2016 - 2017
Strategic Investment Plan

Commonwealth of Pennsylvania
State Employees' Retirement System

Prepared by SERS' Investment Office – in consultation with the State Employees' Retirement Board ("SERS board") and its investment consultants. Adopted by SERS' board on December 9, 2015.

The framework to SERS' 2016 – 2017 Strategic Investment Plan was developed under the assumption that the employer will contribute the full contribution prescribed by Pennsylvania Law (Act 2010-120).

pennsylvania
STATE EMPLOYEES' RETIREMENT SYSTEM

December 09, 2015

Dear SERS' Board Members:

On behalf of SERS' investment office, I am pleased to provide the board with the 2016 – 2017 Strategic Investment Plan ("Investment Plan"). The board's consultants and staff collaborated extensively and fully support this Investment Plan and target asset allocation portfolios under consideration.

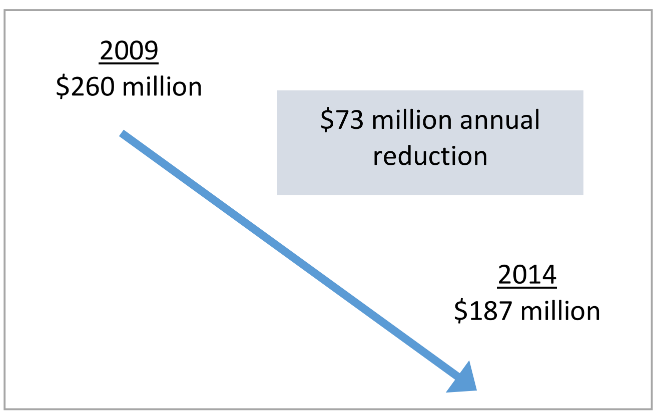
SERS' outstanding long-term and post crisis track record was a result of the board's historical adherence to a consistently executed strategic asset allocation planning process, which has been in place for over 20 years. Several key points include:

- SERS' historical, long-term investment returns (net-of-fees) have exceeded its actuarial targets over 20-year (+8.8%), 25-year (+8.7%), and 30-year (+9.6%) periods (ending December 31, 2014);[1]

- 10.7% return (net-of-fees) since the great financial crisis while ranking in the top 5th percentile of peer funds in terms of its low risk profile (April 1, 2009 to June 30, 2015); and

- $73 million reduction in annual total investment costs from 2009 to 2014, a 28% reduction in fees over the past five years.

SERS Annual Total Investment Costs



Note: Fee reduction calculated by subtracting total investment expenses of $260 million (SERS 2009 CAFR) from $187 million (SERS 2014 CAFR).

As previously indicated, SERS takes a long–term strategic approach to its investment decision–making process. SERS' Investment Plan is based on careful analysis of the long–term outlook for the capital markets and major qualitative and quantitative factors including the unique needs, preferences, objectives and constraints of SERS. This detailed investment plan manifests itself in the development of an asset allocation framework designed to achieve the ongoing commitment to diversification and provide

[1] SERS uses calendar year returns for longer-term performance reporting as provided in SERS' 2014 CAFR.

30 NORTH 3RD STREET, SUITE 150 | HARRISBURG, PA 17101-1716
P: 1.717.787.9008 | F: 717.772.3741 | www.SERS.pa.gov

guidance in the investment decision–making process including advancing investment strategies, the hiring and monitoring of external investment managers, and meeting liquidity needs.

The majority of initiatives and enhancements in the updated 2016 – 2017 Strategic Investment Plan are based on input from the board during several asset class reviews at board meetings over the past year.

While a complete list of initiatives and enhancements to the investment program are included in the Investment Plan, the most significant of these are:

1. Performing a review of all investment manager fees to determine if fees are aligned with SERS' best interests and are reasonable relative to market rates for comparable strategies in each investment asset class.

2. Clarifying Real Estate's role by reestablishing Real Estate as a stand-alone asset class. Real Estate is already comprised of complex, labor intensive public and private market assets. As a stand-alone asset class, Real Estate is now a more narrowly-defined portfolio which enables more focus when considering investment opportunities, clarifies consultant accountability, and leverages the skill sets of SERS' investment professionals from other asset classes.

3. Improving Real Estate's risk/return profile by establishing clear long-term target allocations designed to increase the expected return, liquidity, diversification, and inflation hedging, while decreasing expected risk.

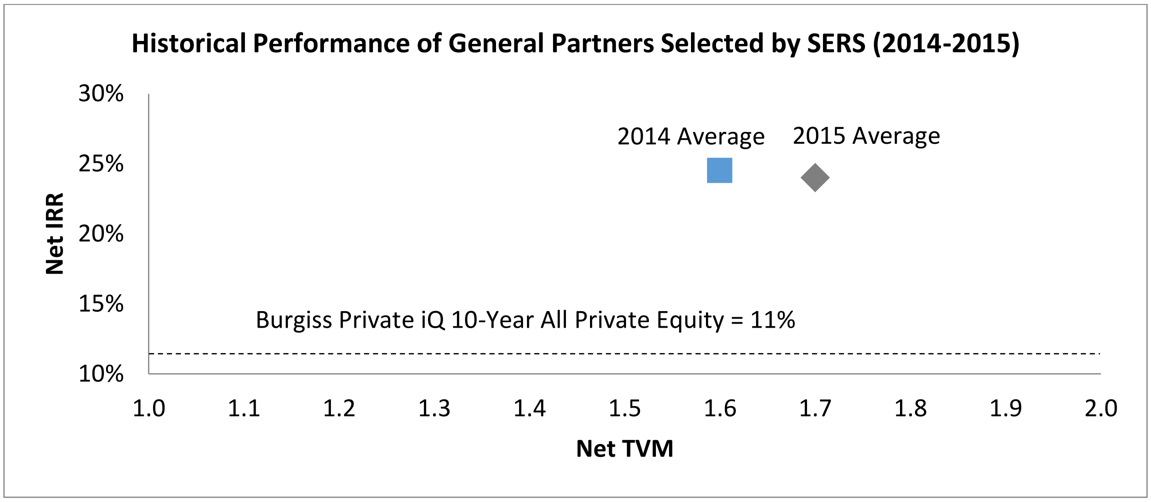
4. Establishing an annual pacing range of new commitments for Real Estate between **$100 million to $200 million** to less liquid non-core closed-end Real Estate funds. Real Estate investment opportunities other than non-core closed-end funds will be evaluated on a case-by-case basis.

5. Target Real Estate fund commitments ranging from **$50 million to $100 million** in best-in-class funds to build long-term strategic partnerships, improve operational efficiency by reducing the number of funds, and improve SERS' leverage to negotiate lower management fees.

6. Increasing the annual pacing of new commitments for Private Equity (Alternative Investments) to **$750 million** (currently at $500 million) to meet the base-case long-term target allocation of 16%.

7. Targeting individual Private Equity fund commitments of approximately **$100 million** or greater, in best-in-class funds to build long-term strategic partnerships, improve operational efficiency by reducing the number of funds, and improve SERS' leverage to negotiate lower management fees.

In 2014 and 2015, SERS selected Private Equity funds launched by general partners with a historical average net return (IRR) of approximately 24% and an average net multiple (TVM) of 1.7x.[2]



8. Providing three long-term target asset allocation scenarios for the board's consideration using RVK's updated capital market assumptions.

9. Improving transparency and efficiency of managing assets by eliminating SERS' specific terminology and renaming assets according to common industry conventions with similar risk/return profiles (Private Equity, Buyouts, Hedge Funds, Core Real Estate, Non-Core Real Estate, and Cash).

10. Assessing the impact on the investment planning process and potential increase in employee contributions from the Shared Risk provisions from Act 2010-120.

Under the supervision and guidance of the board, please be assured that SERS' investment staff, as fiduciaries to over 230,000 members, will carry out its duties prudently, act solely in the interest and for the exclusive purpose of members, and act in accordance with law and plan documents.

Please contact me if you have any comments.

Sincerely,

Thomas F. Brier

Thomas F. Brier
Chief Investment Officer

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[2] Source: StepStone Group. Return is IRR and Multiple is Total Value Multiple based on "since-inception" of funds. TVM, or Total Value Multiple, is a performance metric that measures total value created by the Portfolio relative to capital invested, without consideration for time. TVM is calculated as Total Value, which is comprised of Market Value plus Distributed Capital, divided by Contributed Capital. Fund benchmark data provided by Burgiss Private iQ as of March 31, 2015.

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Investment Plan Purpose

SERS' Statement of Investment Policy established two objectives for SERS' investment program. The two investment objectives are:[1]

- Achieve a net total return equivalent to the actuarial interest rate assumption, or preferably, in excess of this rate in order to improve the funded ratio of the fund through investment earnings and favorably impact future employer and employee contribution rates.

- Achieve a net, total long-term return that meets or exceeds an appropriate composite plan benchmark index on a five to ten-year rolling time horizon. The composite benchmark index will be based on the asset allocation set forth in the Strategic Investment Plan approved by the board.

The 2016 – 2017 Strategic Investment Plan ("Investment Plan") provides a clear strategic direction for SERS' investment program. The State Employees' Retirement Board seeks to pursue five key objectives in this Investment Plan.

1. Formulate an asset allocation policy that provides a high expected probability of achieving SERS' long-term actuarially assumed rate of return, consistent with the board's tolerance for risk, while continuing to meet obligations to beneficiaries.

2. Define the primary strategic objectives that are central to a successful investment program for the total SERS fund at this point in time.

3. Define, in general terms, the strategies and methods to be pursued at both the total fund and individual asset class levels to achieve those objectives.

4. Provide a tool for integrating key aspects of SERS' pension plan attributes with the investment strategy and, similarly, for integrating board decisions and staff execution with that strategy.

5. Embed the pursuit of fund returns in a comprehensive risk monitoring and mitigation program which emphasizes transparency in both the execution of investment policy and the outcomes in varying capital market environments encountered over time.

SERS' investment office staff, in consultation with its board and investment consultants, updates the Investment Plan every other year. If economic, fiscal, or capital market conditions change significantly, SERS' investment office staff and consultants may recommend changes to the

[1] SERS Statement of Investment Policy (amended 10/29/2014) (p.8).

Investment Plan for the board's approval on an interim basis. Approval of this Investment Plan by SERS' board authorizes SERS' investment office staff to:

- Execute the current asset class changes;
- Strive towards asset allocation policy targets; and
- Begin to research and implement initiatives.

SERS' investment office staff will report its recommendations to SERS' board for consideration.

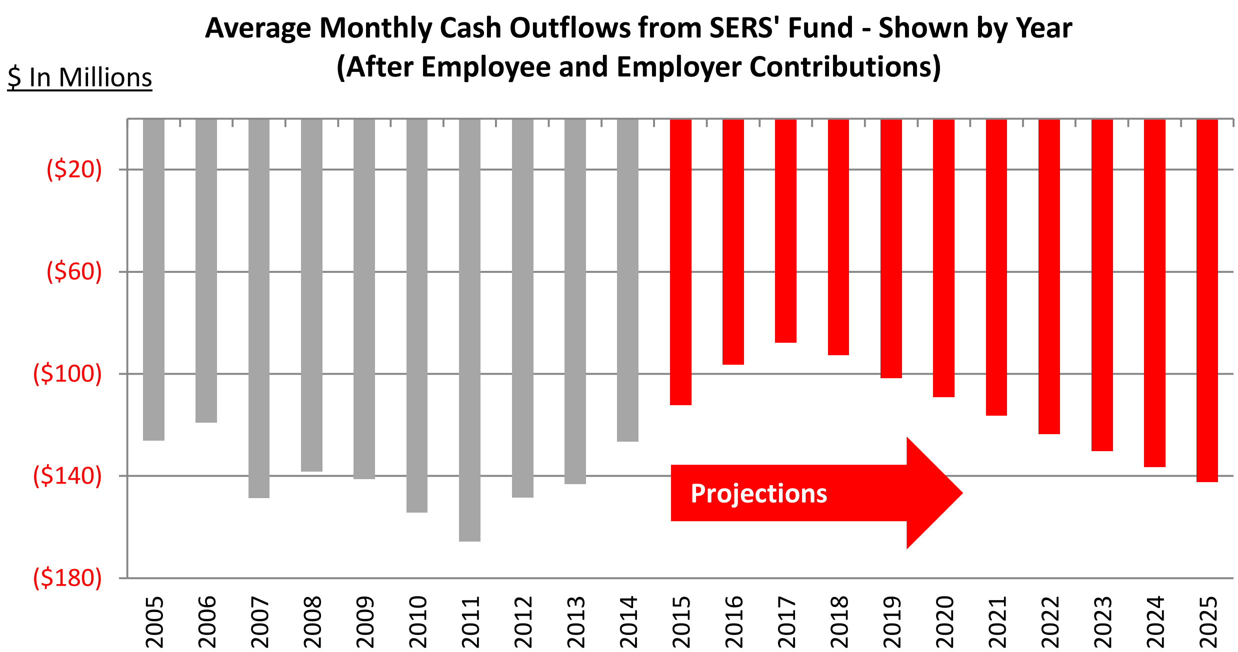
Challenging Liquidity Requirements

SERS is a mature pension plan with negative cash flows – retirement benefit payments are greater than contributions from employees and employers. Over the past decade, SERS paid over $24 billion in retirement benefits to over 100,000 members and their families. During the same period, SERS received contributions of $3.4 billion from employees and $4.2 billion from employers.[2]

Over the next 10 years, SERS projected monthly retirement benefit payments will increase from just under $100 million to $140 million (net of contributions from employees and employers under Act 2010-120 assumptions). [3]

A critical risk factor to consider is the potential for prolonged suppressed cash payments from employers during difficult state government budget cycles. Over the next 10 years, the average annual employer contribution is expected to increase to approximately 28% of payroll. Figure 1 shows the average monthly cash outflows from SERS after employee and employer contributions.

Figure 1



[2] 10-years ending December 31, 2014.
[3] SERS' 2014 Actuarial Report (p.31), Projection of Expected Contributions and Benefits – Reflecting Act 2010-120 Collars.

Shared Risk – Potential Impact on Employee Contributions

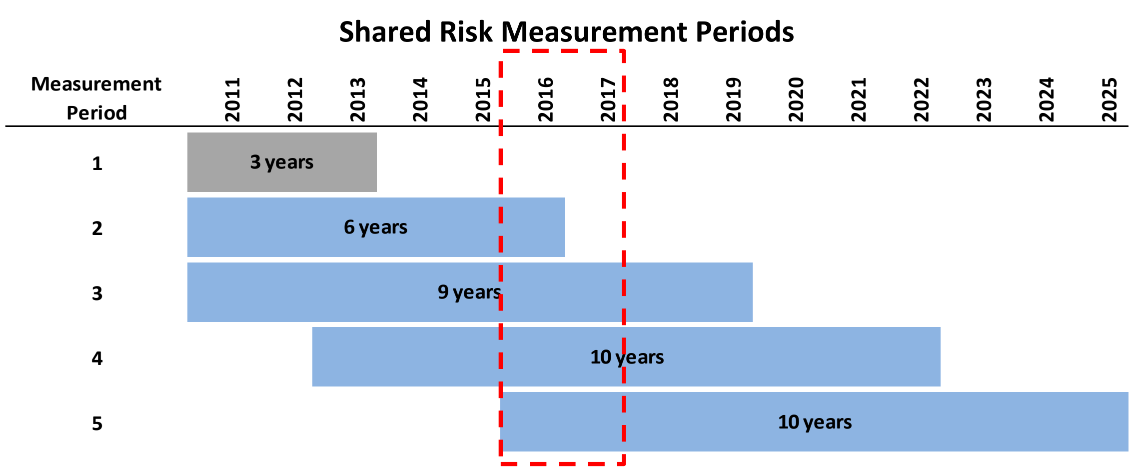
Under the Shared Risk provision of Act 2010-120, employee contributions will increase if SERS underperforms its actuarial assumed rate of return by greater than 100 basis points (>1.0%) over a measurement period. The Shared Risk provision highlights the importance of SERS' investment decision-making process, including:

- The appropriateness of the actuarial assumed rate of return established by the board;
- The probabilities that a board-approved asset allocation can achieve the actuarial assumed rate of return within an appropriate level of expected risk; and
- The process of how investment managers and funds are selected and hired by the board.

The first measurement period to determine if employee contributions should increase was from January 1, 2011 to December 31, 2013 (Figure 2). SERS' actual net-of-fee return was 9.3% over this period. The annualized actuarial assumed rate of return was 7.7% over the same period.

Since SERS outperformed the annualized actuarial assumed rate of return, there was no increase to employee contributions (Measurement Period 1).

Figure 2



The second measurement period will be from January 1, 2011 to December 31, 2016 (Measurement Period 2 covering 6 years). The third measurement period will be from January 1, 2011 to December 31, 2019 (Measurement Period 3 covering 9 years). All measurement periods thereafter are calculated every three years using the prior 10-year rolling annualized return (Measurement Periods 4, 5, etc.). It is important to note that employee contributions may increase by a maximum of 50 basis points (0.5%) as a result of any one measurement period outcome and is subject to a maximum cumulative cap of 200 basis points (2.0%).[4]

[4] SERS 2014 Actuarial Valuation Report (p.19) Shared Risk Contribution Rate.

A Well-Defined Investment Philosophy and Process

SERS' board, investment office staff, and external consultants spend a considerable amount of time evaluating liquidity, shared risk, capital markets, expected returns, and expected risks. With these factors in mind, SERS' investment program has a critical requirement to pay retirement benefits in perpetuity and may be subject to prolonged periods of market decline. To avoid a permanent loss of capital during such a period, SERS' investment program has a continuing commitment to ensure that:

- **The fund is diversified which serves as a foundation of risk management;**
- **Investment strategies embrace risk in order to achieve returns since a risk-free investment strategy does not exist;**
- **A disciplined process to rebalancing is executed to adhere as closely as possible to the board's chosen target asset allocation;**
- **Every dollar invested must align to an initiative or an asset class structure of the board-approved Strategic Investment Plan; and**
- **Every dollar invested must have the potential to add exceptional value relative to its competing investment opportunities with similar risk/return, fee and liquidity profiles.**

SERS' investment program has a continuing commitment to conduct thorough due diligence, intensive manager monitoring, and continuously enhancing its disciplined investment decision-making process. Although it requires extensive time and resources, the goals of SERS' disciplined investment process are to:

- **Improve the probability of achieving long-term expected return objectives;**
- **Ensure confidence that all investment opportunities recommended by investment staff and consultants are the best available opportunities; and**
- **Enhance accountability of investment decisions from investment office staff.**

SERS' investment program is structured with a long-term focus and is based on a combination of academic theory, market and economic assumptions, and state budgetary assumptions. The theoretical framework relies on a mean-variance optimization analysis which combines expected returns, volatility, and covariance of investment combinations. A long-term asset allocation target policy is constructed to provide a high probability of achieving SERS' long-term actuarially assumed rate of return, consistent with the board's tolerance for risk, while continuing to meet retirement benefit payment obligations in perpetuity.

SERS' investment program endeavors to maintain an appropriate level of cash to pay benefits through prolonged periods of market and economic decline.

Key Objectives

After assessing the current status of the pension plan, the fund's existing structure, and the studies/recommendations of SERS' staff, general consultant, and specialist consultants, the board adopts four key objectives.

Objective #1
Pursue the highest returns possible at the level of risk deemed prudent by the board.
The board takes note of its current long-term assumed fund rate of return of 7.5% in both setting its asset allocation—the largest determinant of both risk and return in the fund—as well as in executing each investment in each asset class. The board recognizes that at any point in time, however, depending on market conditions and the board's assessment of risk, the probability of achieving the assumed rate will vary.

Objective #2
Reduce gradually the percentage of fund assets committed to long-term illiquid investments.
After reviewing the system's increasing maturity, the results of the asset/liability study, and the risks associated with the forced sale of liquid assets at undesirably low valuations in market declines, the board has determined that a steady decline in illiquid investments to a level better aligned with the system's current and evolving structure is appropriate.

Objective #3
Continue to maintain vigorous and highly transparent performance monitoring and board education programs.
The challenges facing fiduciaries in responsibly managing the prudent investment of more than $27 billion across multiple asset classes, scores of investment mandates, and thousands of individual securities and other assets are immense. To this end, the board, working with SERS' staff and consultants, will work to maintain—and enhance, where possible—the ongoing monitoring program as well as the board's understanding of institutional investing via a series of educational sessions.

Objective #4
Continue to maintain a comprehensive risk monitoring and mitigation program.
It is crucial to focus on the risks that are likely to have the largest effect on the fund's assets and, in turn, the fund's ability to ensure payment of current and future benefits.

Forward Vision

Although significant accomplishments to improve returns and reduce fees have been achieved, SERS' investment program strives for continuous improvement to utilize best practices to achieve or exceed its expected return, while controlling costs.

As a long-term investor, SERS remains committed to utilizing best practices in governance, asset allocation, and risk management. Accordingly, SERS will continue to enhance its efficiency, while simultaneously allocating resources to low-cost passive strategies or best-in-class actively managed opportunities where the board, investment office, and external consultants have the highest conviction that the opportunities can generate excess return.

All of the 2016 – 2017 Strategic Investment Plan initiatives listed below focus on achieving SERS' long-term expected return of 7.5%.

Strategic Initiatives

Private Equity and Real Estate

1. Increase the annual pacing of new commitments for Private Equity (Alternative Investments) to **$750 million** (currently at $500 million) to meet the base-case long-term target allocation of 16%.

2. Target Private Equity fund commitments of approximately **$100 million** or greater, in best-in-class funds to build long-term strategic partnerships, improve operational efficiency by reducing the number of funds, and improve SERS' leverage to negotiate lower management fees.

3. Establish an annual pacing range of new commitments for Real Estate between **$100 million to $200 million** to less liquid non-core closed-end Real Estate funds. Real Estate investment opportunities other than non-core closed-end funds will be evaluated on a case-by-case basis.

4. Target Real Estate fund commitments ranging from **$50 million to $100 million** in best-in-class funds to build long-term strategic partnerships, improve operational efficiency by reducing the number of funds, and improve SERS' leverage to negotiate lower management fees.

5. Research third-party Private Equity programs to consolidate and administer SERS' non-core Private Equity funds.

6. Clarify Real Estate's role by reestablishing Real Estate as a stand-alone asset class. Real Estate is already comprised of complex, labor intensive public and private market assets. As

a stand-alone asset class, Real Estate is now a more narrowly-defined portfolio which enables more focus when considering investment opportunities, clarifies consultant accountability, and leverages the skill sets of SERS' investment professionals from other asset classes.

7. Improve Real Estate's risk/return profile by establishing clear long-term target allocations designed to increase the expected return, liquidity, diversification, and inflation hedging, while decreasing expected risk.

8. Further diversify SERS' Real Estate program by expanding Core Real Estate investments, and new initiatives in Timber and Agriculture.

9. Research the viability of reinstituting / implementing an in-state Real Estate separate account investment program focused on investing exclusively within the Commonwealth of Pennsylvania.

Hedge Funds

10. Recommend and implement an optimal structure for SERS' Hedge Fund program (fund-of-hedge funds or direct investments structure).

Global Public Equity and Fixed Income

11. Research and implement optimal active and passive allocations within SERS' Global Public Equity and Fixed Income programs.

12. Research optimal structures to enhance global mandate and emerging market equity investment opportunities.

13. Research optimal inflation protection exposure levels and strategies.

14. Research the viability of implementing an emerging investment manager program for public equities.

Total Fund Level

15. Perform a review of all investment manager fees to determine if fees are aligned with SERS' best interests and are reasonable relative to market rates for comparable strategies in each investment asset class.

16. Improve transparency and efficiency of managing assets by eliminating SERS' specific terminology and renaming assets according to common industry conventions with similar risk/return profiles (Private Equity, Buyouts, Hedge Funds, Core Real Estate, Non-Core Real Estate, and Cash).

17. Continue to build a world-class investment organization and plan for succession of investment professionals.

18. Enhance investment-related governance policies (e.g. Statement of Investment Policies, Investment Advisor Monitoring Policy, Rebalancing Policy, Proxy Voting Policies, Derivatives Policy, etc.).

19. Identify and implement enhancements to the disciplined investment decision-making process.

20. Enhancing SERS' due diligence practices, in collaboration with SERS' legal team.

21. Provide SERS' board with educational opportunities to discuss global market and economic conditions and their impact on SERS' investment program.

Asset Liability Study

SERS performs a comprehensive asset liability study every three years to examine the probable future consequences, over extended periods of time, of applying alternative asset allocation strategies to SERS' investment assets in order to fund the liabilities created by the benefit provisions of the pension plan. Asset liability studies are unique in their ability to combine, in a single analysis, the three critical factors that drive the financial health of the pension plan: 1) benefit policy (liabilities), 2) contribution policy, and 3) investment strategy (asset allocation).

The results of the 2015 Asset Liability Study indicate that SERS is currently underfunded but improvements in financial health are possible. SERS can best meet its objectives through the continued use of a well-diversified investment portfolio. **However, positive outcomes are extremely dependent on the employer contribution policy.**[5]

Asset Allocation Policy

Asset allocation is widely accepted as the primary determinant of any pension plan's long-term return and risk. It is substantially more influential than the mandates deployed in individual asset classes, the managers selected to implement them, or tactical asset allocation decisions. A significant and often-cited study on this topic demonstrates that asset allocation explained 93.6% of the variation in quarterly returns for a typical large pension fund (Brinson, Hood, and Beebower, "Determinants of Portfolio Performance," *Financial Analysts Journal*, July/August 1986).

SERS' historical adherence to its asset allocation process generated investment returns that added 70% of the assets to its portfolio over the past decade. The remaining 30% of the portfolio was a result of employee contributions adding 13%, and employer contributions adding 17%.[6]

In developing long-term asset allocation policy targets, SERS' investment team must consider:

- Maintaining an appropriate level of cash to pay retirement benefits and covenants during prolonged periods of market decline and potential state budgetary constraints;

- Improving the liquidity profile of the total fund to align with the projected increase in retirement benefit payments; and

- Pursuing the highest returns possible at the level of risk deemed prudent by SERS' board.

[5] RVK Asset Liability Study Executive Summary dated September 16, 2015.
[6] SERS 2014 CAFR (p.6).

SERS' asset allocation structure was developed and weighted by considering each asset classes' expected return, volatility, and correlation with other asset classes. SERS' investment office staff, in consultation with its board and external investment consultants, combines asset classes in such a way to provide the highest expected return for a given level of risk, subject to the fundamental liquidity and diversification constraints.

SERS' updated asset allocation is positioned to maintain the current liquidity profile of the total fund, improve staff, consultant, and investment manager accountability, leverage staff and consultant skill sets, and improve transparency. The board selected Target Allocation 2 as the 10-year target asset allocation policy (Figure 3).

Figure 3

SERS 2016 – 2017 Strategic Asset Allocation Policy[7]

	Current Exposure 6/30/2015	**2016 – 2017 Strategic Asset Allocation Policy *Target Allocation 2***	**Policy Ranges**
Private Equity	19%	16%	
Global Equity	39%	43%	
Total Equity	***58%***	***59%***	***+/- 5%***
Real Estate	10%	12%	+/- 3%
Hedge Funds	8%	12%	+/- 3%
Fixed Income	19%	14%	+/- 3%
Cash	5%	3%	+/- 3%
Total	100%	100%	
Expected Return	7.31%	7.50%	
Risk (Standard Deviation)	13.65%	14.15%	
RVK Liquidity Metric	60	60	

[7] Source: SERS' Investment Office and RVK

As a result of the board's selected target asset allocation policy, SERS' investment program is positioned to achieve an expected return of 7.5% over the long-term (on average), while ensuring there is sufficient liquidity to pay retirement benefits.

To explain the primary risk and return contributors, the chart below (Figure 4) shows the major asset class components of SERS' asset allocation, with expected return on the vertical axis, and expected risk along the horizontal axis.

Figure 4

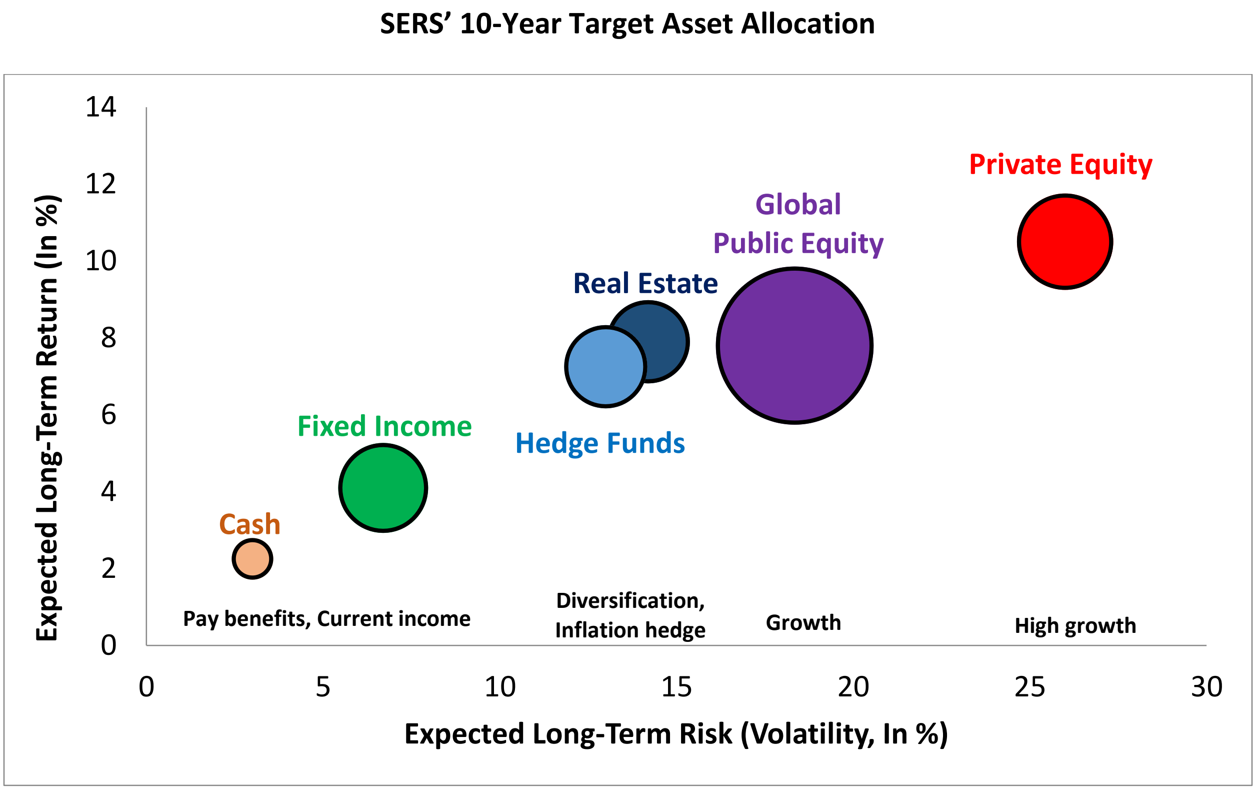
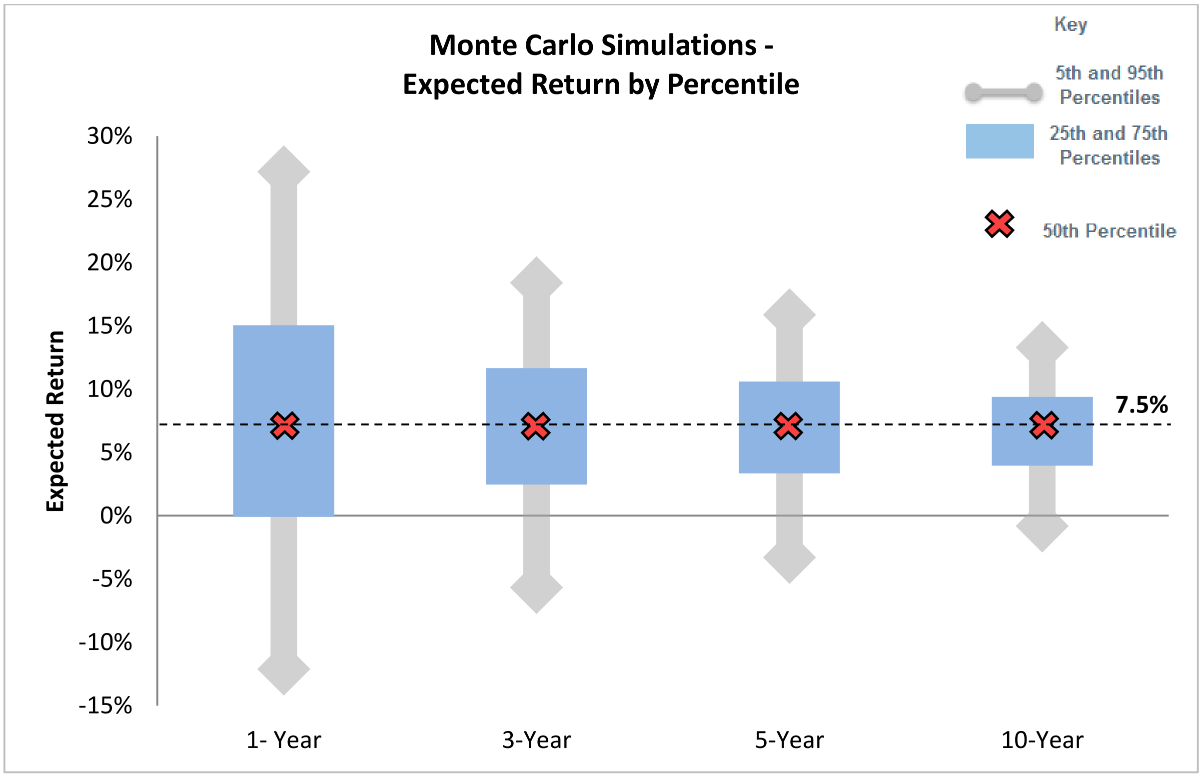


Figure 5 below depicts a range of possible distribution of returns over one, three, five, and ten-year horizons. Note that the dispersion of possible returns narrows significantly as the length of time covered by the analysis increases; extreme returns in any given year may tend to offset each other over a longer timeframe.

Figure 5

Potential Dispersion of Returns by Percentile for Target Allocation Policy[8]



[8] Source: SERS' Investment Office and RVK

Asset Classes

Private Equity

(former name: Alternative Investments)

Role: SERS' Private Equity program seeks the highest return and growth opportunities which capture market inefficiencies through active management in the private markets.

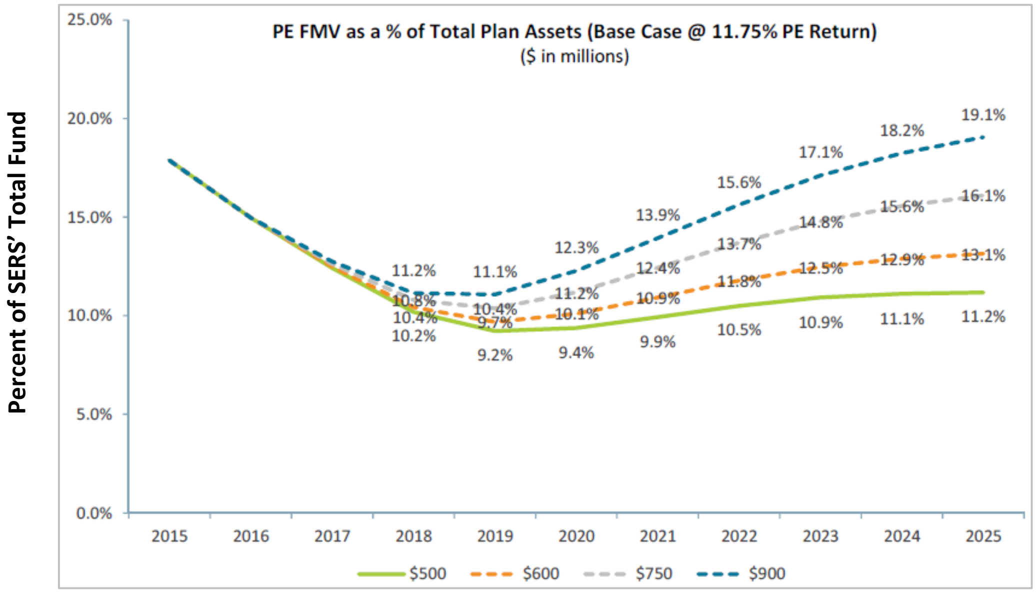
Objective: The objective of the Private Equity program is to generate annualized net-of-fee returns that exceed the total return of public equity markets by at least 3% (illiquidity premium) and exceed the mean return for the asset class over a seven- to ten-year period (see Benchmarks section of Investment Plan).

Structure: Investments in Private Equity are in the form of closed-end limited partnership interests. As an investor, SERS is a limited partner and does not have control of distributions in Private Equity investments. The investment horizon is typically seven or more years. SERS' Private Equity program endeavors to continue to build long-term strategic partnerships by investing in world class top-quartile funds. Private equity investments require commitments greater than seven years and therefore, must offer premium returns to compensate for illiquidity and risks.

SERS' Private Equity program is subject to the investment pacing established by this Investment Plan to help manage the liquidity profile of the total fund to align with the projected increase in retirement benefit payments.

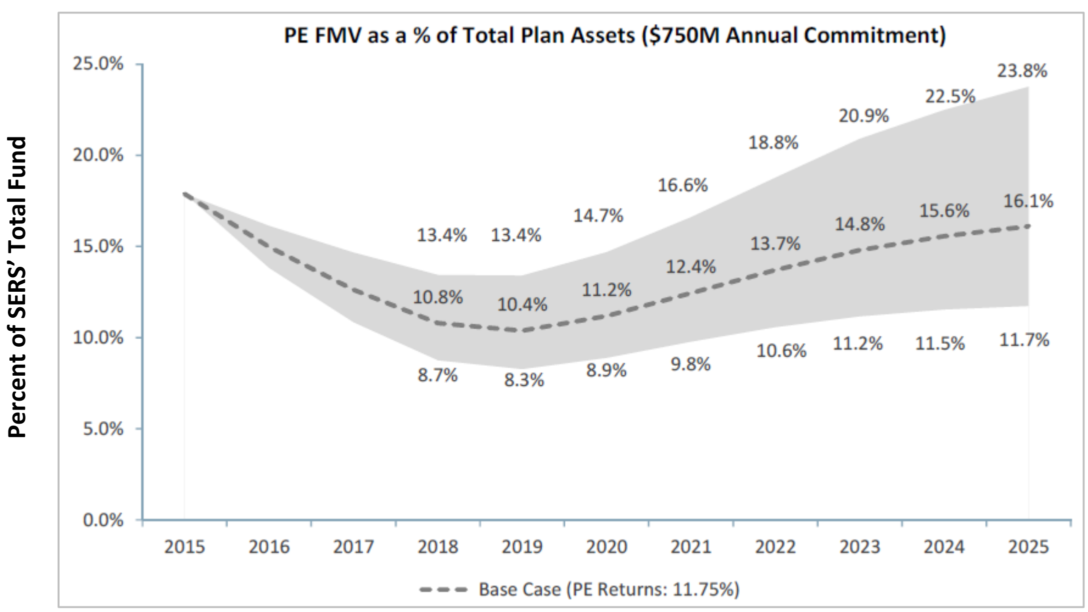
The 2016 – 2017 Strategic Investment Plan sets the Private Equity investment annual pacing target at **$750 million**. Figure 6 shows the 10-year (Year 2025) expected allocation to Private Equity as a percent of the total fund from 11.2% to 19.1% at multiple annual commitment pacing levels.

Figure 6



As shown in the chart below, long-term projections indicate that the expected allocation to Private Equity in 10-years could range from 11.7% to 23.8% of the total fund's value (Figure 7), at an annual commitment pace of **$750 million**.

Figure 7



NOTE: Private Equity annual commitment pacing assumes 100% employer contributions pursuant to Pennsylvania law (Act 2010-120). Any significant change in expected employer contributions and returns will require review and possible revision of the pace of commitments.

SERS' Private Equity program is categorized into three strategies.

Strategy	Description
Buyouts	A specialized form of private equity, characterized chiefly by investments in established private or publicly listed firms that are undergoing a fundamental change in operations or strategy.
Special Situations	Investments in funds which acquire distressed companies or companies in need of restructuring, funds from the secondary market, and funds providing mezzanine financing.
Venture Capital	Investments in specialized forms of private equity, characterized chiefly by high-risk investments in new or young companies following a growth path (early, late, balanced stage funds) in technology and other value-added sectors.

Global Public Equity

Role: SERS' Global Public Equity program seeks high returns through capital appreciation and income from dividend payments while also improving the total fund's liquidity. As of June 30, 2015, 44% of SERS' Global Public Equity program is invested using index funds. SERS' Global Public Equity program contributes a high expected long-term return to the fund but also may be the greatest contributor to near-term volatility.

Objective: The objective of the Global Public Equity program is to generate annualized net-of-fee returns that exceed its benchmark over a three- to five-year period (see Benchmarks section of Investment Plan).

Structure: Investments in public equity are achieved through buying and holding publicly-traded securities of companies throughout the developed world and in emerging markets. These companies exhibit a wide range of market capitalizations in many industries and sectors, and offer vastly different equity return opportunities.

SERS' Global Public Equity program is categorized into four strategies.

Strategy	Description
Global Mandate	U.S., non-U.S. developed markets, and emerging markets, large/mid/small cap.
U.S.	U.S. market, large/mid/small cap.
Non-U.S. Developed Markets	Non-U.S. developed markets, large/mid/small cap.
Emerging Markets	Emerging markets, large/mid/small cap.

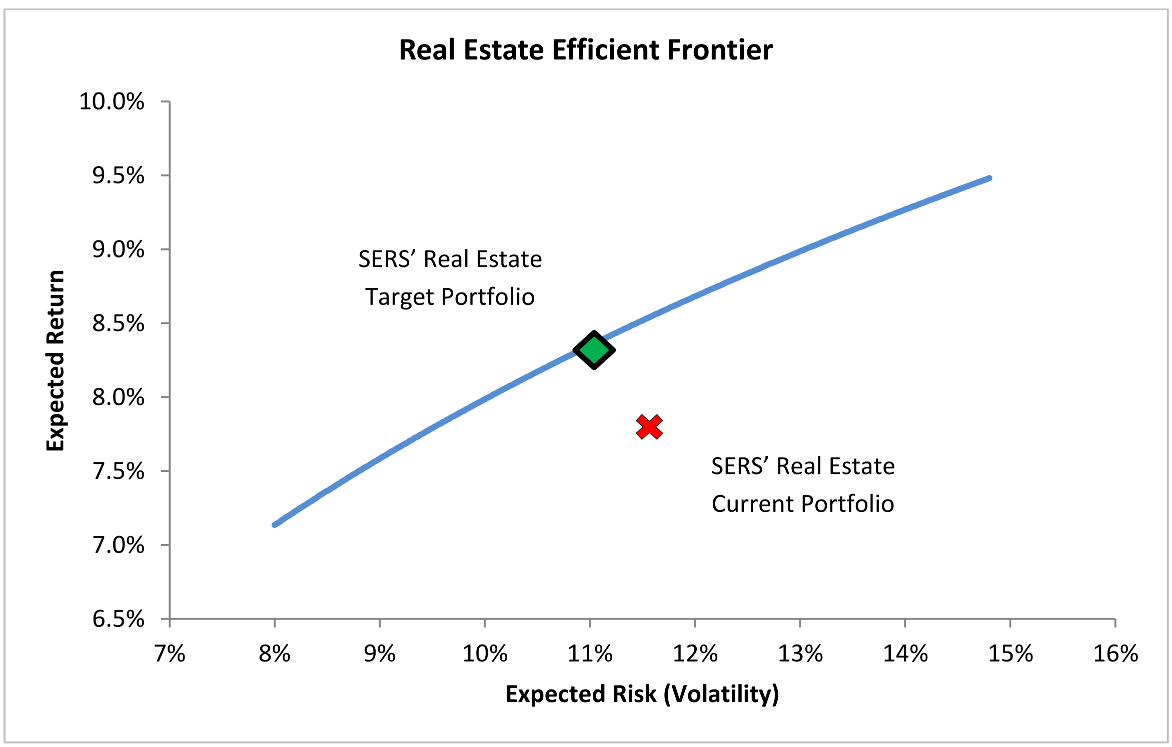
Real Estate

Role: Real Estate plays several roles within SERS' overall investment portfolio, including enhancing returns, diversification and income and providing inflation hedging. In the past, SERS has emphasized tactical value-add and opportunistic Real Estate strategies to provide competitive total returns through capital appreciation. Going forward, SERS will tilt the risk profile to more core-like strategies, which is appropriate given the larger allocation to Real Estate and the desire for more income and liquidity created by SERS' maturing pension fund obligations. This moderating risk profile may be achieved by improving diversification within Real Estate, which may result in better long-term risk-adjusted returns.

Objective: The objective of the Real Estate program is to generate annualized net-of-fee returns that exceed its benchmark over a three- to five-year period, with the various components weighted according to long-term allocation targets within the asset class (see Benchmarks section of Investment Plan).

Structure: SERS will diversify its Real Estate allocation by increasing investments in more stable, core-like investments, and by adding agriculture to the portfolio. New target allocations within the Real Estate program are designed to increase expected return, liquidity, diversification, and inflation hedging, while decreasing expected risk (Figure 8).[9]

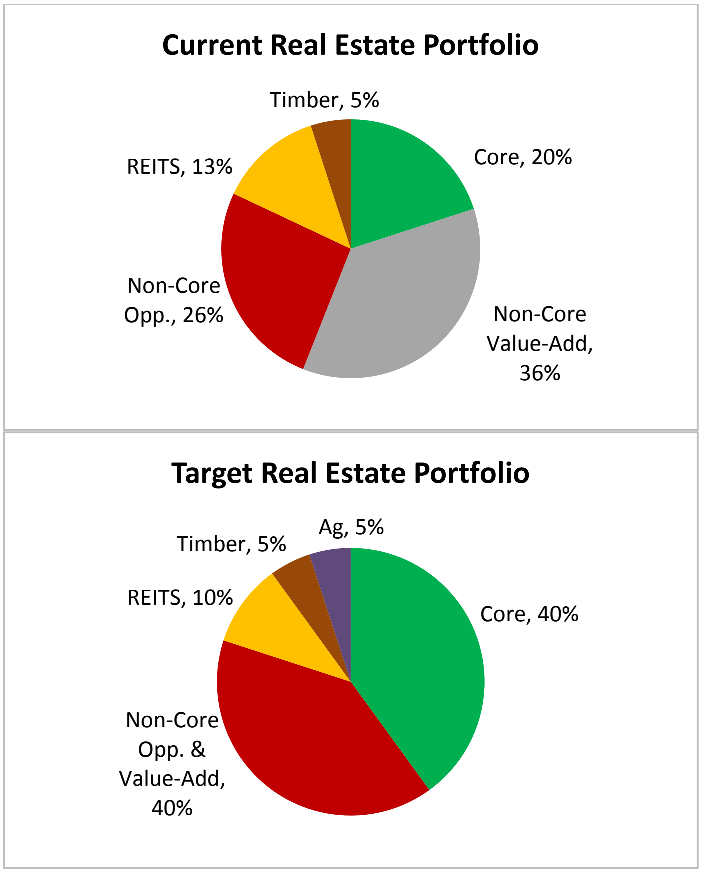
Figure 8



[9] Townsend's analysis and asset allocation assumptions (risk, return, correlation) are based on industry standards.

Figure 9 shows Real Estate's current portfolio structure and target portfolio structure.

Figure 9



Reporting for SERS' Real Estate program is being enhanced in order to improve transparency, facilitate better investment decision-making, and enhance the accountability of staff and consultants, while leveraging their skill sets.

The 2016 – 2017 Strategic Investment Plan sets the annual pacing target at **$100 million** to **$200 million** to non-core closed-end Real Estate funds. Real Estate investment opportunities other than non-core closed-end Real Estate funds will be evaluated on a case-by-case basis.

NOTE: Real Estate annual commitment pacing assumes 100% employer contributions pursuant to Pennsylvania law (Act 2010-120). Any significant change in expected employer contributions and returns will require review and possible revision of the pace of commitments.

SERS' Real Estate program is categorized into five specific strategies.

Strategy	Description
Core Real Estate	Core Real Estate investments are long-term investments in high-quality real estate that generates returns primarily from stable income producing properties.
Non-Core Real Estate (Value-Add and Opportunistic)	Non-Core Real Estate investments have higher risk/return expectations than Core Real Estate investments. Non-Core strategies utilize greater leverage and development strategies, thereby taking higher risks but demand higher returns. Returns are primarily generated from capital appreciation from opportunistic investments.
Real Estate Investment Trust Securities (REITs)	Investments in publicly-traded securities of companies whose primary business is to own real estate. REITs provide SERS with direct exposure to U.S. and non-U.S. real estate markets and offer high dividend yield and liquidity.
Timber	In general, Timber differs from real estate in that it is renewable and derives its return from the biological growth of trees and sale of timber.
Agriculture	Agriculture offers a non-correlated real estate strategy in a sector characterized by increasing institutional investment and global growth in population and preferences for higher value add food products.

Appendix 2 of the Investment Plan details the reclassification of portfolios to current asset classes as a result of the elimination of the classification named Commodities and Infrastructure, a sector-focused sub-strategy within the former Real Assets asset class.

Hedge Funds

(former name: Diversifying Assets)

Role: SERS' Hedge Fund program includes investments designed to provide total returns comparable to the total fund return but with lower volatility and correlation to other asset classes. SERS' Hedge Fund program is designed to provide attractive long-term, risk-adjusted returns, diversification from equity markets, low beta to equity markets, and downside protection during prolonged periods of equity market decline.

Objective: The objective of the Hedge Fund program is to generate annualized net-of-fee returns that exceed its benchmark over a three- to five-year period (see Benchmarks section of Investment Plan).

Structure: Investments in hedge funds are achieved through funds-of-hedge funds and direct investment in hedge funds. SERS' Hedge Fund program invests in a diverse set of strategies including long/short equity, global macro, relative value, credit, event driven, and other hedge fund strategies – all with attractive long-term, risk-adjusted returns. The program is designed to target a liquidity profile less than that of public equities but significantly more liquid than private equity.

SERS' Hedge Fund program is categorized into three strategies.

Strategy	Description
Funds-of-Hedge Funds	Funds-of-hedge funds are investments in funds with investment managers who invest in hedge funds. Funds-of-hedge funds provide an additional layer of fiduciary oversight (investment, legal, compliance, and monitoring) with similar all-in fees as direct investments in hedge funds. SERS is the only limited partner and able to make larger allocations which lowers fees and improves liquidity terms.
Direct Investments	SERS is one of many limited partners.
Absolute Return (Legacy Program)	This is a legacy hedge fund program in liquidation.

Fixed Income

Role: SERS' Fixed Income program is structured to: 1) generate income to pay benefits; 2) provide additional liquidity to minimize capital impairment risk; 3) reduce volatility of the total fund; 4) protect SERS against deflation (and inflation via TIPS); and 5) contribute total return to SERS when market conditions permit.

Objective: The objective of the Fixed Income program is to generate annualized net-of-fee returns that exceed its benchmark over a three- to five-year period (see Benchmarks section of Investment Plan).

Structure: Fixed income includes investments in publicly-traded debt obligations of sovereign, quasi-sovereign and corporate entities. The asset class generates current income and the repayment of principal at maturity. Shorter duration fixed income has substantially lower volatility than equity, and most fixed income investments have a low correlation with equity returns. SERS' Fixed Income program is categorized into five strategies and a separate cash allocation to improve transparency on SERS' unallocated cash amount.

Strategy	Description
Core Plus Fixed Income	Investments in sovereign debt, commercial mortgage-backed securities, credit strategies, high yield debt, and asset backed securities which seek to provide excess return when performance conditions are favorable, and offer varying potential return with a corresponding variance in expected risk.
Core Fixed Income	Investments in intermediate duration bonds, which provide capital loss protection in difficult market conditions, and offer risk mitigation due to low correlation with equity.
Global Treasury Inflation-Protected Securities (TIPS)	Investments in U.S. and non-U.S. inflation-linked bonds designed to preserve purchasing power due to high positive correlation to inflation. The principal value of TIPS increases with inflation and decreases with deflation, as measured by the Consumer Price Index. When TIPS mature, investors are paid the adjusted principal or original principal, whichever is greater.
Nominal U.S. Treasuries	Investments in securities matching the risk and return profile of 10-year U.S. Treasury Notes.
Short-Term Notes	Investments in securities matching the risk and return profile of 1 to 3 year U.S. Government/Credit securities.

Cash

Role: SERS' investment program endeavors to maintain an appropriate level of cash to pay retirement benefits and covenants during prolonged periods of market decline and state budgetary constraints.

Objective: The objective of Cash is to generate annualized net-of-fee returns that exceed its benchmark over a three-year period (see Benchmarks section of Investment Plan).

Structure: Cash investments emphasize the use of higher credit quality debt instruments that are liquid and have short maturities and durations, or have floating rates and have historically been invested in the Pennsylvania Treasury Group Investment Fund, a short-term investment fund.

Benchmarks

The objective of the fund is to generate investment returns that meet, or preferably exceed, the actuarially assumed rate of return over complete market cycles. Performance is measured net-of-fees relative to the following benchmarks according to the long-term target asset allocation weights.

Private Equity	Russell 3000 + a 3% premium and Private Equity Peer Group Comparison
Global Equity	MSCI All Country World Investable Market Index
Real Estate	Custom Index (NCREIF Fund Index - Open End Diversified Core Equity, S&P Developed Property Index for REITs, & CPI plus a 3% premium for Timber and Agriculture)
Hedge Funds	HFRI Fund-of-Funds Strategic Index
Fixed Income	Barclays U.S. Aggregate Bond Index
Cash	90-Day T-Bill Index
Total Fund	Total Fund Custom Index and Public Market Equivalent Index

Russell 3000 Index – The Russell 3000 Index measures the performance of the 3,000 largest U.S. companies based on total market capitalization, which represents approximately 98% of the investable U.S. equity market.

Private Equity Peer Group Custom Indices – The current Private Equity Peer custom indices currently utilize the Burgiss private equity database. They are calculated using the time-weighted returns for a composite of funds based on their specified strategies and with the same vintage dates as SERS' funds. For all Burgiss benchmarks, Geographic Focus, Industry Focus, Fund Size, and Currency are all inclusive across countries, industries, funds, and currencies, respectively.

MSCI All Country World Investable Market Index – The index captures large, mid and small-cap public equity representation across developed markets and emerging markets countries. With approximately 8,600 constituents, the index covers approximately 99% of the global public equity investment opportunity set.

NCREIF Fund Index – Open-End Diversified Core Equity – The first of the NCREIF Fund Database products and is an index of investment returns reporting on both a historical and current basis the results of 33 open-end commingled funds pursuing a core investment strategy, some of which have performance histories dating back to the 1970s. The NFI-ODCE Index is capitalization-weighted and is reported gross of fees. Measurement is time-weighted. NCREIF will calculate the overall aggregated Index return.

Given the proposed more moderate risk profile and increasing diversification objective in Real Estate, the benchmark for Real Estate will be adjusted. Specifically, the NCREIF "Open-End" Fund Index will be replaced with the NCREIF Fund Index for Open-End Diversified Core Equity funds. The benchmark for SERS' timber and agriculture investments will be changed to an index composed of CPI + 300 basis points. The latter change reflects the challenge of fully diversifying SERS' timber and agriculture allocations given the relatively small size of commitments in these sectors.

The S&P Developed Property Index defines and measures the investable universe of publicly traded property companies domiciled in developed markets. The companies in the index are engaged in real estate related activities, such as property ownership, management, development, rental and investment.

The Consumer Price Indexes (CPI) program produces monthly data on changes in the prices paid by urban consumers for a representative basket of goods and services. Prices for the goods and services used to calculate the CPI are collected in 87 urban areas throughout the country and from about 23,000 retail and service establishments.

HFRI Fund-of-Funds Strategic Index – The HFRI Fund-of-Funds Strategic Index includes fund of funds that are classified as "strategic" by exhibiting one or more of the following characteristics: seeks superior returns by primarily investing in funds that generally engage in more opportunistic strategies such as Emerging Markets, Sector specific, and Equity Hedge; exhibits a greater dispersion of returns and higher volatility compared to the HFRI Fund-of Funds-Composite Index.

Barclays U.S. Aggregate Bond Index – The Barclays U.S. Aggregate Bond Index is a comprehensive measure of the entire U.S. taxable bond market. The aggregate includes all publicly issued, non-convertible domestic debt of the U.S. Government and agencies, the three major corporate bond classifications (industrial, utility, and financial), mortgage-backed securities (GNMA, FNMA, FHLMC) and Yankee bonds (U.S. dollar denominated, SEC registered fixed-rate debt issued or guaranteed by sovereign foreign governments). Bonds included are investment grade (Baa rating or higher), have a minimum outstanding principal of $1 million, and a minimum one-year maturity. The index is a capitalization weighted and includes income calculated on an accrual basis at the end of each month. The universe is screened on the last business day of each month for inclusion in the next month's index. Bonds that decline below the minimum quality or one-year maturity will drop out of the index during the monthly screening.

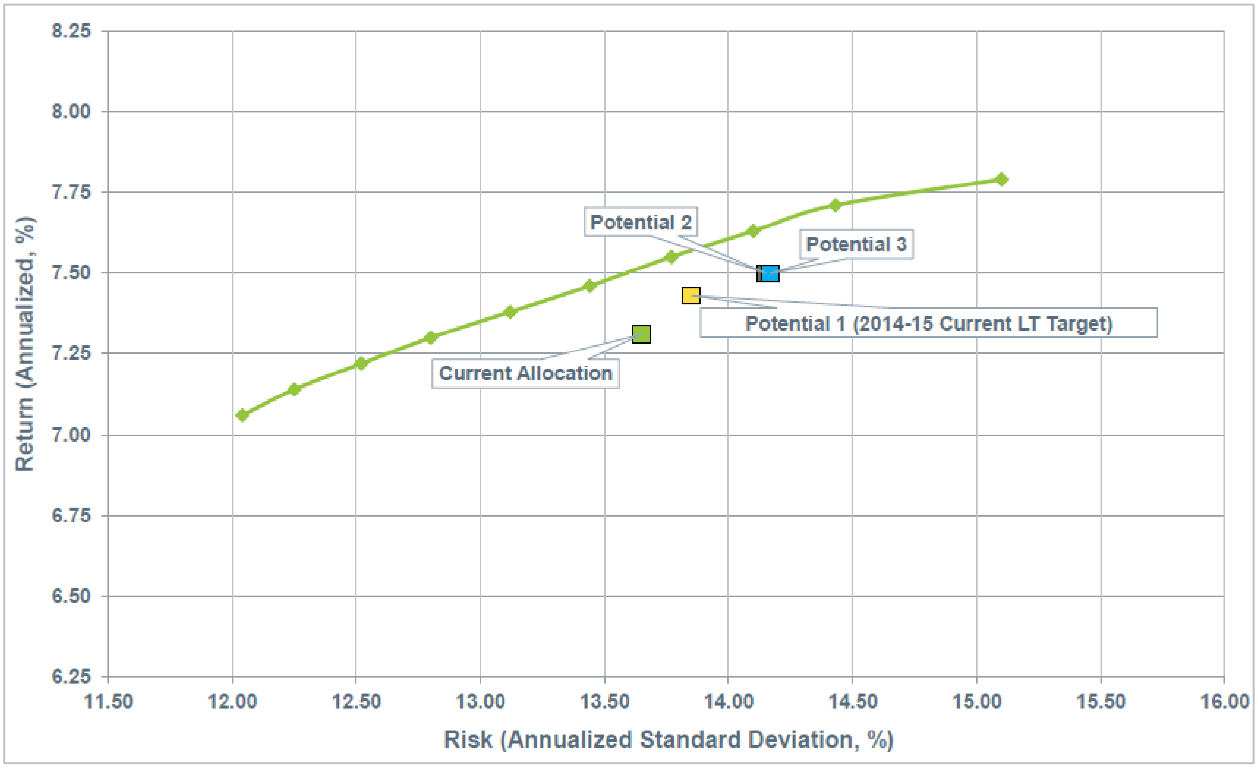
90-Day U.S. T-Bill Index – The index is made up of U.S. Treasury securities maturing in 90 days that assumes reinvestment of all income.

Total Fund Custom Benchmarks – The Total Fund Custom Benchmarks are calculated monthly using target weights for each asset class, applied to corresponding primary and secondary benchmarks.

Appendix 1

RVK Efficient Frontier from Mean Variance Optimization Modeling

All three potential portfolios lie close to the efficient frontier—differences between those and the theoretically efficient portfolios reflect both SERS' liquidity risk management and reflection of general risk preferences of SERS' board.



RVK 2015 Capital Market Assumptions

RVK Return & Risk Assumptions / Longest Historical Time Frame

Asset Class	Arithmetic Return Assumption	Standard Deviation Assumption	Index	Longest Historical Time Frame	Annualized Arithmetic Return	Annualized Standard Deviation
Global Equity	7.80	18.35	MSCI ACW IMI (Gross)	Jun 1994 - Dec 2014	8.23	15.65
Custom Fixed Income	4.13	6.66	SERS Custom FI Index	Mar 1997 - Dec 2014	6.35	4.25
Hedge Funds	7.25	13.00	HFN Long/Short Eq (Net)	Jan 1983 - Dec 2014	14.01	10.39
Private Equity	10.50	26.00	Cambridge US Private Equity Index	Apr 1986 - Jun 2014 (Q)	13.65	9.63
Custom Real Estate	7.94	14.18	SERS Custom RE Index	Jan 1995 - Sep 2014 (Q)	9.76	7.39
Cash Equivalents	2.25	3.00	BofA ML 3 Mo US T-Bill	Jan 1978 - Dec 2014	5.24	1.15

RVK Correlation Assumptions

	Global Equity	Custom Fixed Income	Hedge Funds	Private Equity	Custom Real Estate	Cash Equivalents
Global Equity	1.00	0.37	0.82	0.78	0.51	-0.05
Custom Fixed Income	0.37	1.00	0.28	0.14	0.21	-0.01
Hedge Funds	0.82	0.28	1.00	0.72	0.43	0.05
Private Equity	0.78	0.14	0.72	1.00	0.69	0.07
Custom Real Estate	0.51	0.21	0.43	0.69	1.00	0.10
Cash Equivalents	-0.05	-0.01	0.05	0.07	0.10	1.00

Appendix 2

<u>Portfolio and Fund Reclassifications</u>

The Private Energy strategy will be reclassified as a sub-strategy within the Private Equity asset class. Private Energy funds were previously a subset of the Private Equity asset class. Moving Private Energy funds to the Private Equity asset class will align funds with similar return, risk, and liquidity profiles. It also aligns staff, consultant, and investment manager accountability and skill sets.

The Wellington Diversified Inflation Hedge ("Wellington DIH") portfolio will be reclassified as a stand-alone portfolio within the Global Public Equity asset class. Moving Wellington DIH to the Global Public Equity program will align portfolios with similar return, risk and liquidity profiles. SERS' investment staff and its general investment consultant will evaluate the Wellington DIH portfolio to determine if it continues to fit in SERS' investment program.

The Blackstone Alternative Asset Management Customized Commodities ("BAAM Commodities") fund will be reclassified as a stand-alone fund within the Hedge Fund program. Moving the BAAM Commodities portfolio to the Hedge Funds program will align portfolios with similar return, risk and liquidity profiles. SERS' investment staff and its general investment consultant will evaluate the BAAM Commodities portfolio to determine if it continues to fit in SERS' Investment Program.

The two Master Limited Partnership ("MLPs") portfolios will be reclassified as Core Plus Fixed Income. MLPs are investments in publicly-traded energy MLP securities and securities of energy companies. Although MLPs exhibit similar volatility as public equity, their current income profile through quarterly distributions better align MLPs within Core Plus Fixed Income.

The two portfolios in Short-Term Notes will be moved to the Fixed Income asset class to improve transparency of reporting unallocated cash as a stand-alone strategy.

Appendix 3

The board selected Target Allocation 2 as the 10-year target asset allocation policy.

Efficient Asset Allocation Targets[10]

	Current Exposure 6/30/2015	Target Allocation 1 (Current LT Target)	Target Allocation 2	Target Allocation 3	Policy Ranges
Private Equity	19%	16%	16%	18%	
Global Equity	39%	41%	43%	42%	
Total Equity	***58%***	***57%***	***59%***	***60%***	***+/- 5%***
Real Estate	10%	12%	12%	12%	+/- 3%
Hedge Funds	8%	12%	12%	9%	+/- 3%
Fixed Income	19%	16%	14%	16%	+/- 3%
Cash	5%	3%	3%	3%	+/- 3%
Total	100%	100%	100%	100%	
Expected Return	7.31%	7.43%	7.50%	7.50%	
Risk (Standard Deviation)	13.65%	13.85%	14.15%	14.17%	
RVK Liquidity Metric	60	60	60	60	

[10] Source: SERS' Investment Office and RVK

State Employees' Retirement System
30 N 3rd St, Suite 150
Harrisburg, PA 17101-1716
1.800.633.5461
www.SERS.pa.gov