



COMMONWEALTH OF PENNSYLVANIA
PUBLIC SCHOOL EMPLOYEES' RETIREMENT SYSTEM

Public Investment Memorandum

SASOF IV LP
Absolute Return Program

Robert E. Little, CPA
Senior Portfolio Manager, Non-Traditional Investment Strategies

August 2, 2017



Recommendation:

Staff, together with Aksia, recommends that PSERS invest \$150 million in SASOF IV LP (Fund). This recommendation is based on our assessment of the investment strategy and our evaluation of Apollo Aviation Services IV LP and its affiliates (Apollo Aviation or Investment Manager).

Firm Overview:

Apollo Aviation is a leading aviation company that specializes in the management of mid-life to end-of-life aircraft within the commercial aviation industry. Founded in 2002 by Bill Hoffman and Robert Korn, Apollo Aviation initially started as a private equity advisor managing commercial aircraft investments. In 2007, Apollo Aviation entered into a 50/50 joint venture with Sciens International Aviation Holdings Ltd., an affiliate of Sciens Capital Management LLC, to invest third party capital in the aviation industry. With this affiliation, Apollo Aviation became one of the first investment managers to invest third party capital in the aviation industry. Over time, the Investment Manager has built out a leading mid-life aviation platform.

Apollo Aviation employs over 65 professionals worldwide with offices in Miami, Dublin, and Singapore. These professionals provide a wide range of internal capabilities including origination/sourcing, pricing/financial analysis, risk analysis, technical analysis, marketing, asset management, legal/contracting, and accounting/tax. The Investment Manager also contracts with over 35 consultants throughout the world for technical and engineering services (physical aircraft inspections, repurposing aircraft, etc.). Apollo Aviation has developed a proprietary enterprise management system to integrate all aspects of their aviation business. Our experience with the Investment Manager has found them to be willing to add and develop staff and invest in technology as activity increases and the need arises.

Apollo Aviation is currently investing its third institutional fund, SASOF III LP, which was launched in 2014 and in which PSERS is an investor. The Investment Manager raised \$833 million in capital commitments for SASOF III LP. The investment period for SASOF III LP ends in August 2017. The investment period for SASOF IV LP will begin at that time.

Market Opportunity / Investment Strategy:

While the airline sector has historically been cyclical and impacted by outside events, long-term air traffic and aircraft demand trends have continually increased. Over the last 20 years, global passenger air traffic demand has grown by 4.7% per year with the strongest growth rates in the Asia Pacific and Middle East emerging markets. This increase in demand, combined with cost containment strategies and declining fuel costs, has contributed to record profits for the airline sector.¹

Aircraft manufacturers forecast air traffic growth to continue to outpace world GDP growth. While aircraft manufacturers expect the world aircraft fleet to double over the next 20 years^{2,3}, air traffic growth is expected to exceed capacity growth.⁴

Leased aircraft offer an attractive economic alternative for airlines looking to control costs. As a percentage of the worldwide aircraft fleet, leased aircraft have grown to over 40%. Lower fuel prices and increased demand should provide a strong tailwind for aircraft valuations and lease rates for in-production aircraft.

Another way for airlines to control costs is through aircraft maintenance. An engine overhaul is one of the most material intensive maintenance, repair, and overhaul activities. Airlines seeking cost savings will drive the demand for used surplus parts rather than purchase new replacement parts from the original equipment manufacturers.

¹ ICF Aircraft Industry Review, October 2016

² Boeing Current Market Outlook, 2016-2035, June 2016

³ Airbus Global Market Forecast, 2016-2035, June 2016

⁴ ICF Aircraft Industry Review, October 2016



The Fund's objective is to build a portfolio of in-production, mid-life to end-of-life commercial aircraft that exhibit attractive supply/demand characteristics for aircraft lessees to generate attractive risk-adjusted returns that have low correlation to the equity and credit markets. Apollo Aviation is confident in their ability to achieve their 13% to 15% net IRR return target through:

- Lease rental income – anticipated monthly lease rate factors of 1.0% to 1.2% equate to a 12.0% to 14.4% annual yield
- Marketing and re-leasing services – lease extensions or lease transitions can prevent having aircraft on the ground without leases
- Maintenance event services – active maintenance management of upcoming shop visits can generate incremental income from maintenance reserves (regular payments by lessees toward future maintenance) and end of lease settlements
- Asset residual values – sale of aircraft or part-out of used aircraft parts

Portfolio Fit:

The investment in the Fund will be part of the Absolute Return Program.

Investment Instruments:

The Fund will invest in in-production, mid-life to end-of-life commercial aircraft.

Investment Team:

Robert Korn leads the investment team. Robert co-founded Apollo Aviation with Bill Hoffman in 2002 after previously working for Pegasus Aviation and BF Goodrich in various roles. Robert is supported by a team of over 65 individuals that have a wide range of educational and professional experience.

Name	Title	Years' Experience Firm / Total	Prior Experience	Education
Bill Hoffman	Chairman	15 / 31	Hoffman & Hoffman / Arthur Moller, PA / Plaza Bank of Miami	Juris Doctor / MS, Finance
Robert Korn	President	15 / 24	Pegasus Aviation / BF Goodrich (formerly Rohr)	MBA / BA, Economics
Javier Meireles, CPA	Chief Financial Officer	7 / 14	PricewaterhouseCoopers LLP	MS, Accountancy / BS, Accounting
Marcus Miller	VP – Dublin Operations	9 / 14	KPMG	MSc, Management / HDip, Business Studies
John Logan	VP – Finance	6 / 6	None	MSc, Finance / HDip, Actuarial Science / BSc, Economics and Finance
Kate Holohan	VP – Pricing	5 / 5	None	MSc, Finance / BA, Economics and Business



Dan Logan	VP – Portfolio Management	5 / 5	None	PhD, Manufacturing Design and Control System Engineering
Mark McCaugherty	Director of Risk	6 / 6	None	MSc, Finance / BSc, Accountancy
Simon Leader	Director of Asset Management	6 / 6	None	MSc, Finance / BS, Commerce
Clifton Dameron	SVP – Chief Compliance Officer	2 / 20	Sciens Capital Management LLC / Bingham McCutchen LLP / Morgan, Lewis, & Bockius LLP	Juris Doctor / BA, History
Rob Taylor	SVP – Chief Technical Officer	10 / 36	SEB Corporation / WestJet Airlines / Turbowest Helicopters / Pratt & Whitney Canada / Canadian Airlines International	BTEC, Aerospace (Mechanical) / Aircraft Maintenance Engineer (AME)
Pascal Picano	SVP – Chief Marketing Officer	4 / 23	SAFRAN / Swissair Group / GA Telesis / Sumitomo Corp. / ILFC	MBA, International Business & Administration / BS, Finance
Peter Blakeney	VP – Origination	7 / 7	None	MiM, Management / BS, Engineering

Investment Highlights:

Track Record
Apollo Aviation has a long track record of managing aircraft in commercial aviation strategies.
Experienced Management Team
<p>Apollo Aviation has a deep investment and operations team with extensive aviation industry experience. This team has worked in all parts of the industry from origination to remarketing to asset management. This experience will enable the Investment Manager to pursue attractive opportunities and avoid less attractive opportunities.</p> <p>In addition, having an investment team of over 65 professionals allows Apollo Aviation to underwrite and bid on larger, more complex portfolio transactions that can often be purchased at a discount to smaller transactions. Having the ability to work through more challenging situations will benefit investors in the Fund.</p>
Infrastructure
Apollo Aviation has developed a proprietary enterprise management system for all aspects of their business including deal tracking, maintenance forecasting, technical monitoring, consignment analysis, vendor payment, and legal contracting. Over the years, Apollo Aviation has customized the system for their specific operational requirements.



Established Deal Flow
The aviation sector is characterized by complex transactions where sellers often prefer buyers with strong technical skills, discretionary capital, a proven ability to close deals, and a solid track record. Apollo Aviation is recognized in the industry as a credible buyer and seller of aircraft and aircraft parts having deployed over \$3.8 billion across 74 transactions in the Sciens Aviation Special Opportunities Investment Fund II and SASOF III. The Investment Manager will utilize its global network of airlines, leasing companies, private equity funds, banks, and investment managers to source aircraft.
Committed Capital
Access to committed capital via the Fund reduces execution risk for the aircraft sellers. The reduced execution risk is an advantage for Apollo Aviation compared to many of the other aircraft buyers in the market.
Access to Capital Markets
The Investment Manager has been able to secure multiple sources of financing. Since 2014, the Investment Manager has completed four aircraft-backed structured debt transactions that have raised over \$2.3 billion in additional financing.
Technical Expertise
Sovereign regulatory bodies govern commercial aircraft and aircraft parts. Used aircraft and aircraft parts are complex requiring extensive technical and regulatory knowledge. Apollo Aviation's Technical team consists of experienced industry professionals from former technical and asset management roles.
Active Management
The strategy focuses on the active management of both aircraft and aircraft maintenance visits for in-production aircraft. The Investment Manager has been able to add value through lease extensions, lease transitions for aircraft coming off lease, and actively managing shop visits, maintenance reserves, and end of lease settlements.
Multiple Exit Scenarios
Apollo Aviation has experience with several exit strategies including aircraft sales, aircraft disassembly to the part-out market, and managing the leased aircraft to increase cash flows from lease rental income, maintenance reserves, and end of lease settlements. Individual business units work together to consider multiple exit scenarios before a transaction is approved by the investment committee.

Investment / Risk Considerations:

Reliance on Technology
All aspects of the investment program leverage technology and proprietary software. The investment manager has safeguards in place to detect and prevent any coding errors, technology malfunctions, or security breaches.
Macro Environment
Aviation is a highly cyclical sector exposed to a variety of internal and external risk factors. Economic trends and oil prices tend to drive airline profitability. The Fund's use of in-production aircraft leased out to a diversified group of airline lessees should help to diversify market risk with specific operator counterparty credit risk.



Potential Fund Term Mismatch
Medium and long-term leases along with the aircraft part out process could extend beyond the Fund's six-year term. Investors will be reliant on the Investment Manager to exercise appropriate exit strategies to diminish the need for fund extensions or selling aircraft assets at below market prices.
Releasing Risk
Lease renewals and lease transitions can occur during a weak economic or aviation market. Apollo Aviation has proven to be adept at extending leases or remarketing aircraft at attractive terms to avoid having aircraft on the ground off lease. Apollo Aviation also seeks to diversify the lease lengths and lessee counterparties to mitigate this risk.
Credit Risk
Apollo Aviation will actively monitor the general credit quality and performance of each lessee. Given the portable nature of the asset, aircraft repossession is an option that is available and supported by the current regulations.
Non-U.S. Investment Risk
The Investment Manager may lease aircraft to airlines outside of the United States. Such investments may be subject to certain additional risks due to the applicable governing laws including bankruptcy laws, laws intended to protect lessors, and capital repatriation regulations. In the past, Apollo Aviation has avoided foreign countries that it believes do not offer the appropriate laws and regulations to protect the Fund's interest in aircraft placed within that country.
Leverage
The Fund will use leverage for fund activities. Apollo Aviation will evaluate the aircraft financing options at the time of acquisition. A combination of short-term and long-term financing will be used throughout the life of the aircraft. Financing options are available to match the life of the fund. The cost and availability of leverage is dependent on the state of the broader credit market. The use of leverage may be subject to regulatory limits, contractual limits imposed by lenders, and other restrictions. The use of leverage may magnify both the gains and losses for a particular investment.

Finance Committee Disclosure:

Relationship with Aksia:	None Disclosed
Introduction Source:	PSERS has been invested with Apollo Aviation since February 2013 via our investment in the Sciens Aviation Special Opportunities Investment Fund II, LP.
Placement Agent:	None Used
PA Political Contributions:	None Disclosed
Potential Conflicts:	We are not aware of Apollo Aviation having any material investment conflicts.
PSERS History with the Investment Manager:	PSERS is an investor in both Sciens Aviation Special Opportunities Investment Fund II, LP and SASOF III LP.
PSERS Allocation Implementation Committee Approval:	August 1, 2017



Oversight Responsibility:

Investment Office:	Charles J. Spiller Deputy CIO, Non-Traditional Investments Robert E. Little Senior Portfolio Manager
External Consultant:	Aksia LLC

Manager Recommendation Memo

August 1, 2017

Board of Trustees
Pennsylvania Public School Employees' Retirement System
5 North Fifth Street
Harrisburg, PA 17101

Re: SASOF IV LP

Dear Trustees:

Aksia LLC, having been duly authorized by the Board of PSERS, has evaluated and herewith recommends a direct allocation to SASOF IV LP ("SASOF IV"), in line with PSERS Investment Policy Statement, Objectives, and Guidelines. It is further recommended that PSERS commit up to \$150 million to the fund.

Apollo Aviation Services IV LP (the "General Partner" or "Apollo") is a leading aviation investment organization that specializes in the management of moderately aged commercial aircrafts across a geographically diverse footprint. As a pioneer in the strategy, Apollo was one of the first groups to invest third party capital in the asset class and used its first mover advantage to build one of the most prominent mid-life aviation leasing platforms.

In 2010 the General Partner commenced investing through closed-end funds, targeting both secondary lease and part-out aircraft acquisitions. Apollo raised capital commitments of \$213m for its first commingled fund vintage, Sciens Aviation Special Opportunities Investment Fund ("SASOF I"), followed shortly by \$593m for its second vintage, Sciens Aviation Special Opportunities Investment Fund II ("SASOF II"). SASOF II had a larger weighting toward leasing assets and when Apollo raised \$833m for the third vintage, SASOF III, in 2014, the strategy was almost entirely tied to mid-life aircraft leasing. Mid-life is generally defined as between eight and fifteen year-old assets. PSERS is previously invested in both the SASOF II and SASOF III fund vintages. SASOF IV is setting out to buy mid-life to end-of-life aircraft from a global and diverse set of sellers and lessees. Apollo will target a portfolio of 125+ commercial, in-production aircraft with short-term leases (approximately two to four years). Target assets include narrow-body and wide-body passenger jets manufactured by Boeing and Airbus and engines compatible with those plane types.

Aksia's recommendation is based upon the following analytical factors and is made within the context of PSERS' investment guidelines:

- Due diligence of SASOF IV's investment process, including a review of the sponsor, investment strategy, market positioning, investment personnel, and risk management;
 - Most recent on-site investment due diligence visit conducted June 7, 2017.
- Due diligence of SASOF IV's operations, including a review of its organizational structure, service providers, regulatory and compliance, trade flow process, PPM & LPA, and financial statement analysis;
 - Most recent on-site operational due diligence visit conducted May 16, 2017.
- Evaluation of SASOF IV's strategy within the context of the current investment environment; and
- Appropriateness of SASOF IV as a component of PSERS' portfolio.

This recommendation is given solely for the benefit of PSERS and cannot be relied upon by other investors considering an investment in SASOF IV, since their needs, objectives, and circumstances may not be identical to those of PSERS. The scope of this recommendation is limited to the investment merits of SASOF IV. Aksia manager recommendation memos should be reviewed with other Aksia due diligence materials, including the full Due Diligence Report. In addition, please consult your tax, legal and/or regulatory advisors before allocating to any private investment fund.

Please feel free to contact us should you have any questions about this recommendation.

Respectfully,



Patrick Adelsbach
Partner, Head of Credit Strategies



Simon Fludgate
Partner, Head of Operational Due Diligence