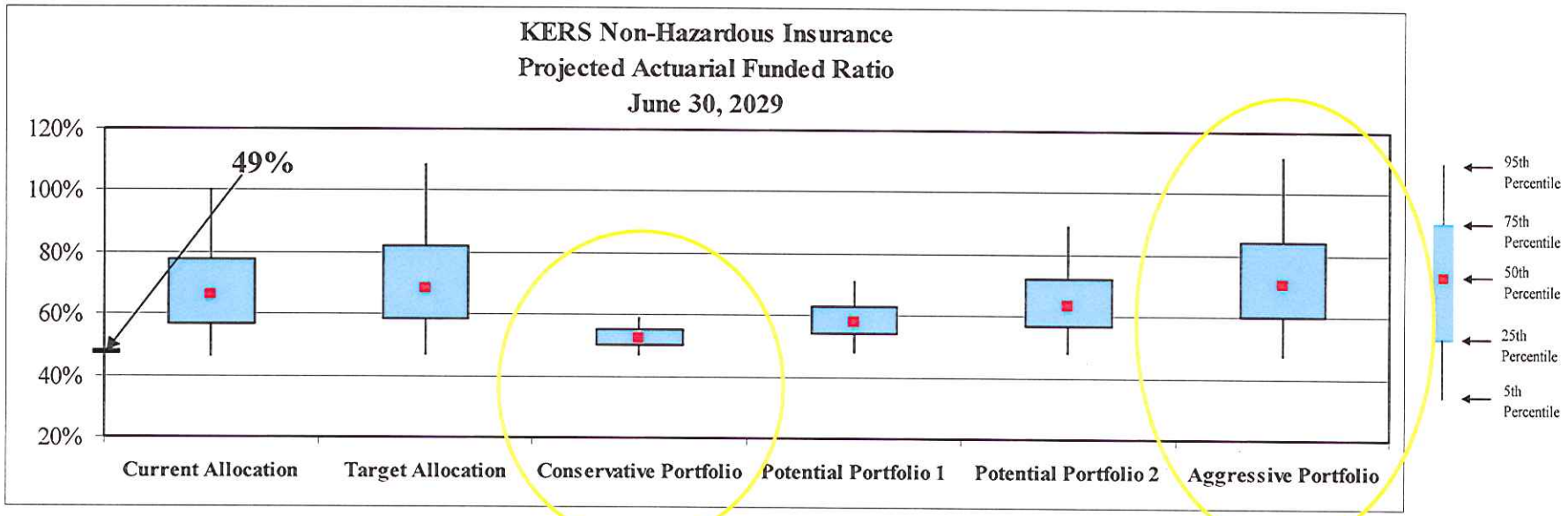
KERS Non-Hazardous Insurance

Stochastic Analysis – Possible Long Term Outcomes



	Current Allocation		Target Allocation		Conservative Portfolio		Potential Portfolio 1		Potential Portfolio 2		Aggressive Portfolio	
	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio
5th Percentile	$4,332.6	46.5%	$4,256.6	46.8%	$4,980.2	47.0%	$4,481.5	48.2%	$4,312.5	47.9%	$4,172.0	47.7%
25th Percentile	$3,178.1	57.0%	$3,049.1	58.7%	$3,974.5	50.0%	$3,565.2	54.0%	$3,256.8	56.8%	$2,926.9	59.9%
50th Percentile	$2,433.1	66.0%	$2,222.3	68.5%	$3,440.0	52.5%	$2,996.2	58.1%	$2,575.9	63.6%	$2,099.1	70.5%
75th Percentile	$1,552.9	77.7%	$1,242.1	82.0%	$2,943.9	55.0%	$2,466.2	63.0%	$1,857.9	72.3%	$1,085.8	84.2%
95th Percentile	($6.0)	100.1%	($616.0)	108.6%	$2,340.0	59.3%	$1,837.1	70.9%	$771.8	89.2%	($862.4)	111.9%

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KERS Non-Hazardous Insurance

Stochastic Analysis – Drawing Inferences

	Funded Ratio in Year 20			Payout Ratios		
	50th	5th	95th	Year 20 Median	2009-2029	
					Peak	Trough
Current Allocation	66.0%	46.5%	100.1%	7.2%	51.7%	4.2%
Target Allocation	68.5%	46.8%	108.6%	6.8%	52.3%	3.8%
Conservative Portfolio	52.5%	47.0%	59.3%	9.5%	43.8%	8.2%
Potential Portfolio 1	58.1%	48.2%	70.9%	8.3%	45.3%	6.4%
Potential Portfolio 2	63.6%	47.9%	89.2%	7.4%	48.5%	4.9%
Aggressive Portfolio	70.5%	47.7%	111.9%	6.6%	51.8%	3.7%
Deterministic	*49.3%*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*

KERS Hazardous Insurance Plan

- Deterministic Analysis
- Stochastic Analysis

KERS Asset/Liability Studies

The Critical Role of House Bill 1

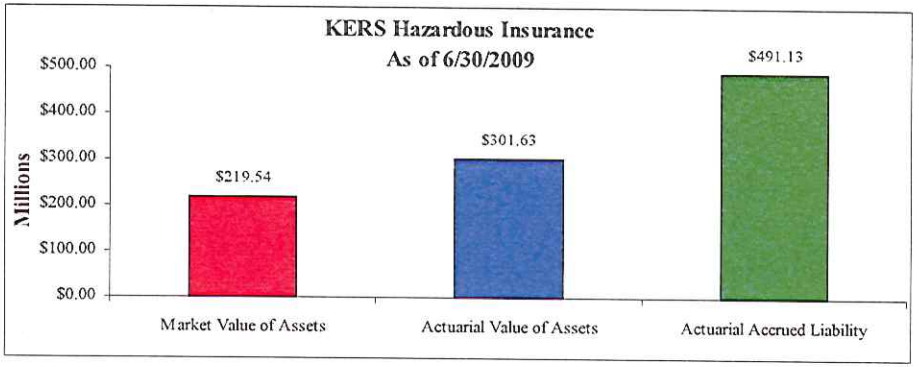
- **Per House Bill 1, future State contributions for Hazardous Insurance Plan will be (as a percentage of the Annual Required Contribution):**

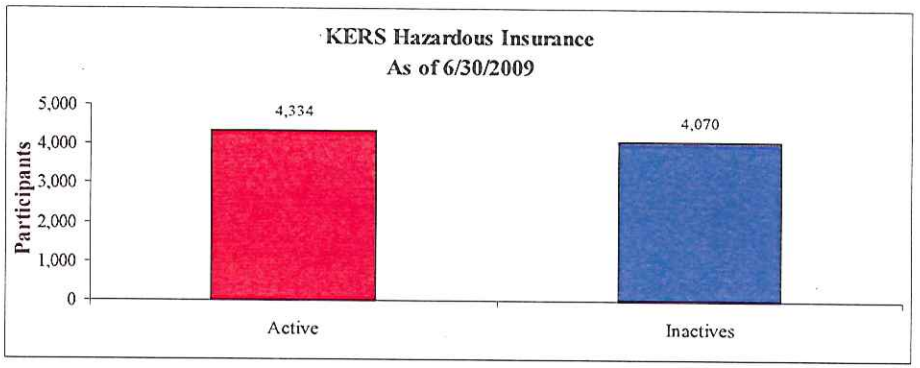
	2010	2011	2012	2013	2014	2015	2016	2017	2018
Hazardous	76%	79%	83%	86%	89%	92%	95%	98%	100%

KERS Hazardous Insurance

Deterministic Analysis – Current Status

Valuation Date	**June 30, 2009**
Market Value of Assets (MVA)	**$219,537,255**
Actuarial Value of Assets (AVA)	**$301,634,592**
Actuarial Accrued Liability (AAL)	**$491,132,170**
Actuarial Funded Ratio (AVA/AAL)	**61%**
Market Value Funded Ratio (MVA/AAL)	**45%**
Active Participants	**4,334**
Inactive Participants Retirees and Beneficiaries	**4,070**





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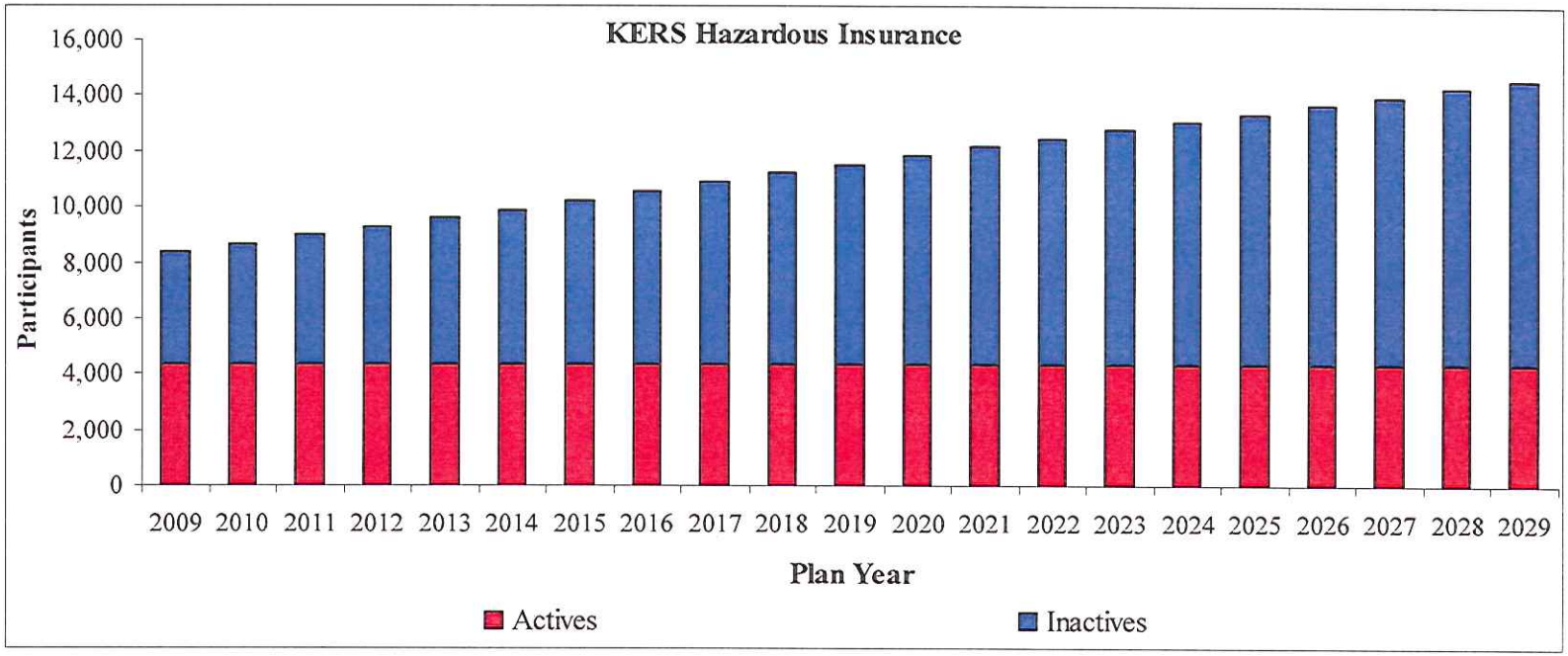
KERS Hazardous Insurance

Deterministic Analysis - Demographics



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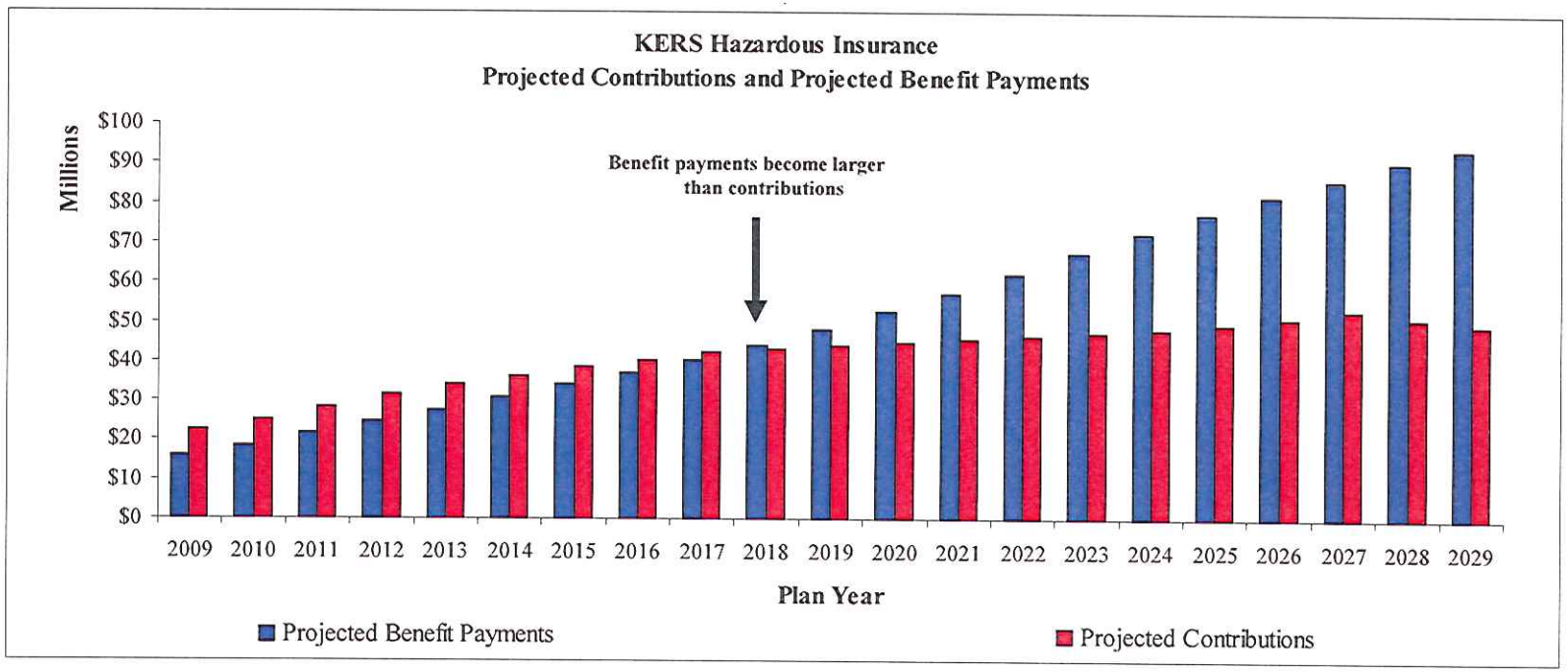
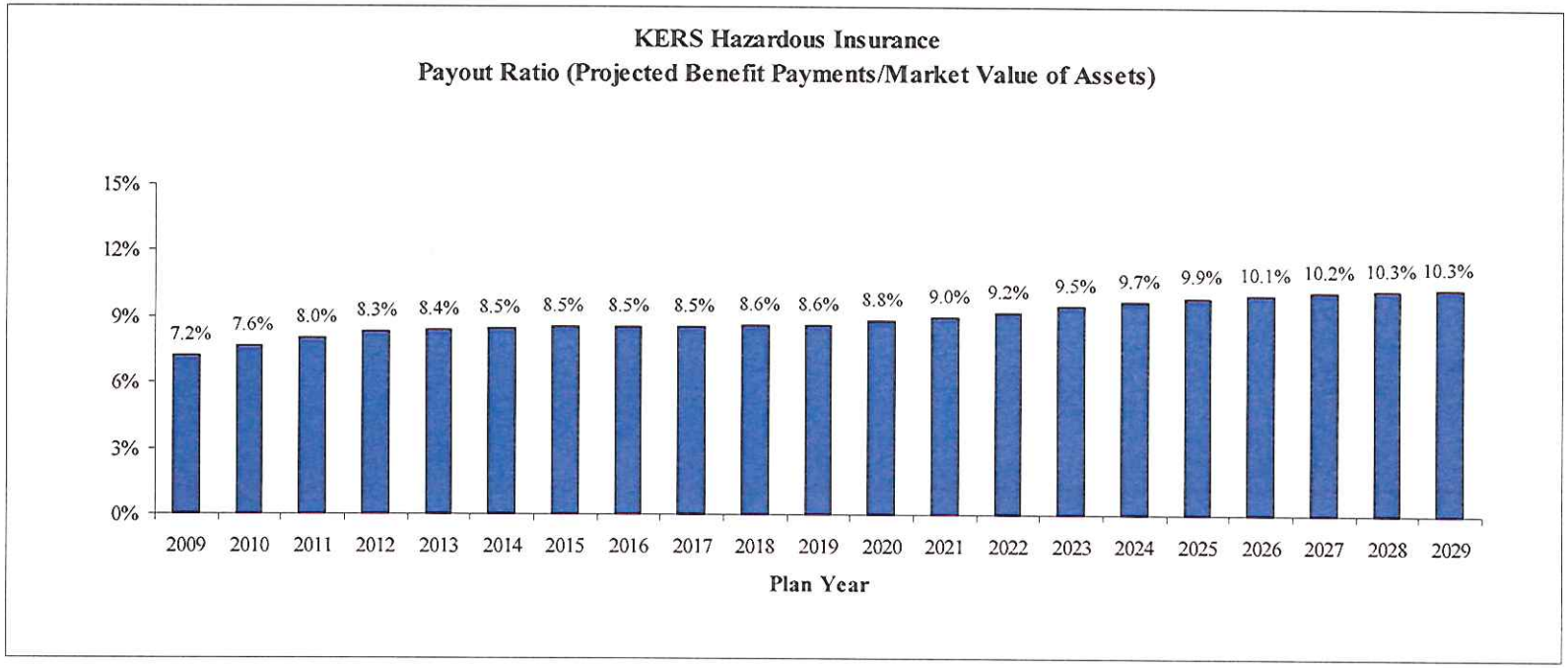
KERS Hazardous Insurance

Deterministic Analysis – Benefits and Contributions



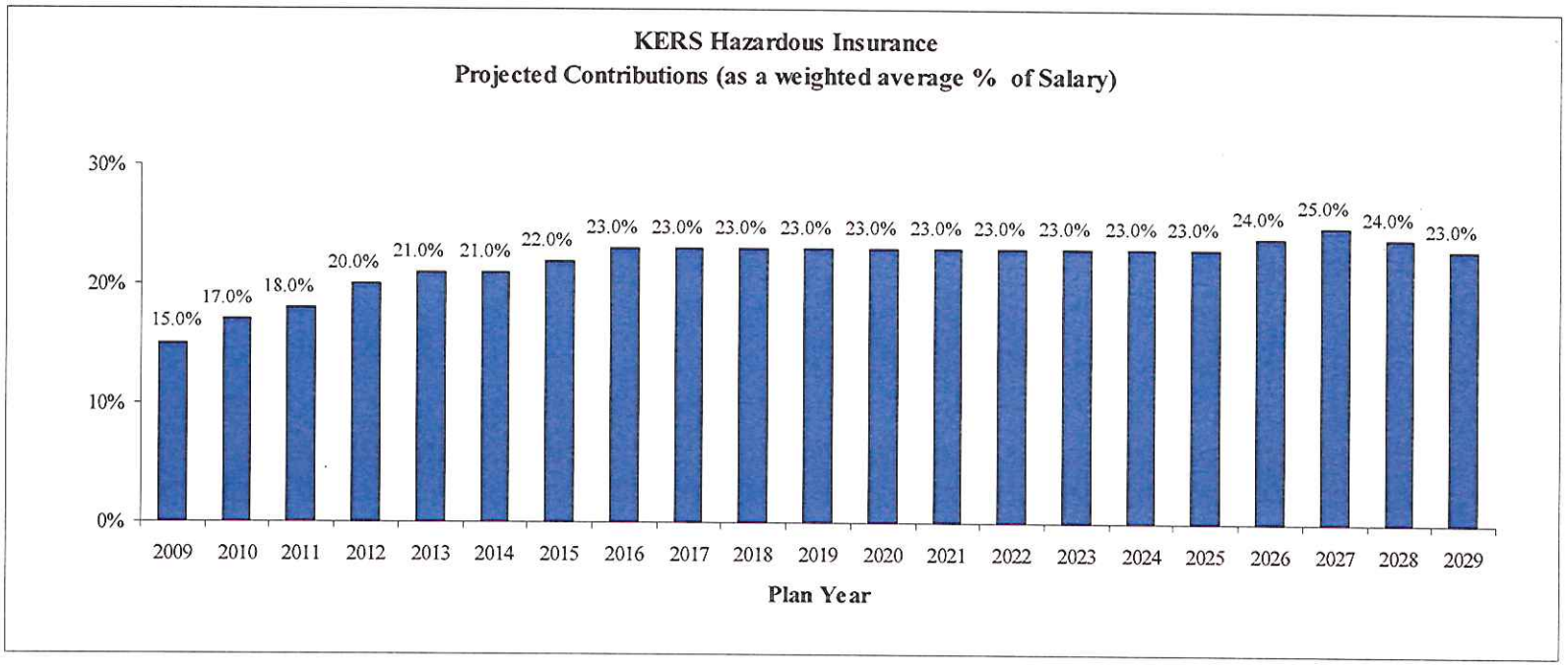
KERS Hazardous Insurance

Deterministic Analysis – Payout Ratio



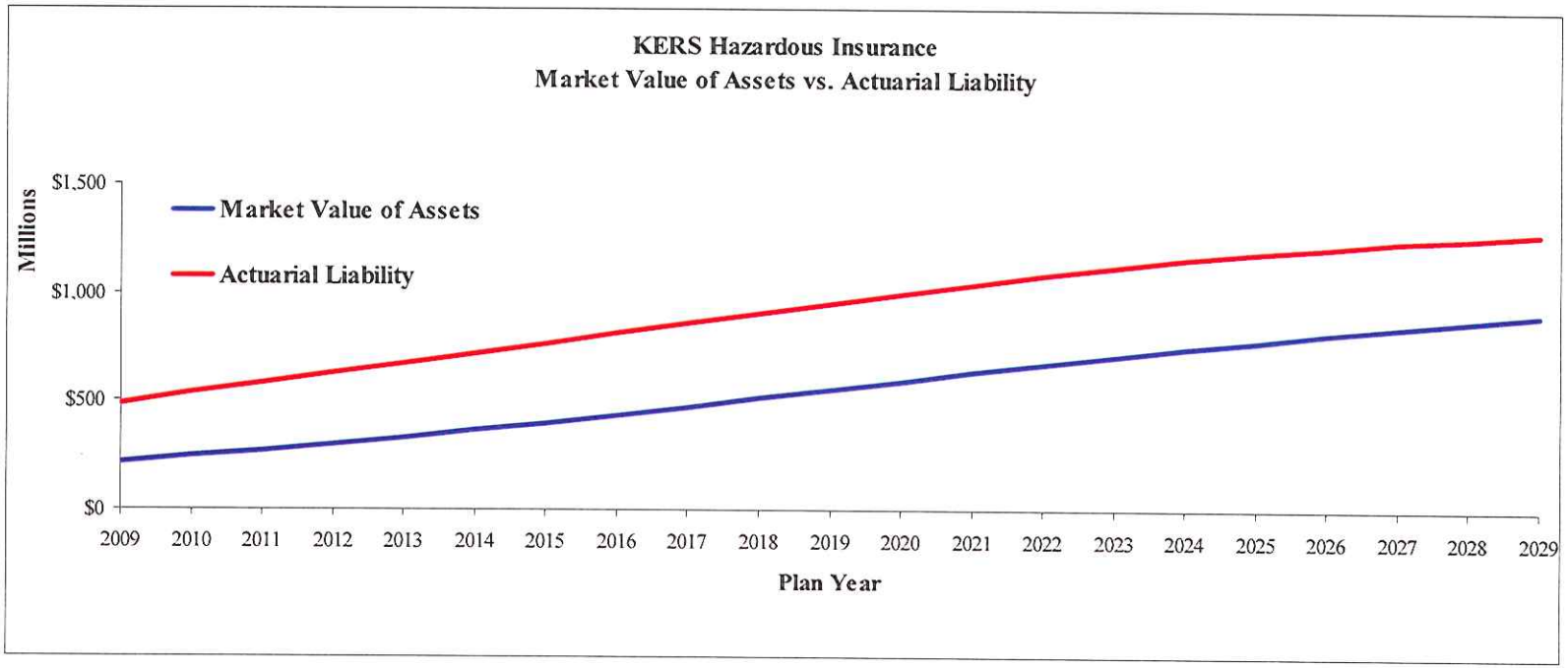
KERS Hazardous Insurance

Deterministic Analysis – Contributions



KERS Hazardous Insurance

Deterministic Analysis – Liabilities/Market Value



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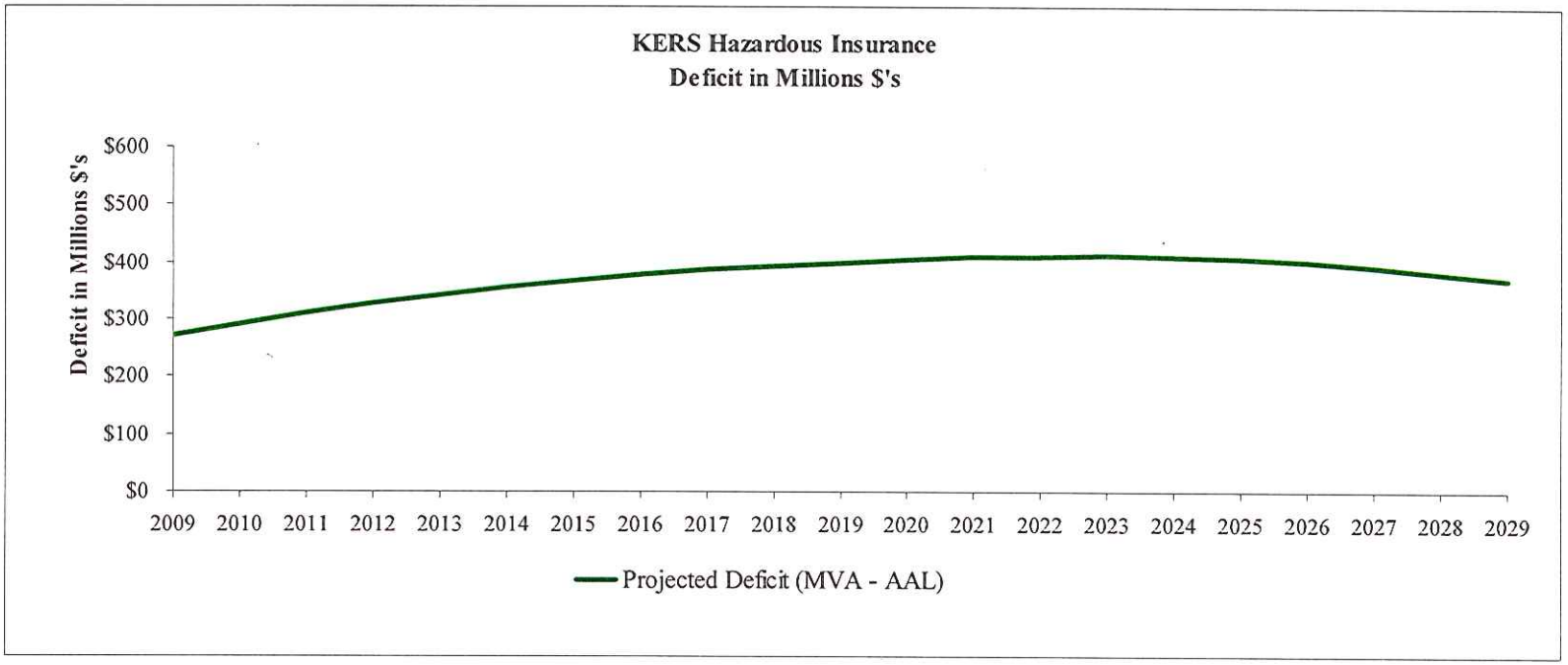
KERS Hazardous Insurance

Deterministic Analysis – Deficit



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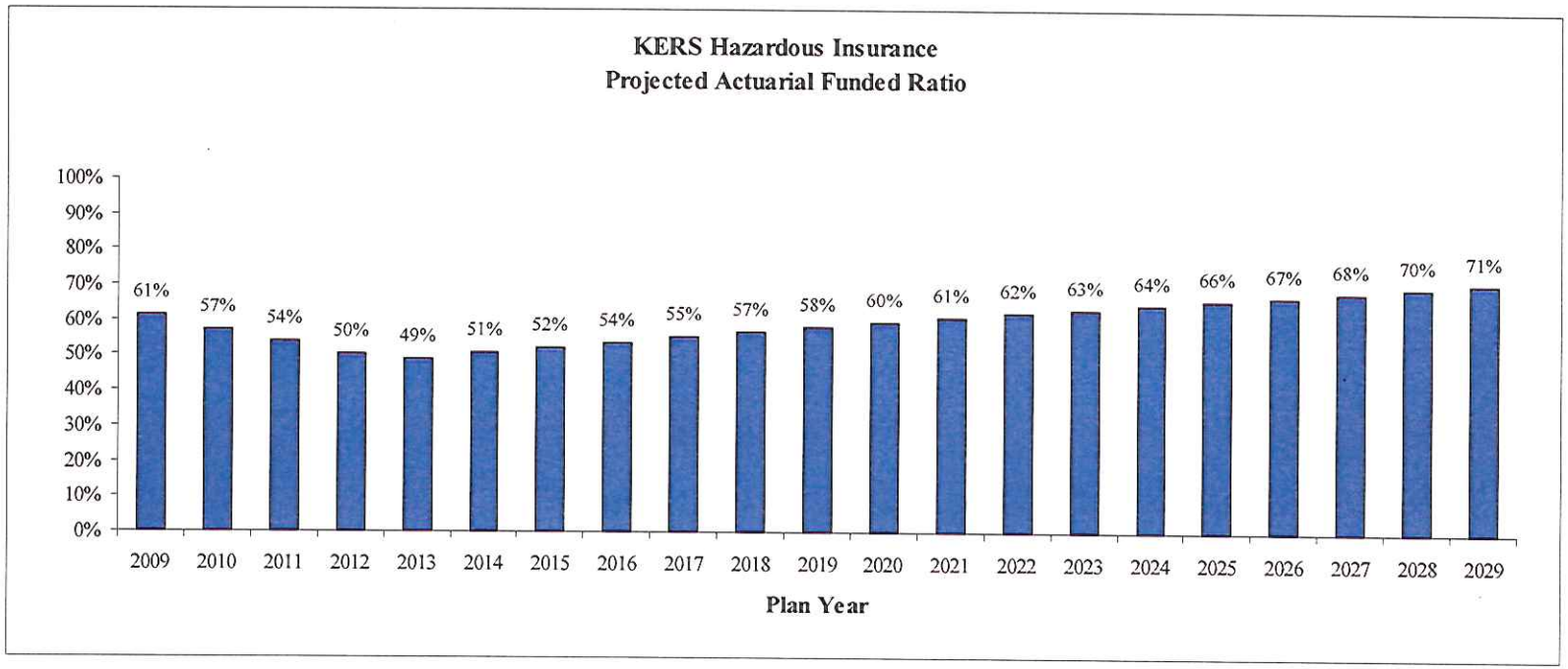
KERS Hazardous Insurance

Deterministic Analysis – Actuarial Funded Ratio



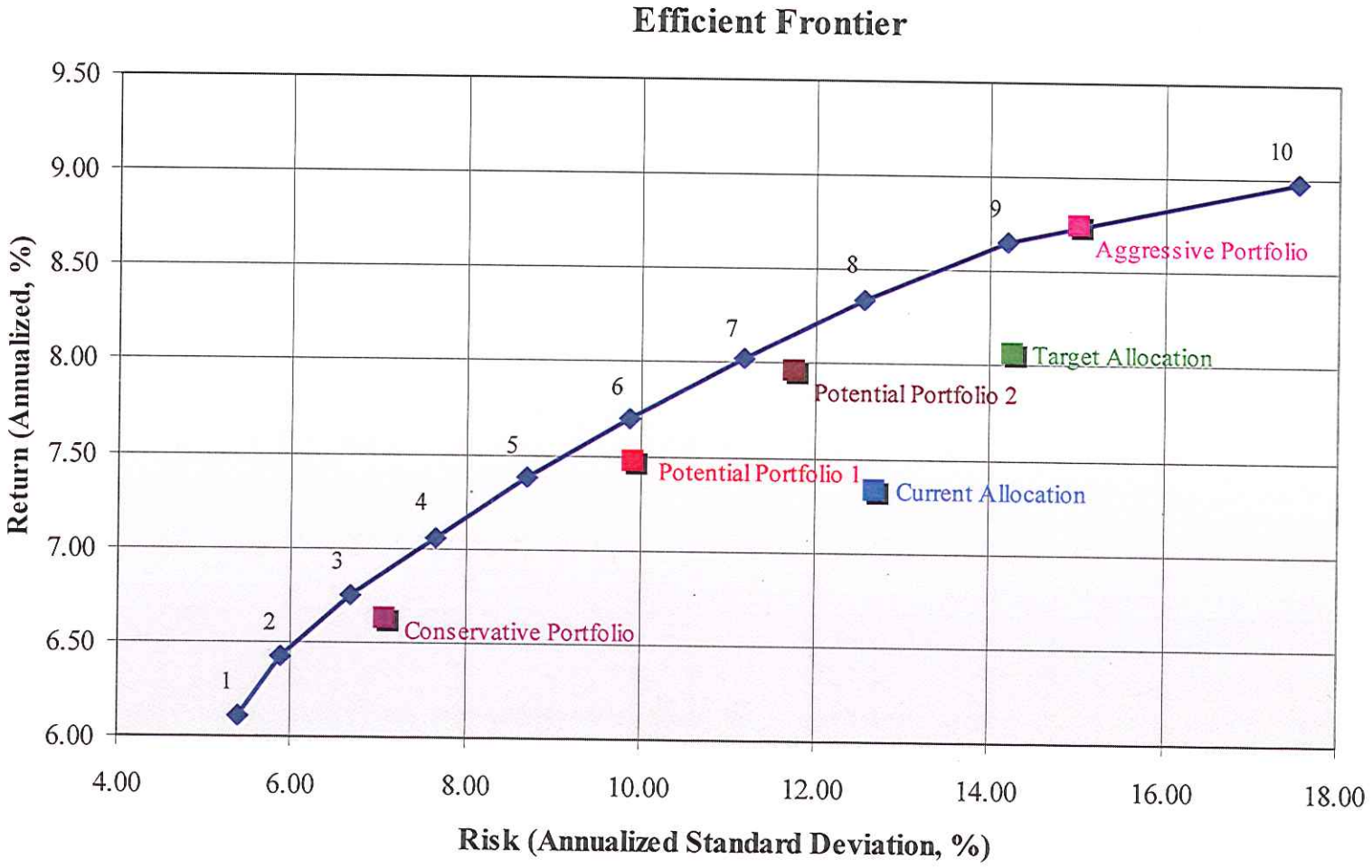
KERS Hazardous Insurance

Stochastic Analysis – Pursuing Uncertain Returns

Asset Class	Current Allocation	Target Allocation	Conservative Portfolio	Potential Portfolio 1	Potential Portfolio 2	Aggressive Portfolio
Broad US Equity	36.1%	40.0%	10.0%	14.0%	18.0%	17.0%
Broad Int'l Equity	27.6%	30.0%	5.0%	12.0%	18.0%	30.0%
Emerging Markets	0.0%	0.0%	3.0%	3.0%	4.0%	10.0%
Core Fixed Income	0.0%	0.0%	43.0%	15.0%	10.0%	5.0%
Non-US Fixed Income UH	0.0%	0.0%	9.0%	10.0%	5.0%	1.0%
High Yield	0.0%	0.0%	5.0%	8.0%	5.0%	2.0%
TIPS	10.3%	12.0%	0.0%	0.0%	0.0%	0.0%
Real Estate - Core	0.2%	5.0%	5.0%	5.0%	7.0%	5.0%
Absolute Return	0.0%	0.0%	5.0%	10.0%	10.0%	10.0%
Private Equity	8.1%	10.0%	7.0%	10.0%	12.0%	15.0%
Real Return	0.0%	3.0%	8.0%	12.0%	10.0%	5.0%
Cash Equivalents	17.7%	0.0%	0.0%	1.0%	1.0%	0.0%
Expected Return	**7.34%**	**8.08%**	**6.64%**	**7.49%**	**7.97%**	**8.76%**
Expected Risk	**12.67%**	**14.24%**	**7.05%**	**9.90%**	**11.72%**	**14.98%**

KERS Hazardous Insurance

Stochastic Analysis – Efficient Frontier



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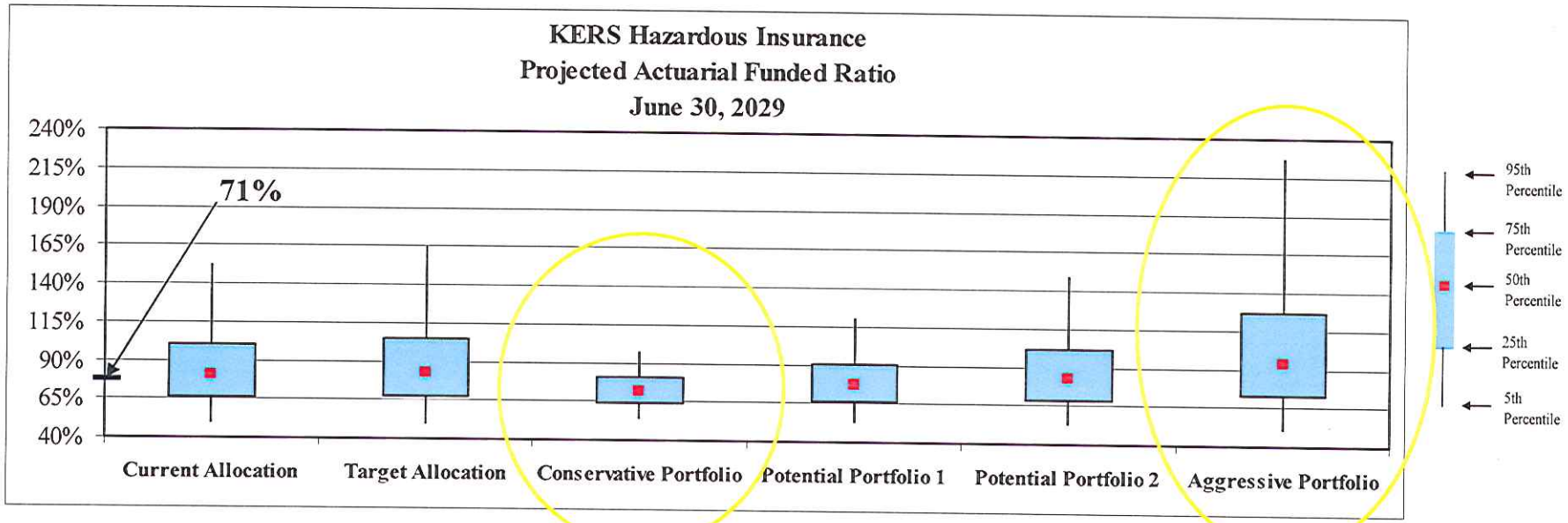
KERS Hazardous Insurance

Stochastic Analysis – Possible Long Term Outcomes



	Current Allocation		Target Allocation		Conservative Portfolio		Potential Portfolio 1		Potential Portfolio 2		Aggressive Portfolio	
	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio	Unfunded Liability (Mil)	Funded Ratio
5th Percentile	$566.5	50.0%	$554.0	50.3%	$528.6	53.7%	$521.0	53.2%	$521.6	52.7%	$536.5	50.9%
25th Percentile	$350.9	66.4%	$339.9	67.4%	$386.6	63.7%	$347.7	66.7%	$323.6	68.9%	$282.1	72.6%
50th Percentile	$199.6	80.6%	$179.8	82.4%	$294.3	71.4%	$228.4	77.4%	$173.4	83.0%	$66.1	93.5%
75th Percentile	($5.6)	100.6%	($47.5)	104.7%	$189.9	81.1%	$90.2	90.8%	($16.4)	101.6%	($297.2)	127.1%
95th Percentile	($527.4)	152.5%	($667.2)	164.3%	$31.7	96.9%	($204.5)	120.2%	($529.6)	148.9%	($1,354.6)	227.3%

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KERS Hazardous Insurance

Stochastic Analysis – Drawing Inferences

	Funded Ratio in Year 20			Payout Ratios		
	50th	5th	95th	Year 20 Median	2009-2029	
					Peak	Trough
Current Allocation	80.6%	50.0%	152.5%	9.0%	16.5%	4.5%
Target Allocation	82.4%	50.3%	164.3%	8.8%	16.7%	4.2%
Conservative Portfolio	71.4%	53.7%	96.9%	10.4%	14.8%	6.5%
Potential Portfolio 1	77.4%	53.2%	120.2%	9.5%	15.1%	5.6%
Potential Portfolio 2	83.0%	52.7%	148.9%	8.8%	15.5%	4.6%
Aggressive Portfolio	93.5%	50.9%	227.3%	7.6%	16.5%	3.0%
Deterministic	*71.1%*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*

Appendix

KERS Asset/Liability Studies

This Asset/Liability Study...

- Uses data from the most recent (June 30, 2009 KERS Actuarial Valuation to project liabilities.
- Takes into account the effects of House Bill 1 from 2008 which sets future State contributions as a percentage of the Annual Required Contribution.
- Uses the Actuarial Cost Method and assumes these assumptions remain constant in the future.
- Compares these specific investment strategies – (A) Current Allocation, (B) Target Allocation, (C) a conservative illustrative portfolio (Conservative Portfolio), (D) diversified lower risk (Potential Portfolio 1), (E) diversified higher risk (Potential Portfolio 2), and (F) an aggressive illustrative portfolio (Aggressive Portfolio) – expressed as total fund asset allocations to the projection of Fund liabilities.
- Does not assume any actuarial adjustments that may take place in future years.

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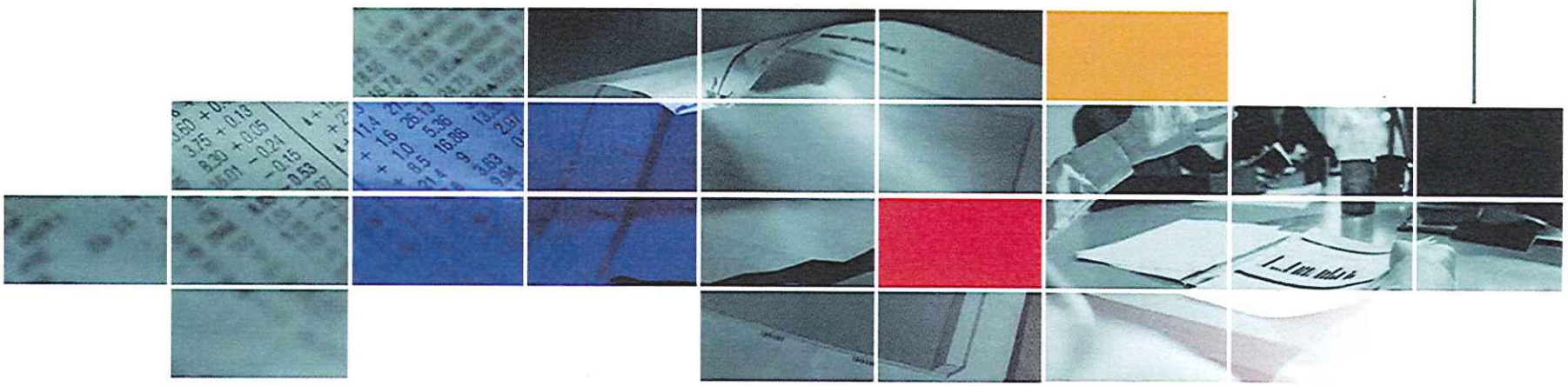
KRS Non Hazardous Pension Plan

Asset Liability Study Example

July 8th, 2010

Presented by Jim Voytko



Introduction

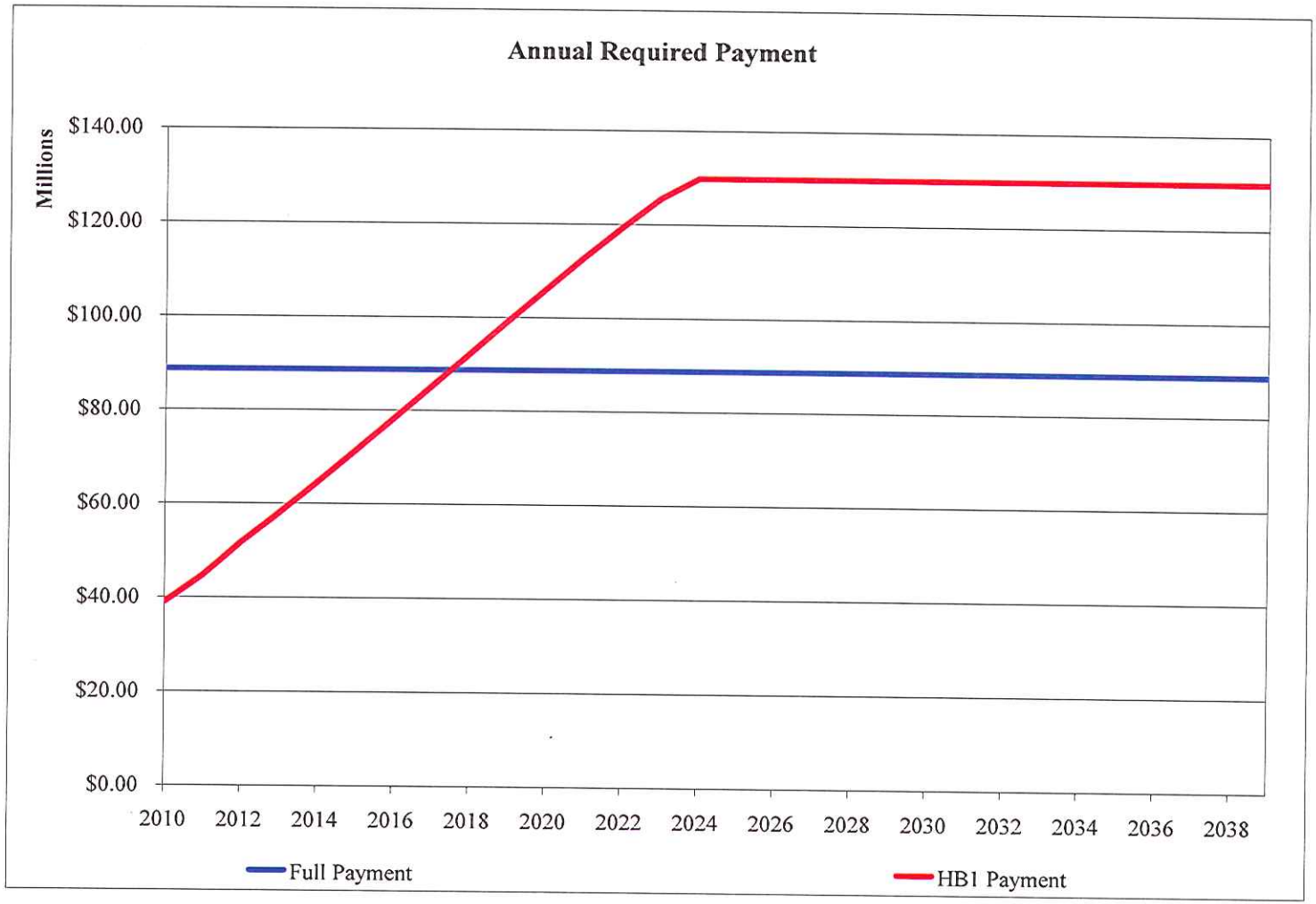
- **$1 billion mortgage obligation**
  - Due in 30 years
  - 8% interest rate
- **2 options for paying off the obligation**
  1) Make required annual payments
     - Constant payments
     - Obligation paid in full
  2) Make payments according to House Bill 1
     - Variable payments
     - Obligation paid in full

House Bill 1 (2008)

- **Payments made at percentage of required payment**
- **Recalculated annually based on new principal balance and number of years to maturity**

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Non-Hazardous	44%	48%	53%	57%	61%	65%	69%	73%	77%	81%	85%	89%	93%	97%	100%

Annual Required Payment



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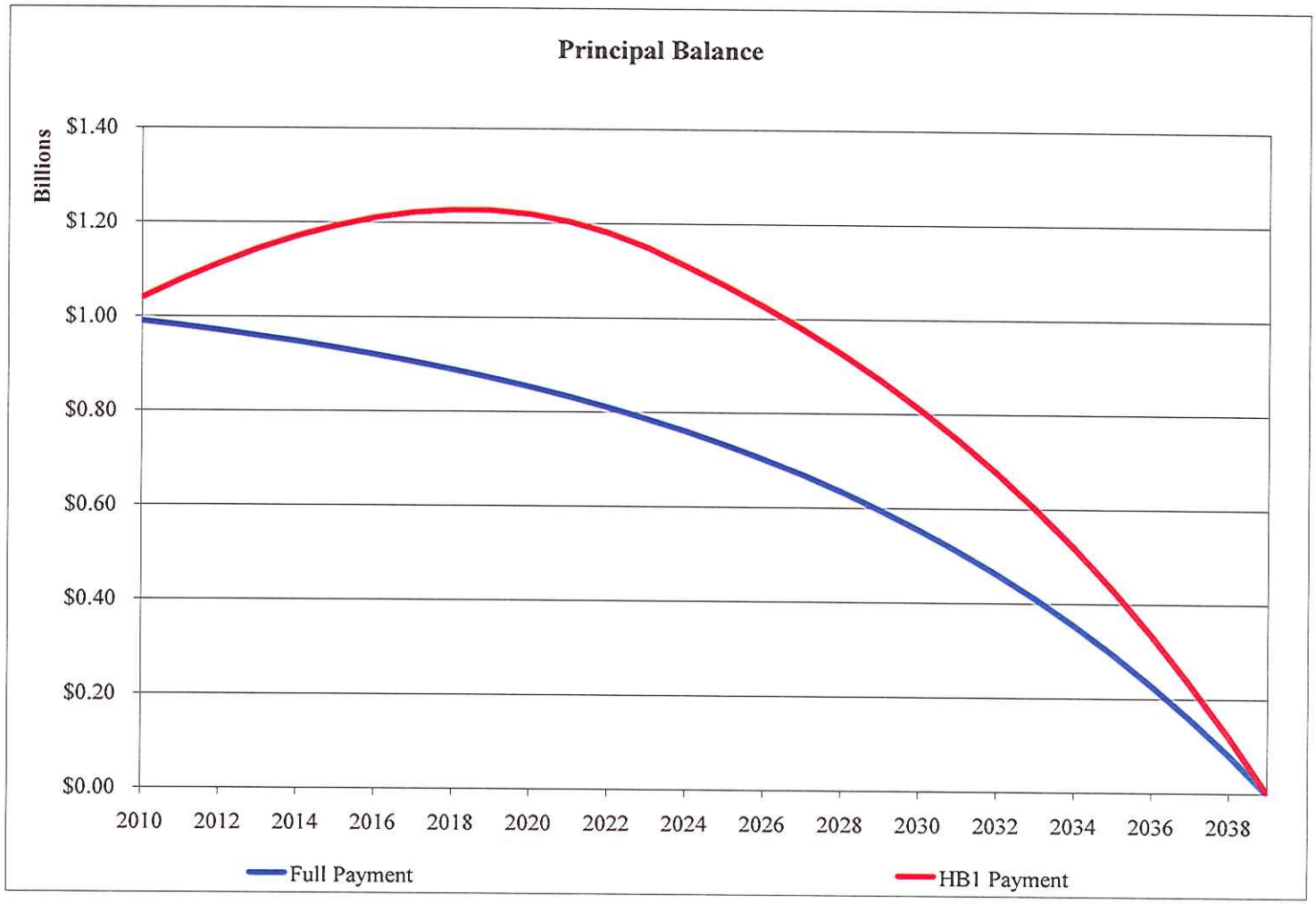
Principal Balance



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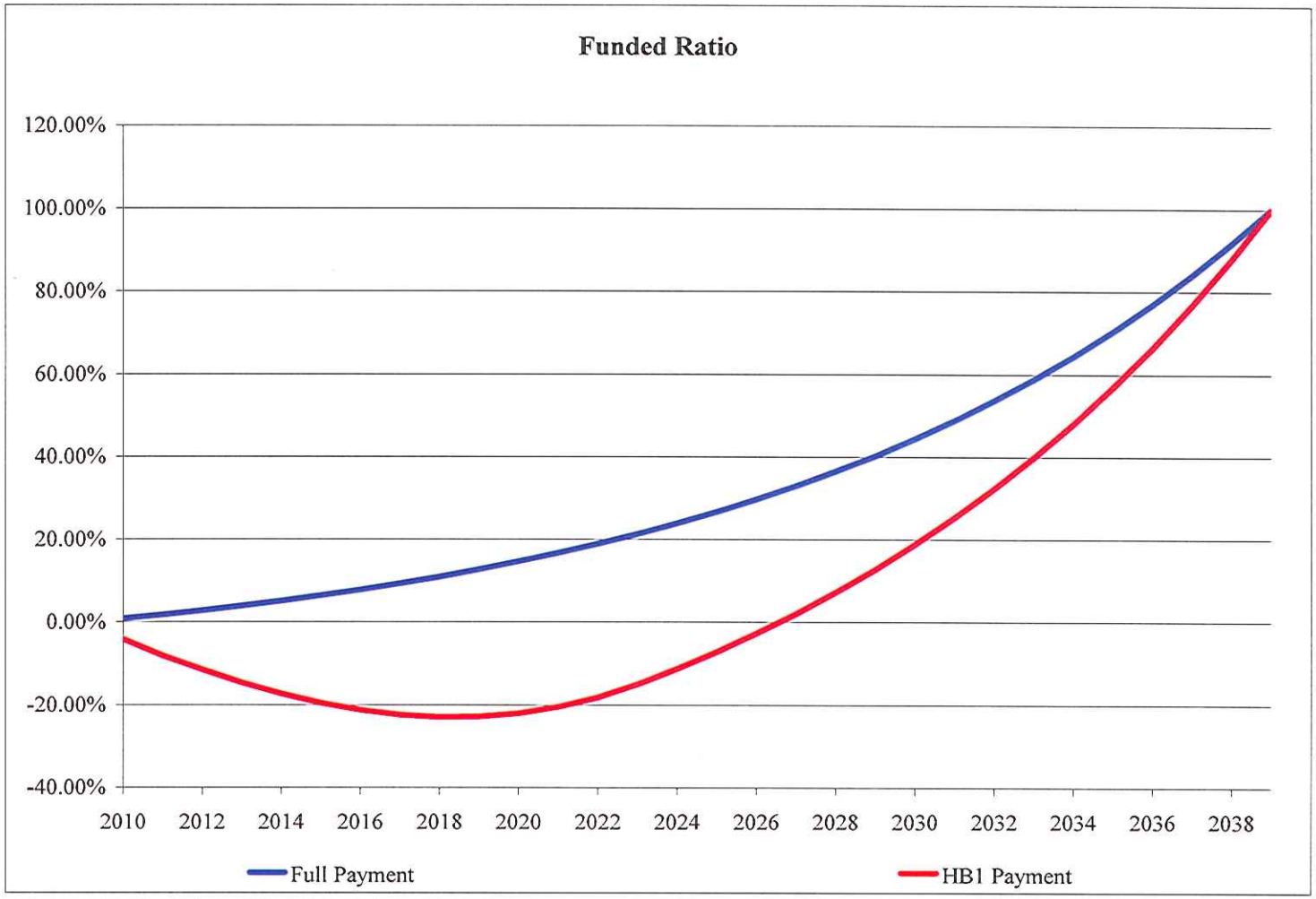
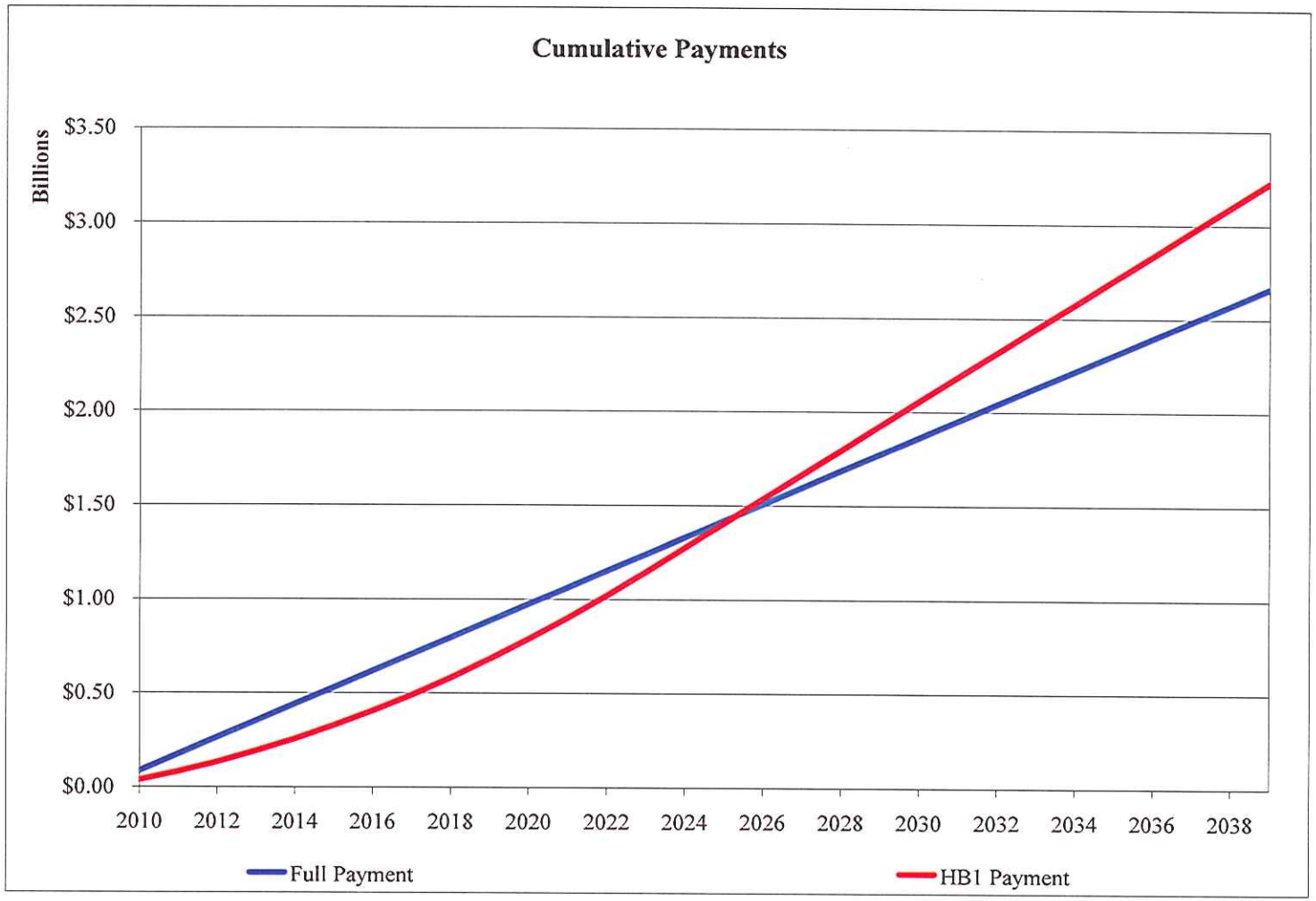
Funded Ratio



Funded Ratio equals the total accrued principal payments divided by the original obligation of $1 billion. Assumes principal payments build in a non-interest bearing account. Negative Funded Ratio results during first several years under the HB 1 payment scenario, because the annual payments are not large enough to cover the interest accruals.

Cumulative Payments



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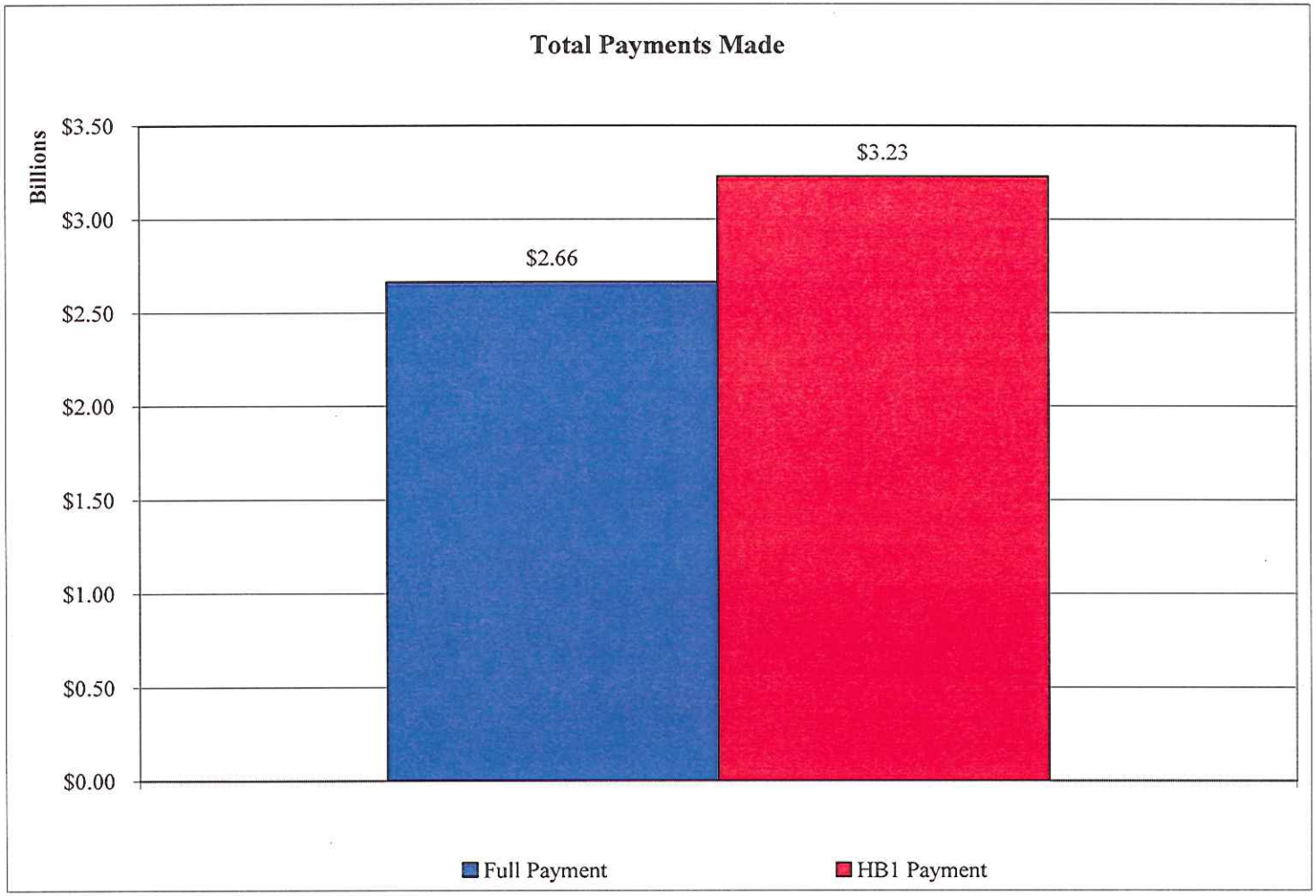
Total Payments Made



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