MEKETA INVESTMENT GROUP

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November 18, 2019

Mr. Rob Feckner
Chairman of the Investment Committee
California Public Employees' Retirement System
400 Q Street
Sacramento, CA 95814

RE: INFRASTRUCTURE PORTFOLIO ANNUAL PROGRAM REVIEW 2019

Dear Mr. Feckner:

In our role as the Board Infrastructure Consultant, Meketa Investment Group ("Meketa") conducted an annual review of the Infrastructure Portfolio ("the Portfolio"), which is part of the Real Assets Program, for the period ending June 30, 2019. Our review covered the Portfolio's investment performance, implementation, compliance with applicable investment policies, staffing, and representation of CalPERS' Investment Beliefs. Following a Summary Review, each area is addressed in more detail. We note that some values may vary slightly from other reports due to different information sources and/or rounding.

Summary Review[1]

- **Performance:** The Portfolio's 2019 one-year net total return of 11.1% exceeded its Policy Benchmark, the PREA/IPD US Quarterly Property Fund NTR[2] (6.5%) by 4.5%.
- **Implementation:** The Net Asset Value ("NAV") was $4.87 billion, up $570 million, or 13.3%, over the March 31, 2018 NAV of $4.30 billion. Current NAV is 1.3% of the Total Fund.
- **Policy Compliance:** The Portfolio is in compliance with the Key Parameters related to risk classification, geography, leverage, and external manager limits, as measured by NAV.
- **Staffing:** The Real Assets Unit had 47 filled positions out of 52 authorized as of June 30, 2019. As noted in prior reports, no positions are formally exclusively dedicated to the Infrastructure Portfolio.
- **Investment Beliefs:** In our view, the Infrastructure Portfolio, as implemented by Staff, supports many CalPERS' Investment Beliefs.

Across these areas, the Portfolio's investment activity for the year was appropriate and consistent with applicable policies and Infrastructure's strategic role.

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[1] All years refer to fiscal years ending June 30, unless otherwise noted. 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 and Total Fund data are as of June 30.

[2] The current index went into effect July 1, 2018. From June 30, 2018 and prior, the Infrastructure Portfolio benchmark's returns are linked to its prior benchmark, which was CPI + 400 bps, one quarter lagged.

Investment Performance

CalPERS' Infrastructure Portfolio continues to significantly outperform its Policy Benchmark for the reporting period, and all other trailing periods shown below. Compared to FY 2018, one- and five-year returns are down, but three- and ten-year returns are up. The performance shifts from year to year likely reflect a combination of higher core valuations, new investments held at cost, and older lower performing years rolling off, among other factors. CalPERS' consistent double digit net returns are impressively high for a predominantly Core portfolio.

June 2019 Net Returns %	1 year	3 year	5 year	10 year
Infrastructure Portfolio	11.1	13.8	12.7	17.9
PREA/IPD US Quarterly Property Fund NTR[1]	6.5	6.5	5.6	6.2
Over (under) Performance	4.5	7.3	7.0	11.7

Performance Attribution

Income delivered approximately 3.2%, or slightly less than one-third of the total return, with the balance from appreciation. This yield is less than the recent three- and five-year periods that delivered 4.2% and 3.7%, respectively, but consistent with Staff's expectations of income between 3% and 5% over the long term.

Among the risk categories, Core continues to deliver the strongest returns, posting 13.4% for 2019, followed by Value Add at 10.2%, and Opportunistic at 2.2%. As we continue to note, the categorical performance rankings are the inverse of what would be expected by definition, as a combination of vintage year effects and manager selection continues to influence absolute and relative performance across the categories. International Core, representing 39% of the Core exposure, is a key component of Core's impressive returns, posting an 18.4%, as also noted below.

Across the segments, International-Infrastructure continues to be the top performer, delivering 18.4%, compared to the second-best segment Commercial-Transportation, which delivered 15.5%. Essential-Energy also provided a nice positive contribution with a 9.4% return, while Specialized-Opportunistic Infrastructure delivered 6.2% for the year.

At the partnership level, net returns ranged from -15.8% to 23.9% for the year, with eight posting positive returns and three posting negative returns. Among the positive performers, six had double-digit net returns.

[1] The current index, PREA/IPD US Quarterly Property Fund NTR, went into effect July 1, 2018. From June 30, 2018 and prior, the Infrastructure Portfolio benchmark's returns are linked to its prior benchmark, which was CPI + 400 bps, one quarter lagged.

Implementation

Current NAV and Historical Portfolio Growth

The Portfolio's NAV as of March 31, 2019, was $4.87 billion, an increase of $570 million, or 13.3%, compared to the March 31, 2018 NAV of $4.30 billion. Additionally, unfunded commitments were $1.52 billion, slightly up from $1.42 billion last year. The current NAV represents 1.3% of the Total Fund,[1] and 11.9% of the Real Assets Program. As of July 2018, Infrastructure no longer has its own Policy Target, which was previously 1%, as it is now included in the Real Asset Program Policy Target of 13% (±5%) comprising the Real Estate, Infrastructure, and Forestland Portfolios. We note that the Real Assets NAV is currently 11.0% of the Total Fund.

In our 2018 Annual Program Review ("APR"), we reported in detail on the historical Infrastructure Portfolio growth over the last 10 years: commitments have increased from $700 million to $7.5 billion; and NAV has increased from $100 million to almost $5 billion. On a year to year basis, the growth (or contraction) of the Portfolio depends on the net effect of new contributions, and income and appreciation from existing investments, against distributions from maturing and terminating investments. For example, a gross gain of $1 billion with $500 million of distributions nets only $500 million in NAV growth. Thus, maintaining or growing NAV depends on gains keeping pace with or outpacing distributions.

FY 2019 Investment Activity

The increase in NAV from 2018 to 2019 of $570 million is mostly attributed to a combination of new contributions to existing investment vehicles and unrealized appreciations totaling $862 million, offset by distributions of $335 million, and the net effect of income, fees, and other credits.

CalPERS' managers made seven new acquisitions during the period totaling almost $300 million: all have a Core risk profile; and either contracted or regulated revenues. Approximately $200 million was invested in the U.S., with the balance in Europe and Australia. More than half of the capital was deployed into power generation assets, 25% into communications investments, and about 20% into the energy sector, including pipelines, storage, and gas distribution assets. These all appear consistent with the managers' mandates and Portfolio objectives.

Managers and Investment Structures

The Portfolio's investments are managed by eight General Partners, comprising two separate accounts, three direct investments, and eight commingled funds, representing 35%, 36%, and 30% of 2019 NAV, respectively. The number of external managers is unchanged from the prior year. This distribution of invested capital across the three structures is consistent with policy preferences favoring separate accounts and direct investments over commingled funds.[2] Since its first

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[1] The Total Fund market value was $370.3 billion as of June 30, 2019, per Staff's Real Assets APR.
[2] According to the Investment Procedures & Guidelines for the Real Assets Program.

separate account in 2014, which handled 17% of that year's NAV, Staff have effectively doubled the amount of capital managed in these preferred vehicles.

Over the past year, Staff have made significant progress in judiciously expanding the Infrastructure Portfolio's manager roster and investment capacity, including: making two new strategic commitments to commingled funds, one with a new Core manager and one with an existing Value Add manager; executing a new separate account with an existing manager; and expanding and restructuring two existing separate accounts. These actions are consistent with Staff's prior stated goals and Meketa's prior recommendations and will enhance the Portfolio's ability to source, execute, and manage infrastructure investments.

Future Portfolio Evolution

Under the combined Real Assets Program Policy Target of 13% (±5%), the Board may look to seek more information around Staff's intention for the Infrastructure Portfolio now that it does not have its own policy target, which was intentional, as Board and Staff are aware. Meketa currently presumes that there is a shared objective to maintain and increase CalPERS' exposure to infrastructure investments in a disciplined, thoughtful, and efficient manner, and Meketa supports this stance.

To accomplish this objective, the Real Assets Unit ("RAU") will need to further expand and diversify the types of investment structures and strategy mandates it relies on for infrastructure. Above, we noted several new and expanded investment vehicles that represent significant progress in this regard. We support further program enhancements in directions and at scales Staff are already contemplating, as well as other potentially viable options, including the following:

- Continue to expand the number and scope of separate accounts with qualified and proven managers;
- Continue to seek direct investment opportunities with known and respected partners;
- Explore club and consortia vehicles, such as joint ventures and other structures, with compatible partners;
- Consider selective commitments to funds for strategies, segments, sectors, and geographies where the manager offers distinct advantages;
- Consider selective commitments to funds as an avenue to access meaningful co-investment allocations offered fee and carry free; and
- Consider greater deployment to Value Add and Opportunistic investments to target less competitive markets and pursue build-to-core strategies with longer term hold optionality.

Investment Policy

The following CalPERS policies and guidelines currently govern the Real Assets Program, and the Infrastructure Portfolio therein (inclusive of prior versions of these policies in effect during this reporting period):

- Total Fund Investment Policy (the "Fund Policy"), September 16, 2019;
- Investment Policy for Real Assets Program (the "Real Assets Policy"), December 17, 2018; and
- Investment Procedures & Guidelines[1] for the Real Assets Program ("IPG"), June 27, 2019.

Based on our review, Meketa believes that the Portfolio is in compliance with the Real Assets Policy, related documents, and key parameters, as described below.

Strategic Objectives

- ***Stable and predictable cash yield*** – Net incomes for trailing one-, three-, and five-year periods ending in March were 3.2%, 4.2%, and 3.7%, respectively. Staff reports they expect future net yields to come in between 3% and 5%. The policy expectation is that Core will produce a relative immediate current net income 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. The significant exposure to Core (currently 82.8%) should support continuing yield in the target range.
- ***Diversification of equity risk*** – The forecasted five-year volatility for Real Assets is 3.4%, compared to the equity benchmark, FTSE Global All Cap Custom Net, value of 11.2%, according to Staff. The correlation between the two is reported as -0.14. These metrics indicate positive diversification benefits from Real Assets, including infrastructure. We note however that data for Infrastructure alone are no longer available.
- ***Inflation protection*** – The Portfolio seeks to invest in essential infrastructure assets, many of which have explicit inflation adjustment mechanisms, which helps the Portfolio comply with this investment objective. For example, 82.1% of the Portfolio's March 2019 NAV is invested in concession, contracted, or regulated revenue structures.

Performance Benchmark: PREA/IPD US Quarterly Property Fund NTR[2]

For FY 2019, the Portfolio returned 11.1% against the Policy Benchmark for the period of 6.5%, providing an excess return of 4.5%. As reported above, the Portfolio has also outperformed its benchmark by between 450 and 1170 basis points for the various reported periods. Additionally, from FY 2014 to FY 2019, one-, three-, and five-year rolling returns have all been well above the benchmark.

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[1] These previously were titled Investment Policy Procedures & Guidelines ("IPPG").

[2] The current index, PREA/IPD US Quarterly Property Fund NTR, went into effect July 1, 2018. From June 30, 2018 and prior, the Infrastructure Portfolio benchmark's returns are linked to its prior benchmark, which was CPI + 400 bps, one quarter lagged.

Diversification Along Key Parameters

The Portfolio is compliant with all key parameters related to diversification and other limits, as demonstrated in the table below, with summary following. We note that the risk and geographic parameters formally apply to the Portfolio when the NAV exceeds $5 billion, whereas the March 31, 2019 NAV is $4.87 billion.

Key Portfolio Parameter	Policy Range/Limit	NAV 3/31/19 Exposure
Risk Classification	***(%)***	***(%)***
Core	60-100	82.8
Value Add	0-25	7.1
Opportunistic-All Strategies	0-25	10.1
Opportunistic-Development	0-10	0.0
Geographic Region[1]	***(%)***	***(%)***
United States	40-100	54.5
International Developed	0-60	45.1
International Developing	0-15	0.4
International Frontier	0-5	0.0
Real Asset Segments[2]	***(%)***	***(%)***
Commercial	0-60	11.6
Consumer	0-40	0.0
Essential	0-25	32.0
Residential	0-40	0.0[3]
Specialized	0-20	27.0
International	0-25	29.4
Manager Exposure[4]	***(%)***	***(%)***
Largest Partner Relationship	20 max	3.1
No External Manager	20 max	1.8
Leverage		
Loan to Value	65% max	43.9%
Debt Service Coverage Ratio	1.25x min	2.11x
Public Securities[5]	***(%)***	***(%)***
Directly Invested[6]	10	0.0

[1] Geographic NAV policy ranges effective as of December 17, 2018.
[2] For informational purposes only: these parameters are measured at the Real Assets Program level.
[3] The Residential segment has no infrastructure sectors.
[4] Calculated as NAV plus total unfunded commitments relative to a Real Assets Program base of $48.8 billion.
[5] Measured at the Real Assets Program level.
[6] 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.

In summary, we find the following with respect to diversification parameters:

- ***Risk***—Exposures are within the middle of the classification policy ranges, with the exception of Opportunistic-Development which has $0 NAV;
- ***Geography***—Exposures in the U.S. are at the lower end of the policy range, while International Developed is at the upper end of its range, with de minimus other international exposures;
- ***Segment***—Investments represent multiple segments, noting that data are informational, as range targets are set at the Real Assets Program level;
- ***Manager***—Exposures are well below the maximums allowed;
- ***Leverage***—Metrics are comfortably compliant; and
- ***Public Securities***—The Portfolio has no direct exposures.

Staffing and Resources[1]

The Real Assets Program had 52 authorized positions as of June 30, 2019, of which 47 were filled, with authorized positions unchanged from FY 2018 end. During the year, three RAU team members left CalPERS, departing or retiring from State service entirely. Recruitments during the year included three promotions from within RAU, and one appointment from another Investment Office division. Subsequent to the end of the period, one vacant and one filled position were transferred to CalPERS' Sustainable Investments Program and the Research and Strategy Group.

With respect to resources for the Infrastructure Portfolio, as noted in previous Meketa reports, the RAU organizes staffing around the six investment segments for both the New Investments Team ("NIT") and the Portfolio Management Group ("PMG"), but not for the Portfolio Analytics, Research, Risk, Government & Operations Team ("PARRGO"). Five of the six segments include one or more infrastructure sector, along with other real assets sectors. As such, NIT and PMG staff are dedicated to specific infrastructure sectors, but also will work on real estate and/or forestland investments. The degree of dedication for NIT staff is fluid, depending on deal flow and active diligence efforts, while PMG staff are explicitly assigned to a specific segment(s) and respective sectors.

The three vacancies are all Investment Officer ("IO") positions: one in NIT (IO I); one in PMG (IO II); and one in PARRGO (IO III). As the PMG position covers Commercial, Power, and Water assets, filling this will directly benefit the Infrastructure Portfolio, while filling the other positions will benefit all Real Asset segments. The NIT and PMG positions are under active recruitment.

With respect to staffing levels, the Managing Investment Director reports to us that the total number of staff for the RAU is sufficient for the time being. As Meketa has previously noted, the RAU deploys staff using a combination of Portfolio-

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

specific specialization and Program-level generalization, which provides expertise and workload balancing flexibility across Real Asset portfolios. We are comfortable with staffing levels at this time, but will continue to evaluate resources for the Portfolio.

With respect to Meketa providing resources during 2019, we supported the Infrastructure Portfolio in the following ways:

- Real Asset Investment Committee ("RAIC")—Attended 30 RAIC's by phone, including review of materials related to pipeline, screening, due diligence, performance reporting, segment plans, manager annual investment plants, policy and guidance, and commenting as applicable.
- Weekly Call with Leadership—Received updates on the Portfolio and RAU activities, including prospective new investments, existing investments, potential exits, staffing, policy and guidance, and Total Fund matters.
- Policy Review and Comment—Reviewed, provided informal comments, and formal opinions on several proposed policy revisions affecting or otherwise relevant to the Infrastructure Portfolio.
- Periodic Reports and Board Investment Committee—Prepared Annual and Semi-Annual Reports for FY 2018, and H2 2018 and H1 2019, respectively, and attended all Committee meetings.
- Investment Opinion Letters—None requested.

Investment Beliefs

In our view, the Infrastructure Portfolio, as implemented by Staff, is well aligned with CalPERS' Investment Beliefs. We highlight below several Beliefs (#) that are particularly important to the infrastructure asset class, with our commentary largely unchanged from prior APRs but for the current data.

- ***Liabilities must influence the asset structure (#1):*** As an asset class, infrastructure consists of long-lived assets that have either/both long-term contracted revenue or stable, inflation-protected revenue, and 82.1% of the Portfolio's NAV falls into this category. 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 Portfolio's investment approach consists of a buy and hold strategy, mainly targeting Core assets that are long-lived. Shorter-term investors without the liquidity to invest long-term in private infrastructure cannot access these assets.
- ***CalPERS will take risk only with a strong belief we will be rewarded (#7):*** While targeting lower-risk, Core investments, over the last 10 years the Portfolio has returned 17.9% per year, on average, against the Policy Benchmark of 6.2%, delivering 11.7% in over-performance. Core exposure is currently 82.8% in keeping with this stance.

- ***Costs matter and need to be effectively managed (#8):*** The Portfolio has been successful in negotiating favorable terms with managers, focusing on providing reasonable operations support and strong economic alignment. Asset management fee rates are expected to decline as the Portfolio focuses on lower-fee customized separate accounts and direct investments over commingled funds. However, profit sharing fees may increase where managers exceed performance hurdles. Additionally, as the Portfolio's NAV grows, total fees would be expected to increase, even as fee rates may decline.
- ***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. The additional governance secured under separate accounts and direct investments over commingled funds helps mitigate these risks.

Conclusion

We believe that the Portfolio's performance, investment activity, and portfolio position during the reporting period has been appropriate and consistent with the applicable policies and the strategic role of the Portfolio. In particular, we applaud Staff on their recent expansion of the Infrastructure Portfolio manager roster and consequent additional capital deployment capacity. The Portfolio's consistent significant over-performance is impressive, but the Board and Staff should be prepared for these returns to moderate over the longer term, given the continuing fierce competition for Core infrastructure assets. As we reported in our August Semi-Annual Infrastructure Performance Review, the global infrastructure market is at a record high $228 billion in dry powder and continues to add to that with record fundraising approaching $100 billion annually. Much of this capital is seeking the same high quality assets of scale that fit CalPERS' investment objectives. We believe the RAU Staff and the Infrastructure Portfolio's managers appear well situated to navigate their mandates' opportunity set and successfully compete in the marketplace.

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
Principal

SPM/EFB/jls