MEKETA INVESTMENT GROUP

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November 13, 2017

Mr. Henry Jones
Chairman of the Investment Committee
California Public Employees' Retirement System
400 P Street, Suite 3492
Sacramento, CA 95814

RE: INFRASTRUCTURE PROGRAM ANNUAL REVIEW 2017

Dear Mr. Jones:

In our role as the Board Infrastructure Consultant, Meketa Investment Group conducted an annual review of the Infrastructure Program ("the Program") for the period ending June 30, 2017. Our review covered the Program's investment performance, implementation, compliance with the Investment Policy for Real Assets Program, staffing, and overall compliance with CalPERS' Investment Beliefs. Each area is addressed in this letter, first in summary, followed by additional detail.

Summary Review

Meketa Investment Group was selected to replace the incumbent Board Infrastructure Consultant, following their resignation, in September 2017 and our contract became effective October 1, 2017. Consequently, this review is based primarily on: (1) the Real Assets Annual Program Review (2017) prepared by Staff, including supplemental reports and materials; (2) several calls with Staff members; and (3) review of relevant policies and strategic plans.

Based on our review, Meketa Investment Group identified the following as key developments occurring during the reporting period. All years refer to fiscal years ending June 30, unless otherwise noted.[1]

- **Performance:** The Program's 2017 one-year net total return of 9.9% exceeded its Policy Benchmark of CPI + 400 bps (6.5% for the period) by 3.4%. Three-year, five-year, and since inception net returns also exceed the respective period Policy Benchmarks.[2]

[1] Financial data are as of March 31 for the fiscal years ending June 30, due to the quarter lag in private investment performance reporting from the managers, while staffing data are as of June 30.
[2] All returns are reported as Total Return net of fees, except if noted.

- **Implementation:** The Program's fiscal year end 2017 Net Asset Value ("NAV") was $3.8 billion, an increase of $1.2 billion, or 47%, over the last reporting period. The current NAV represents 1.2% of the Total Fund, compared to the 1% Interim Target.[3]
- **Policy Compliance:** As of the end of the reporting period, the Program was in compliance with the key Policy parameters, including those related to risk classification, geography, and leverage, as measured by NAV.[4,5]
- **Staffing:** While the Real Assets Unit staffing plan does not generally dedicate positions to one of the three individual real asset classes, a number of appointments were made during the period that will benefit the Infrastructure Program, while a number of vacancies remain that are under active recruitment.
- **Investment Beliefs:** In our view, the Infrastructure Program, as implemented by Staff, complies with CalPERS' Investment Beliefs.

In general, we believe that the Program's investment activity for the year was appropriate and consistent with both the Policy and the strategic role of the Program.

Investment Performance

The Program's one-year net investment return of 9.9% exceeded its Policy Benchmark of CPI + 400 bps (6.5% for the period) by 3.4%. Staff attributes this period's outperformance primarily to core holdings, which represent 70.1% of the NAV. Individually, all but two investment partnerships posted positive net returns for 2017, with three being not yet meaningful or not applicable. The 2017 return compares favorably to the 2016 return of 9.0% on an absolute basis, however the excess return for that year was higher at 4.1%.

The Program's 2017 one-year net valuation change was 6.7% and the one-year net income was 3.3%, which represent a slight increase compared to 2016, for which the figures were 6.0% and 3.1%, respectively.

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[3] The 1% Interim Target is reported by Staff in their 2017 Annual Program Review, and verbally confirmed, citing also the 1% interim target for Infrastructure that appears in Asset Allocation materials. We note that Appendix 4, Table 1, of the Total Fund Investment Policy, effective April 17, 2017, lists the Strategic Asset Allocation Targets and Ranges, including for Infrastructure and Forestland combined, with a 3% Policy Target, 2% Interim Target, and a ± 2% Policy Range Relative to Target (the targets and ranges were effective October 1, 2016).

[4] CalPERS Investment Policy for Real Assets (RA) Program, became effective January 1, 2017, conditionally approved August 15, 2016.

[5] The Key Policy Parameters pertaining to risk and geographic segments will apply to the Infrastructure portfolio only when the NAV for that portfolio exceeds $5.0 billion, per the Investment Policy for Real Assets Program.

Additionally, the three-year, five-year, and since inception net returns as of 2017 came in at 10.7%, 12.0%, and 12.6%, respectively, with all periods also exceeding the period Policy Benchmark, by 5.6%, 6.7%, and 6.5%, respectively.

By risk classification, as Staff observed, core investments representing 70.1% of the Program helped account for the overall benchmark outperformance, delivering a 12.9% return for the year. By comparison, value add partnerships (numbering six) and opportunistic partnerships (one), representing 17.9% and 12.0% of the Program's 2017 NAV, only delivered 6.1% and 4.0% for 2017, respectively. Within the value add category for 2017, three partnerships delivered healthy mid-teen net returns, while the other three lagged.

At the portfolio level, the Program's returns are generally consistent with the way it is positioned with respect to risk and geographic diversification (see also under Policy review below), the timing of commitments and capital deployment, and overall market conditions. However, investors usually expect higher returns from value add and opportunistic investments than core. CalPERS' experience to date then may represent a combination of vintage year conditions and manager selection, with a reasonable expectation that future performance would more closely match categorical targets as the Program's portfolio is built out and legacy investments roll off.

Implementation

The Program's NAV at 2017 end was $3.8 billion, a 47% increase over the last reporting period's NAV of $2.6 billion. This exposure represents 1.2% of the Total Fund, compared to the 1% Interim Target.[6] Additionally, unfunded commitments were $1.7 billion, down from $2.0 billion last year, with $1.3 billion at CalPERS' discretion (unchanged).

The Program's investments are managed by eight General Partners, comprising three separate accounts, three direct investments, and eight commingled funds, representing 33%, 31%, and 36% of 2017 NAV, respectively. The number of external managers and vehicles is unchanged from the prior year, but relatively more capital has been deployed via separate accounts and directly than via commingled funds, compared to 2016 when these modes represented 28%, 26%, and 46% of NAV, respectively. These metrics are consistent with the policy preference of separate accounts.[7]

The change in NAV from 2016 to 2017 came largely in the form of new contributions, totaling $1 billion, with the balance coming from the net effect of distributions, income, appreciation, fees, and other credits. The two largest new investments, described below, each exceeded $400 million; the balance comprised seven new investments and one add-on, each less than $30 million.

[6] Ibid, 3.
[7] According to the Investment Policy Procedures & Guidelines for the Real Assets Program.

- **The Port of Melbourne**: CalPERS secured a 10% share in this 50-year container and cargo port concession in Victoria, Australia via its Golden Reef Infrastructure Trust, a non-discretionary separate account managed by the Queensland Investment Corporation ("QIC") with a mandate for high-quality infrastructure assets in the Asia-Pacific region. The winning Consortia also included other QIC entities, Global Infrastructure Partners, and OMERS Infrastructure Management.[8] CalPERS funded the investment in October 2016.
- **Concession Investment Holdings**: CalPERS secured a 10% share in the Indiana Toll Road Concession Company from IFM Investors via direct investment. This is a 157-mile divided highway spanning southern Indiana from Ohio to Illinois, with 65 years remaining on the concession and annual toll escalators linked to CPI and GDP. IFM retains 85.2% ownership, while two other co-investors hold the balance. CalPERS funded the investment in May 2016.[9]

These two investments are consistent with the Program's strategic objectives and policies, including preference for using separate accounts and direct investment modes. They also represent a meaningful accomplishment in a market environment where demand for high-quality, defensive infrastructure assets is high and continues to grow, increasing competition and pressuring prices up and underwritten returns down.

Worldwide, dry powder for unlisted infrastructure funds was steady across 2016 and 2017 at a little over $150 billion, with more than half of this seeking investments in North America and about one-third targeting Europe, according to Preqin. Several of the largest closed-end funds are executing a core or core-plus strategy in the U.S. and Europe, including two with an estimated $10 billion and $8 billion in available capital, according to Preqin. Both managers are also reportedly developing "super-core" strategies for offering in fund and/or separate account packages. The two main core open-end funds, continue to secure new commitments, and one has sufficient demand that the queue is reportedly 12 to 18 months.

Raising the bar, one manager is launching a new $40 billion open-end infrastructure fund, with $20 billion already committed. According to various sources, the Fund is targeting 70% of the capital for North America, across large-scale greenfield and brownfield infrastructure in the energy, transportation, communications, and water/waste sectors.

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[8] Until August 2017, known as Borealis Infrastructure Management.
[9] This investment and its funding are included as a 2017 event due to the quarter lag in financial data reporting.

Seeking greater governance and lower fees via direct investments, as CalPERS has, long-standing and new direct investors also have plenty of capital to deploy. Preqin reports pension funds struck 21 direct deals across 2016 through July 2017, representing $3.6 billion in deal value, down from 2015 that tabulated 26 deals valued at $9.6 billion. These investors often pose stiff competition to others, given their lower target return rates and sophisticated in-house resources dedicated to deal origination and asset management.

Meketa does not expect CalPERS' competition for infrastructure with the desired risk/return profile to decrease in the near term and, in fact, it will probably increase. CalPERS' prestige as a partner for investment managers and other investors provides a competitive advantage in the marketplace the Program can use to its benefit with existing and new managers and other prospective partners. The cycling of investments through closed-end funds, new public-private partnerships, asset expansion needs, and build-to-core opportunities in the near term should feed deal flow attractive to CalPERS.

Investment Policy

The structure of the policies governing the Real Assets Program, including the Infrastructure Program, was reconfigured over the last two calendar years, with some elements having been approved and taken effect during 2017. Some stated objectives of these changes relate to increasing consistency across Real Assets' major sectors (real estate, infrastructure, and forestland), simplifying certain policy items, and introducing segments into the portfolio hierarchy, among other objectives. While a full review of this policy evolution is not possible in the timeframe allotted for the preparation of this report, Meketa Investment Group believes the changes are collectively reasonable, and bring improved governance and implementation guidance to the Program.

As we understand the current configuration in effect, the following policies and guidelines apply to the Infrastructure Program.

- **CalPERS Investment Policy for Real Assets (RA) Program (the "Real Assets Policy,")**—The current Real Assets Policy became effective January 1, 2017, having been conditionally approved August 15, 2016.[10] It includes three appendices:
    - Appendix 1, Reporting to the Investment Committee;
    - Appendix 2, Investment Responsibilities; and
    - Appendix 3, Investment Constraint/Limitations, which includes certain asset class-specific requirements as applicable.

[10] The prior version was approved by the Investment Committee February 16, 2016, and included as Attachment B the investment policy for the Infrastructure Program.

- **Total Fund Investment Policy (the "Fund Policy")**—The current Fund Policy, effective April 17, 2017, includes several sections applicable to Infrastructure:
  - Appendix 4, Table 1, has a list of the Strategic Asset Allocation Targets and Ranges, including for Infrastructure and Forestland combined, with a 3% Policy Target, 2% Interim Target, and a + 2% Policy Range Relative to Target (the targets and ranges were effective October 1, 2016);[11]
  - Appendix 5, Investment Benchmarks, Table 2, specifies the benchmark for the Infrastructure Program as the Consumer Price Index + 4%, lagged on quarter; and
  - Appendix 6, Summary of Permissible and Prohibited Types of Leverage, covers notional, non-recourse debt, and recourse debt limits specifically for Infrastructure.
- **Investment Policy Procedures & Guidelines for the Real Assets Program ("IPPG")**—This document, effective January 1, 2017, governs Staff's administration of the Real Assets Program, and is itself governed by the Real Assets Policy. It contains Appendices covering investment responsibilities, and investment constraints and limitations, for the program and specific to asset classes.

Across the policies, the objectives and requirements specific to the Infrastructure Program appear to be consistent, with some policy items contained in two or more documents, and others detailed only in one place.

Based on our review of the Program against the Policies as currently configured, we find the Program is compliant, as described below.

Strategic Objectives

- *Stable and predictable cash yield*—Net income over 2017 was 3.3%, compared to 3.1% over 2016. Staff reports these net yield levels have been fairly consistent over time, and they expect future net yields to come in between 3% and 5%.[12]

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[11] Ibid, 3.

[12] The policy expectation is that core will produce a relative immediate current net income yield after debt service, value add a cash yield after an initial period of several years, and opportunistic low or no cash yield during the holding period.

- *Diversification of equity risk*—Staff reports that the forecasted volatility for infrastructure is 9.1% and its correlation with the entire Fund portfolio is 0.85%. This is the lowest volatility among the Real Assets, but the highest correlation. Staff reports the five-year correlation between the Real Assets Program overall and an equity benchmark, the FTSE Global All Cap Custom Net, as -0.05. These metrics indicate positive diversification benefits from real assets, including infrastructure, and as the Program is built out, opportunities to capture additional diversification benefits should exist.
- *Inflation protection*—The Program seeks to invest in essential infrastructure assets, many of which have explicit inflation adjustment mechanisms, which helps the Program comply with this investment objective.

Performance Objective and Benchmarks

- *CPI + 400*—Since inception, the Program has returned 12.6% against a Policy Benchmark for the period of 6.1%, providing an excess return of 6.5%. As previously reported herein, the Program has also outperformed its benchmark by between 340 and 670 basis points for the one, three, and five-year periods. With the exception of all single years except 2009, one-year returns and rolling three-year returns have all been above the benchmark as well.

Diversification[13]

- *Risk classifications*—2017 NAV exposures are 70.1% core, 17.9% value add, 12.0% opportunistic, and 0% development/build-to-core, which are compliant with established policy ranges, with each classification comfortably within its range.
- *Geography*—2017 NAV exposures are 56.3% U.S.,[14] 42.6% international-developed, 1.1% international-emerging, and 0% international-frontier, which are compliant with established policy ranges. The international-developed exposure is at the higher end of its range (0-50%), while the other exposures are at the lower end of their respective ranges.

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[13] Ibid, 5.
[14] Ten percent of the NAV is invested in California.

- *Segments and sectors*—The IPPG specifies permissible ranges for segment-sector combinations that apply at the Real Assets Program-level. Infrastructure Program 2017 NAV diversification along the categories is shown below for informational purposes—with infrastructure comprising less than 10% of the Real Assets Program, it is assumed its segment exposures above the Program-level range would not throw the whole out of compliance. Staff also reports diversification by asset type exposures for 2017 NAV as follows: Transportation 44%; Power 41%; Energy 8%; Water 3%; Communications 2%; and Other 2%. By these metrics, the Program appears well diversified across segments and sectors, noting that transportation and power categories themselves include a number of sub-categories.

Real Asset Segment	**Included Sectors Applicable to Infrastructure**	**Permissible Program Segment Range (%)**	**2017 Infrastructure NAV: Segment (%)**
Essential	Domestic Water, Energy, Waste, Timberland, Agriculture	0-25	29
Commercial	Domestic Transportation	0-60	11
Consumer	Domestic Communications	0-40	0
Specialized	Domestic Opportunistic Infrastructure	0-20	36
International	International Infrastructure	0-25	24

External Manager

- For 2017, the maximum Infrastructure Partner Relationship Exposure for the Program was approximately 3% (Harbert), compared to a limit of 20%, and the maximum exposure to outstanding investments with no External Manager was 0%, compared to a limit of 20%.[15]

[15] Real Assets Policy, page 5: "Partner Relationship Exposure" means, with reference to any given Partner Relationship, the ratio of (i) the NAV of assets under management with such Partner Relationship, plus total unfunded commitments, to (ii) the total NAV of the Program plus total unfunded commitments. It is assumed this limit is applied at the Real Assets Program level, not individually for the three asset classes. With a total base of $45.0 billion ($36.3 billion 2017 NAV + $8.7 billion unfunded), exposure with a single Partner would have to exceed $9 billion to violate this limit.

Leverage

- 2017 NAV loan-to-value (LTV) was 46.6% and the debt service coverage ratio (DSCR) was 2.25, which are compliant with the policy limit of 65% and minimum DSCR of 1.25, respectively.[16]

Public Securities

- The Infrastructure Program has 0% directly invested in public securities.[17] Across the Real Assets Program, the limit is 10%.

As outlined above, Meketa Investment Group believes that the Program is in compliance with the Real Assets Policy and related documents, including the listed key policy parameters.

Staffing and Resources[18]

The Total Real Assets Program has 55 positions, and with few exceptions none is fully dedicated to infrastructure. The New Investments Team ("NIT") Investment Managers ("IMs") and Investment Officers ("IOs") work across real assets and the Portfolio Analytics, Research, Risk, Government & Operations Team ("PARRGO") organize staff by functional area. The Portfolio Management Group ("PMG") has IMs and IOs assigned by sector, several of which map to infrastructure, including "Commercial Industrial/ Transportation," and "Commercial/Power/Water," with "International" covering ex-U.S. infrastructure. As such, a number of appointments were made during the period that are presumed to benefit the Infrastructure Program, while a number of vacancies remain that are reportedly not long term and are under active recruitment.

At the end of 2017, the Real Assets Program had 47 filled positions of 55 authorized, and eight vacancies, having made 17 appointments and three transfers (to other INVO programs). At the end of 2016, the Real Assets Program had 50 filled positions of 56 authorized, and six vacancies, including four IOs. Investment positions account for 11 of the 2017 appointments, all three transfers, and five of the remaining vacancies.

While some of these appointments reflect internal advancements (e.g., one internal move begets another to fill it, and so on), between July 1, 2016 and June 30, 2017 eight Real Asset Unit employees left CalPERS (including six investment professionals), and seven individuals joined the Unit (including

[16] Non-recourse debt is permitted up to 65%, while notional leverage and recourse debt are prohibited for Infrastructure, per Appendix 6, Total Fund Investment Policy.

[17] Staff reports no direct investments in public securities via separately managed accounts; it is possible that one or more of the commingled fund managers could have de minimus positions in public securities.

[18] Staffing and resource metrics are as of June 30 of the respective fiscal year.

three investment professionals). The eight departures represent 17% of the filled and 15% of the authorized positions at the beginning of the period.

Respecting Meketa Investment Group's providing resources related to the Program during 2017, we did not review any prospective investments or provide any opinion letters, as our engagement for the Program Consultancy began following the end of the period.

Investment Beliefs

In our view, the Infrastructure Program, as implemented by Staff, is well aligned with CalPERS' Investment Beliefs. We highlight several Beliefs that are particularly important to the infrastructure asset class.

- *Liabilities must influence the asset structure (Belief #1):* As an asset class, infrastructure consists of long-lived assets that have either/both long-term contracted revenue or stable, inflation-protected revenue. These attributes make infrastructure assets well aligned with CalPERS' time horizon and liability structure.
- *A long time horizon is a responsibility and an advantage (#2):* The Program's investment approach consists of a buy and hold strategy, targeting assets that are long-lived. Shorter-term investors that do not have the liquidity to invest long-term in private infrastructure assets cannot access these assets in the marketplace.
- *CalPERS will take risk only where we have a strong belief we will be rewarded (#7):* While targeting lower-risk, core investments, the Program has returned, since inception, 12.6% per year, on average against a policy benchmark of 6.1%.
- *Costs matter and need to be effectively managed (#8):* The Program has been successful in negotiating favorable terms across its investments. Fee rates are expected to decline as the Program focuses on lower-fee customized separate accounts and direct investments. For example total fees across the Infrastructure Program decreased from 208 to 126 basis points from 2016 to 2017.[19]
- *Risk to CalPERS is multi-faceted and not fully captured through measures such as volatility or tracking error (#9):* As a private market asset class, infrastructure risk analysis incorporates many risk factors beyond price volatility, including financial and operating leverage, counterparty risk, interest rate risk, regulatory risk, and environmental risks.

[19] Supplemental calculations were provided by Staff to break out the combined Infrastructure and Forestland Program fees initially presented in Staff's Real Assets Annual Program Review, which in addition to external management fees attributable to infrastructure investments include all internal, consultant, and technology/operating expenses that are not divisible between the two programs. All basis point fees paid figures are calculated on Total Program Assets Under Management defined as NAV.

Conclusion

We believe that the Program's performance, investment activity, and portfolio position during the reporting period has been appropriate and consistent with the Policy and the strategic role of the Program.

Please do not hesitate to contact us if you have questions or require additional information.

Sincerely,

Stephen P. McCourt, CFA
Managing Principal

Lisa Bacon, CAIA
Senior Vice President

SPM/EFB/nca