



Investment Advisory Committee (IAC) Meeting

**VRS Board Room
Pavilion Bldg - 3rd Floor
1111 East Main Street
Richmond, VA 23219**

**Wednesday, 11/10/2021
10:00 AM - 12:30 PM ET**

I. Approval of Minutes (August 26, 2021)

IAC Meeting Minutes 08262021 - Final - Page 2

II. CIO Report

Asset Allocation Report 9-30-2021 - Page 6

Daily Asset Allocation Report 11-4-2021 - Page 7

Performance 9-30-2021 Final - Summary - Page 8

Plan Tracking Error - Page 9

New Investments and Terminations 11-10-2021 - Page 10

III. Private Markets Program Reviews

IAC Nov 2021 Pvt Mkts Presentation Deck FINAL - Page 11

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• Overview - K.C. Howell

i. Credit Strategies - Steve Woodall

ii. Real Assets - Walker Noland

iii. Private Equity - John Alouf

iv. Private Investment Partnership (PIP) - Steve McClelland

IV. Long Term Themes Discussion

Long Term Themes - Nov 2021 IAC - Page 147

Minutes

A meeting of the Investment Advisory Committee of the Virginia Retirement System was held on August 27, 2021 with the following members present:

Larry Kochard, Chairperson, from Virginia, under § 2.2-3708.2(A)(1)(a)
Hance West
Michael Beasley
Thomas Gayner
Deborah Allen Hewitt
Nancy Leake
Bryan Lewis
Rod Smyth, from Virginia, under § 2.2-3708.2(A)(1)(a)

The following Board members were present:

O'Kelly E. McWilliams, III
Brandon Bell
John Bennett
William Garrett
Troilen Seward

The following staff members were in attendance:

Trish Bishop, Ron Schmitz, Jennifer Schreck, John Alouf, Advait Apte, Rory Badura, Parham Behrooz, Tom Coleman, Michael Cooper, Sara Denson, Valerie Disanto, Jon Farmer, Laurie Fennell, Katherine Grawe, JT Grier, Dane Honrado, K.C. Howell, Kristina Koutrakos, Matt Lacy, Chung Ma, Curt Mattson, Jennifer MacKnight, Steve McClelland, Walker Noland, Greg Oliff, Steven Peterson, Mark Rein, Jummai Sarki-Hurd, Dan Schlussler, Kristy Scott, Jillian Sherman, Corey Turner, Lisa Turner, Scott Weaver, Dan Whitlock, Cindy Wilkinson, and Nick Zizzo.

Also in attendance was Lauren Albanese of Financial Investment News; Brian Deveney of the Virginia Auditor of Public Accounts; Cyril Espanol of Pageant Media; Latosha Johnson of the Virginia Department of Planning and Budget; Adam Rees of Pageant Media; James Rosatelli of the Virginia Senate Finance & Appropriations Committee; and Kelci Simonsen of the Virginia Auditor of Public Accounts.

Mr. West, Vice-Chairperson, conducted the meeting as Mr. Kochard was unable to attend in person under § 2.2-3708.2(A)(1)(a). Mr. West called the meeting to order at 10:07 a.m. Mr. West turned the meet over to Ms. Turner to address logistics of a meeting being conducted in-person with remote participants.

Ms. Turner served as host and walked participants through the logistics of a meeting being conducted in-person with remote participants. Ms. Turner then turned the meeting over to Mr. West to cover the items noted in the agenda.

Mr. Kochard took a roll call of each IAC member for attendance purposes:

Mr. Beasley – present
Dr. Hewitt – present
Ms. Leake – present
Mr. Lewis – present
Mr. Smyth – present
Mr. Kochard – present
Mr. Gayner – present
Mr. West – present

Mr. West noted that Mr. Economou would not be joining today; and that several Trustees would be joining today.

Minutes

A motion was made by Mr. West and seconded by Mr. Beasley to approve the minutes for the April 14, 2021 Committee meeting. The motion was unanimously approved via roll call:

Mr. Beasley – approve
Dr. Hewitt – approve
Ms. Leake – approve
Mr. Lewis – approve
Mr. Smyth – approve
Mr. Kochard – approve
Mr. Gayner – approve
Mr. West – approve

CIO Report

Mr. Schmitz presented the Performance Summary, Asset Allocation Report, and Total Fund Tracking Error as of June 30, 2021. During the review of the Performance Summary, Mr. Schmitz provided a detailed review of each Program's performance. Last, Mr. Schmitz reviewed the New Investments and Terminations Report.

**Portfolio Solutions
Group Program Reviews**

Mr. Ma provided a brief overview of the Portfolio Solutions Group (PSG), provided a preview of agenda items that each Director will be covering, and introduced the following Program reviews: Currency Management, Dynamic Strategies (DStrat), and Risk Based Investments (RBI).

Mr. Ma provided an annual review of the Currency Management program. Annual review topics included: a fiscal year 2021 review, performance, manager positioning, and summary thoughts.

Ms. Koutrakos provided an annual review of the Dynamic Strategies program. Annual review topics included: an overview of team members, markets, exposures, mandates, results, and a look forward.

Mr. Ma provided an annual review of the Risk Based Investments program. Annual review topics included: an overview of team members, program objectives, results, and a look forward.

**Forward Returns &
Scenario Analyses**

Dr. Peterson presented the VRS investment staff's 10-year and 20-year forward return estimates by asset class and for the total fund. He then focused on 10-year forward returns attributions in selected asset classes.

Due to technical difficulties the meeting paused at 11:42 a.m. and restarted at 12:17 p.m.

Dr. Peterson then presented the macro factor impact on forward returns, public pension plan discount rates through time, and external managers' 10-year forward return history and expectations. Dr. Peterson then presented four prospective median path scenarios and their implication for rates of return, funded status, contribution rates and liquidity.

Mr. West led discussion to ensure that the Committee is comfortable with the Expected Return Assumption, and all Committee members agreed that they are comfortable with the current VRS assumption.

The Committee members engaged in general discussion throughout all the reviews provided.

Adjournment

Mr. Beasley made a motion to adjourn the meeting. Dr. Hewitt seconded the motion. Mr. Kochard asked for each Committee member to vote on the motion:

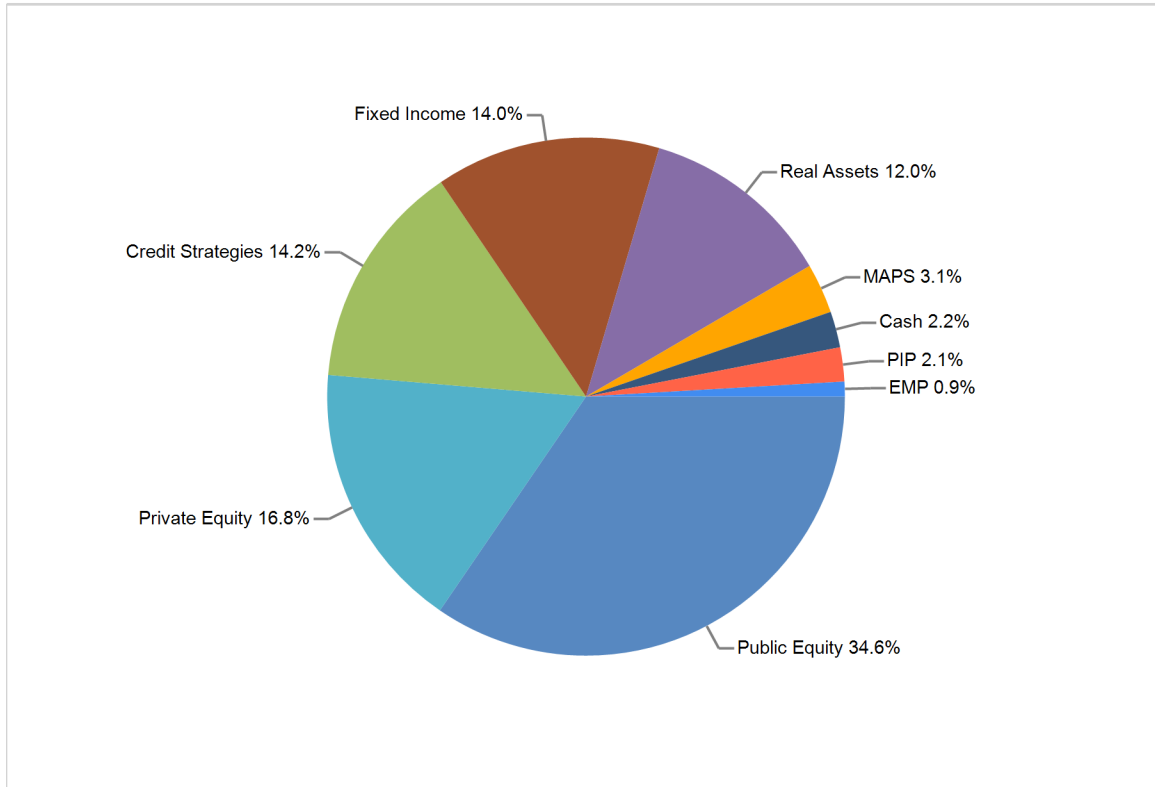
Mr. Beasley – aye
Dr. Hewitt – aye

Ms. Leake – aye
Mr. Lewis – aye
Mr. Smyth – aye
Mr. Kochard – aye
Mr. Gayner – aye
Mr. West – aye

The motion to adjourn the meeting passed.

The meeting was adjourned at 12:42 p.m.

Larry Kochard, Chairperson



	<u>Current \$Bil</u>	<u>Current Weight</u>	<u>Policy Weight</u>	<u>Variance</u>	<u>Allowable Range</u>		<u>Internal %</u>
Total Fund	103.7						27.4%
Public Equity	35.8	34.6%	36.0%	-1.4%	-5%	+5%	37.3%
Fixed Income	14.6	14.0%	15.0%	-1.0%	-3%	+5%	95.1%
Credit Strategies	14.7	14.2%	14.0%	0.2%	-5%	+5%	
RS Credit	5.5	5.3%	5.6%	-0.3%			
NRS Credit	9.2	8.8%	8.4%	0.4%			
Real Assets	12.5	12.0%	14.0%	-2.0%	-5%	+5%	9.6%
Public RE	1.2	1.2%					99.9%
Private RE	7.3	7.1%					
Other RA	3.9	3.8%					
Private Equity	17.4	16.8%	14.0%	2.8%	-5%	+5%	
MAPS	3.2	3.1%	4.0%	-0.9%	-2%	+2%	
DSTRAT	1.7	1.7%					
RBI	1.5	1.4%					1.8%
PIP	2.2	2.1%	2.0%	0.1%	-2%	+2%	
EMP	1.0	0.9%	0.0%	0.9%		+3%	
Cash	2.3	2.2%	1.0%	1.2%	-1%	+4%	

	<u>Current \$Bil</u>	<u>Current Weight</u>	<u>Policy Limit</u>
Hedge Funds	11.5	11.1%	15.0%

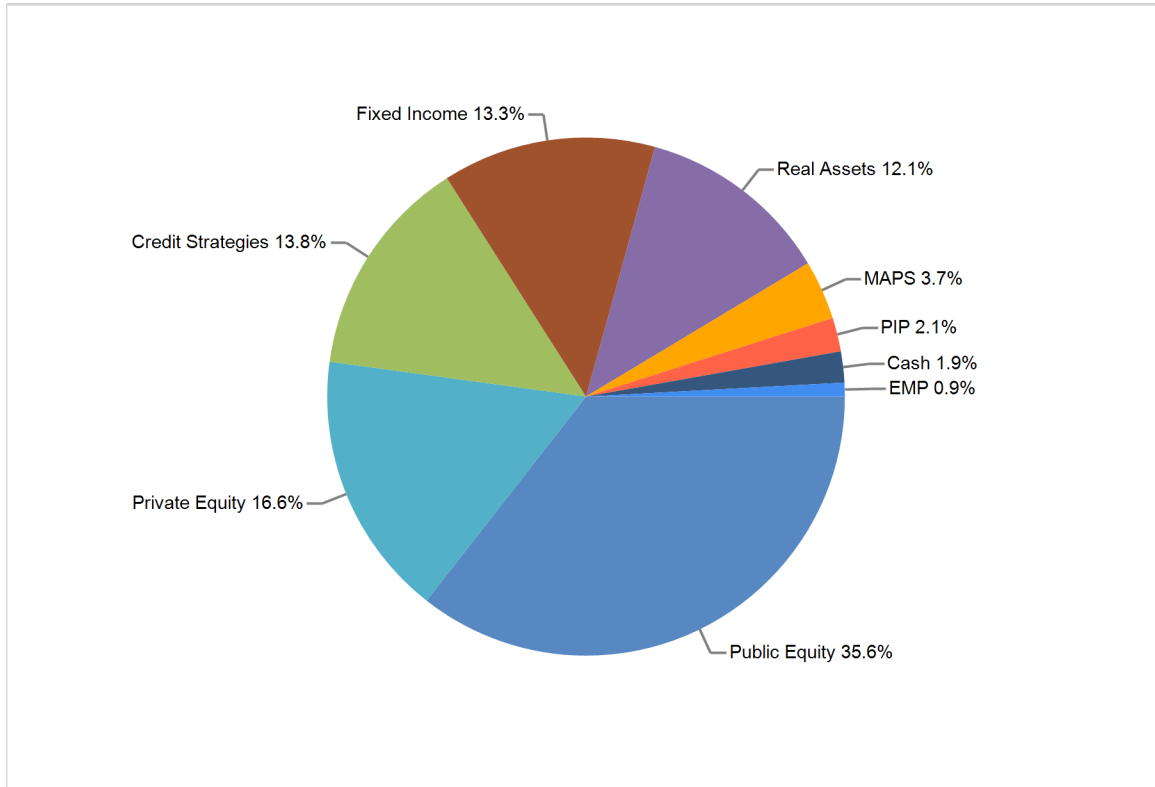
3 Year Tracking Error	
Total Fund:	3.26%
Total Public:	1.10%

*Total Fund includes the following amt held by the Treasurer of VA: \$ 256 million

• The values shown for each asset class on this report may differ from the VRS Monthly Performance Report due to adjustments related to derivative positions in the Rebalance Account, pending transactions, and certain accruals. The values on this report are a more descriptive representation of the Virginia Retirement System's true economic exposure to each asset class.(3 adjustments applied)

*Total Fund and Total Public tracking error are calculated using monthly returns, then annualized

* Differences in totals are due to rounding.



	Current \$Bil	Current Weight	Policy Weight	Variance	Allowable Range	Internal %
Total Fund	104.8					27.6%
Public Equity	37.3	35.6%	36.0%	-0.4%	-5% +5%	38.3%
Fixed Income	14.0	13.3%	15.0%	-1.7%	-3% +5%	94.9%
Credit Strategies	14.5	13.8%	14.0%	-0.2%	-5% +5%	
RS Credit	5.4	5.1%	5.6%	-0.5%		
NRS Credit	9.1	8.7%	8.4%	0.3%		
Real Assets	12.7	12.1%	14.0%	-1.9%	-5% +5%	10.1%
Public RE	1.3	1.2%				99.9%
Private RE	7.4	7.0%				
Other RA	4.0	3.9%				
Private Equity	17.4	16.6%	14.0%	2.6%	-5% +5%	
MAPS	3.9	3.7%	4.0%	-0.3%	-2% +2%	
DSTRAT	2.4	2.3%				4.7%
RBI	1.5	1.4%				1.9%
PIP	2.2	2.1%	2.0%	0.1%	-2% +2%	
EMP	0.9	0.9%	0.0%	0.9%	+3%	
Cash	2.0	1.9%	1.0%	0.9%	-1% +4%	

	Current \$Bil	Current Weight	Policy Limit
Hedge Funds	11.5	10.9%	15.0%

3 Year Tracking Error
Total Fund: 3.26%
Total Public: 1.10%

*Total Fund includes the following amt held by the Treasurer of VA: \$ 72 million

• The values shown for each asset class on this report may reflect adjustments related to derivative positions in the Rebalance Account, pending transactions and certain accruals, in order to provide a more descriptive representation of the true economic exposure to each asset class (5 adjustments applied)

*Total Fund and Total Public tracking error are calculated using monthly returns, then annualized

* Differences in totals are due to rounding.

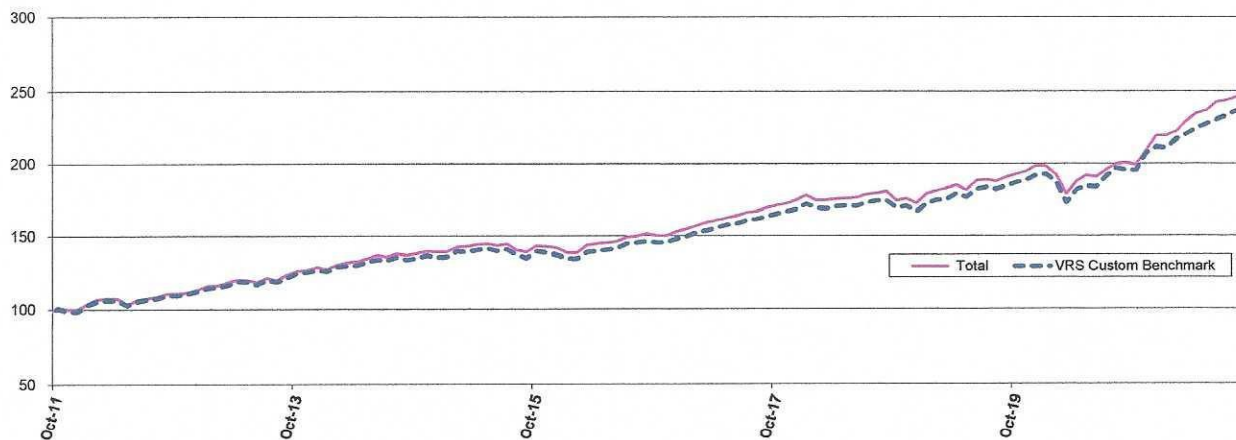
PERFORMANCE SUMMARY
Rolling Periods Ending
September 30, 2021



TOTAL FUND PERFORMANCE

	10 Yr	5 Yr	3 Yr	1 Yr	Qtr	Month	Fiscal YTD	Cal YTD	Market Value (\$MM)
Total Public Equity Strategies	12.0	12.3	11.8	31.3	-0.5	-3.4	-0.5	13.6	35,834
<i>Benchmark</i>	12.1	13.1	12.8	29.4	-1.0	-4.0	-1.0	11.7	
Total Fixed Income	4.0	4.1	7.0	1.8	0.1	-0.8	0.1	-0.3	13,601
<i>Benchmark</i>	3.1	3.0	5.5	-0.1	0.1	-0.9	0.1	-1.3	
Total Credit Strategies	7.6	7.6	8.3	16.2	2.3	1.6	2.3	9.6	14,711
<i>Benchmark</i>	6.4	5.9	6.3	8.1	1.0	0.3	1.0	3.8	
Total Real Assets	10.4	8.2	7.2	14.0	3.4	2.8	3.4	10.6	12,468
<i>Benchmark</i>	8.8	6.3	5.8	10.2	3.2	0.5	3.2	7.9	
Total Private Equity	16.8	21.6	24.0	55.7	12.5	12.5	12.5	39.0	17,409
<i>Benchmark</i>	14.8	18.1	18.1	41.9	7.3	1.2	7.3	31.1	
Total Private Investment Partnerships	n/a	10.7	11.0	30.6	6.8	6.8	6.8	23.9	2,205
<i>Benchmark</i>	n/a	10.2	10.1	20.1	3.9	0.9	3.9	14.9	
Total Multi-Asset Public Strategies	n/a	n/a	5.7	15.8	0.3	-0.8	0.3	6.6	3,227
<i>Benchmark</i>	n/a	n/a	8.2	12.7	0.1	-1.6	0.1	5.5	
Total Fund	10.0	10.5	11.3	24.3	2.6	1.2	2.6	13.8	103,710
<i>VRS Custom Benchmark</i>	9.3	9.8	10.2	19.3	1.3	-1.3	1.3	10.2	

10-Year Performance
Indexed to 100



Effective July 2013, the VRS Custom Benchmark is a blend of the Asset Class Benchmarks at policy weights.

The VRS Cash Account, the Treasurer Short-Term Investment Account, the VRS Rebalancing Account, transition activity and accounts with market values of less than \$1 million are included in the Total Fund's market value. Differences in market value totals are due to rounding.



Total Fund Tracking Error

Figure 1: Policy Tracking Error Rolling Three Year - Plan (as of 9/30/2021)

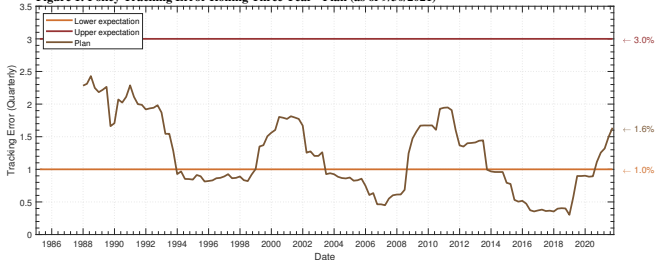
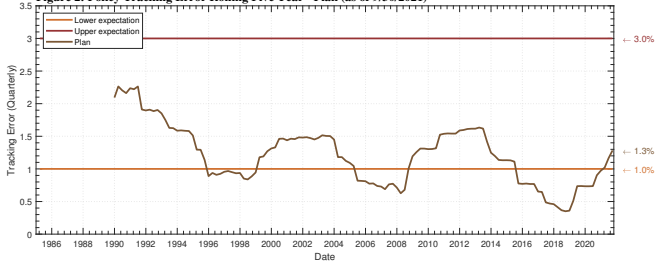


Figure 2: Policy Tracking Error Rolling Five Year - Plan (as of 9/30/2021)



The VRS Defined Benefit Plan Investment Policy Statement established the total fund tracking error range as the allowable observed tracking error calculated quarterly using 5 years of history.

VRS Investment Department
 Recap of New Investments/Terminations
 Time Period: 08/26/2021 – 11/10/2021



Program	Action	Effective Date	Commitment/ Current Value	Funding/ Defunding Period	Description
Credit Strategies	Hired	09/27/2021	\$500 Million	3 Years	Oak Hill Diversified Credit – A fund that will invest opportunistically across credit markets, with a focus on private credit investments.
Credit Strategies	Hired	10/01/2021	\$250 Million	3 Years	Whitehorse Liquidity Partners V – A portfolio finance strategy.
Credit Strategies	Hired	10/26/2021	\$300 Million	4 Years	Ares Special Opportunities Fund II – A middle market stressed and distressed credit fund in both the private and public markets.
Real Assets	Hired	09/13/2021	\$150 Million	4 Years	Crow Holdings Realty Partners Fund IX – A closed-end fund investing in diversified opportunistic real estate in the United States.
Private Equity	Hired	08/24/2021	\$25 Million	6 Years	Advent Global Technology II – A technology companion fund to Advent International GPE, its flagship fund. The technology fund will invest alongside the flagship fund in technology companies and make smaller standalone investments in high growth technology businesses.
Private Equity	Hired	08/31/2021	\$35 Million	6 Years	Spectrum Equity Select Opportunities – A growth equity fund that will invest in existing Spectrum Equity portfolio companies during a liquidity event when Spectrum maintains high conviction in the future growth prospects of the investment.
Private Equity	Hired	09/13/2021	\$175 Million	6 Years	Trident IX – A large market buyout fund with a focus on the global financial services industry.
Dynamic Strategies	Hired	10/01/2021	\$50 Million	Immediate	Nordea Global Climate & Environment – A long-only global equity mandate focused on opportunities resulting from climate change.
Dynamic Strategies	Hired	10/01/2021	\$150 Million	Immediate	Wellington Emerging Market Development – A targeted emerging market equity strategy investing around economic development themes.
Risk-Based Investments	Hired	09/01/2021	\$100 Million	Immediate	Orchard Liquid Credit Fund – A long volatility credit hedge fund.

Investment Advisory Committee

Private Market Assets Program Reviews

November 10, 2021

Presentation Deck



Overview (K.C. Howell, Managing Director)

5 min

Program Reviews

- **Credit Strategies**
(Steve Woodall, Sr. Portfolio Manager) 30 min
- **Real Assets**
(Walker Noland, Program Director) 30 min
- **Private Equity**
(John Alouf, Program Director) 30 min
- **Private Investment Partnership (PIP)**
(Steve McClelland, Program Director) 30 min



Virginia
Retirement
System

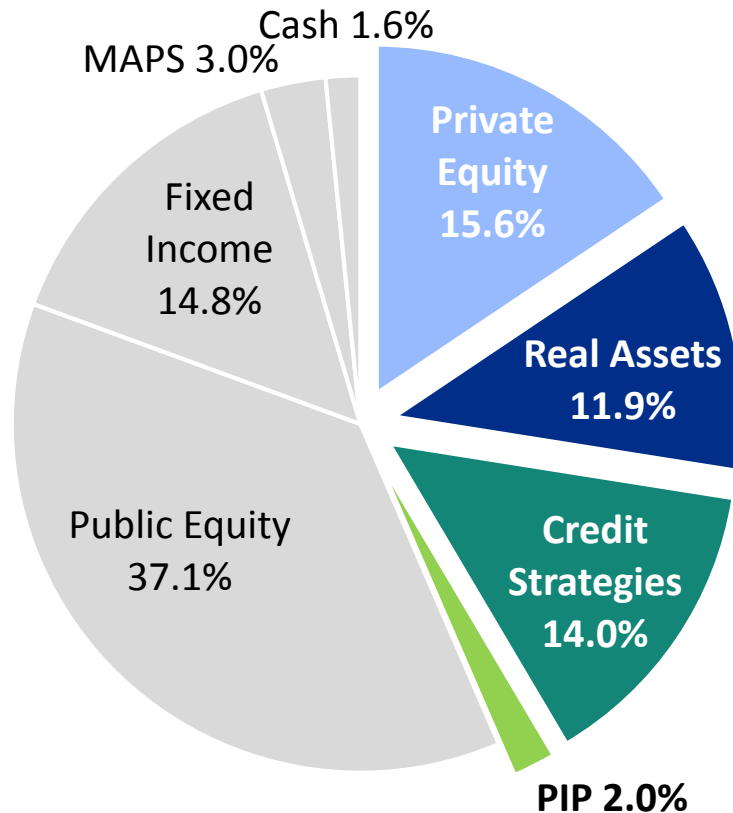
Program Reviews

K.C. Howell

Managing Director, Private Assets



Overview: What Does VRS Classify As Private Assets?



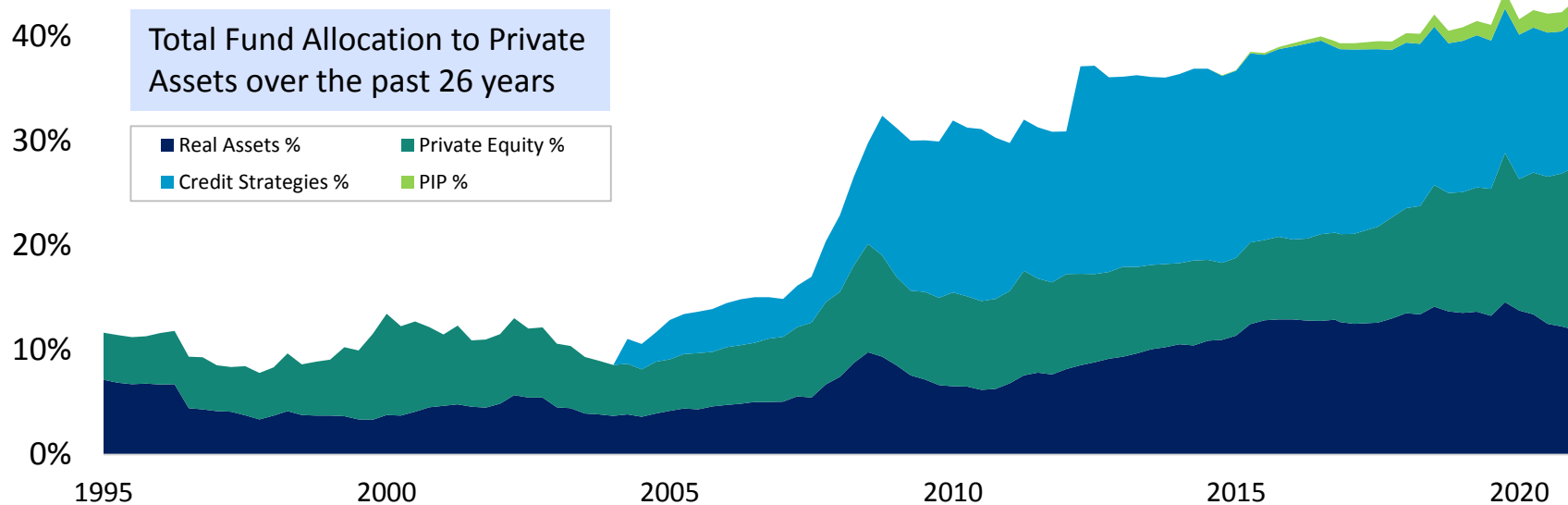
Private Market Assets: 43.5%

- **Real Assets**
Real estate, infrastructure, natural resources, etc.
- **Private Equity**
Buyouts, growth, turnaround, etc.
- **Credit Strategies**
Distressed, opportunistic, niche, etc.
- **Private Investment Partnerships (PIP)**
Multi-asset class

Market values as of 6/30/21; source: BNY Mellon data

Overview: Why Does VRS Invest In Private Assets?

- Enhance absolute & relative returns
- Capture illiquidity premium
- Reduced risk via diversification
- Migration from public to private



Market values as of 6/30/21; source: BNY Mellon data

Overview: Preview Of Agenda Items



- Overview
- Markets
- Exposures
- Results
- Co-investments
- Managers
- Looking Forward

Credit Strategies

Steve Woodall

Sr. Portfolio Manager, Credit Strategies



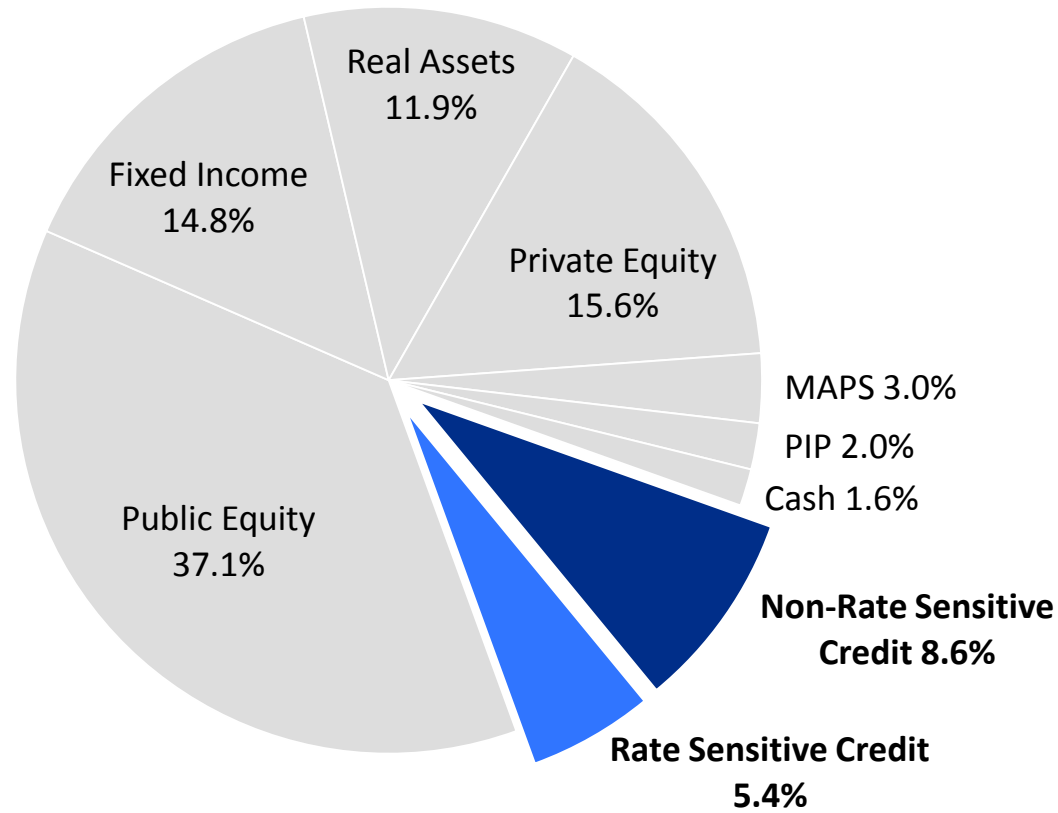
Overview: Team Members



Professional	Position	Highest Degree	Professional Certifications	Investment Experience	VRS Tenure
Steve McClelland	Director	MBA	CFA, CAIA	34	23
Steve Woodall	Senior Portfolio Manager	MBA	CFA, CAIA	17	16
Perry Corsello	Portfolio Manager	MBA	CFA	24	10
Matt Bennett	Investment Officer	MBA		13	13
Erica Billingslea	Investment Officer	MA	CFA Candidate	9	9
Kevin Bliss	Investment Officer	Bcom		7	0
Kelly Baker	Portfolio Assistant	AAS		11	6

Overview: Asset Allocation – 6/30/21

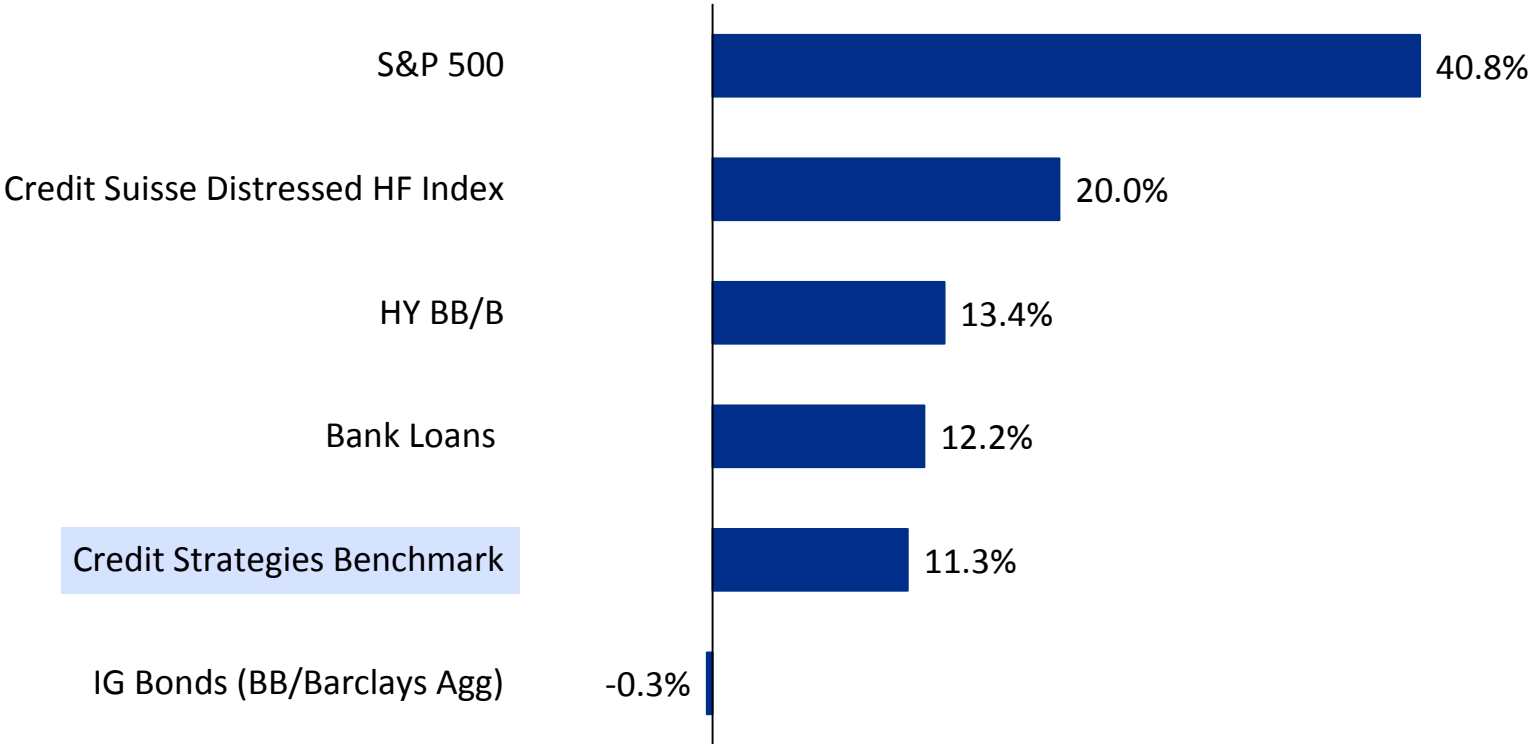
**Total Credit Strategies
14%**



Source: BNY Mellon

Markets: Update - Part 1

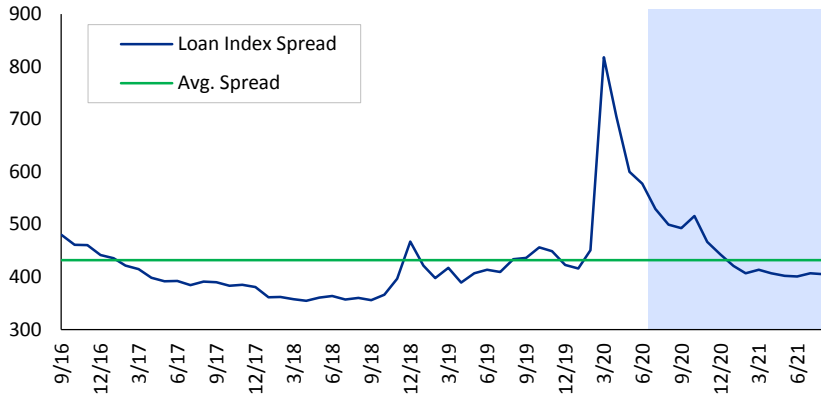
FY 2021 Returns



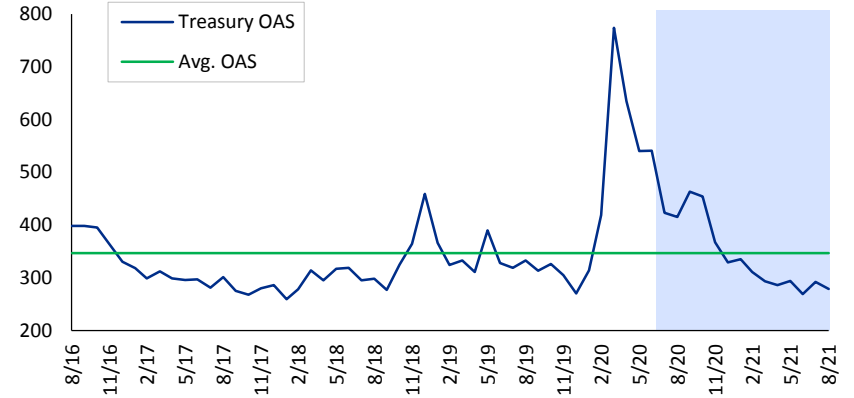
Source: VRS, Bloomberg, Credit Suisse

Markets: Update - Part 2

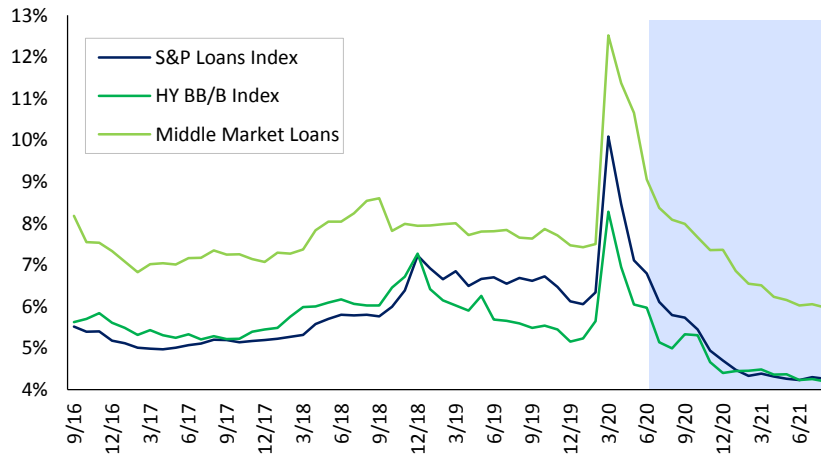
Loan Index Spread



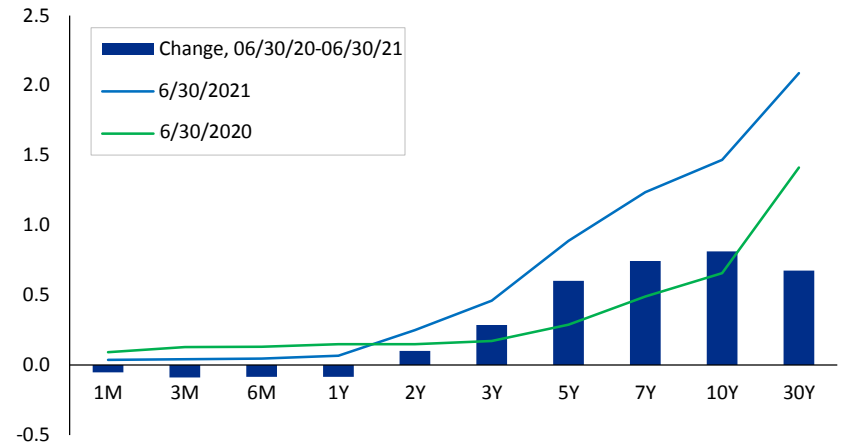
HY BB/B Index Spread



Yields



U.S. Treasury Yields



Exposures: Sub Strategies



Sub Strategies	% Allocation 6/30/20	% Allocation 6/30/21	Change
Rate Sensitive			
High Yield	20.1%	16.7%	-3.4%
Investment Grade	10.0%	8.9%	-1.1%
Mezzanine	5.1%	5.3%	0.2%
Other Rate Sensitive	8.2%	7.4%	-0.8%
Total Rate Sensitive	43.4%	38.5%	-4.9%
Non Rate Sensitive			
Bank Loans	15.7%	14.0%	-1.7%
Direct Lending	13.4%	13.8%	0.4%
Absolute Return			
Hedge Fund	2.1%	1.1%	-1.0%
Opportunistic	14.6%	15.7%	1.1%
Distressed	5.8%	7.2%	1.4%
Other Non Rate Sensitive	5.0%	9.7%	4.7%
Total Non Rate Sensitive	56.6%	61.5%	4.9%
Total	100.0%	100.0%	0.0%
Asset Value	\$11,271,368,991	\$14,224,607,404	\$2,953,238,413

Results: Total Credit Strategies – 6/30/21



	10 Year	5 year	3 Year	1 Year
Total Credit Strategies	6.57	8.01	8.25	18.43
Strategic Benchmark	5.72	6.54	6.68	11.26
Excess Return	0.85	1.47	1.57	7.17
Portfolio Risk	5.25	5.48	6.86	3.43
Benchmark Risk	5.86	6.62	8.35	3.18
Active Risk	1.75	2.09	2.68	2.47

Source: BNY Mellon

Managers: Top 10 Investment Managers



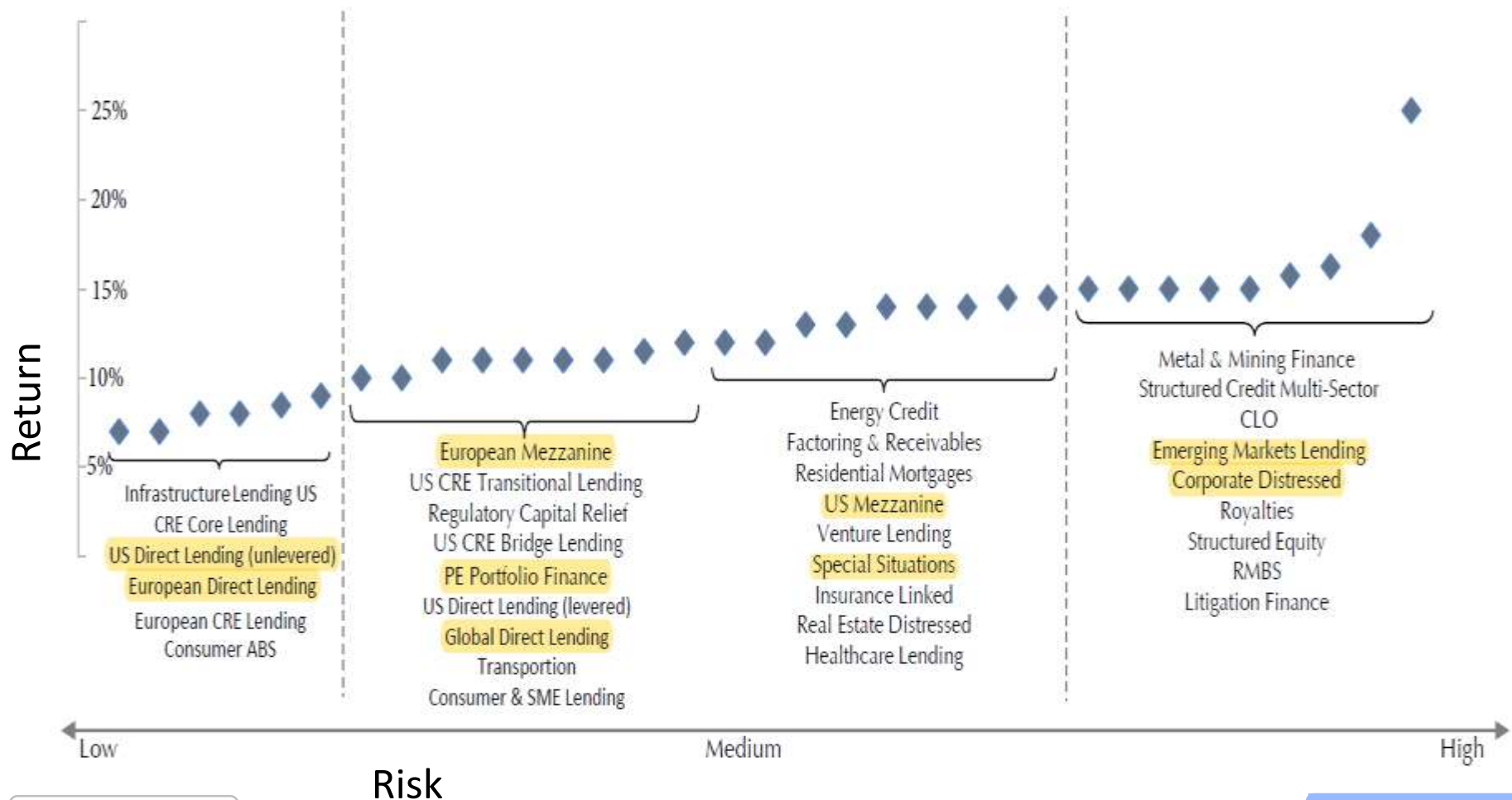
Manager	Mandates	# of Mandates	% of Program
Beach Point Total	Bank Loan, Distressed, Opportunistic	6	18.7%
PGIM Total	Investment Grade, Mezzanine	4	9.4%
JPM Total	High Yield	1	8.6%
Solus Total	Bank Loan, Hedge Fund, Opportunistic	3	8.4%
PIMCO Total	High Yield	2	8.1%
Anchorage Total	Opportunistic, Other Rate Sensitive	4	5.2%
HPS Total	Direct Lending, Mezzanine	3	4.7%
Allianz Total	Other Rate Sensitive	1	4.5%
BlackRock Total	Direct Lending	1	4.4%
Schroders Total	Structured and Securitized Credit	1	4.1%

Looking Ahead: CS2020 Implementation

- Targeted <20% liquid strategies within 3 years
- Increase breadth of strategy mix, with a focus on contractual returns and downside protection
- Increase expected return profile while holding volatility consistent with pre-CS2020 levels

Opportunities in Private Credit

Attractive Opportunities Across the Risk Spectrum



Real Assets

Walker Noland
Director, Real Assets



Overview: Team Members

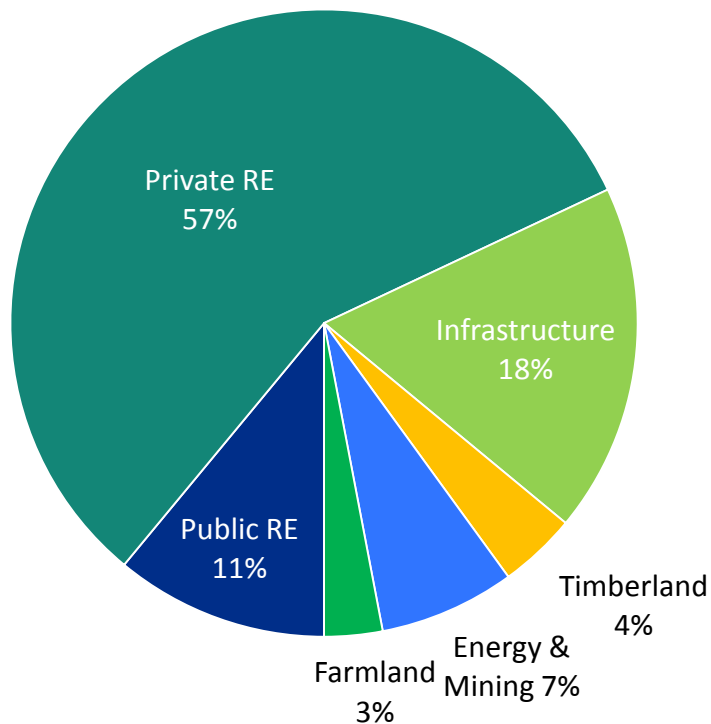


Professional	Position	Highest Degree	Professional Certifications	Investment Experience	VRS Tenure
Walker Noland	Director	MBA	CFA	21	11
Tom Coleman	Portfolio Manager	BS	CFA, CAIA	21	10
Jummai Sarki-Hurd	Portfolio Manager	MBA, MS	-	15	8
Tom Mulvin	Senior Investment Officer	BS	-	28	28
Warren Chang	Senior Investment Officer	MBA, MS	CFA	24	6
Carol Timpano	Portfolio Assistant	BS	-	6	6

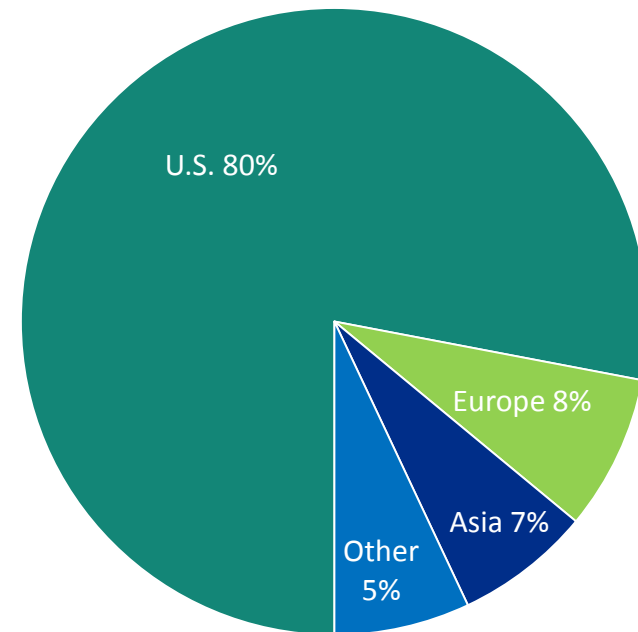
Exposures: Sectors & Geography – 6/30/21

Current Market Value: \$12.1 Billion

Sectors



Geography



Results: Portfolio Returns – 6/30/21



	10 Year	5 year	3 Year	1 Year	MV (\$MM)
Total Real Assets	10.0	8.0	6.6	11.3	12,122
Strategic Benchmark	8.5	6.1	5.2	6.4	
Excess Return	1.5	1.9	1.4	4.9	
Private Real Estate	10.7	7.9	6.4	5.3	6,941
Benchmark	8.7	5.3	4.0	1.5	
Excess Return	2.0	2.6	2.4	3.8	
REITs	6.8	5.4	6.1	34.2	1,298
Benchmark	7.5	6.0	7.4	34.8	
Excess Return	-0.7	-0.6	-1.3	-0.6	
Infrastructure	n/a	11.4	9.6	14.3	2,134
Benchmark	n/a	6.2	6.0	6.6	
Excess Return	n/a	5.2	3.6	7.7	
Total Natural Resources	n/a	6.0	2.7	16.8	1,748
Benchmark	n/a	6.2	6.0	6.6	
Excess Return	n/a	-0.2	-3.3	10.2	

Source: BNY Mellon

Headwinds/Tailwinds

- **Tailwinds:** Industrial & Multifamily Real Estate, Digital Infrastructure
- **Headwinds:** Office Real Estate, Energy Related Infra

Largest Absolute Return Contributors:

- **Positive**
 - REITs: +34.2% (10.7% of program). (Overweighted REITs by 2%)
 - Natural Resources: +16.8% (14.4% of program)
- **Less Positive**
 - Private Real Estate: +5.3% (57.3% of program)

Largest Relative Return Contributors:

- **Positive**
 - Natural Resources: +10.2% excess return. Strong recovery in energy/public markets
 - Infrastructure: +7.7% excess return. Strong recovery from Covid hit sectors
 - Private Real Estate: +3.8% excess return (57.3% of program)
- **Negative**
 - REITs: -0.6% (10.7% of program)

Managers: Top 10 Investment Managers

Manager	# of Mandates	% of Program
PGIM	2	13.7%
VRS Internal Equity Mgmt.	2	10.7%
Blackstone	11	8.5%
Morgan Stanley	3	7.4%
Clarion Partners	1	5.4%
Industry Funds Mgmt.	3	4.5%
Pritzker Realty Group*	2	4.0%
JP Morgan	2	3.9%
Pantheon Ventures	3	3.2%
Stonepeak	7	3.0%

*DIME (Diverse Investment Management Engagement) firm

Managers: Diverse Investment Management Engagement (DIME)

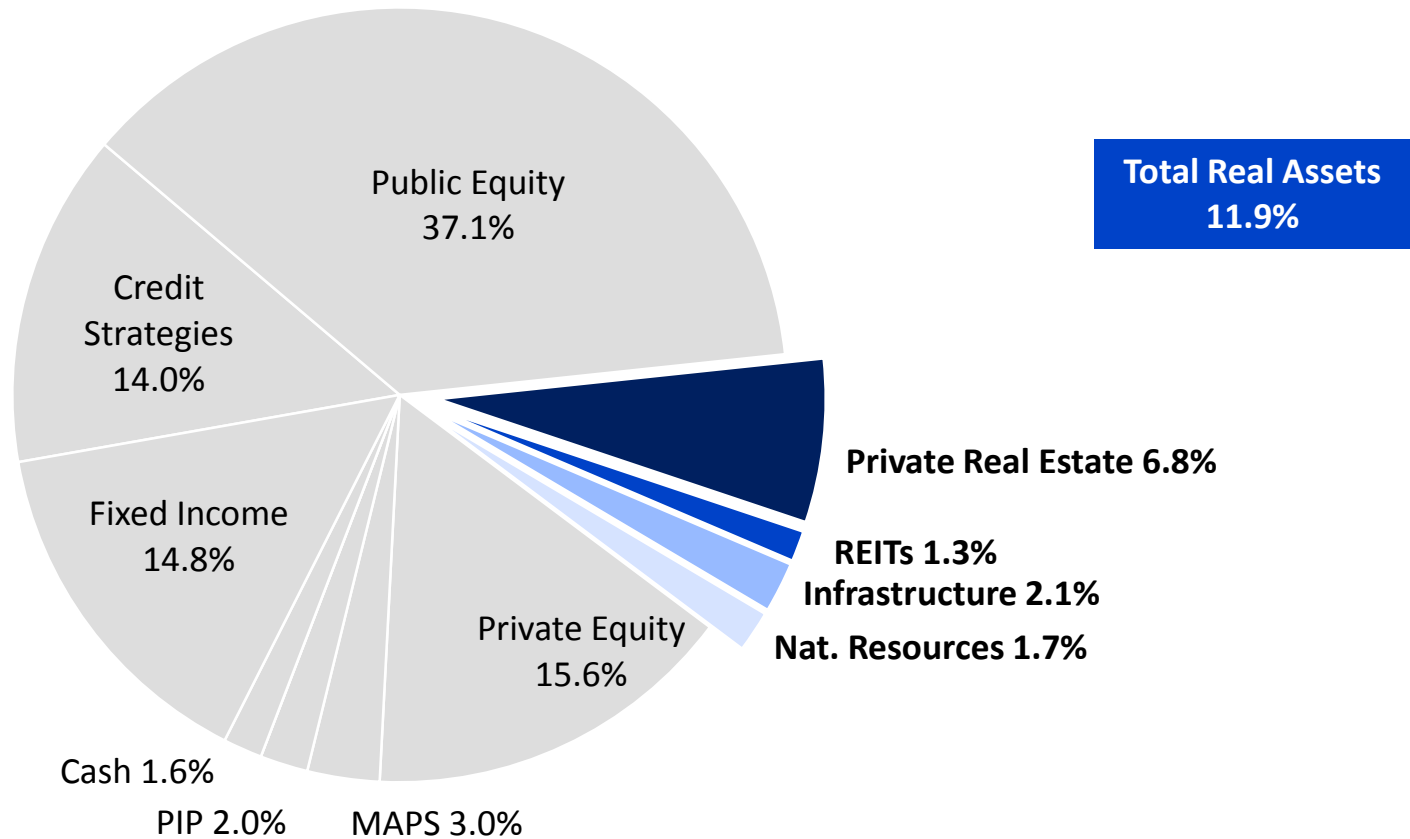
Resources		
Townsend	Pantheon	Aksia
<ul style="list-style-type: none"> • Real Estate • Infrastructure 	<ul style="list-style-type: none"> • Infrastructure • Natural Resources 	<ul style="list-style-type: none"> • Infrastructure • Natural Resources

Conversations with 25 new DIME managers across 25 mandates in 12 months ending 6/30/21

Manager	Sector	Vintage	Comm./Alloc. (\$MM)
Artemis RE Partners	Real Estate	2018	75
Artemis Income & Growth	Real Estate	2020	75
Capri/EGM JV	Real Estate	2014	300
Grain Infra	Infrastructure	2012	75
Pritzker JV	Real Estate	2012	232
Pritzker JV II	Real Estate	2015	200
Tristan Curzon	Real Estate	2017	180
		Total	1,137

- Continue active portfolio management
- Focus on objectives & risk
- Further build out of natural resources sub-portfolios; prudently work to manage around targeted allocation

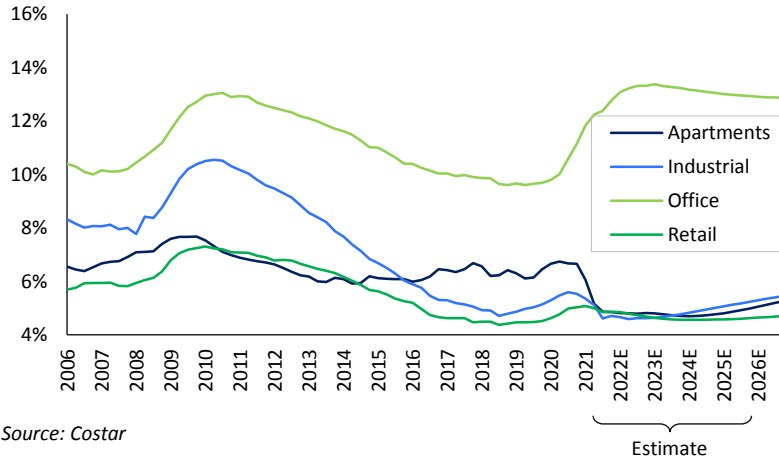
Overview: Asset Allocation – 6/30/21



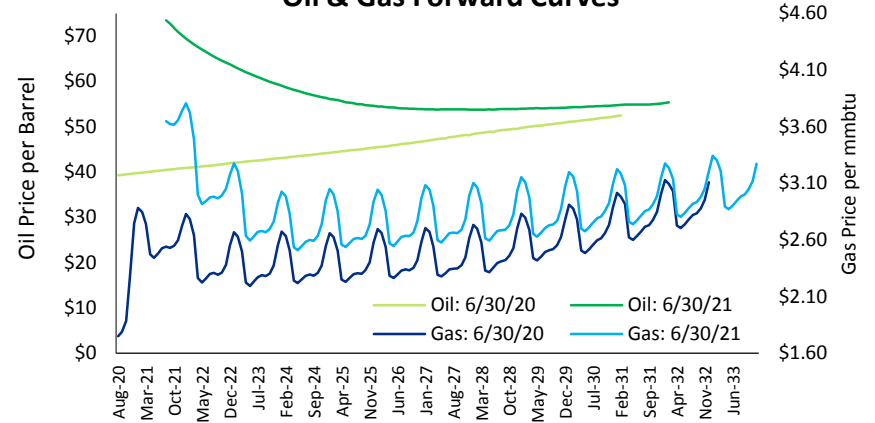
Source: BNY Mellon

Markets: Fundamentals

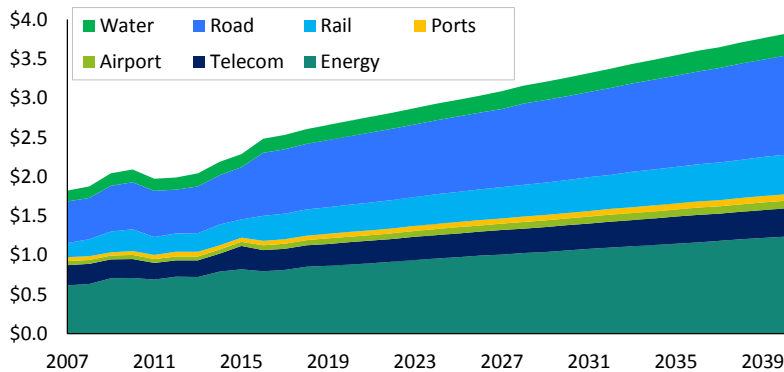
U.S. Property Vacancy Rates 2006-2026



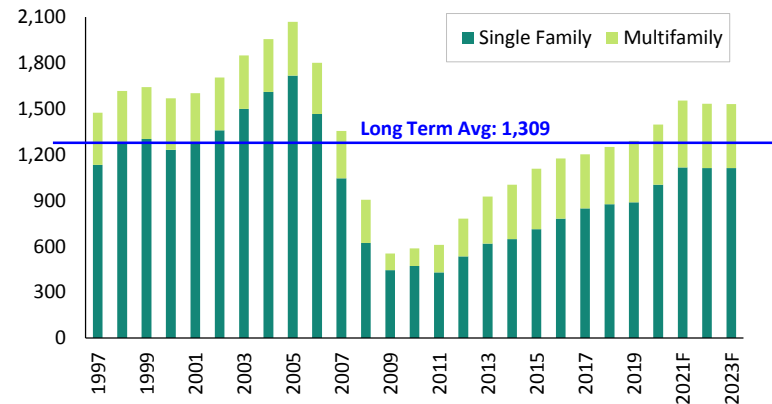
Oil & Gas Forward Curves



Infrastructure Investment Need (\$T)



Housing Starts 1997-2023 (000)





Virginia
Retirement
System

Private Equity

John Alouf
Program Director



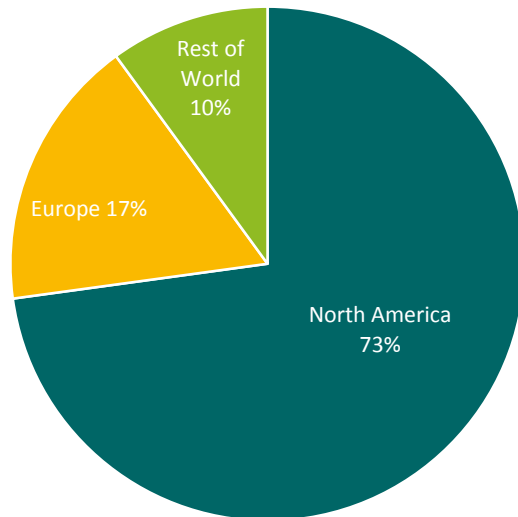
Overview: Team Members



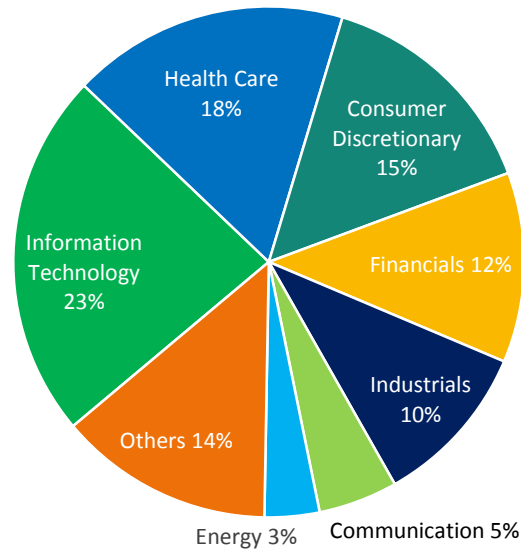
Professional	Position	Highest Degree	Professional Certifications	Investment Experience	VRS Tenure
John Alouf	Director	MBA	CFA	27	21
Jay Gentry	Portfolio Manager	BBA	CFA, CPA	27	27
Peter Murphy	Portfolio Manager	BBA	CFA, CPA	21	10
Rob Voeks	Portfolio Manager	PhD		24	7
De'Von Jones	Investment Officer	BBA	CFA	11	2
Carol Timpano	Portfolio Assistant	BS		6	6

Exposures: Position Weighting

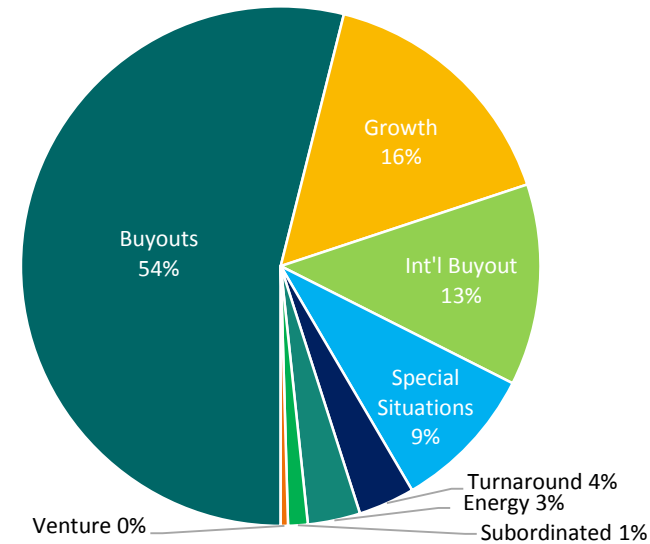
Geography



Industry



Sector



Geography and Industry charts based on 3/31/2021 manager information.
Sector chart based on 6/30/21 BNY Mellon information

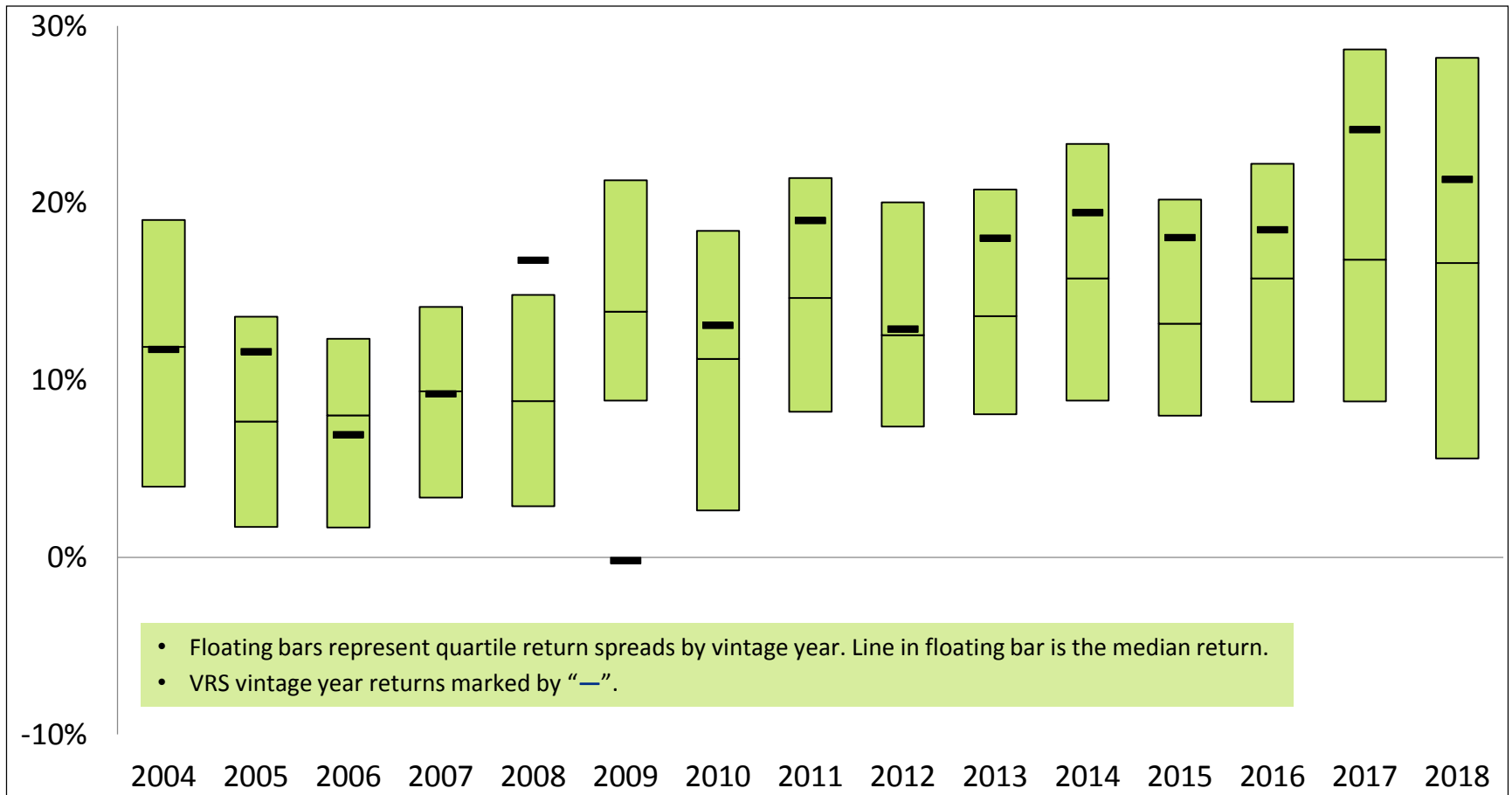
Results: Time-Weighted Performance – 6/30/21



	10 Year	5 year	3 Year	1 Year	MV (\$MM)
Total Private Equity	15.8	19.8	21.0	54.1	15,880
Strategic Benchmark ¹	14.0	17.1	16.3	57.8	
Excess Return	1.8	2.7	4.7	-3.7	
Buyouts	18.7	21.8	22.4	57.9	8,560
Energy	-3.9	-0.6	-12.6	1.8	519
Growth	24.5	31.6	37.6	87.8	2,540
Int'l Buyout	14.9	19.0	24.2	51.7	1,990
Special Situations	14.3	15.1	15.5	28.0	1,447
Sub Debt	12.7	16.3	12.9	18.3	194
Turnaround	14.4	14.5	12.7	51.6	556
Venture	12.2	13.3	20.4	61.4	71

¹ Benchmark: Russell 3000 + 250 basis points through 6/30/2013; MSCI ACWI 50% hedged + 250 basis points through 6/30/2020; MSCI ACWI thereafter

Results: VRS Relative IRR By Vintage Year



Source: PrivateIQ/Burgiss; all data as of 3/31/2021

Managers: Top Ten Investment Managers

Manager	Exposure
VRS Co-Investments	7.4%
Grosvenor	7.4%
TA Associates	5.7%
Hellman & Friedman	5.7%
Apax Partners	4.7%
General Atlantic	4.0%
CVC Capital	3.7%
Bain Capital	3.7%
Audax Group	3.5%
GTCR	3.1%
Total	48.8%

Exposure as of July 1, 2021; figures may not sum due to rounding

Diverse Investment Management Engagement (DIME)

Nine existing in-house relationships

- Asia Alternatives
- Clearlake
- ICV
- MBK Partners
- Siris
- Sycamore
- TSG
- Veritas
- Vista Equity

15 potential manager meetings & 1 conference in FY 2021

Four relationships through Grosvenor

Quarterly reports from Grosvenor

- Maintain commitment pace
- Continue with strategic separate accounts
- Co-investments on pace
- Selectively add new managers

Current Dynamics: Private Equity Pacing Model



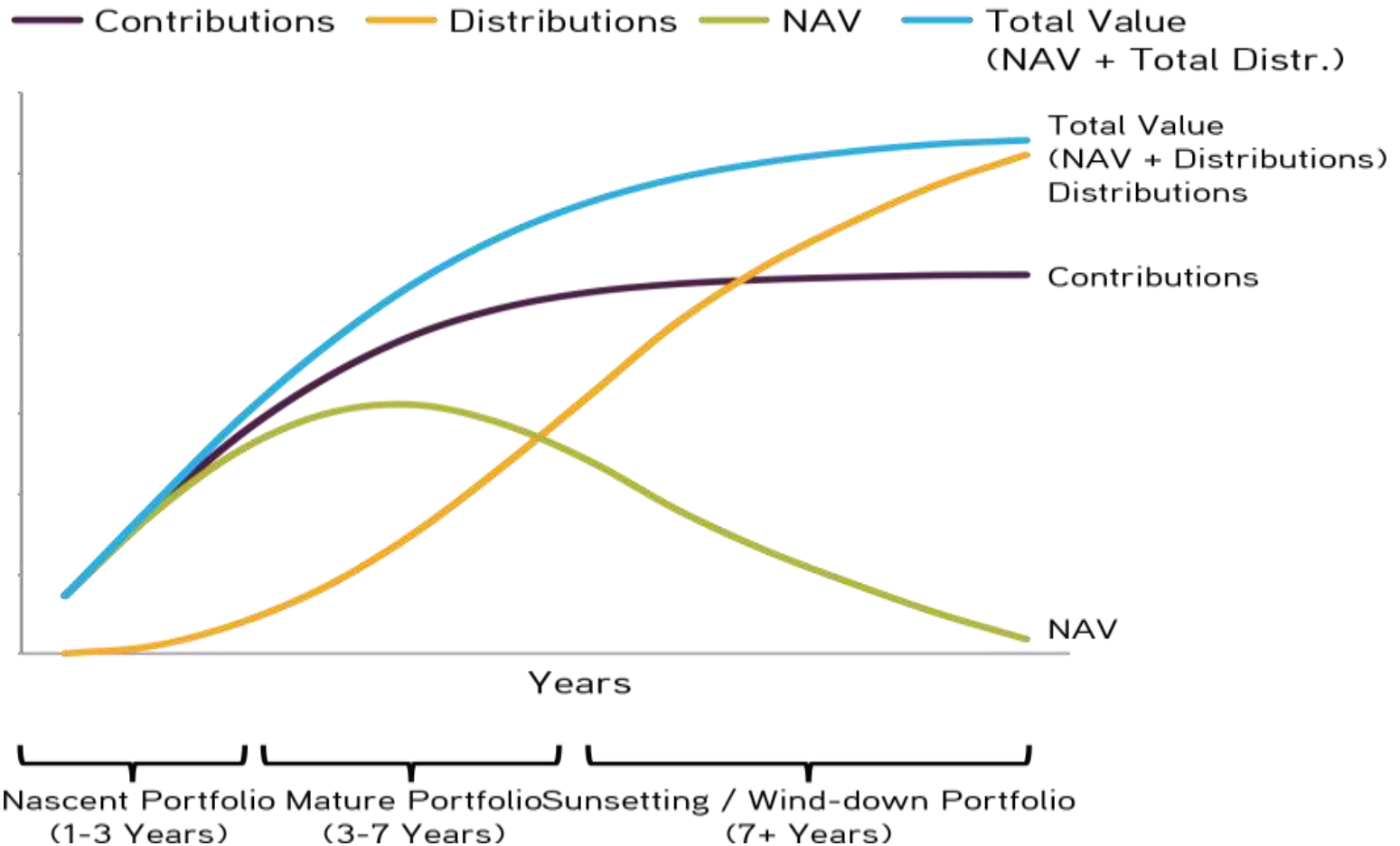
VRS AUM \$M (6/30/21)	101,788
Private Equity Target Allocation	14.0%
VRS Growth Assumption	3.5%

	6/2022	2023	2024	2025	2026	2027	2028	2029	2030
VRS AUM	105,351	109,038	112,854	116,804	120,892	125,123	129,503	134,035	138,277
PE NAV	17,331	17,950	17,944	17,952	17,704	17,507	15,566	18,335	18,722
Total PE % AUM	16.5%	16.5%	15.9%	15.4%	14.6%	14.0%	13.6%	13.7%	13.5%
PE % Target	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%
Ann. Commitments	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,400	3,400

Note: 2023-2030 are estimates

Current Dynamics: Fund Life Cycle

Sample Cash Flow Analysis Based on Life of a Typical Portfolio



Current Dynamics: Extending Hold Periods

- **Long Term Funds**
- **Continuation Funds**
- **GP-led Secondary Transactions**
 - Entire Fund
 - Partial Fund
 - Single Asset

Private Investment Partnership (PIP)

Steve McClelland
Program Director



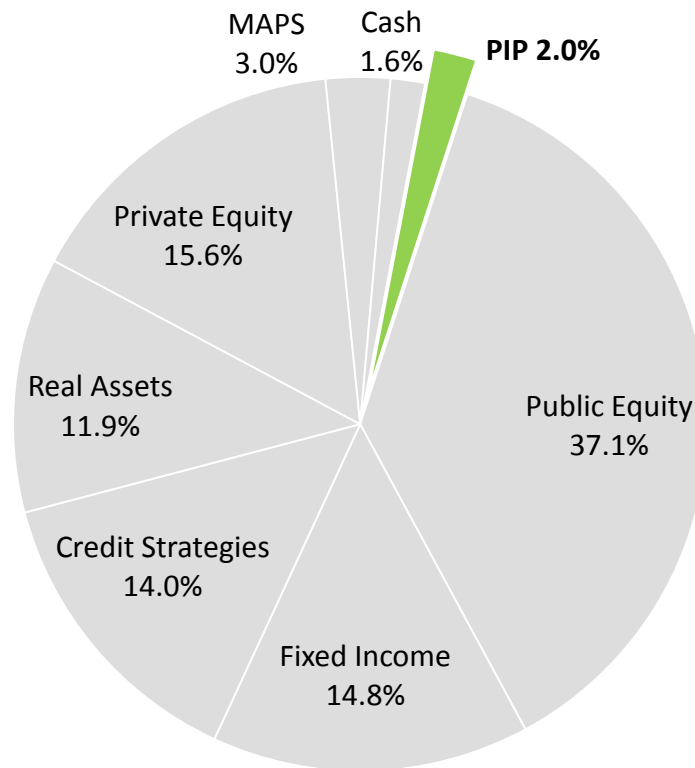
Overview: Team Members



Professional	Position	Highest Degree	Professional Certifications	Investment Experience	VRS Tenure
Steve McClelland	Director	MBA	CFA, CAIA	34	23
Steve Woodall	Senior Portfolio Manager	MBA	CFA, CAIA	17	16
Erica Billingslea	Investment Officer	MA	CFA Candidate	9	9
Kelly Baker	Portfolio Assistant	AAS		11	6

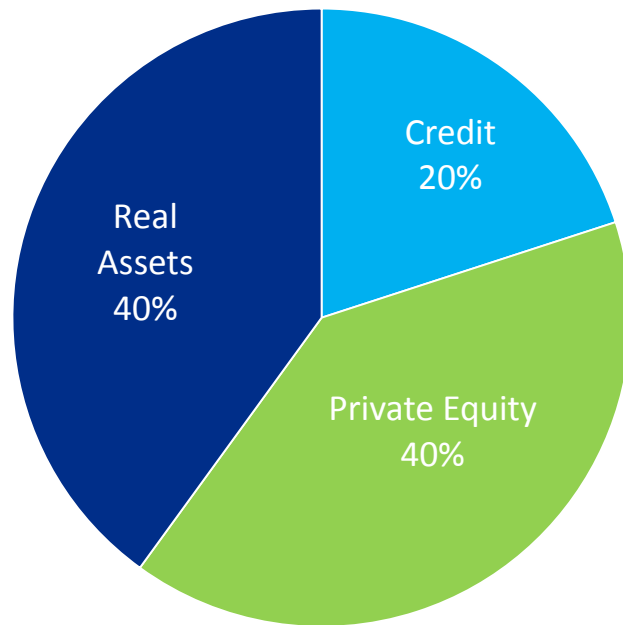
Overview: Total Fund Pie With PIP Allocation

Total PIP
2.0%

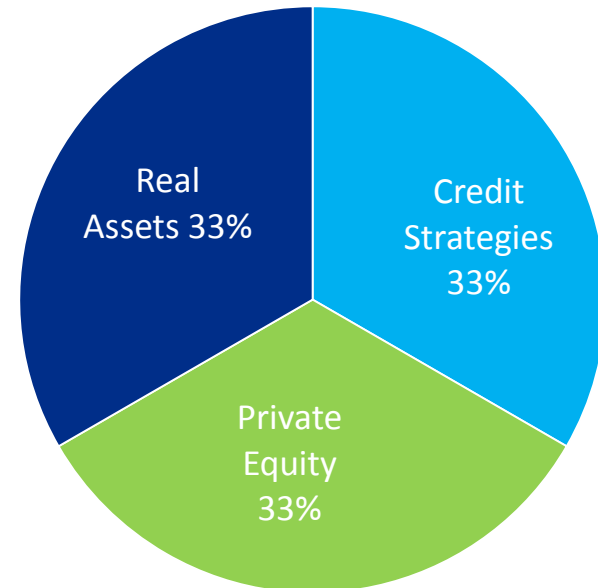


Asset Allocation: Benchmark – FY21 and FY22

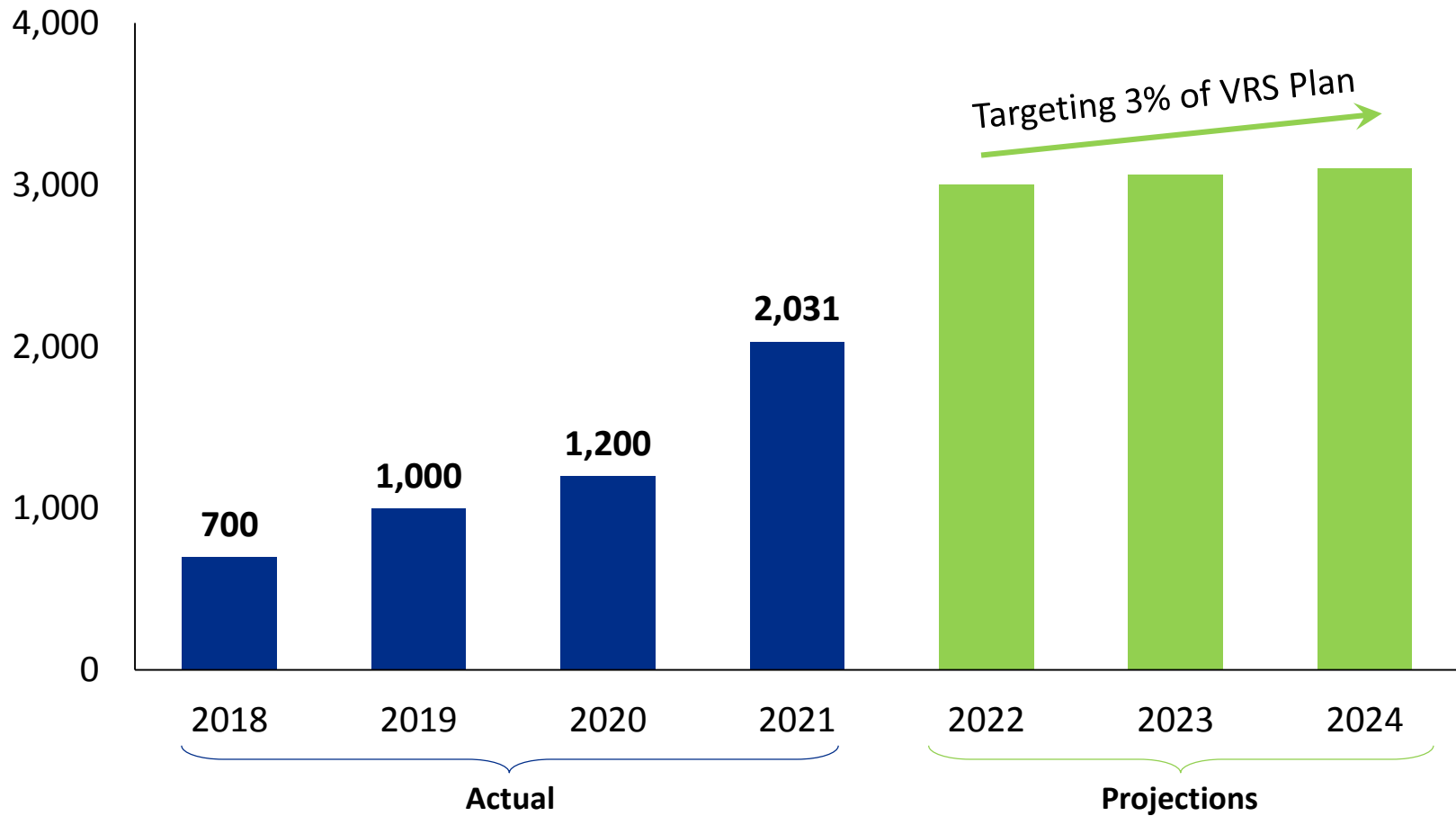
Benchmark – June 30, 2021



Benchmark – July 1, 2021



Portfolio Growth: Market Value (\$MM)



Results: Performance – 6/30/21



	Inception (2015)	5 Year	3 Year	1 Year	MV (\$MM)
Total PIP	8.37	9.19	9.30	30.77	2,031
Benchmark	8.44	9.28	9.41	24.97	
Excess Return	(0.07)	(0.09)	(0.11)	5.81	

Total Program IRR 11.68%

Source: BNY Mellon

- Expect to reach target of 3% of total plan in next year.
- Using re-investment rate to manage overall size of program.
- Roundtables and conferences are the primary group setting.
- Each program now working directly with manager as desired.
- Return expectation is to exceed benchmark and be competitive with individual programs.

- Thinking Long Term
- Investment Innovation
 - Account Structure
 - Investment Mandate

Investment Advisory Committee

November 10, 2021



Virginia
Retirement
System

Investment Advisory Committee Private Market Assets Program Reviews November 10, 2021

Reading Deck



Overview (K.C. Howell, Managing Director)

5 min

Program Reviews

- **Credit Strategies**
(Steve Woodall, Sr. Portfolio Manager) 30 min
- **Real Assets**
(Walker Noland, Program Director) 30 min
- **Private Equity**
(John Alouf, Program Director) 30 min
- **Private Investment Partnership (PIP)**
(Steve McClelland, Program Director) 30 min

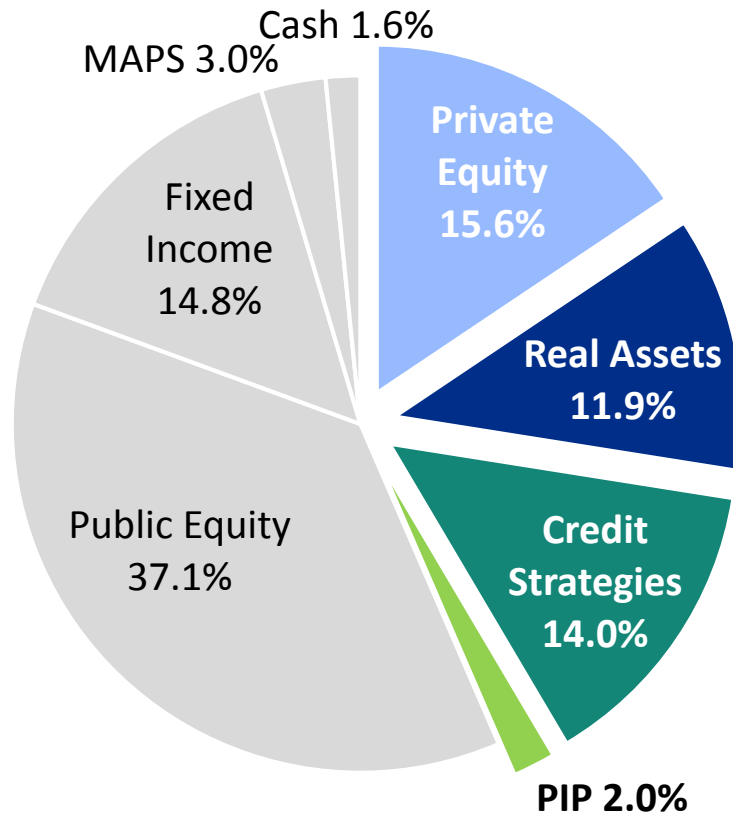
Program Reviews

K.C. Howell

Managing Director, Private Assets



Overview: What Does VRS Classify As Private Assets?



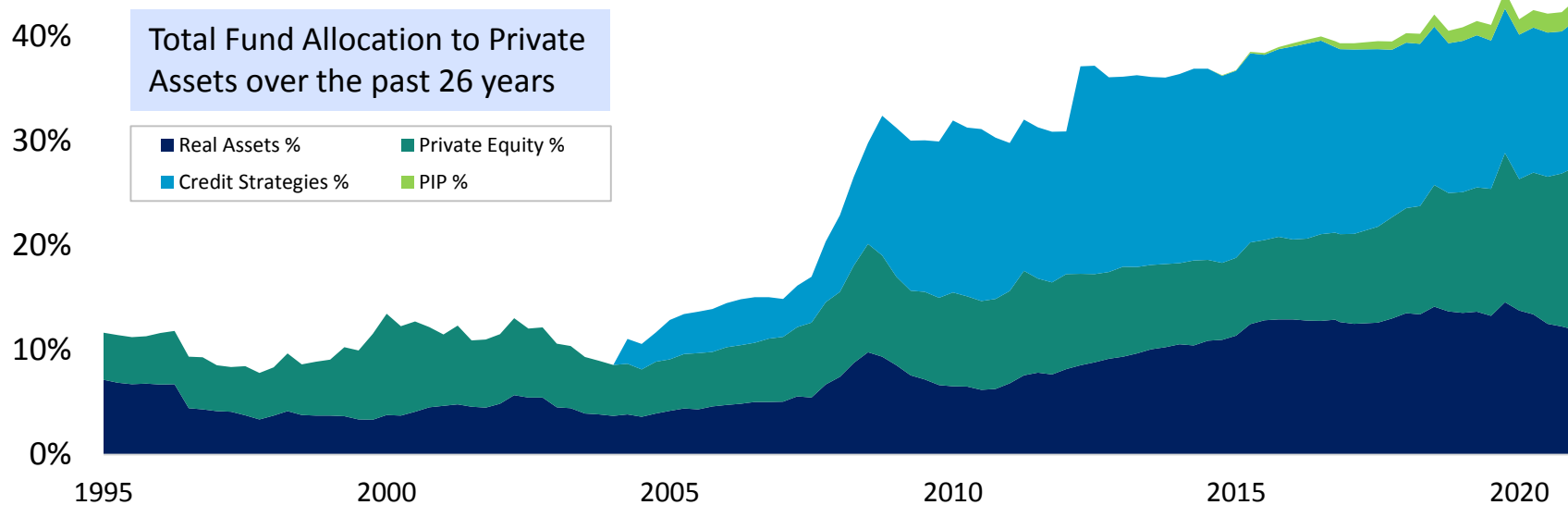
Private Market Assets: 43.5%

- **Real Assets**
Real estate, infrastructure, natural resources, etc.
- **Private Equity**
Buyouts, growth, turnaround, etc.
- **Credit Strategies**
Distressed, opportunistic, niche, etc.
- **Private Investment Partnerships (PIP)**
Multi-asset class

Market values as of 6/30/21; source: BNY Mellon data

Overview: Why Does VRS Invest In Private Assets?

- Enhance absolute & relative returns
- Capture illiquidity premium
- Reduced risk via diversification
- Migration from public to private



Market values as of 6/30/21; source: BNY Mellon data

Overview: Preview Of Agenda Items



- Overview
- Markets
- Exposures
- Results
- Co-investments
- Managers
- Looking Forward

Credit Strategies

Steve Woodall

Sr. Portfolio Manager, Credit Strategies



Agenda: Credit Strategies Annual Review Topics



- Overview
- Markets
- Exposures
- Results
- Co-investments
- Managers
- Looking Forward

Overview: Team Members



Professional	Position	Highest Degree	Professional Certifications	Investment Experience	VRS Tenure
Steve McClelland	Director	MBA	CFA, CAIA	34	23
Steve Woodall	Senior Portfolio Manager	MBA	CFA, CAIA	17	16
Perry Corsello	Portfolio Manager	MBA	CFA	24	10
Matt Bennett	Investment Officer	MBA		13	13
Erica Billingslea	Investment Officer	MA	CFA Candidate	9	9
Kevin Bliss	Investment Officer	Bcom		7	0
Kelly Baker	Portfolio Assistant	AAS		11	6

Overview: Credit Strategies Is Evolving



Diversified Program

- Investing broadly across areas exposed to credit risk

Primary Focus

- Less liquid, opportunistic & private credit solutions

Program Objective

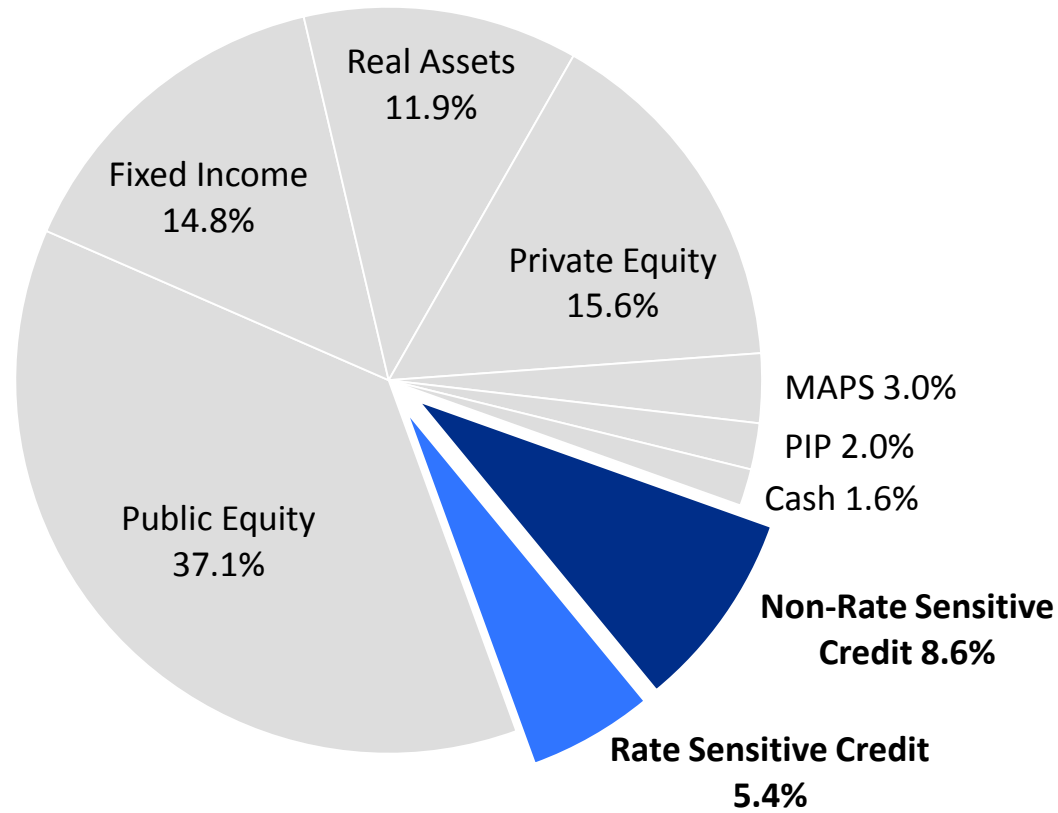
- Outperform liquid representative benchmarks (blend of senior secured term loans, high yield bonds, and investment grade indices)

Overview: Why Credit Strategies?

- Credit provides a large, investible market space
- Credit, with its high level of return contribution from income & its positioning in the capital structure, has an attractive risk/reward profile across market cycles
- An experienced dedicated team affords VRS the opportunity to explore less traveled areas & invest (or dis-invest) more efficiently

Overview: Asset Allocation – 6/30/21

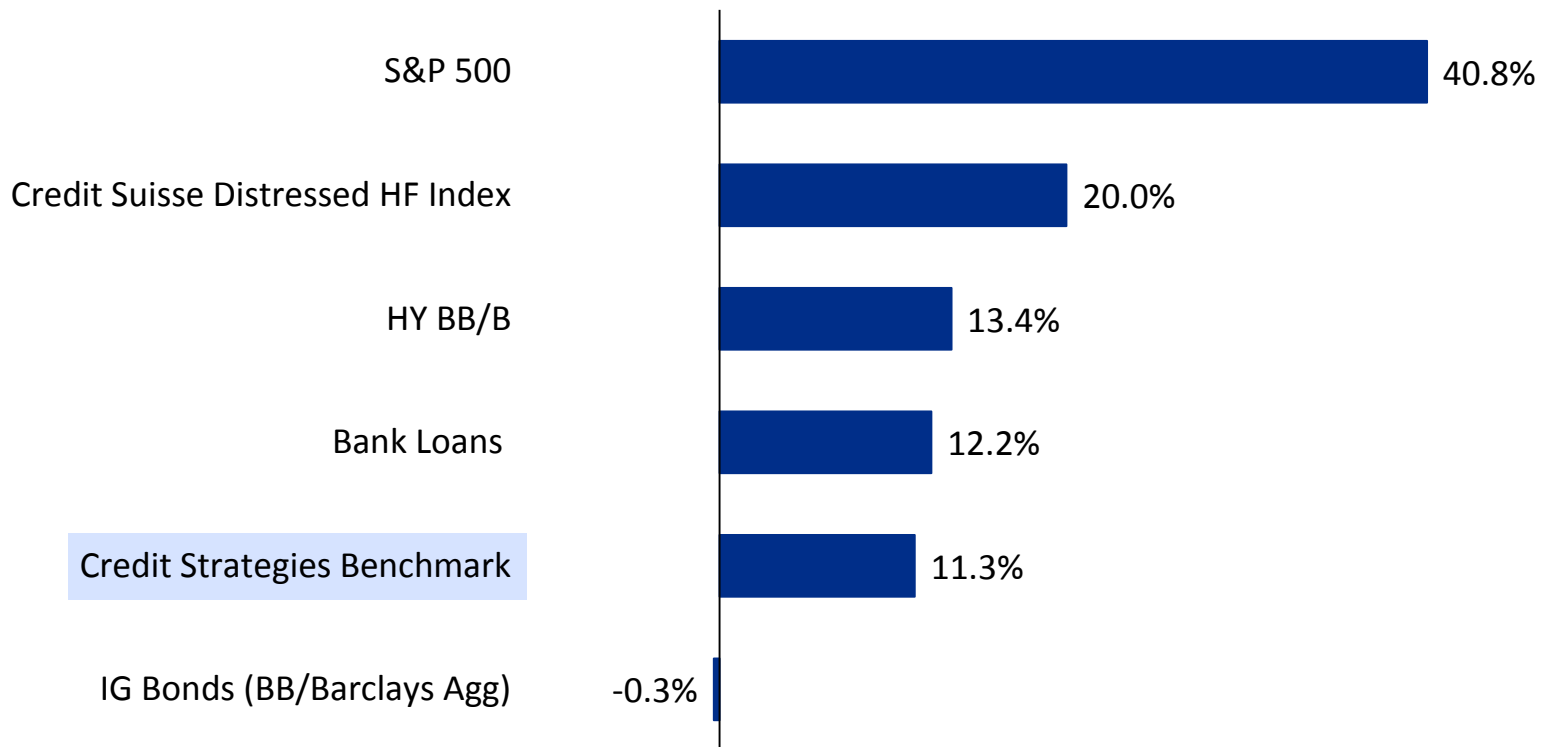
**Total Credit Strategies
14%**



Source: BNY Mellon

Markets: Update - Part 1

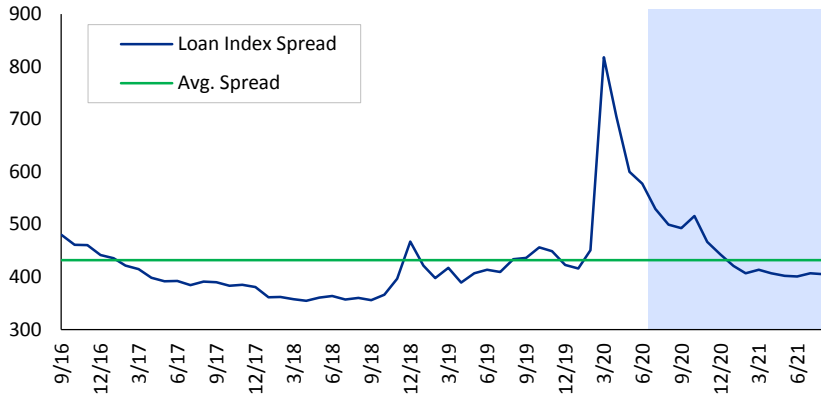
FY 2021 Returns



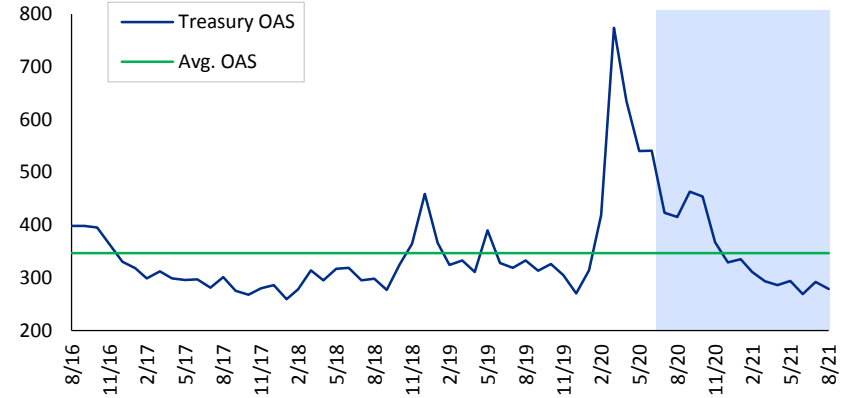
Source: VRS, Bloomberg, Credit Suisse

Markets: Update - Part 2

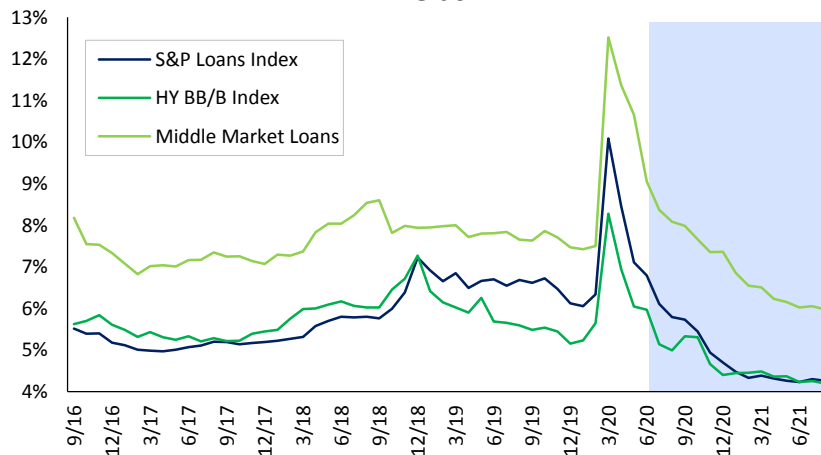
Loan Index Spread



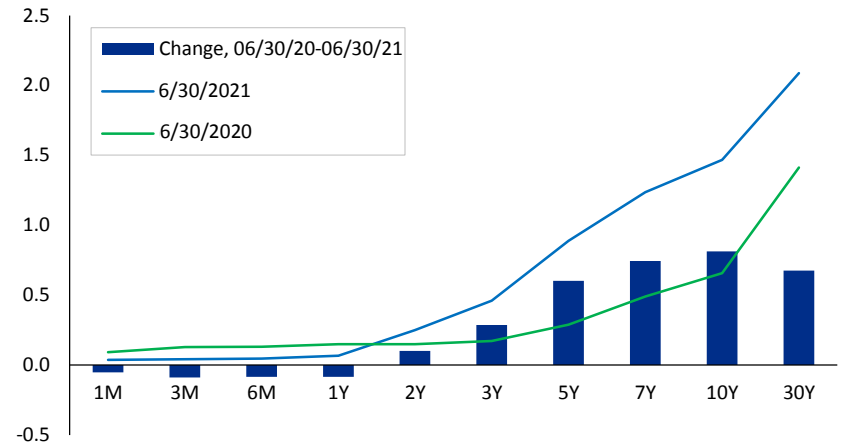
HY BB/B Index Spread



Yields

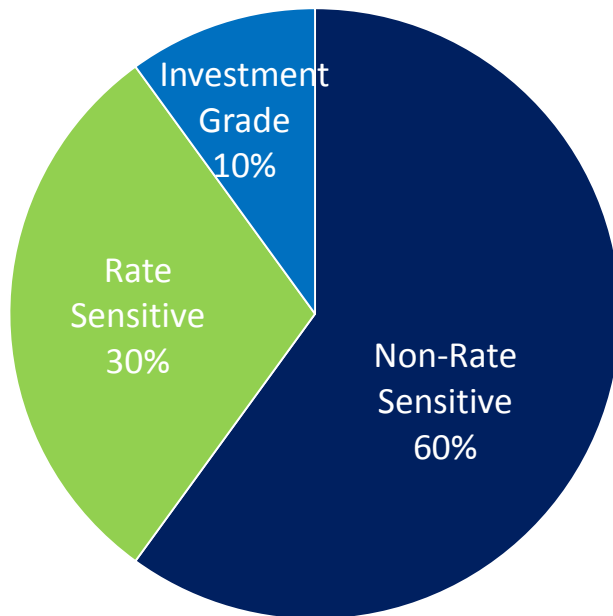


U.S. Treasury Yields

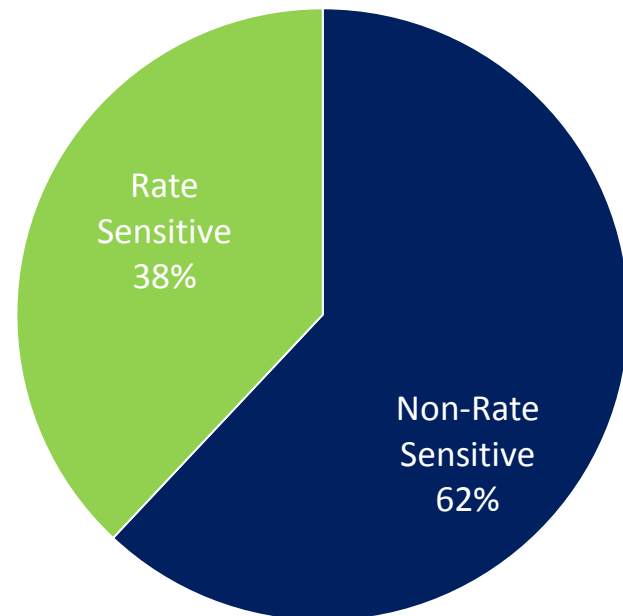


Exposures: Allocation Of Benchmark & Program

Benchmark Weights



Program Weights



Source: BNY Mellon

Exposures: Sub Strategies



Sub Strategies	% Allocation 6/30/20	% Allocation 6/30/21	Change
Rate Sensitive			
High Yield	20.1%	16.7%	-3.4%
Investment Grade	10.0%	8.9%	-1.1%
Mezzanine	5.1%	5.3%	0.2%
Other Rate Sensitive	8.2%	7.4%	-0.8%
Total Rate Sensitive	43.4%	38.5%	-4.9%
Non Rate Sensitive			
Bank Loans	15.7%	14.0%	-1.7%
Direct Lending	13.4%	13.8%	0.4%
Absolute Return			
Hedge Fund	2.1%	1.1%	-1.0%
Opportunistic	14.6%	15.7%	1.1%
Distressed	5.8%	7.2%	1.4%
Other Non Rate Sensitive	5.0%	9.7%	4.7%
Total Non Rate Sensitive	56.6%	61.5%	4.9%
Total	100.0%	100.0%	0.0%
Asset Value	\$11,271,368,991	\$14,224,607,404	\$2,953,238,413

Exposures: Positioning

Close to neutral weighting for broad categories

- Rate Sensitive Credit 38.5% (benchmark weight: 40%)
- Non Rate Sensitive Credit 61.5% (benchmark weight: 60%)

Shifting to less liquid/private assets

- Liquid Investments 31%
- Illiquid investments 69%

Growth areas for coming year

- Direct Lending
- Opportunistic
- Mezzanine
- Other NRS

Sources of funds

- High Yield
- Bank Loans

Results: Total Credit Strategies – 6/30/21



	10 Year	5 year	3 Year	1 Year
Total Credit Strategies	6.57	8.01	8.25	18.43
Strategic Benchmark	5.72	6.54	6.68	11.26
Excess Return	0.85	1.47	1.57	7.17
Portfolio Risk	5.25	5.48	6.86	3.43
Benchmark Risk	5.86	6.62	8.35	3.18
Active Risk	1.75	2.09	2.68	2.47

Source: BNY Mellon

Results: Rate Sensitive – 6/30/21



	10 Year	5 year	3 Year	1 Year
Rate Sensitive	7.19	8.28	10.01	15.73
Strategic Benchmark	5.57	5.99	7.26	9.80
Excess Return	1.62	2.30	2.75	5.93
Portfolio Risk	4.66	5.32	6.64	5.08
Benchmark Risk	5.30	5.45	6.78	4.79
Active Risk	1.79	1.31	1.54	1.46

Source: BNY Mellon

Results: Non-Rate Sensitive – 6/30/21



	10 Year	5 Year	3 Year	1 Year
Non-Rate Sensitive	6.65	6.79	5.60	20.15
Strategic Benchmark	4.97	5.20	4.60	12.22
Excess Return	1.68	1.58	1.00	7.92
Portfolio Risk	4.41	5.27	6.74	3.34
Benchmark Risk	5.92	7.10	9.16	2.54
Active Risk	3.08	3.40	4.32	3.88

Source: BNY Mellon

Headwinds/Tailwinds

- Tailwinds: Falling credit spreads; HY fell from 541 to 269
- Headwinds: Rising UST yields : 5 year rose 60 basis points

Largest Absolute Return Contributors:

- Positive
 - Opportunistic: +4.9% (16% of program)
 - Other Rate Sensitive: +2.7% (7% of program)

Largest Relative Return Contributors:

- Positive
 - Opportunistic: +2.9% (16% of program)
 - Other Rate Sensitive: +1.7% (7% of program)
- Negative
 - Other Non-Rate Sensitive: -0.2% (10% of program)
 - Mezzanine: -0.04% (5% of program)

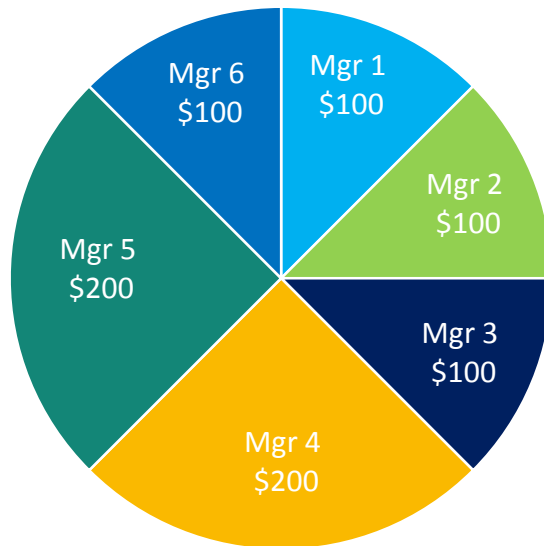
Co-investments: Credit Strategies Approach



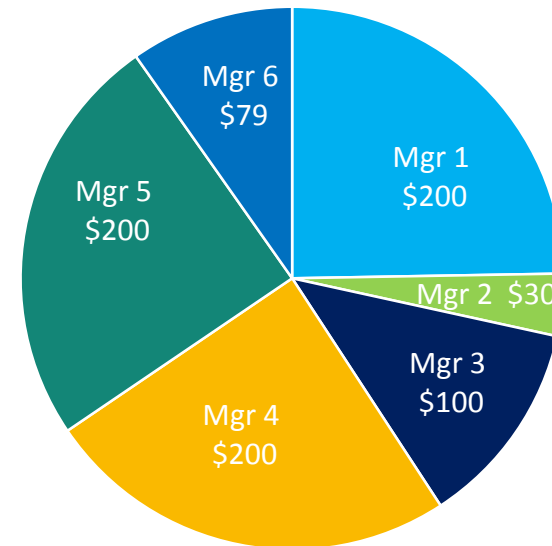
- Objective is to invest additional funds alongside existing strategies with a lower fee arrangement
- Moved to a more efficient legal structure (separate accounts)
- The manager remains fiduciary
- VRS reviews all proposals prior to allowing investment to move forward

Co-investment: Manager Capacity

June 2020 (\$M)



June 2021 (\$M)



- 6 accounts totaling \$800 million in commitments
- Commitment size range: \$100-\$200 million
- Market Value @ 6/30/2020: \$210 million

- 6 accounts totaling \$807 million in commitments
- Commitment size range: \$30-\$200 million
- Market Value @ 6/30/2021: \$386 million

The increase in market value primarily reflects an increase in called commitments.

Managers: Top 10 Investment Managers



Manager	Mandates	# of Mandates	% of Program
Beach Point Total	Bank Loan, Distressed, Opportunistic	6	18.7%
PGIM Total	Investment Grade, Mezzanine	4	9.4%
JPM Total	High Yield	1	8.6%
Solus Total	Bank Loan, Hedge Fund, Opportunistic	3	8.4%
PIMCO Total	High Yield	2	8.1%
Anchorage Total	Opportunistic, Other Rate Sensitive	4	5.2%
HPS Total	Direct Lending, Mezzanine	3	4.7%
Allianz Total	Other Rate Sensitive	1	4.5%
BlackRock Total	Direct Lending	1	4.4%
Schroders Total	Structured and Securitized Credit	1	4.1%

Managers: DIME Investments

- 15 potential manager meetings/calls in FY 2021
- Quarterly reports from Aon Hewitt on DIME managers in the asset class
- Aksia relationship (FY 2020 inception) has provided more visibility of smaller credit managers
- One relationship through Aksia

Managers: Hires & Terminations (FY 2021)



Action	Effective Date	Commitment/ Current Value	Funding/Defunding Period	Description
Hired	7/1/2020	\$300 Million	3 Years	Oaktree Opportunities Fund XI – A closed-end fund focused on investing in both private and public corporate distressed debt opportunities.
Hired	8/17/2020	\$200 Million	5 Years	Audax Mezzanine V – A closed-end fund investing in middle market mezzanine debt and equity.
Hired	9/4/2020	\$300 Million	4 Years	Ares Capital Europe V – A closed-end fund that will directly originate and provide one-stop, flexible and scaled debt capital to European middle market companies.
Hired	9/17/2020	\$1 Billion	4 Years	Carlyle Diversified Credit – A fund that will invest opportunistically across credit markets, with a focus on private credit investments.
Terminated	10/21/2020	\$42 Million	Immediate	Anchorage Capital Partners – An event-driven credit hedge fund.
Hired	11/25/2020	\$300 Million	4 Years	Ares Private Credit Solutions II – An upper middle market junior capital lending strategy.
Hired	3/10/2021	\$400 Million	3 Years	Whitehorse Liquidity Partners IV – A portfolio finance strategy.

Continue to execute on CS2020

- Hired or upsized 8 mandates representing over \$3B in commitments
- Shifted program from 39%/61% liquid/illiquid to 31%/69% liquid/illiquid

Diversification of program

- Broaden strategies to capture market opportunities
- Wider geographical footprint: two dedicated European mandates; one global
- New targeted strategies: portfolio finance and asset-based lending

Executed broad credit mandates

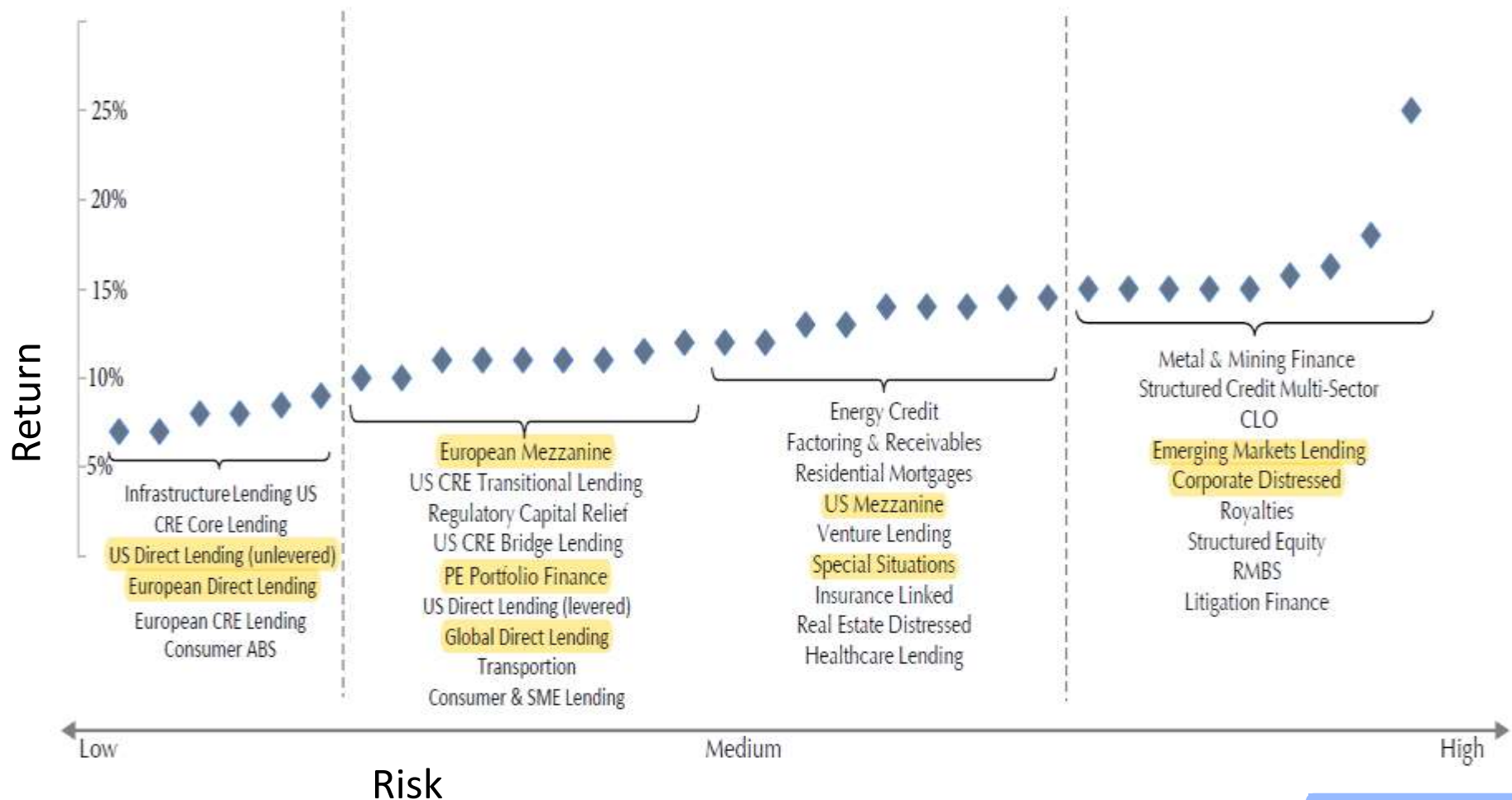
- \$1 billion mandate with Carlyle
- \$500 million mandate with OHA

Looking Ahead: CS2020 Implementation

- Targeted <20% liquid strategies within 3 years
- Increase breadth of strategy mix, with a focus on contractual returns and downside protection
- Increase expected return profile while holding volatility consistent with pre-CS2020 levels

Opportunities in Private Credit

Attractive Opportunities Across the Risk Spectrum





Virginia
Retirement
System

Real Assets

Walker Noland
Director, Real Assets



Overview: Objectives



Diversification – historically low correlation to global equities as shown below

Competitive Returns – strong historical returns

Cash Flow – investments tend to distribute cash quarterly

Inflation Linkages – varies by sector & asset type, but some ability to pass through inflation

Correlations

	Global REITs	U.S. Commercial Real Estate	Timberland	Farmland	Energy Equities	Mining Equities (ex. Gold & Silver)	Gold	Infrastructure Equities	Global Equities	IG Corp Bonds	CPI
Global REITs	1.00										
Commercial Real Estate	0.40	1.00									
Timberland	0.05	(0.11)	1.00								
Farmland	0.21	(0.00)	0.28	1.00							
Energy Equities	0.53	0.19	0.31	0.20	1.00						
Mining Equities	0.64	0.23	0.25	0.17	0.74	1.00					
Gold	0.13	(0.07)	0.19	0.31	0.04	0.24	1.00				
Infrastructure Equities	0.84	0.38	0.19	0.31	0.70	0.71	0.16	1.00			
Global Equities	0.76	0.30	0.25	0.13	0.66	0.76	0.10	0.85	1.00		
IG Corp Bonds	(0.00)	(0.27)	0.29	(0.29)	(0.26)	(0.27)	0.41	0.02	(0.19)	1.00	
U.S. CPI	0.18	0.33	0.45	0.32	0.31	0.27	0.19	0.25	0.13	(0.13)	1.00

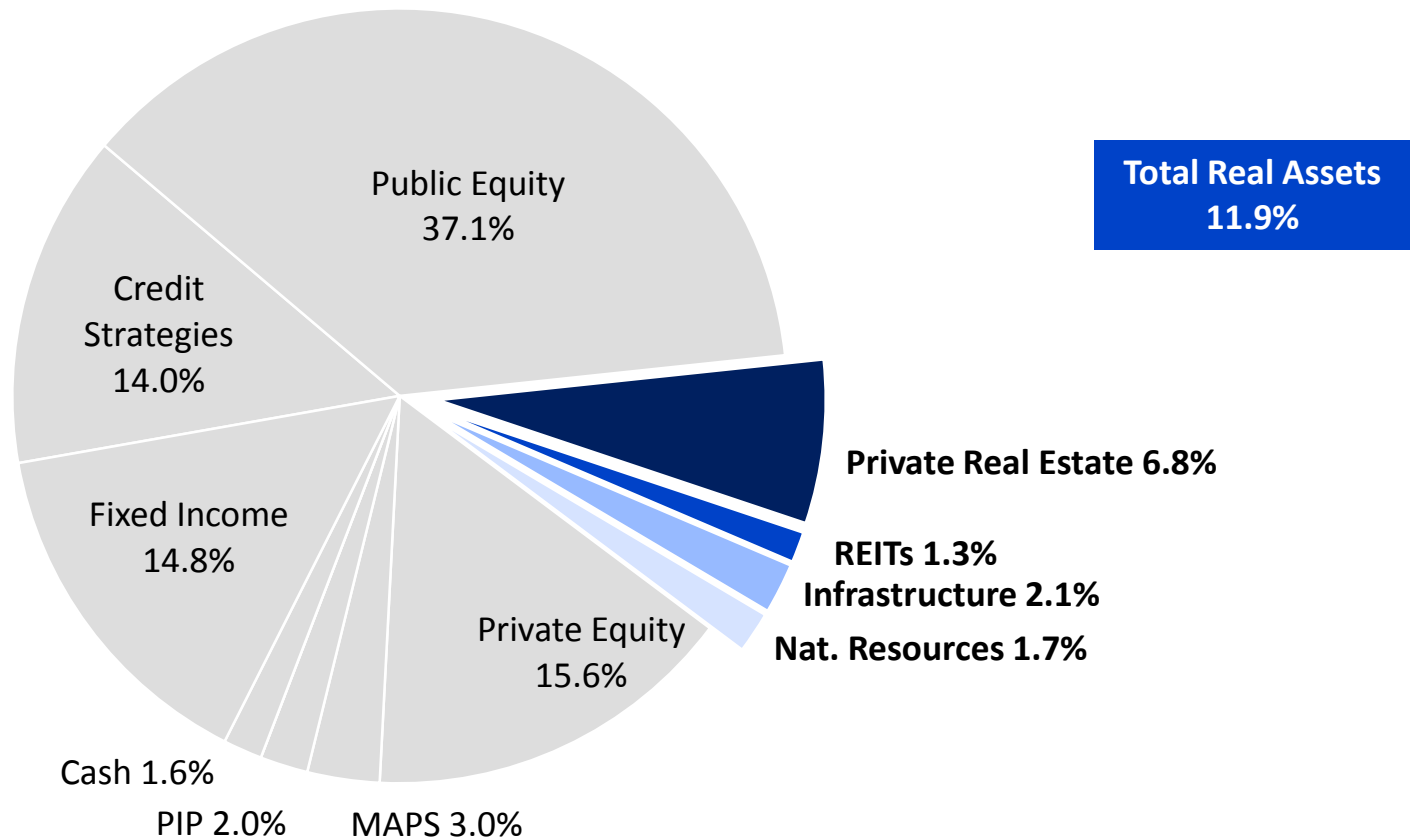
Notes: Private Commercial Real Estate returns de-smoothed. Correlations based on quarterly data, except Timberland and Farmland, which are based on annual data since those assets are generally appraised only once per year.

Overview: Team Members



Professional	Position	Highest Degree	Professional Certifications	Investment Experience	VRS Tenure
Walker Noland	Director	MBA	CFA	21	11
Tom Coleman	Portfolio Manager	BS	CFA, CAIA	21	10
Jummai Sarki-Hurd	Portfolio Manager	MBA, MS	-	15	8
Tom Mulvin	Senior Investment Officer	BS	-	28	28
Warren Chang	Senior Investment Officer	MBA, MS	CFA	24	6
Carol Timpano	Portfolio Assistant	BS	-	6	6

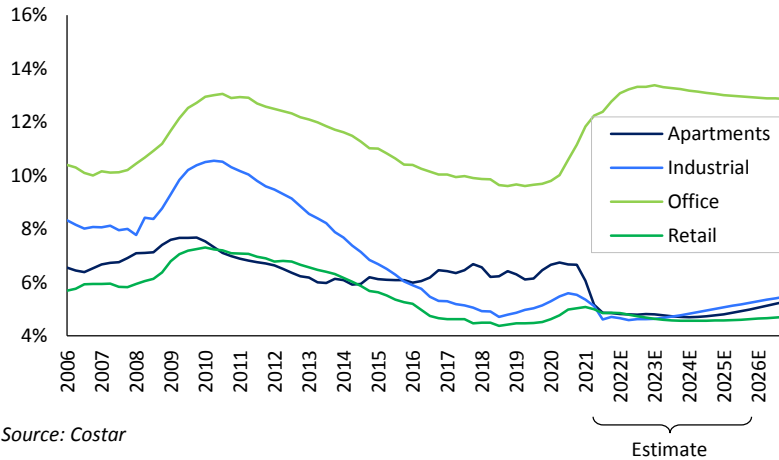
Overview: Asset Allocation – 6/30/21



Source: BNY Mellon

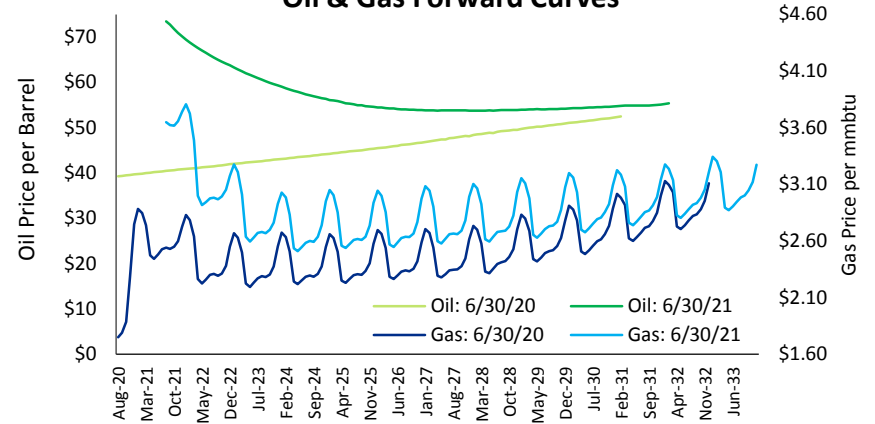
Markets: Fundamentals

U.S. Property Vacancy Rates 2006-2026



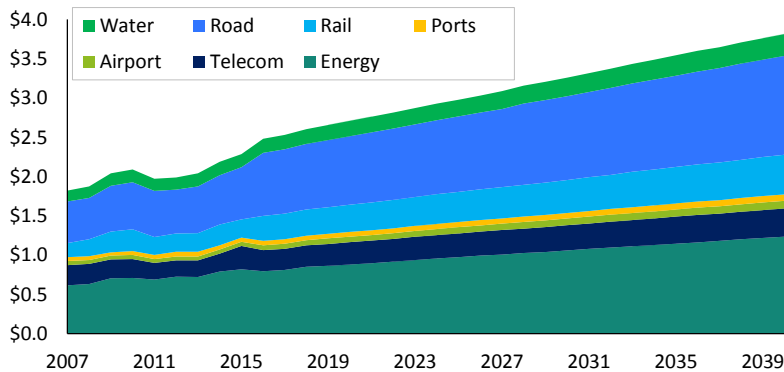
Source: Costar

Oil & Gas Forward Curves



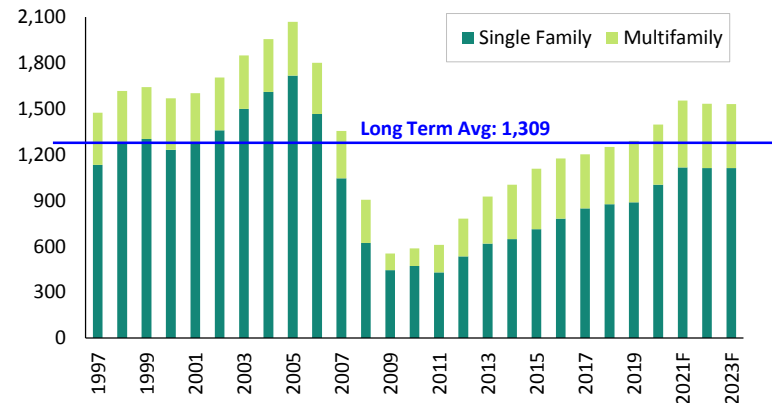
Source: Bloomberg

Infrastructure Investment Need (\$T)



Source: GI Hub Infrastructure Outlook

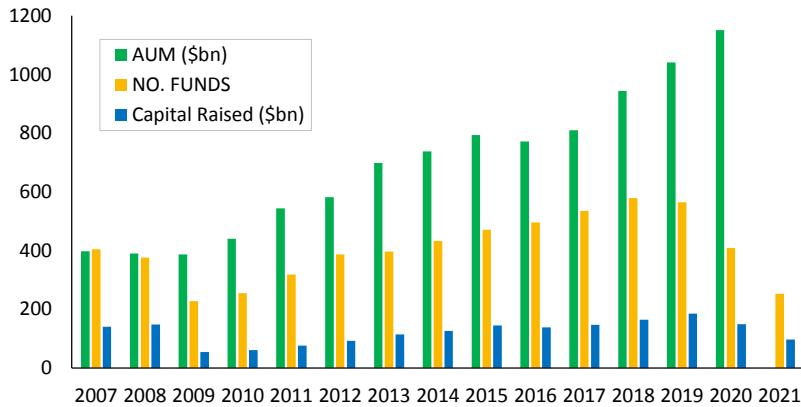
Housing Starts 1997-2023 (000)



Source: U.S. Census Bureau, NAHB

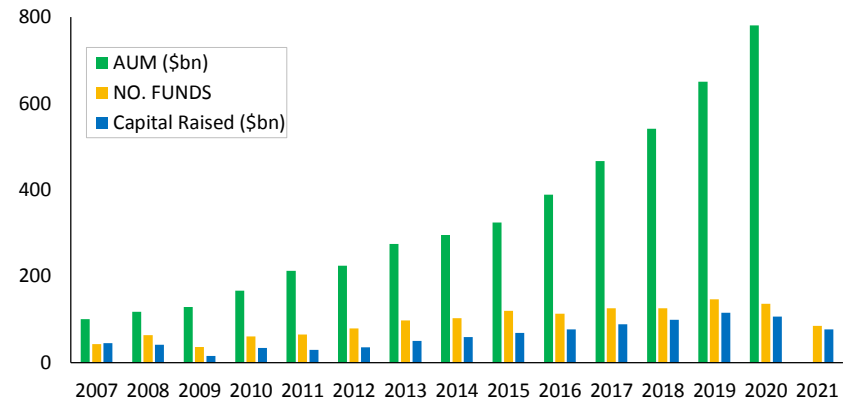
Markets: Capital Markets

Closed-End Private Real Estate Fundraising



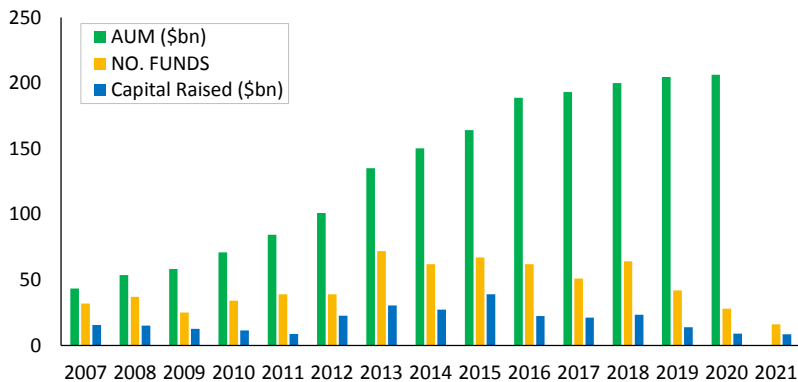
Source: Preqin Aug 2021

Closed-End Infrastructure Fundraising



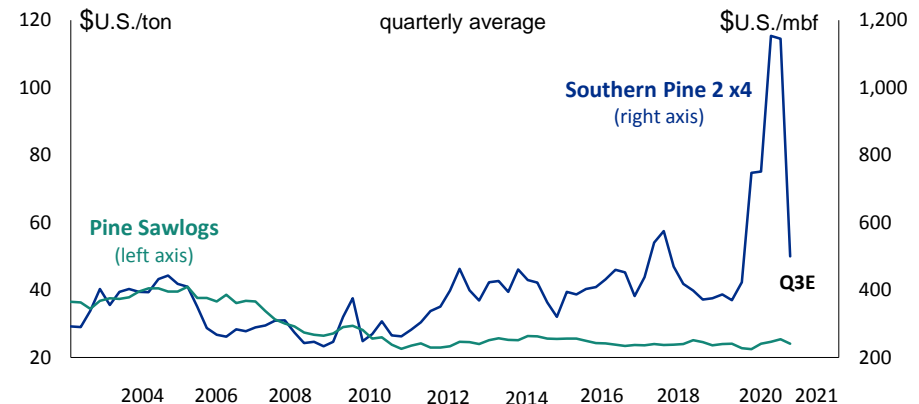
Source: Preqin Aug 2021

Closed-End Natural Resources Fundraising



Source: Preqin Aug 2021

U.S. South Lumber vs. Stumpage Prices

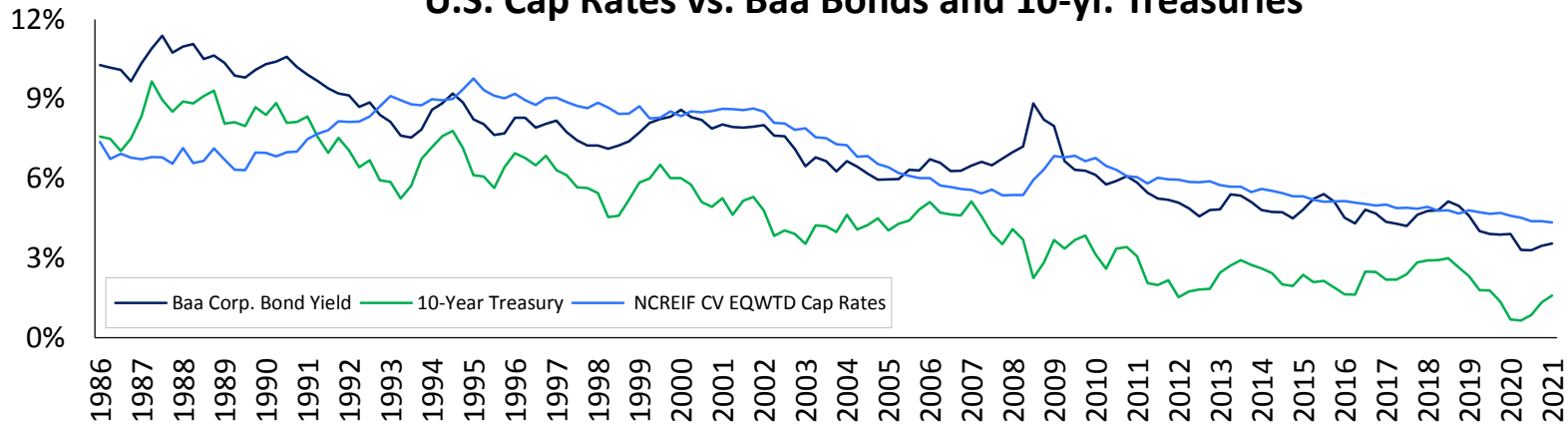


Data Sources: Timber Mart-South; Random Lengths; ERA

Markets: U.S. Cap Rates & REIT NAV Premiums

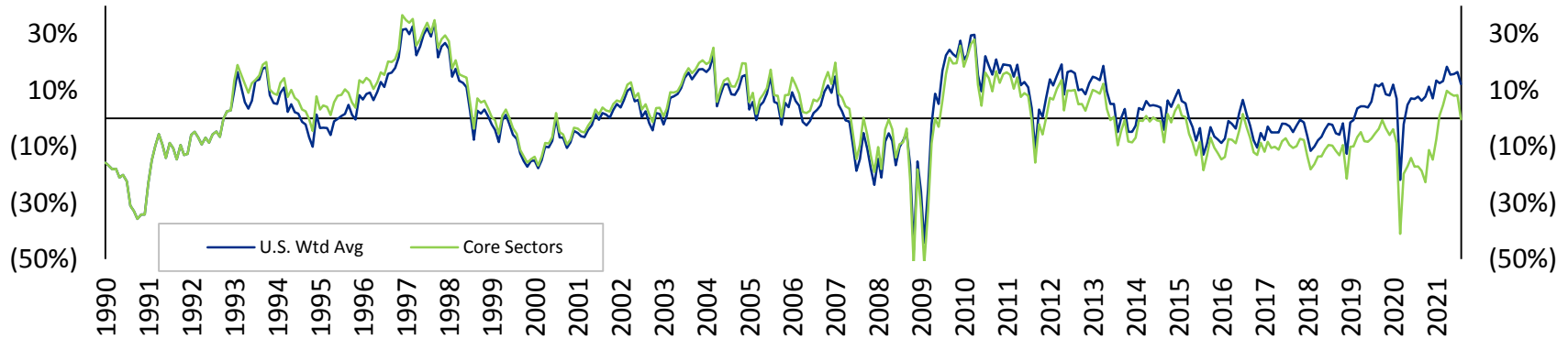


U.S. Cap Rates vs. Baa Bonds and 10-yr. Treasuries



Sources: Bloomberg, NCREIF

REITs Average Premium to NAV

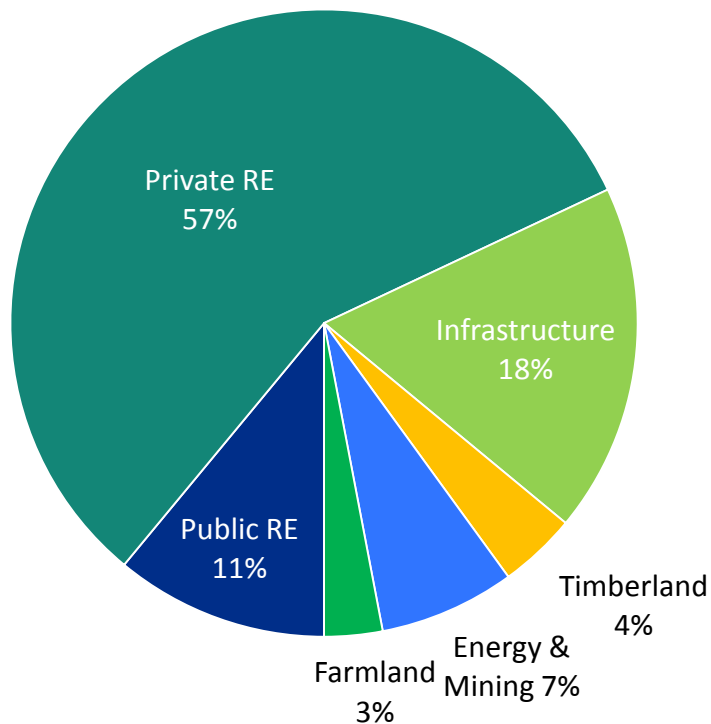


Sources: Green Street Advisors

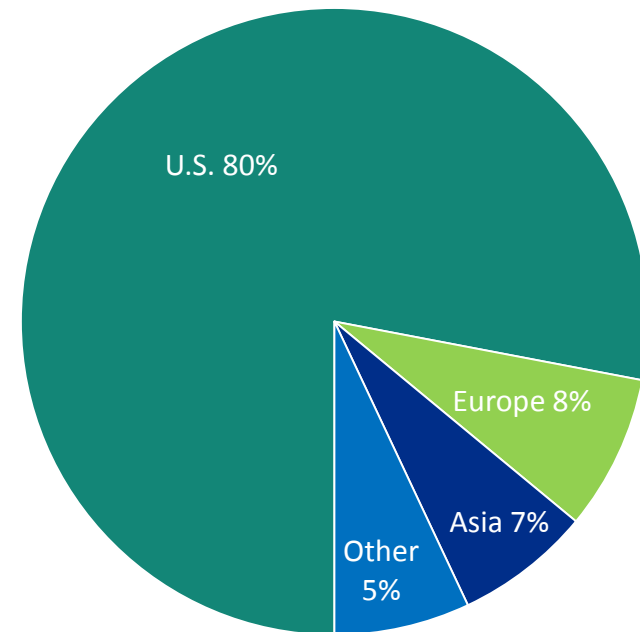
Exposures: Sectors & Geography – 6/30/21

Current Market Value: \$12.1 Billion

Sectors

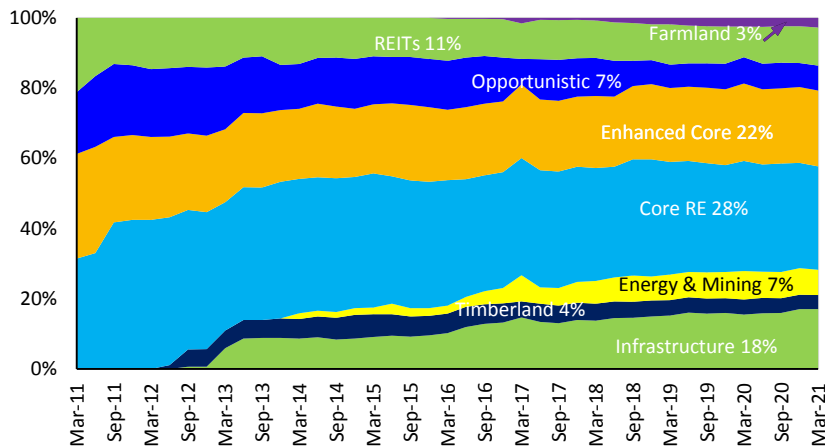


Geography

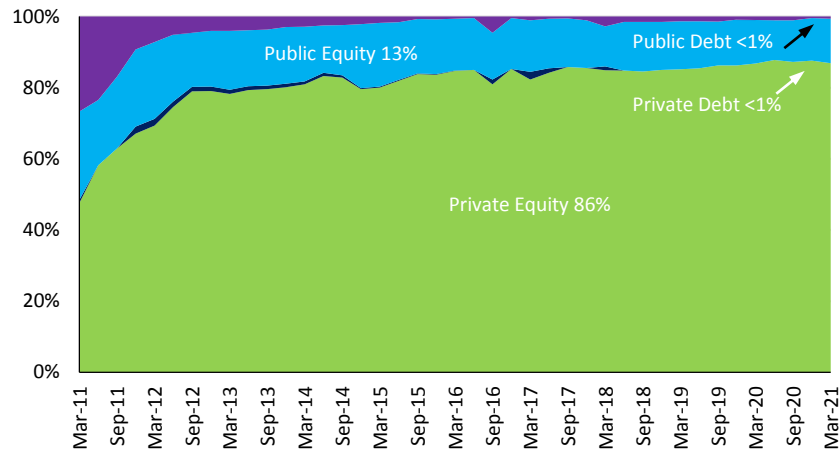


Exposures: Risk Metrics

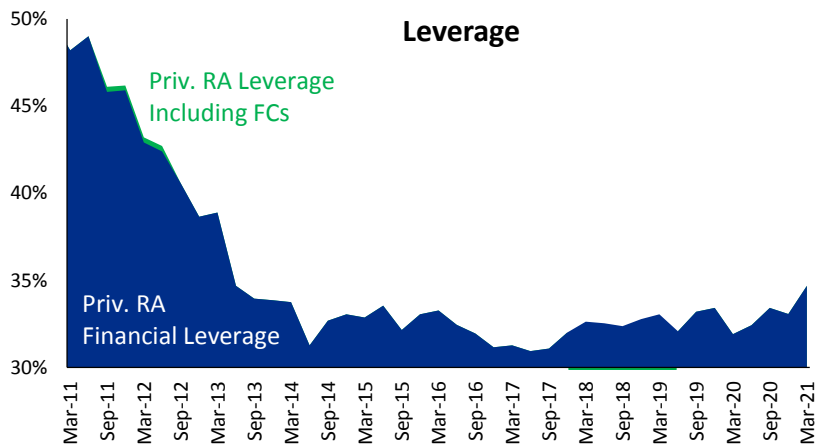
Risk/Sector Categories



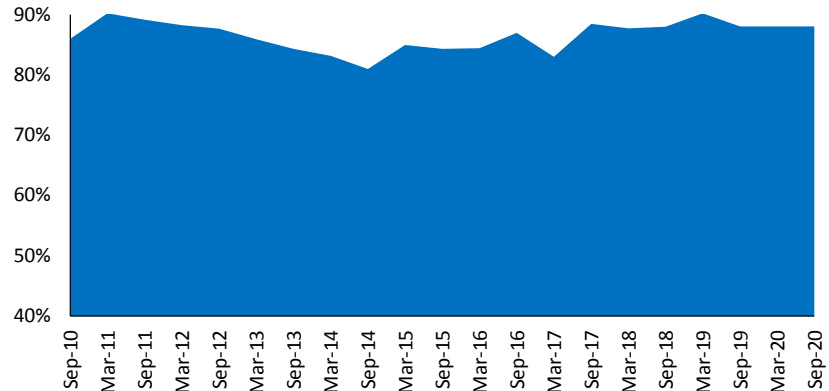
Four Quadrants



Leverage



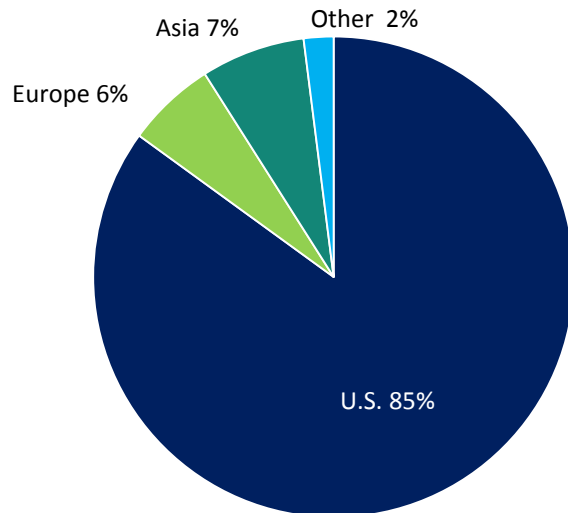
Stabilized Operating (% of Private RE)



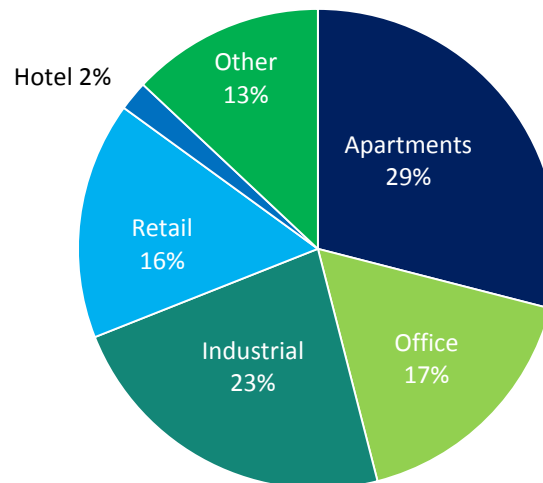
Source: BNY Mellon

Exposures: Real Estate – 6/30/21

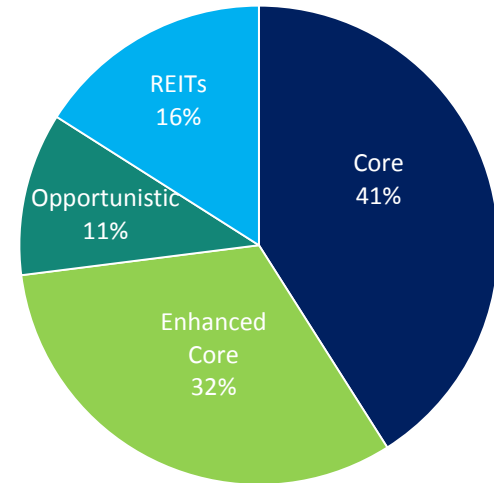
Geography



Property Type



Category

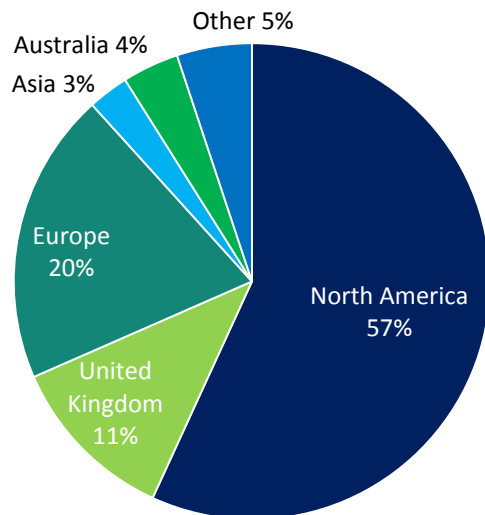


Market	# Accts.	Market Value (\$MM)	Market Value %	Unfunded Commitment/Allocation (\$MM)
Private	44	6,941	84	2,114
Public	2	1,298	16	0
Total	46	8,239	100	2,114

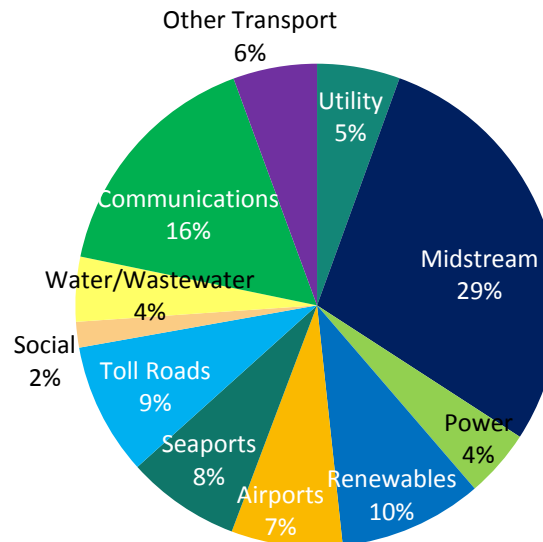
Source: BNY Mellon

Exposures: Infrastructure – 6/30/21

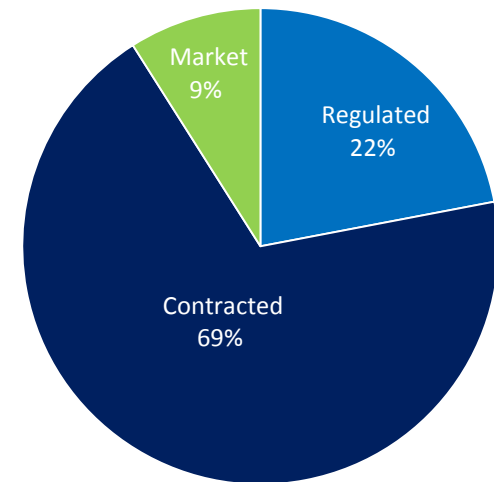
Geography



Sector



Revenue Source

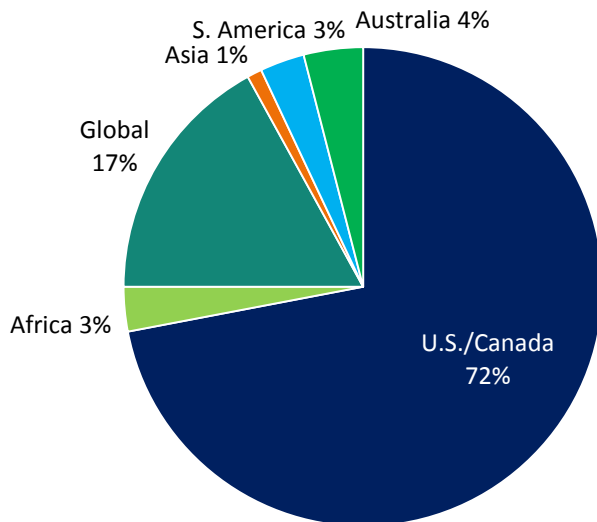


Market	# Accts.	Market Value (\$MM)	Market Value %	Unfunded Commitment/Allocation (\$MM)
Private	24	2,043	96	1,005
Public	1	91	4	-
Total	25	2,134	100	1,005

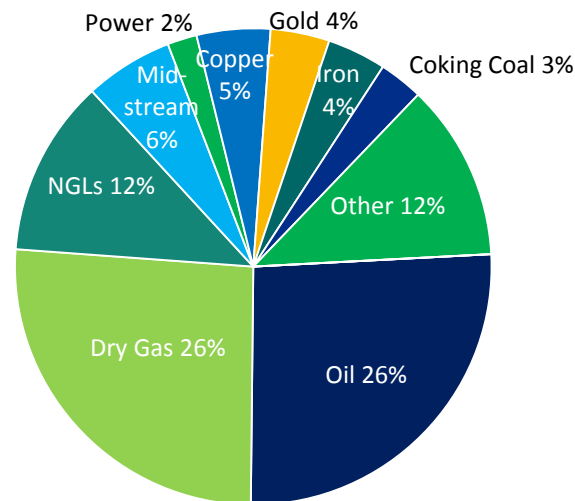
Source: BNY Mellon

Exposures: Energy & Mining – 6/30/21

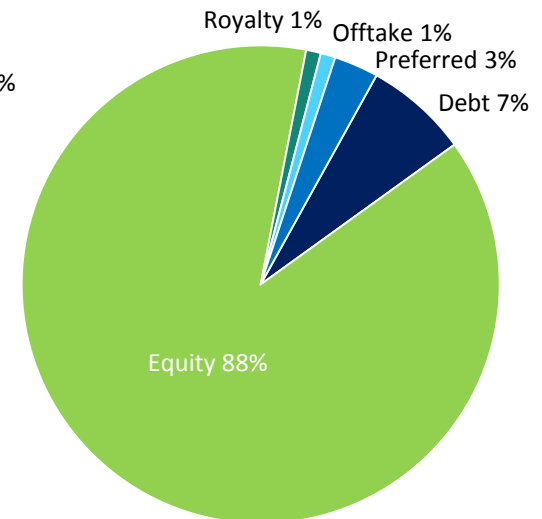
Geography



Commodity



Structure

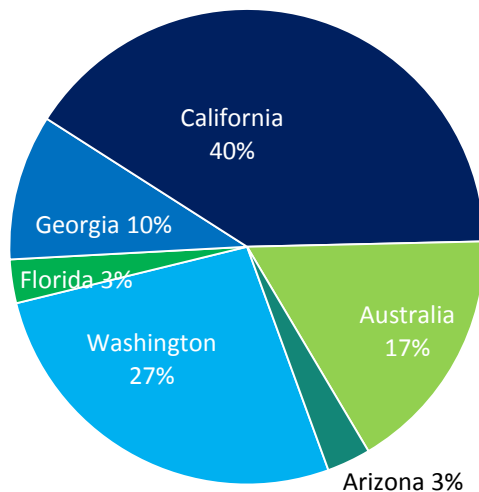


Market	# Accts.	Market Value (\$MM)	Market Value %	Unfunded Commitment/Allocation (\$MM)
Private	16	697	81	536
Public	1	162	19	-
Total	17	859	100	536

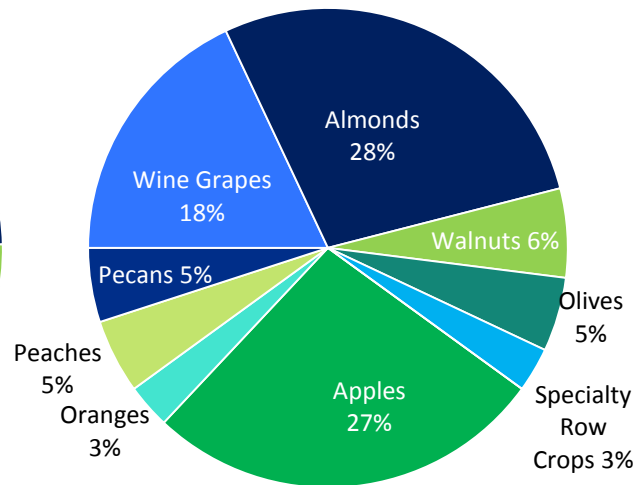
Source: BNY Mellon

Exposures: Farmland – 6/30/21

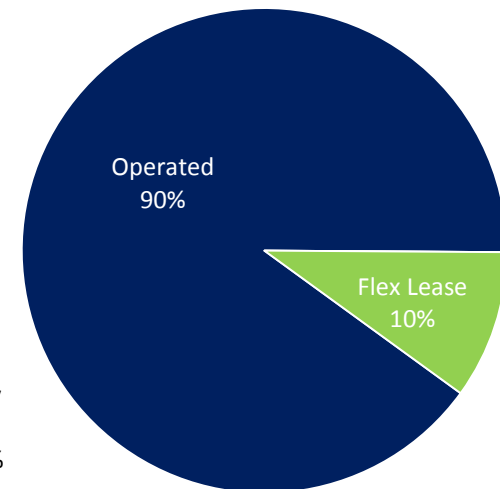
Geography



Crop



Revenue Source

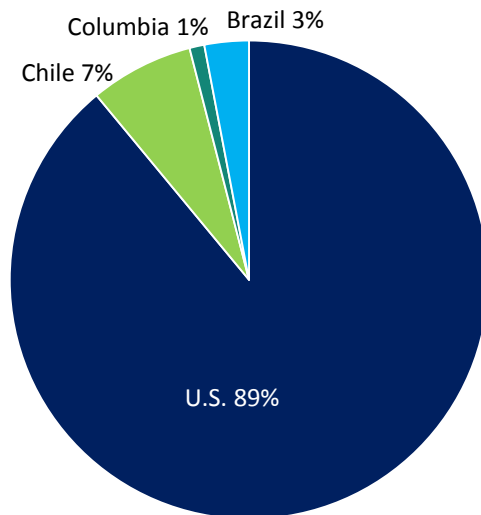


Market	# Accts.	Market Value (\$MM)	Market Value %	Unfunded Commitment/Allocation (\$MM)
Private	2	325	100	66

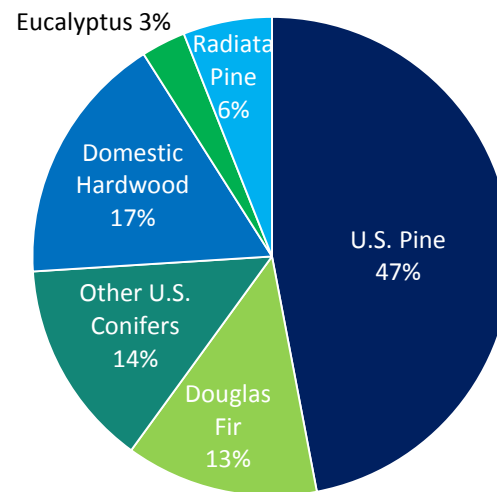
Source: BNY Mellon

Exposures: Timberland – 6/30/21

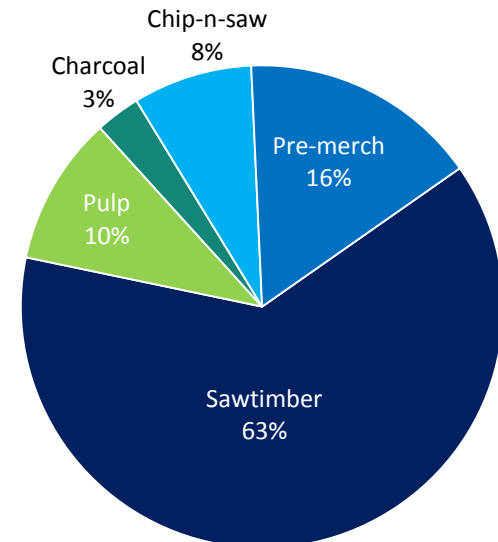
Region



Species



Product Type



Market	# Accts.	Market Value (\$MM)	Market Value %	Unfunded Commitment/Allocation (\$MM)
Private	3	477	100	218

Source: BNY Mellon

Results: Portfolio Returns – 6/30/21



	10 Year	5 year	3 Year	1 Year	MV (\$MM)
Total Real Assets	10.0	8.0	6.6	11.3	12,122
Strategic Benchmark	8.5	6.1	5.2	6.4	
Excess Return	1.5	1.9	1.4	4.9	
Private Real Estate	10.7	7.9	6.4	5.3	6,941
Benchmark	8.7	5.3	4.0	1.5	
Excess Return	2.0	2.6	2.4	3.8	
REITs	6.8	5.4	6.1	34.2	1,298
Benchmark	7.5	6.0	7.4	34.8	
Excess Return	-0.7	-0.6	-1.3	-0.6	
Infrastructure	n/a	11.4	9.6	14.3	2,134
Benchmark	n/a	6.2	6.0	6.6	
Excess Return	n/a	5.2	3.6	7.7	
Total Natural Resources	n/a	6.0	2.7	16.8	1,748
Benchmark	n/a	6.2	6.0	6.6	
Excess Return	n/a	-0.2	-3.3	10.2	

Source: BNY Mellon

Headwinds/Tailwinds

- **Tailwinds:** Industrial & Multifamily Real Estate, Digital Infrastructure
- **Headwinds:** Office Real Estate, Energy Related Infra

Largest Absolute Return Contributors:

- **Positive**
 - REITs: +34.2% (10.7% of program). (Overweighted REITs by 2%)
 - Natural Resources: +16.8% (14.4% of program)
- **Less Positive**
 - Private Real Estate: +5.3% (57.3% of program)

Largest Relative Return Contributors:

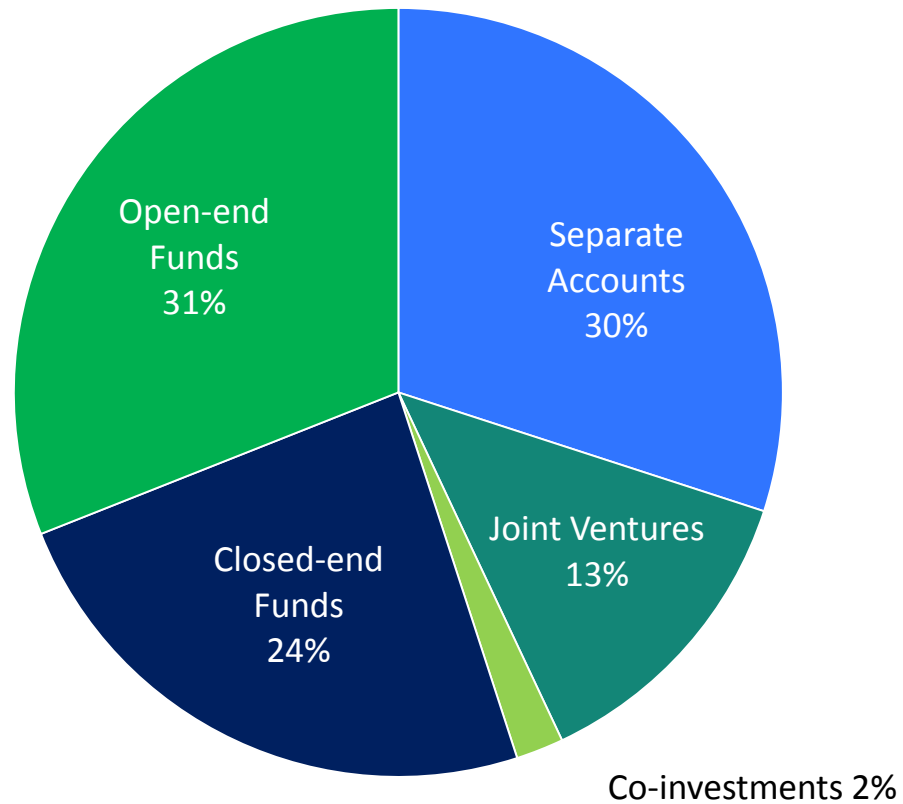
- **Positive**
 - Natural Resources: +10.2% excess return. Strong recovery in energy/public markets
 - Infrastructure: +7.7% excess return. Strong recovery from Covid hit sectors
 - Private Real Estate: +3.8% excess return (57.3% of program)
- **Negative**
 - REITs: -0.6% (10.7% of program)

Co-investments: Real Assets Approach



- Objective is to invest additional funds alongside existing managers to fine tune portfolio exposures, generally with lower (or no) fees
- Target investment size of +/- \$25MM per co-investment
- Real assets team member responsible for manager relationship runs point on co-investment activity from that manager; SWAT teams formed accordingly
- VRS staff makes the go/no-go call on investments in consultation with CIO and Director of Private Markets
- Manager remains fiduciary

Co-investments: Structure – 6/30/21



Source: BNY Mellon

Managers: Top 10 Investment Managers



Manager	# of Mandates	% of Program
PGIM	2	13.7%
VRS Internal Equity Mgmt.	2	10.7%
Blackstone	11	8.5%
Morgan Stanley	3	7.4%
Clarion Partners	1	5.4%
Industry Funds Mgmt.	3	4.5%
Pritzker Realty Group*	2	4.0%
JP Morgan	2	3.9%
Pantheon Ventures	3	3.2%
Stonepeak	7	3.0%

*DIME (Diverse Investment Management Engagement) firm

Managers: Diverse Investment Management Engagement (DIME)

Resources		
Townsend	Pantheon	Aksia
<ul style="list-style-type: none"> • Real Estate • Infrastructure 	<ul style="list-style-type: none"> • Infrastructure • Natural Resources 	<ul style="list-style-type: none"> • Infrastructure • Natural Resources

Conversations with 25 new DIME managers across 25 mandates in 12 months ending 6/30/21

Manager	Sector	Vintage	Comm./Alloc. (\$MM)
Artemis RE Partners	Real Estate	2018	75
Artemis Income & Growth	Real Estate	2020	75
Capri/EGM JV	Real Estate	2014	300
Grain Infra	Infrastructure	2012	75
Pritzker JV	Real Estate	2012	232
Pritzker JV II	Real Estate	2015	200
Tristan Curzon	Real Estate	2017	180
		Total	1,137

Managers: Investment Commitments (\$MM)



Sector	Commitment
Public REITs	None
Private RE Equity	Apollo U.S. Real Estate Fund III - \$50 Penwood Select Industrial Partners VI - \$125 Harrison Street Real Estate Partners Fund VIII - \$125 Artemis RE Partners Income & Growth Sidecar - \$75 Carlyle Realty Partners IX - \$250 One Co-investment - \$60
Infrastructure	Digital Colony Partners II - \$100 Antin Infrastructure Partners Mid-Cap I - €75 Four Co-investments - \$100
Natural Resources	Aplomado Partners - \$100

Period Ending 6/30/21

- Continue active portfolio management
- Focus on objectives & risk
- Further build out of natural resources sub-portfolios; prudently work to manage around targeted allocation

Private Equity

John Alouf
Program Director



Agenda: Private Equity Annual Review Topics



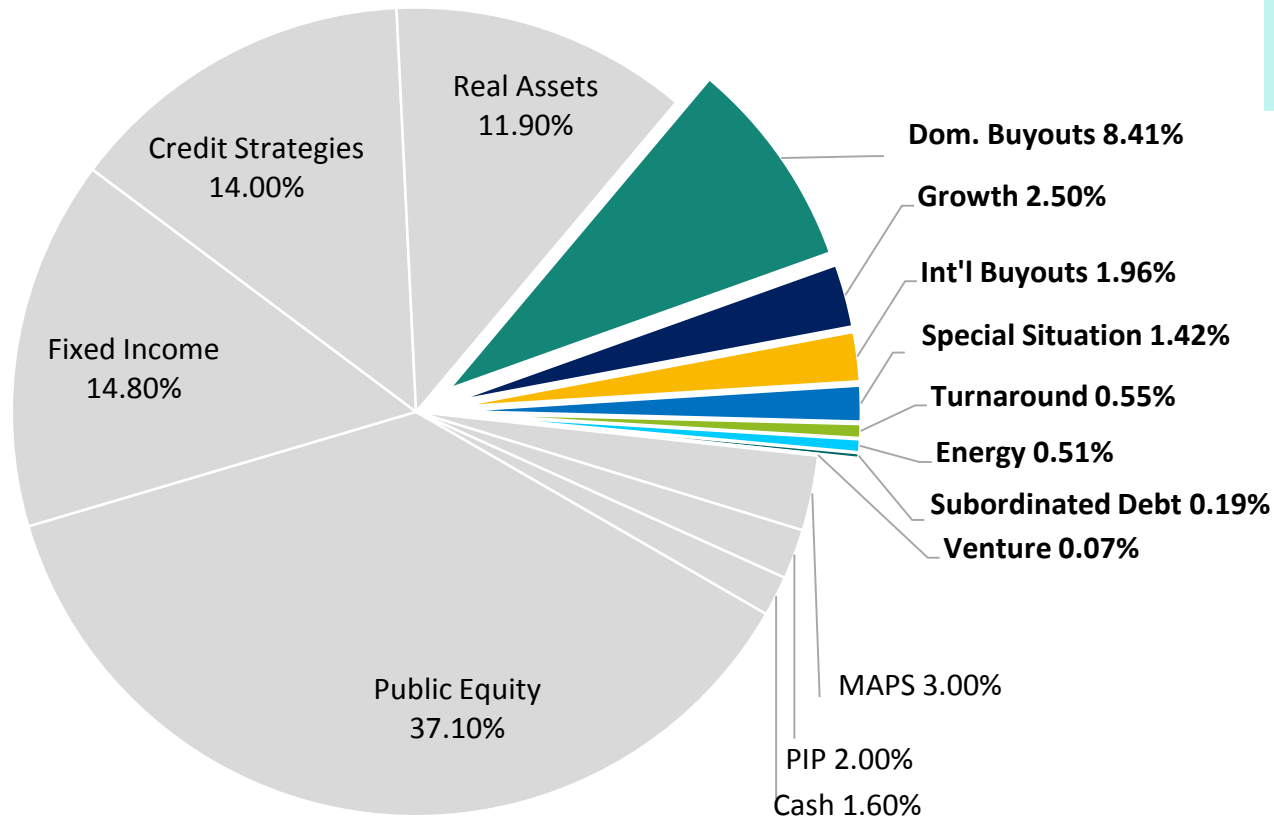
- Overview
- Markets
- Exposures
- Results
- Managers
- Co-investments
- Looking Forward

Overview: Team Members



Professional	Position	Highest Degree	Professional Certifications	Investment Experience	VRS Tenure
John Alouf	Director	MBA	CFA	27	21
Jay Gentry	Portfolio Manager	BBA	CFA, CPA	27	27
Peter Murphy	Portfolio Manager	BBA	CFA, CPA	21	10
Rob Voeks	Portfolio Manager	PhD		24	7
De'Von Jones	Investment Officer	BBA	CFA	11	2
Carol Timpano	Portfolio Assistant	BS		6	6

Overview: Asset Allocation – 6/30/21

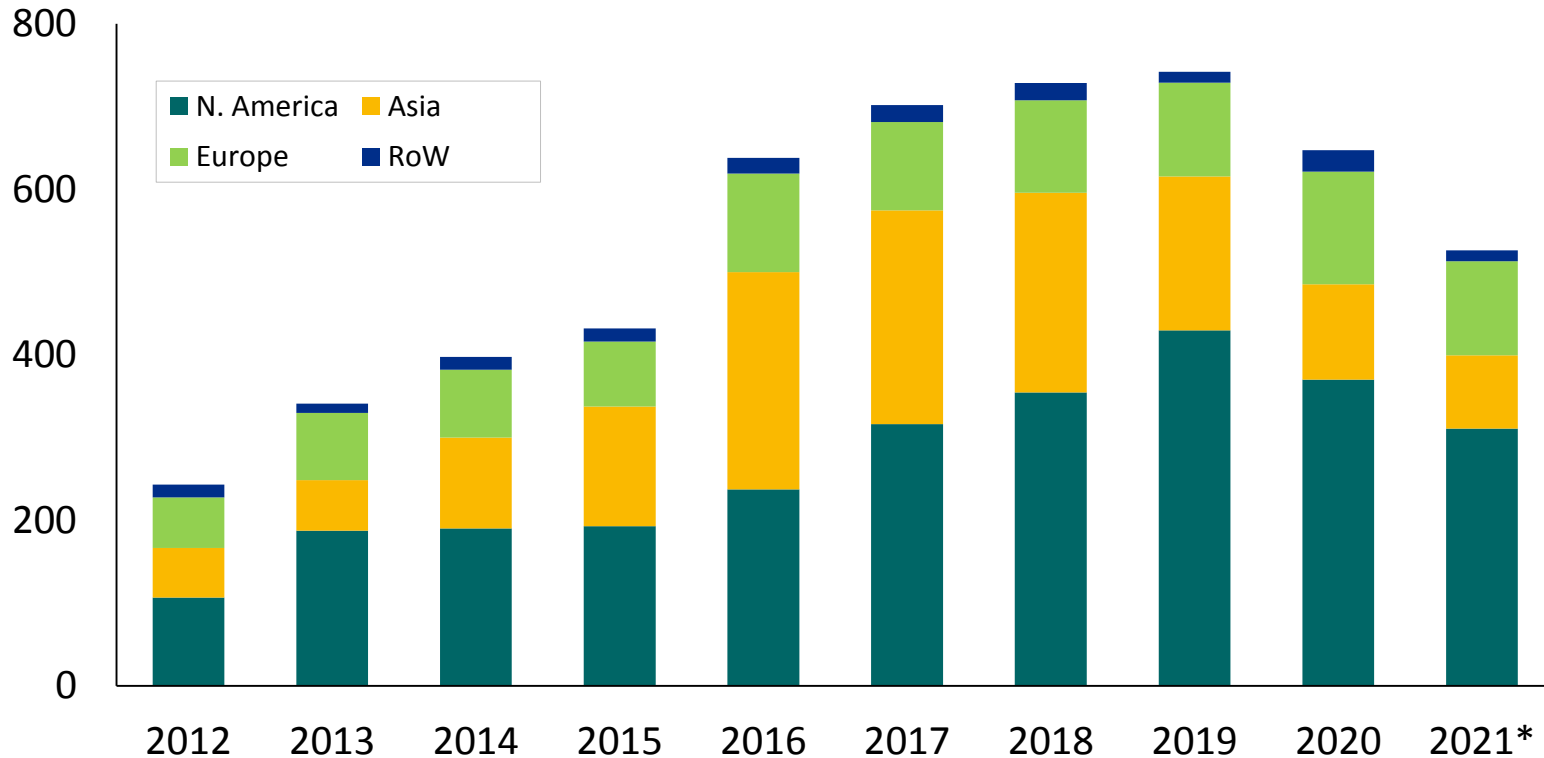


**Total Private Equity:
15.6%**

Overview: Philosophy

- Private Equity is an opportunistic substitute for public equity. We should earn a meaningful return premium
- Allocate capital to managers & strategies in which we have a high degree of confidence, not necessarily to the asset class.

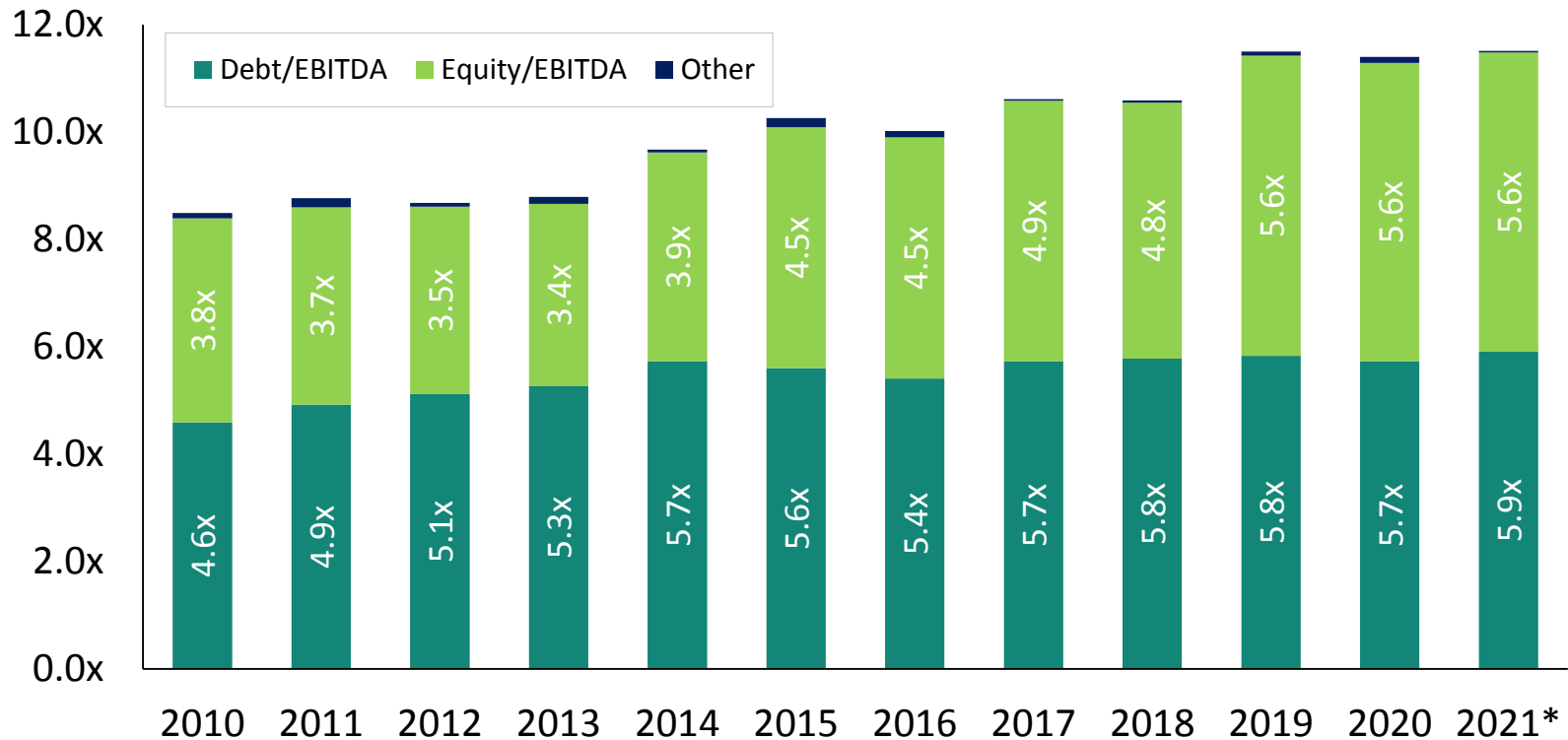
Markets: Global Private Equity Fundraising (\$M)



Source: Preqin

*2021 is through the first six months of the year

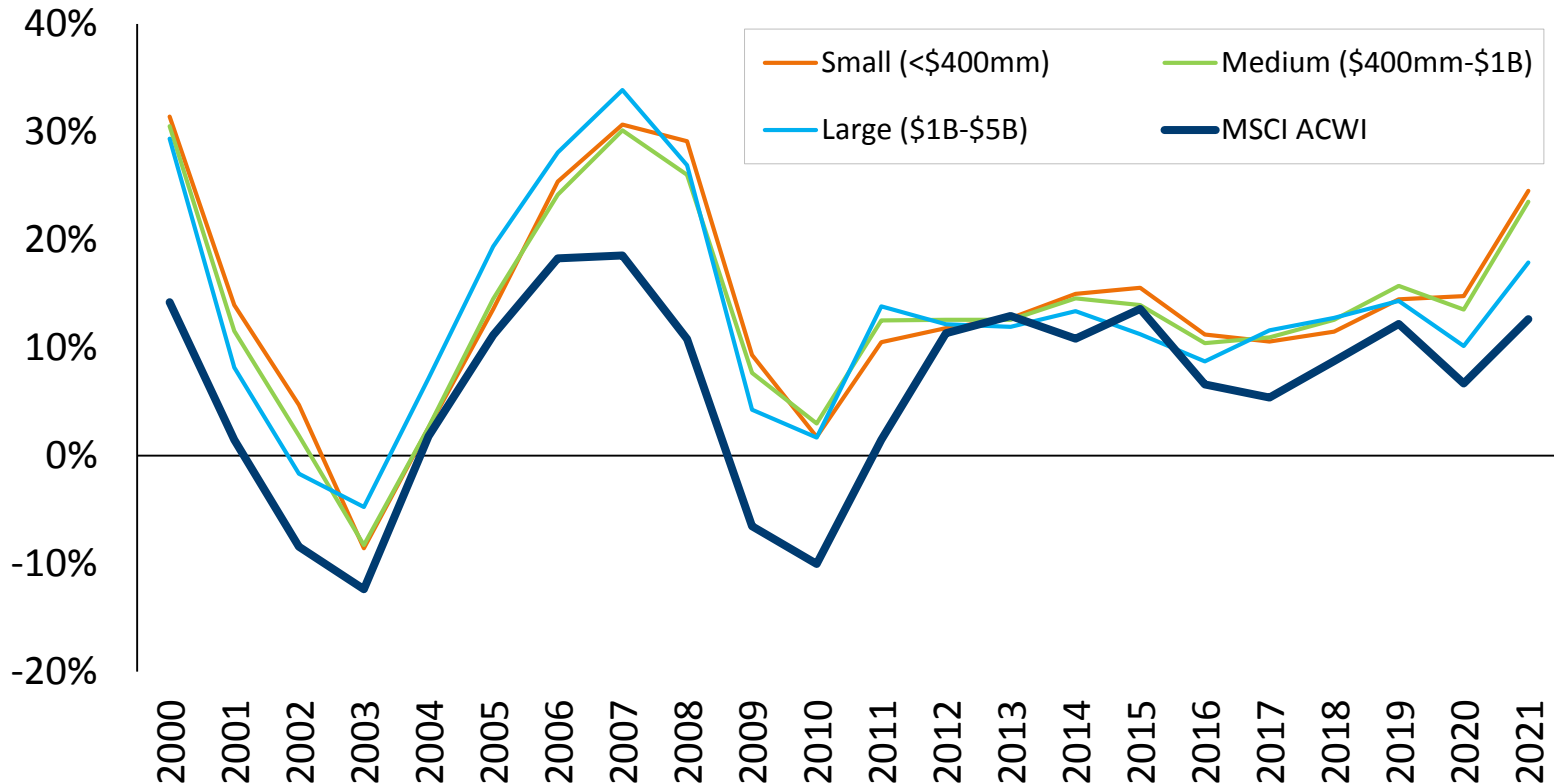
Markets: Purchase Price Multiples (U.S. Buyouts)



Source: LCD Leveraged Buyout Review

*2021 is through the first six months of the year

Markets: Rolling 3-Year Returns By Fund Size



Source: PrivateIQ/Burgiss – Global Private Equity and MSCI information

Markets: Headwinds/Tailwinds

Tailwinds

- Growth investments
- Technology
- Multiple exit mechanisms
- High prices
- Debt

Headwinds

- Retail & energy
- COVID-19
- Capital overhang
- Strong LP interest in the asset class
- High prices

Markets: Existing Investments & Liquidity



Existing Investments

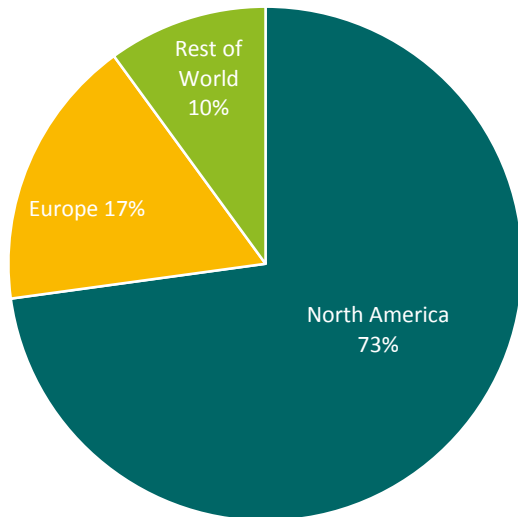
- Add-ons
- Enhance & incent management
- Strategic repositioning
- Expansion: product line or geographic
- Utilized operational expertise

Liquidity

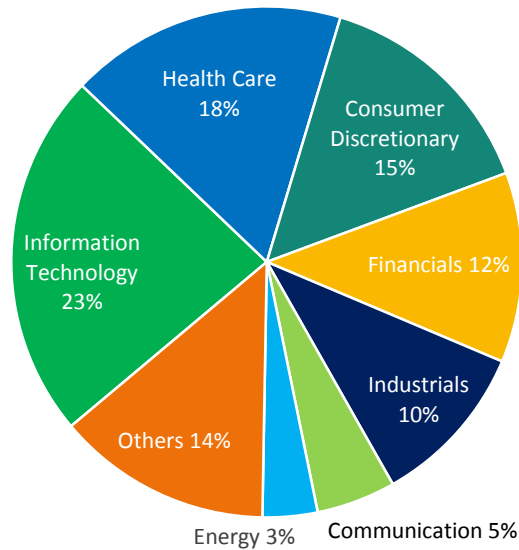
- Strategic sales
- Sponsor to sponsor
- IPO
- Dividend recap
- Partial exit

Exposures: Position Weighting

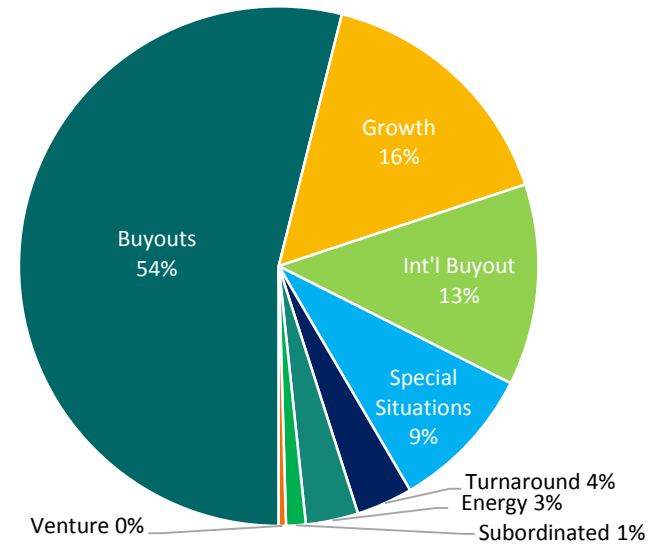
Geography



Industry



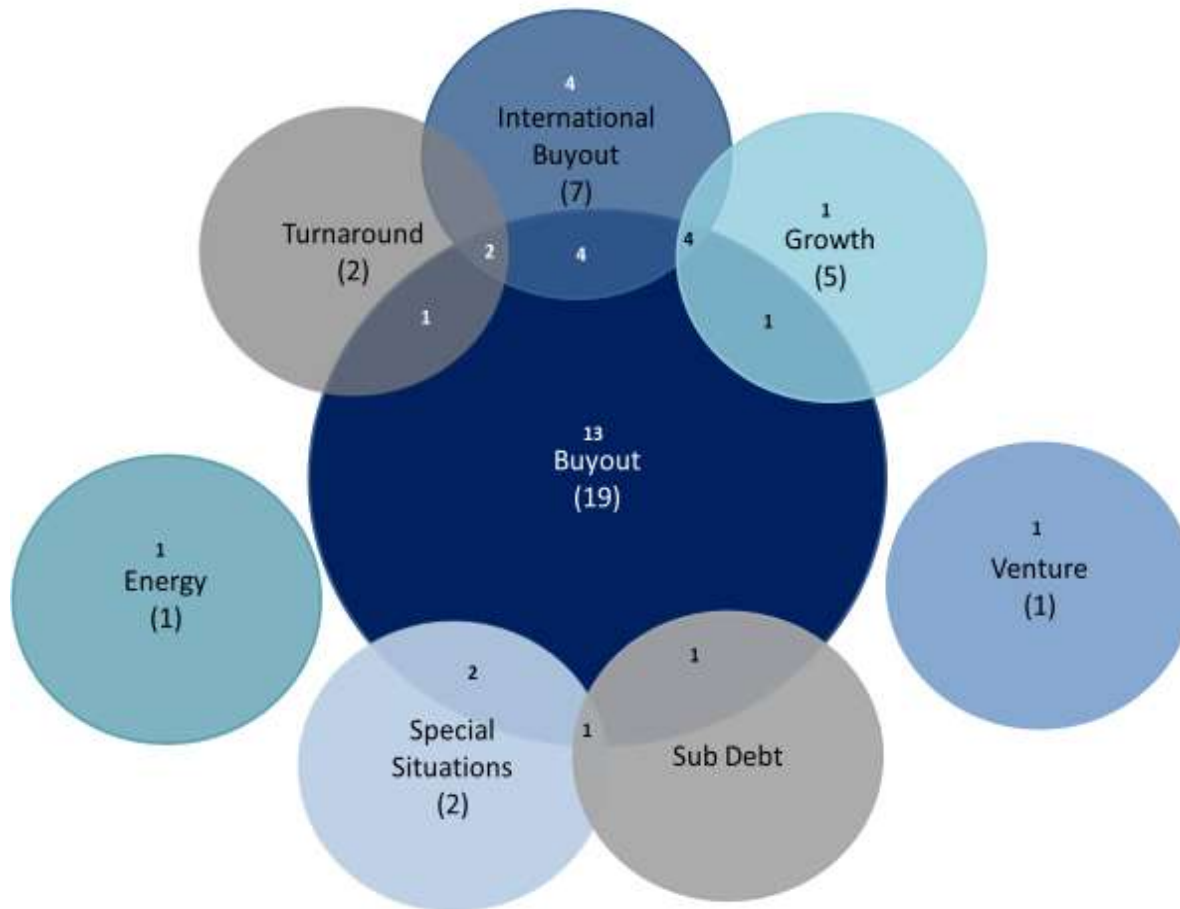
Sector



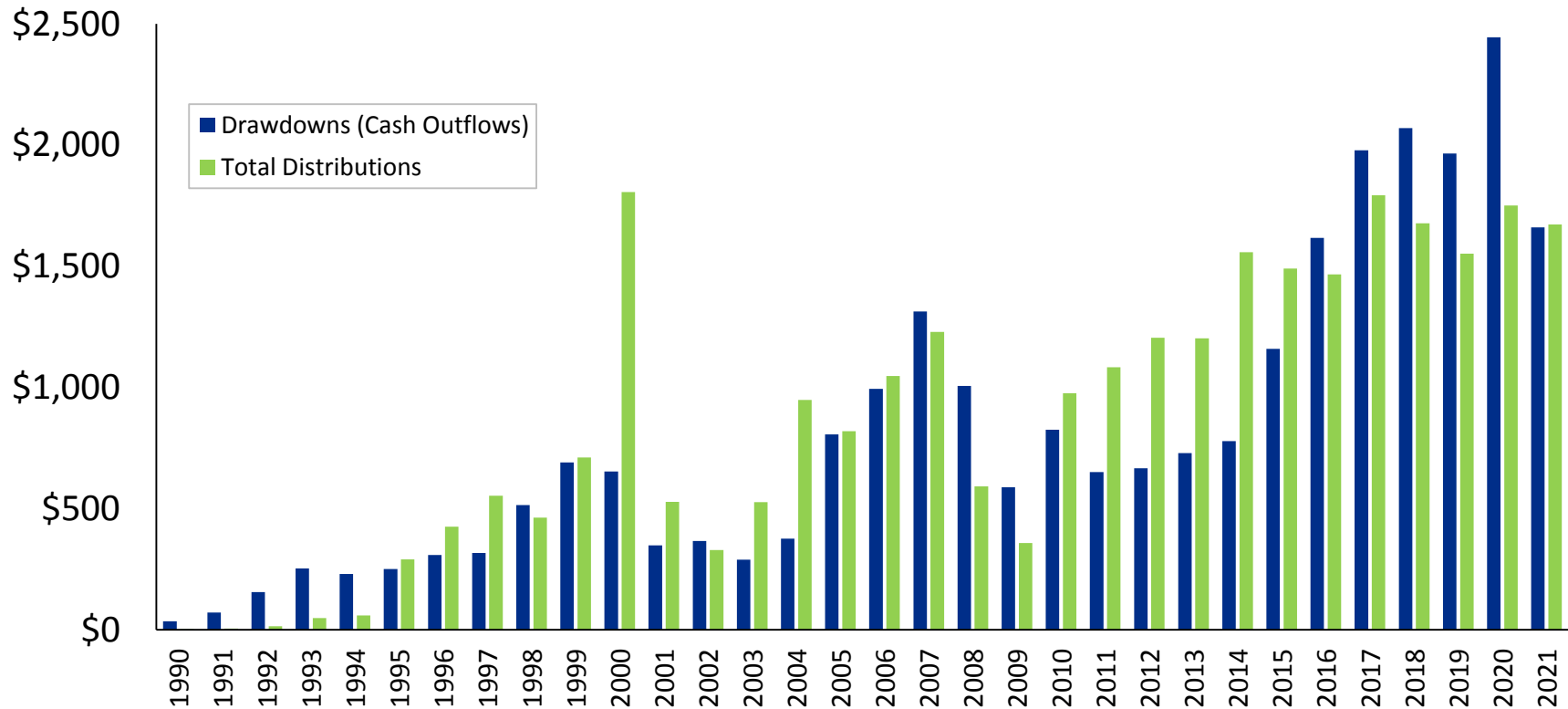
Geography and Industry charts based on 3/31/2021 manager information.
Sector chart based on 6/30/21 BNY Mellon information

Exposures: Active Relationships By Sector

Private equity manages a total of 37 active relationships



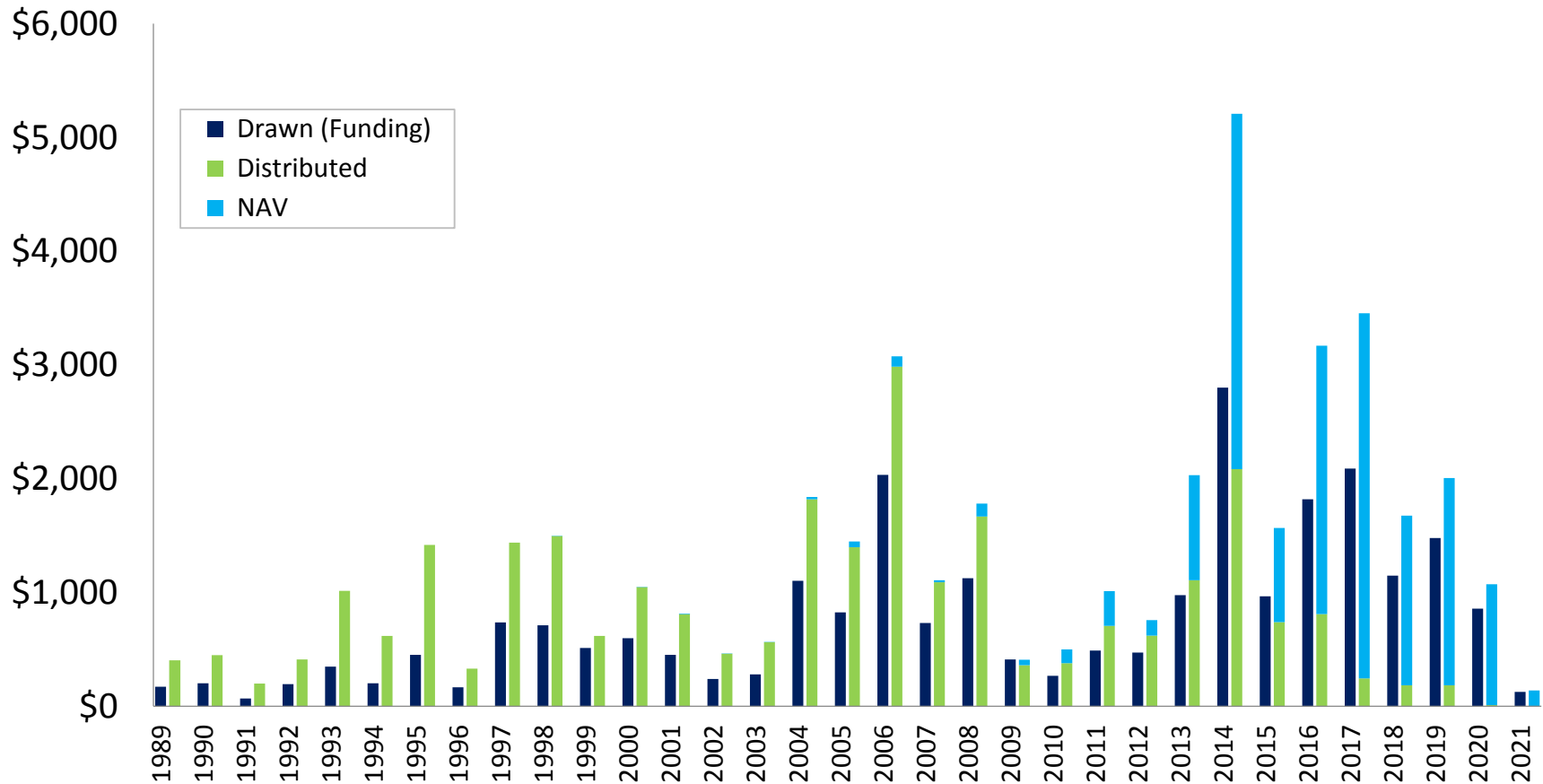
Results: Annual Cash Flows (\$MM)



Since inception net cash flow to VRS of \$2.0 billion

Note: 2021 is YTD July 31

Results: Cash Flows & NAV By Vintage Year (\$MM)



Valuations as of 3/31/2021 adjusted for cash flows through 6/30/2021

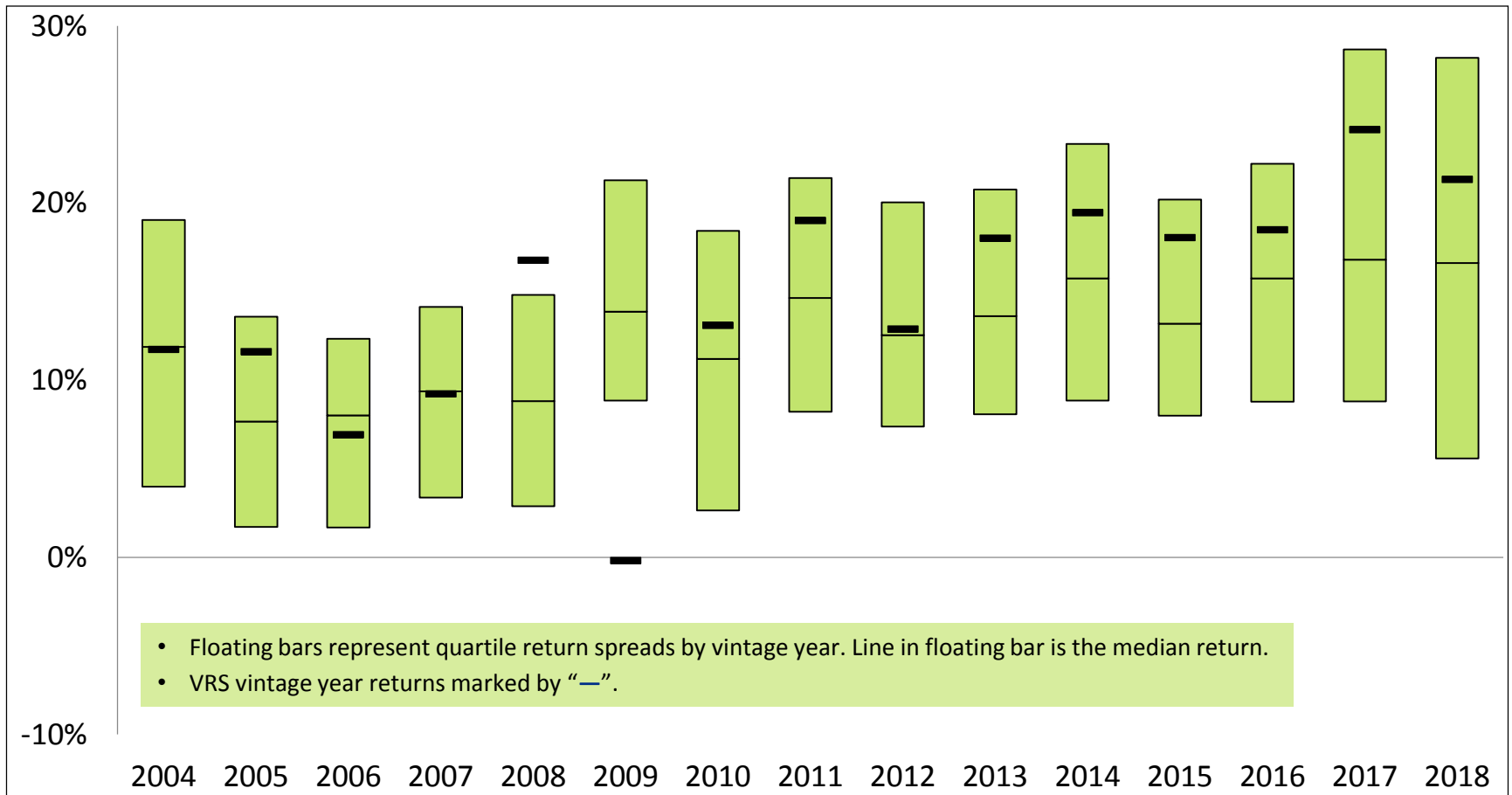
Results: Time-Weighted Performance – 6/30/21



	10 Year	5 year	3 Year	1 Year	MV (\$MM)
Total Private Equity	15.8	19.8	21.0	54.1	15,880
Strategic Benchmark ¹	14.0	17.1	16.3	57.8	
Excess Return	1.8	2.7	4.7	-3.7	
Buyouts	18.7	21.8	22.4	57.9	8,560
Energy	-3.9	-0.6	-12.6	1.8	519
Growth	24.5	31.6	37.6	87.8	2,540
Int'l Buyout	14.9	19.0	24.2	51.7	1,990
Special Situations	14.3	15.1	15.5	28.0	1,447
Sub Debt	12.7	16.3	12.9	18.3	194
Turnaround	14.4	14.5	12.7	51.6	556
Venture	12.2	13.3	20.4	61.4	71

¹ Benchmark: Russell 3000 + 250 basis points through 6/30/2013; MSCI ACWI 50% hedged + 250 basis points through 6/30/2020; MSCI ACWI thereafter

Results: VRS Relative IRR By Vintage Year



Source: PrivateIQ/Burgiss; all data as of 3/31/2021

Managers: Top Ten Investment Managers

Manager	Exposure
VRS Co-Investments	7.4%
Grosvenor	7.4%
TA Associates	5.7%
Hellman & Friedman	5.7%
Apax Partners	4.7%
General Atlantic	4.0%
CVC Capital	3.7%
Bain Capital	3.7%
Audax Group	3.5%
GTCR	3.1%
Total	48.8%

Exposure as of July 1, 2021; figures may not sum due to rounding

Managers: Manager Hires LTM – 6/30/21



Effective Date	Commitment (MM)	Funding Period	Description
7/1/2020	€220	6 Years	CVC VIII
7/14/2020	\$50	6 Years	HIG LBO VI
7/14/2020	\$150	6 Years	Thoma Bravo XIV
7/31/2020	\$125	6 Years	KKR Asian IV
8/3/2020	\$225	5 Years	Bain XIII
9/17/2020	\$200	5 Years	Asia Alts. Separate Account
10/9/2020	€50	6 Years	HIG Europe III
10/26/2020	\$255	6 Years	GTCR XIII
11/20/2020	\$100	6 Years	Charlesbank X
4/23/2021	€170	5 Years	Charterhouse XI
5/19/2021	\$40	5 Years	Abry Senior Equity VI
6/22/2021	\$175	6 Years	Quad-C X

Diverse Investment Management Engagement (DIME)

Nine existing in-house relationships

- Asia Alternatives
- Clearlake
- ICV
- MBK Partners
- Siris
- Sycamore
- TSG
- Veritas
- Vista Equity

15 potential manager meetings & 1 conference in FY 2021

Four relationships through Grosvenor

Quarterly reports from Grosvenor

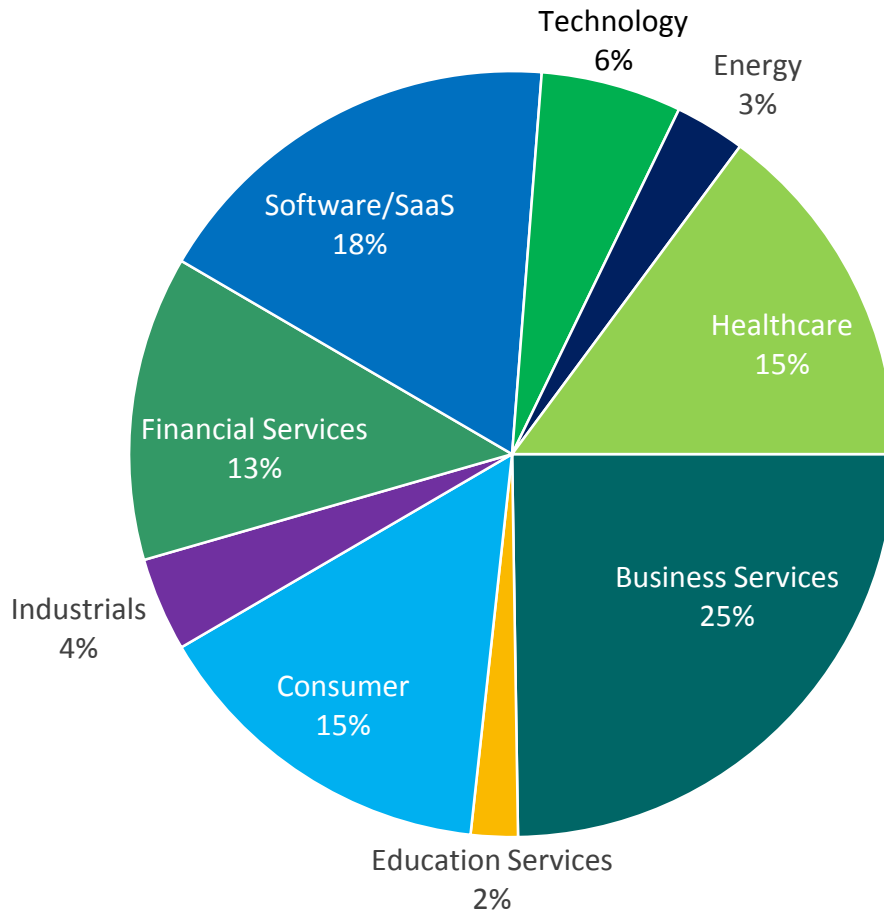
Co-investments: VRS Co-investment Program



- Dedicated professional to manage the initiative with support from the remaining private equity staff
- Anticipated annual commitments of \$200-300 million
- Target investment size of \$25-50 million per investment
- To date, VRS has reviewed approximately 170 potential opportunities & has made 58 investments
- Increased company allocations typically with no fees or carry

Focused on sourcing & executing opportunities alongside high conviction GPs in which VRS has a commitment

Co-investments: Portfolio Exposures By Sectors



- 58 investments totaling \$1.5 billion cost since April 2013
- Investments made with 23 existing GPs
- Size range: \$7-53 million (\$25 million average size)

- Maintain commitment pace
- Continue with strategic separate accounts
- Co-investments on pace
- Selectively add new managers

Current Dynamics: Private Equity Pacing Model



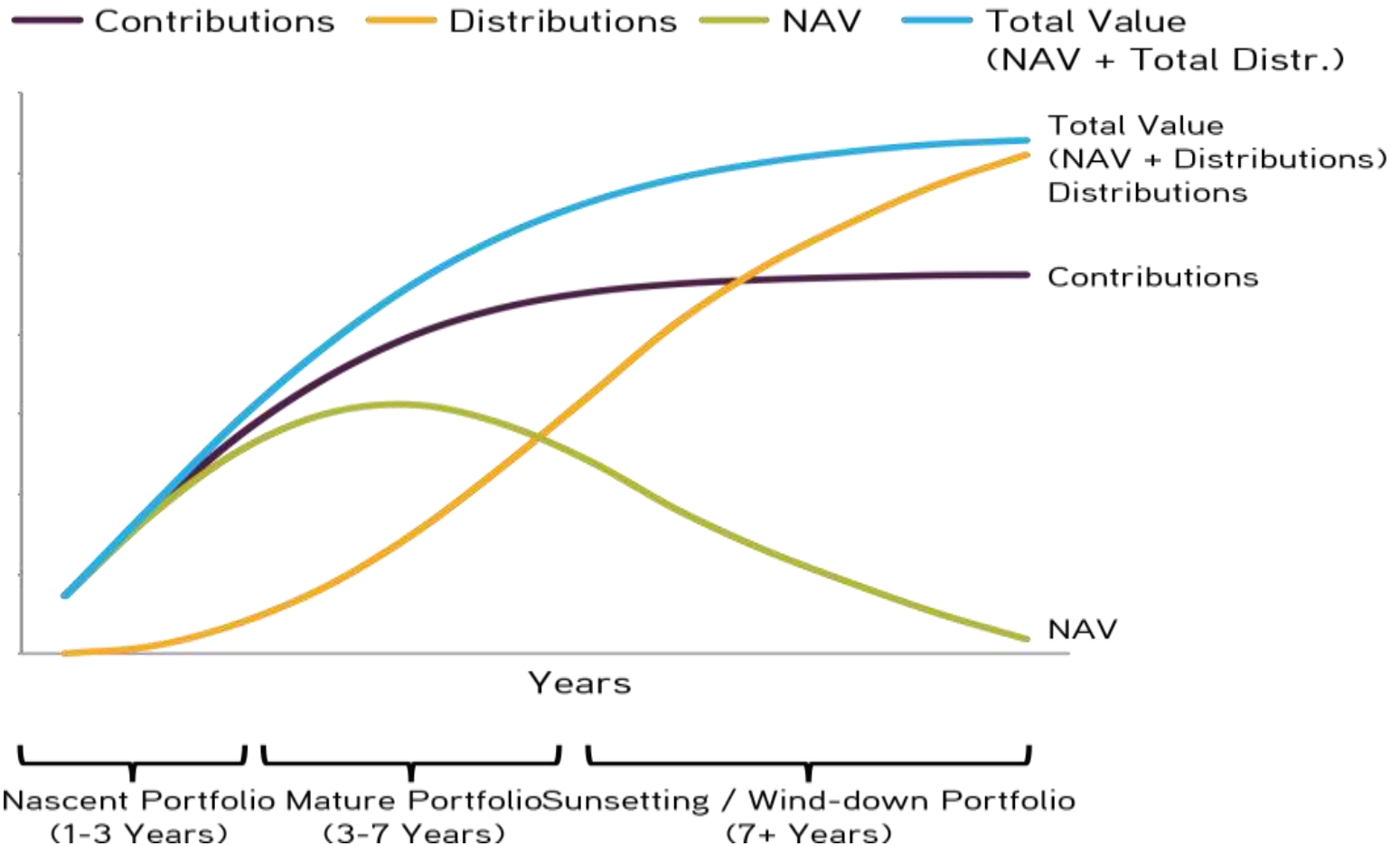
VRS AUM \$M (6/30/21)	101,788
Private Equity Target Allocation	14.0%
VRS Growth Assumption	3.5%

	6/2022	2023	2024	2025	2026	2027	2028	2029	2030
VRS AUM	105,351	109,038	112,854	116,804	120,892	125,123	129,503	134,035	138,277
PE NAV	17,331	17,950	17,944	17,952	17,704	17,507	15,566	18,335	18,722
Total PE % AUM	16.5%	16.5%	15.9%	15.4%	14.6%	14.0%	13.6%	13.7%	13.5%
PE % Target	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%
Ann. Commitments	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,400	3,400

Note: 2023-2030 are estimates

Current Dynamics: Fund Life Cycle

Sample Cash Flow Analysis Based on Life of a Typical Portfolio



Current Dynamics: Extending Hold Periods

- **Long Term Funds**
- **Continuation Funds**
- **GP led Secondary Transactions**
 - Entire Fund
 - Partial Fund
 - Single Asset

Agenda: PIP Annual Review Topics



- Overview
- Exposures
- Results
- Looking Forward

Overview: Team Members



Professional	Position	Highest Degree	Professional Certifications	Investment Experience	VRS Tenure
Steve McClelland	Director	MBA	CFA, CAIA	34	23
Steve Woodall	Senior Portfolio Manager	MBA	CFA, CAIA	17	16
Erica Billingslea	Investment Officer	MA	CFA Candidate	9	9
Kelly Baker	Portfolio Assistant	AAS		11	6

Overview: What Are Private Investment Partnerships?



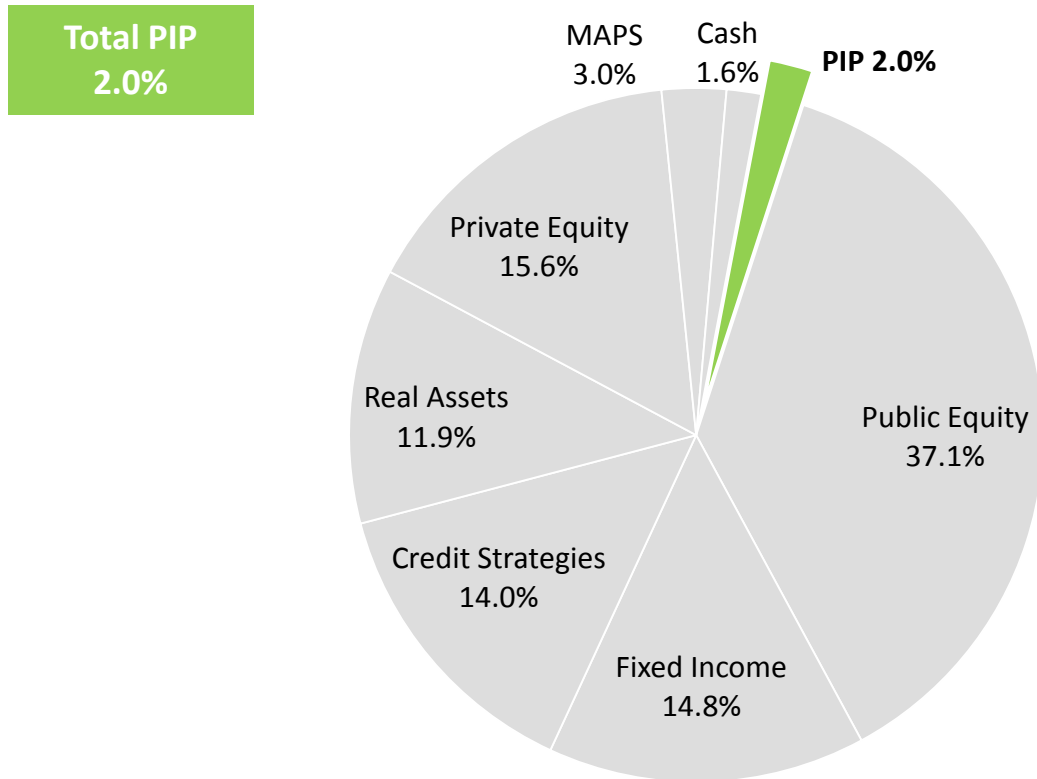
- A diversified investment platform dedicated to private and illiquid investments
- A platform that emphasizes opportunistic asset allocation, co-investment and reduced investment management fees/carry
- A close relationship between partner organizations that allows for expanded access and an elevated level of inclusion

Overview: Why Have Private Investment Partnerships?



- Creates a new avenue for growing VRS private investment exposure
- Limits the costs of private investing through its structure & leveraging the size of the commitments
- Provides exposure/access to two global private investment managers that were not broadly utilized by VRS
- Opens the door to their global investment expertise & creates an operating partnership benefiting both organizations

Overview: Total Fund Pie With PIP Allocation

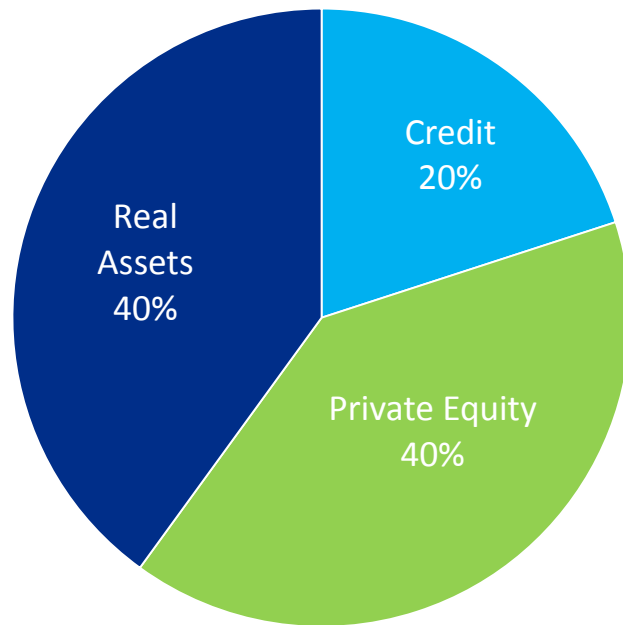


Exposures: Portfolio Update

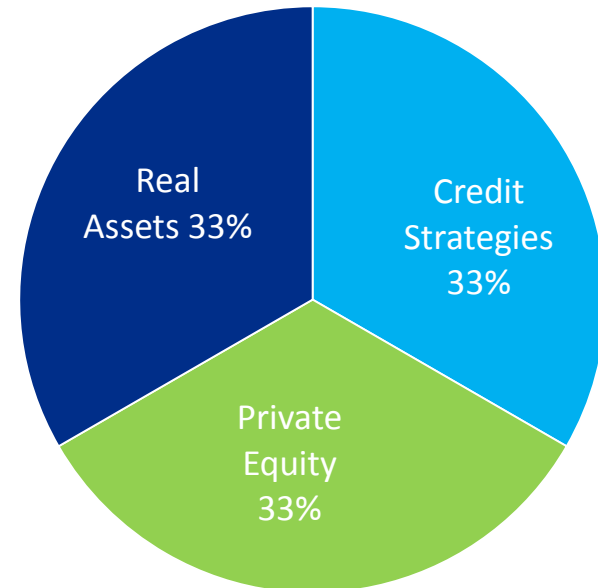
- Asset allocation
- Commitments
- Portfolio growth

Asset Allocation: Benchmark – FY21 and FY22

Benchmark – June 30, 2021



Benchmark – July 1, 2021

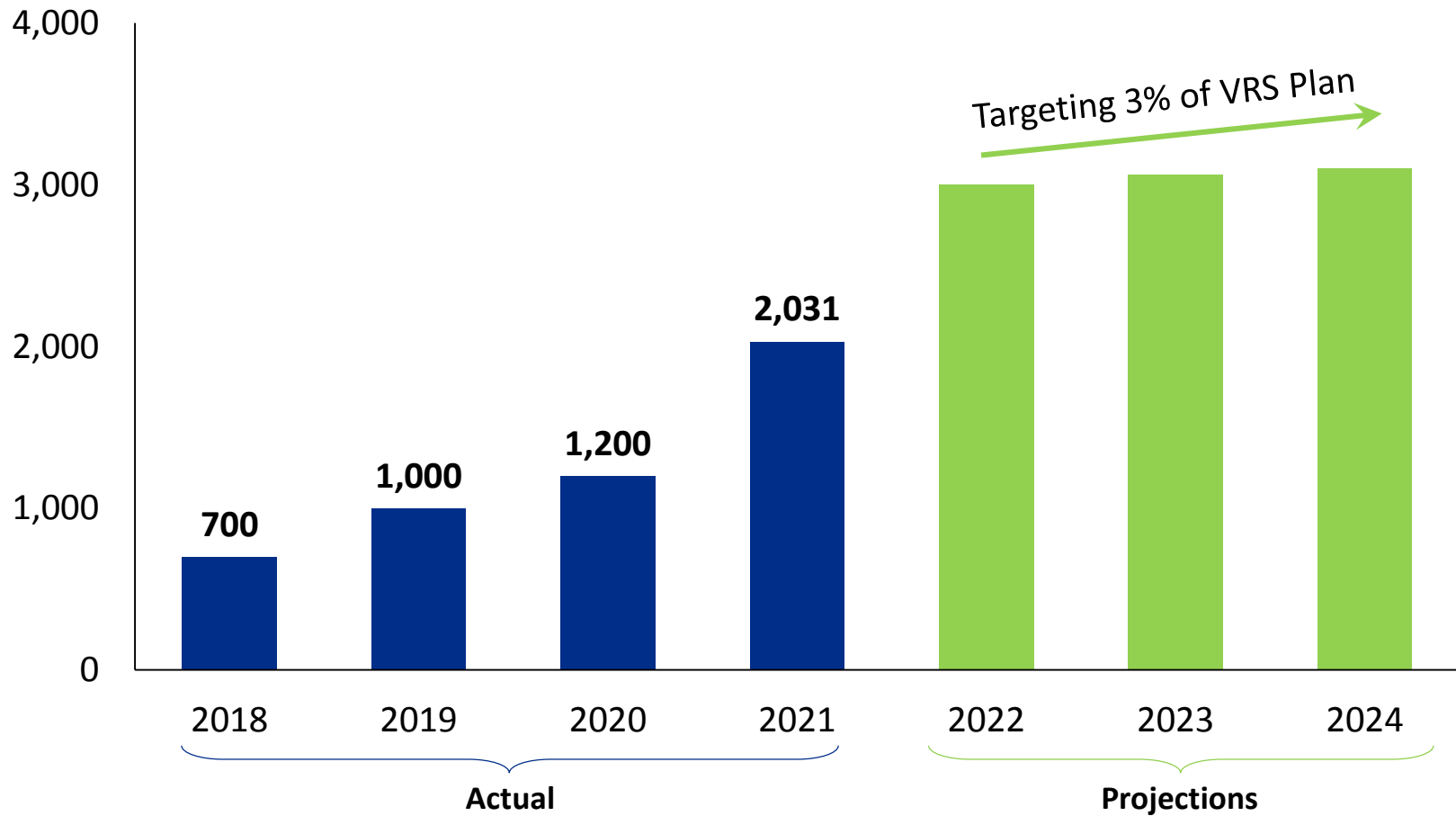


Commitments (\$MM): FY 2020



	6/30/20	6/30/21	Change \$	Change %
Fund	890.7	1,367.1	476.4	53
Co-investment	1,012.8	1,264.2	251.4	25
Total	1,903.5	2,631.3	727.8	38

Portfolio Growth: Market Value (\$MM)



Results: Performance – 6/30/21



	Inception (2015)	5 Year	3 Year	1 Year	MV (\$MM)
Total PIP	8.37	9.19	9.30	30.77	2,031
Benchmark	8.44	9.28	9.41	24.97	
Excess Return	(0.07)	(0.09)	(0.11)	5.81	

Total Program IRR 11.68%

Source: BNY Mellon

- Expect to reach target of 3% of total plan in next year.
- Using re-investment rate to manage overall size of program.
- Roundtables and conferences are the primary group setting.
- Each program now working directly with manager as desired.
- Return expectation is to exceed benchmark and be competitive with individual programs.

Lessons Learned Discussion

- Thinking Long Term
- Investment Innovation
 - Account Structure
 - Investment Mandate

Investment Advisory Committee

November 10, 2021

Dialog On Long Term Investment Themes

IAC Meeting
November 10, 2021



Board Policy Themes (Investment Beliefs Document)

- Active management across all asset classes enhances returns.
- Private market exposure enhances return and reduces risk/volatility.

Staff Implementation Themes

- IEM: Value and quality tilts – within tight risk-controlled framework.
- FI: Security selection and sector rotation with tight duration control.
- CS: Opportunistic implementation – now emphasizes private market allocation.
- RA: Overweight industrial/underweight retail malls and office.
- PE: Emphasize technology and innovation through Growth Strategies vs VC and de-emphasize more traditional LBOs.

We monitor several broad themes - some themes/sub-themes are in play, while others are too broad or are difficult to implement:

- ✓ Technology/4th industrial revolution
- ✓ Climate Change/energy transition
- ✓ Growing activism of shareholders and stakeholders
- ✓ Demographics: Aging population in developed world

-
- ? Wealth inequality/rising populism
 - ? Dislocation between Wall St. and Main St.
 - ? Increasing geo-political risk

- Thoughts on themes identified
- Ideas on implementation of difficult or broad themes
- Possible new themes for consideration