5796 Armada Drive
Suite 110
Carlsbad, CA 92008
760.795.3450
Meketa.com

MEKETA
INVESTMENT GROUP

MEMORANDUM

TO: Members of the Investment Committee, CalPERS
FROM: Meketa Investment Group
DATE: September 14, 2020
RE: Infrastructure Annual Program Review and Semi-Annual Report as of June 30, 2020

Purpose

As the Board Infrastructure Consultant, Meketa Investment Group ("Meketa") conducted the following two reviews of the Infrastructure Portfolio (the "Portfolio") for the period ending June 30, 2020:

- Semi-Annual Performance Review; and
- Annual Program Review.

In the context of the revised Investment Committee meeting schedule for Fiscal Year Ending 2021, the two reviews have been requested for the same Investment Committee meeting. As such we have combined them into this single deliverable. Our reviews are based on data provided in Wilshire Associates' California Public Employees' Retirement System ("CalPERS") Real Assets Performance Analysis Review for the period ended June 30, 2020, and selected CalPERS reports.[1]

This memorandum organizes our coverage of the combined Semi-Annual Performance and Annual Program Reviews into the following topical areas:

- Summary of Review Findings
- Portfolio Performance
- Implementation
- Investment Policy
- Staffing and Resources
- Market Commentary
- Investment Beliefs
- Conclusion

[1] Real Assets Quarterly Performance Report, Partnership Financial Statements (pdf) and Datasheets (Excel), Period Ending March 31, 2020, and Real Assets 3/31/20 Quarterly Review (pdf).

September 14, 2020

Summary of Review Findings

- **Portfolio Performance:** This is the first quarter in some time that the Infrastructure Portfolio's one-year trailing return has fallen short of its benchmark. We believe this reflects the fact that CalPERS' infrastructure managers have already accounted for COVID-19 impacts in their recent quarter valuations, while the real estate managers contributing results to the Infrastructure Policy Benchmark largely have not. The Portfolio continues to significantly outperform its policy benchmark for all trailing periods longer than one year.
- **Implementation**: The Portfolio's Net Asset Value (NAV) as of June 30, 2020, was $5.4 billion, a decrease of $170.3 million, or -3.1%, compared to the December 31, 2019 NAV of $5.6 billion. The current NAV represents 1.4% of the Total Fund.
- **Investment Policy**: The Infrastructure Portfolio complies with all policy guidelines.
- **Staffing and Resources**: The Real Assets Program had 44 authorized positions as of June 30, 2020, of which 42 were filled and two were vacant. Subsequent to the end of the period, the open Real Assets ("RA") Managing Investment Director ("MID") position, vacated by Paul Mouchakkaa in April 2020, was filled as of July 1, 2020 with the appointment of Sarah Corr, who had been the Interim MID for the Private Equity Program from April 2017 to July 2019, and otherwise an Investment Director ("ID") in that program.
- **Market Commentary**: While lagging private market valuations have yet to fully reflect the economic impacts of the pandemic, global market data for transactions and fundraising clearly shows a reduced level of activity in the first half of 2020 as the coronavirus spread around the world. CalPERS will likely see a lower level of deal flow in the near term, but could find asset owners under duress where its capital and expertise would be welcome.
- **Investment Beliefs**: In our view, the Infrastructure Portfolio, as implemented by Staff, supports many of CalPERS' Investment Beliefs.
- **Conclusion**: The Infrastructure program is evolving in a manner consistent with the Real Assets Program Strategic Plan. It is growing in scale at a reasonable pace through its preferred reliance on separate accounts, complimented by strategic commitments to commingled funds and direct investments where possible and appropriate. The impacts from the pandemic have already been felt and at least partially recognized in the most recent quarter's valuations, particularly in the transportation sector. Near term returns are likely to continue to be tempered, but relatively resilient on an asset class basis.

September 14, 2020

Portfolio Performance[1]

Portfolio-Level Returns

CalPERS' Infrastructure Portfolio continues to significantly outperform its policy benchmark for all reporting periods except the trailing one-year return as shown below.

Net Returns (%)	1 Year	3 Year	5 Year	10 Year
Infrastructure Portfolio Returns	0.2	10.3	10.0	13.8
Infrastructure Policy Benchmark[2]	3.9	5.6	5.6	5.9
Over (Under) Performance	-3.7	4.7	4.3	7.9

We observe that one-year returns are lower than prior periods. By comparison, as of December 31, 2019, the trailing one-year return was 7.3%, with three-, five-, and ten-year returns at 12.2%, 11.2%, and 14.6%, respectively. We have previously commented that CalPERS should expect the Portfolio's returns to moderate as the NAV grows with new investments secured in a more competitive market, and we are seeing such effects. However, the coronavirus pandemic's widespread economic impacts in the US and abroad have adversely impacted recent performance, and the trailing one-year return reflects infrastructure managers' recent write-downs of investments in the face of market volatility and economic uncertainty. The Portfolio's trailing one-quarter return is negative.

We note that infrastructure managers' valuation policies and practices mean that the asset class' valuations tend to more closely track the market, with a shorter lag than in real estate. As illustration of this dynamic, the Infrastructure Policy Benchmark for the trailing one-year period is +3.9%. For this period, the benchmark is the Real Assets Program benchmark, with underlying assets that are 100% real estate. Meketa believes the real estate assets have not yet been marked down to reflect the full impact of the pandemic. We discussed this situation in our June 15, 2020 Quarterly Real Estate Performance Review (valuations as of March 31, 2020), and concurrently with this review in our September 14, 2020 Real Estate Portfolio: Semi-Annual Performance and Annual Program Reviews (valuations as of June 30, 2020). Consequently, in the coming reporting periods we expect the Real Assets benchmark's performance to decline relative to the Infrastructure Portfolio's performance.

Performance Attribution for the Trailing One-Year Period

Other aspects of performance drivers are consistent with the Portfolio's current positioning, historical performance, and expected evolution, as highlighted below.

---

[1] Per Wilshire's CalPERS Real Assets Performance Analysis Review for the period ended June 30, 2020, reported with a 1-quarter lag, so as of March 31, 2020. Based on State Street Bank's data.

[2] CalPERS Custom Infrastructure Benchmark, with historical composition as follows: MSCI/PREA U.S. ACOE Quarterly Property Fund Index Net of Fees (April 1, 2018 forward); Consumer Price Index ("CPI") + 400 basis points (July 1, 2011 through March 31, 2018); and CPI + 500 basis points (October 1, 2007 through June 30, 2011).

- ***Core***, comprising 86.8% of the Portfolio, continues to deliver the strongest relative returns among the risk categories, with a positive mid-single digit trailing one-year mark, but has also moderated considerably compared to prior periods. Meketa has previously observed that, generally, Core target returns are lower than other risk categories, but CalPERS has benefitted from good asset selection and favorable market pricing, relative to its Value Add and Opportunistic investments. Core's trailing 10-year returns remain impressive in the high double digits.
- ***Value Add*** performance has also moderated and is still the second strongest performer, but not hugely impactful at approximately 7.6% of the Portfolio. Trailing one-year returns are slightly negative, likely reflecting the early impacts of the pandemic. New commitments to a global value add General Partner should increase exposures in this category. Value Add's trailing 10-year performance is modestly positive in the mid single-digits.
- **Opportunistic** is still the lowest performer, in negative double-digit territory, but is only 5.6% of the Portfolio. This category comprises a single commingled fund of 2007 vintage that is winding down. Its trailing 10-year performance is positive low double-digit.
- ***Among segments***, International continues to be the best performing for periods greater than one year, but the effects from the pandemic hitting Europe before North America may have dampened the one-year returns. The Essential segment is the most consistent, posting high single- to low double-digit returns, and has the best one-year return of all segments. Commercial segment investments have moderated from a three-year low double-digit to a low single-digit return, likely reflecting some early COVID-19 impacts. The Specialized segment posted negative returns for the trailing one-year period across all risk categories.
- The Portfolio's one-year ***net income*** is down, as have been for several prior periods, coming in below Staff's expectations of net income between 3% and 5% over the long term.

Implementation

Current NAV and Historical Portfolio Growth

The Portfolio's Net Asset Value (NAV) as of June 30, 2020, was $5.4 billion, a decrease of $170.3 million, or -3.1%, compared to the December 31, 2019 NAV of $5.6 billion. The current NAV represents 1.4% of the Total Fund.[1] For the prior year period, the Portfolio's contributions of outpaced distributions $1.9 billion to $1.4 billion, respectively.[2] Over recent prior periods, contributions and distributions are both trending up, as approved commitments are deployed and older investments wind down. We would expect to see contributions outpace distributions going forward, given the Portfolio's positioning, over trailing one-year periods, even if not quarter to quarter given the occasional lumpiness of cash flows.

[1] The Total Fund market value was $389 billion as of June 30, 2020, per Staff.

[2] Real Assets QPR Q1 2020 Final (Excel).

Fiscal Year 2020 Investment Activity

Notable investment activity for the period July 1, 2019 to June 30, 2020 included two new acquisitions, which both closed in December 2019: a European transportation asset; and a US portfolio of operating renewable projects.

Managers and Investment Vehicles

The Infrastructure Portfolio comprises 17 vehicles with NAV distributed across managers and investment structures as shown in the table below. The reliance on separate accounts is consistent with the Real Asset Program's Strategic Plan and Investment Beliefs.

Investment Vehicle	Number of Vehicles	Number of Managers	% of NAV
Commingled Fund	11	8	21.7%
Direct Investment	3	3	15.7%
Separate Account	3	3	62.6%

Future Portfolio Evolution

New commitments to existing and new investment managers made recently are intended to further strengthen the portfolio and position it for the future market environment, including but not limited to expected investments in yield-generating core, global value add, and North American mandates. The Portfolio has approximately $3.7 billion in unfunded commitments, split roughly evenly among Core-focused separate accounts, Value Add separate accounts, and commingled funds.

The distribution of NAV and unfunded amounts across vintage years 2007 to 2020 reflects the older vintages winding down and newer strategic fund commitments representing important future investment capacity (vintage years with no values are not shown).

Commingled Funds	2007	2009	2012	2013	2014	2019	2020	Total
% NAV	30	7	22	8	33	0	0	100%
% Unfunded	2	1	2	1	7	80	8	100%
% NAV + Unfunded	15	4	11	4	19	42	4	100%

September 14, 2020

Investment Policy

Governing Policies and Guidelines

The following CalPERS policies and guidelines currently govern the Real Assets Program, and the Infrastructure Portfolio therein:

- Total Fund Investment Policy (the "Fund Policy"), June 17, 2020;
- Policy-Related Procedures Total Fund Investment Policy Investment Leverage Section, September 16, 2019;
- Investment Policy for Real Assets Program (the "Real Assets Policy"), December 16, 2019; and
- Policy-Related Procedures for the Real Assets Program, December 16, 2019.

Key Policy Parameters

The Portfolio is compliant with all key parameters related to diversification and other limits applicable at the Portfolio level, as demonstrated in the table below. We note this is the second quarter Infrastructure's NAV exceeds $5.0 billion, the threshold above which risk and geography parameters officially apply.

Key Portfolio Parameter	Policy Range/Limit	NAV 6/30/20 Exposure
Risk Classification	**(%)**	**(%) [1]**
Core	60-100	86.8%
Value Add	0-25	7.6%
Opportunistic-All Strategies	0-25	5.6%
Geographic Region	**(%)**	**(%) [1]**
United States	40-100	53.7
International Developed	0-60	45.4
International Developing	0-15	0.7
International Frontier	0-5	0.2
Manager Exposure[2]	**(%)**	**(%)**
Largest Partner Relationship	20 max	4.6
Investments with No External Manager	20 max	1.6
Leverage[3]		
Loan to Value	65% max	45.3%
Debt Service Coverage Ratio	1.25x min	1.89x

[1] Real Assets 3/31/20 Quarterly Review and Real Assets Characteristics Report Datasheet, calculated based on asset-level risk and geography.

[2] Real Assets Allocation Report Datasheet, calculated based on manager- and account-level NAV. Percent calculated using relevant NAV plus total unfunded commitments for relationships/investments and same for the Real Assets Program ($52.5 billion).

[3] Real Assets 3/31/20 Quarterly Review.

Staffing and Resources

The Real Assets Program had 44 authorized positions as of June 30, 2020, of which 42 were filled and two were vacant. Subsequent to the end of the period, the open Real Assets ("RA") Managing Investment Director ("MID") position, vacated by Paul Mouchakkaa in April 2020, was filled as of July 1, 2020 with the appointment of Sarah Corr, who had been the Interim MID for the Private Equity Program from April 2017 to July 2019, and otherwise an Investment Director ("ID") in that program. Mike Inglett, an ID and head of the RA Strategy, Portfolio Analytics, Research & Risk[1] ("SPARR") group, served as the RA Interim MID in the intervening months. The Program is not actively recruiting for the single vacancy, an ID that would head the New Investments Team. The process to fill this position had been underway prior to Mr. Mouchakkaa's departure and was put on hold pending the appointment of a new MID.

The Program's current position count is down from July 1, 2019 when it had 55 authorized positions, of which 49 were filled and six were vacant, a net change of -11. Ten positions were transferred to other CalPERS units, including: four administrative positions to the Total Fund Business & Analytical Services ("TFBAS") section and one administrative position to the Board Governance & Sustainability ("BGS") Program (previously Sustainable Investments, or SI); three Investment Officers ("IO") to the Investment Servicing Division ("ISD"); and one Investment Manager ("IM") to the Research & Strategy Group ("RSG"). Additionally three Seasonal Clerk ("SC") positions were deactivated. Five positions were filled over the fiscal year, with three external hires and two internal transfers.

We are told the transfer of the administrative positions occurred at the end of 2019, and was part of an organization-wide effort to centralize administrative and related support staff. Previously, the RA Program's administrative staff members were 100% dedicated to the Program; they are now part of a pool where individuals may not have any formal dedication to a specific asset class group(s).

With respect to the transfer of four investment positions out of RA, we understand that for three their work went with them, and so the losses had minimal impact on workload capacity. However, the IM transfer represents a true loss of capacity, as well as a unique skill set, and remaining RA staff have had to step into the void. Effectively the transfers represent a net loss of one important IM position, and to date the Program has not gotten this back.

As described above, there have been a significant number of staffing changes in the last six to nine months. The pandemic and working remotely have also created new challenges around workflow, training, and collaboration methods. The Program has weathered these changes and the current situation well from our vantage point. While Mr. Mouchakkaa's departure is a meaningful loss, Mr. Inglett was a strong and steady steward pending Ms. Corr's appointment, and he and the rest of the senior team are strong support for her during her transition to RA MID. As we have observed over the last several months, sourcing and diligence activities remain robust, investment processes are consistent, and deliberations and decision-making remain transparent and thoughtful. Additionally, the quality of

[1] Previously called the Portfolio Analytics, Research, Risk, Governance & Operations ("PARRGO") group.

the RA Program’s analysis and work products is high. Nonetheless, careful consideration should be given to ensuring that the Program has the right number of positions with the necessary skill sets to successfully execute on its Strategic Plan. In particular, as the Real Assets Infrastructure and Real Estate Portfolios continue to grow in number of managers, accounts, committed amounts, and NAV, additional resources may be needed in the near future.

With respect to Meketa providing resources during 2020, we supported the Infrastructure Portfolio in the following ways: attending the roughly weekly Real Asset Investment Committee (“RAIC”) meetings and commenting on market conditions, industry trends, prospective acquisitions, financings and dispositions, and the Annual Investment Plan submissions; weekly calls with RA Program leadership; conducting reviews of proposed policy revisions and providing opinions on them; meeting as requested with Investment Committee Chair and Vice Chair; and preparing periodic reports for the Board Investment Committee and attending those meetings. No investment opinion letters for the Infrastructure Portfolio were requested during the fiscal year.

Market Commentary[1]

While lagging private market valuations have yet to fully reflect the economic impacts of the pandemic, global market data for transactions and fundraising clearly show a reduced level of activity in the first half of 2020 as the coronavirus spread around the world. COVID-19 has severely constricted human movements, associated commercial activity, and demand for certain infrastructure facilities and services. This raises questions in investors and deal-makers minds about the accuracy of current forecasts underlying the valuations and creates some hesitancy to pursue transactions in the face of such uncertainty. Buyers may be concerned about valuations dropping further, while sellers will want to wait for some recovery if they can. Additionally, much of infrastructure investing is relationship-based and participants are accustomed to conducting business in person. Everyone has had to adjust to doing diligence and negotiating effectively by videoconference.

In the face of COVID-19 we see that transaction activity declined during the first six months of 2020, and was down approximately 30% in the second quarter, with average deal value also down. Fundraising slowed dramatically in Q2 2020, down to roughly 25% of recent prior levels, with the lowest number of funds raised in a quarter since Q1 2016. Dry powder was roughly unchanged, reflecting a clear pause in its prior strong upward trend. On a risk category basis, we see Core holding up well, but some passenger-dependent and GDP-linked assets are facing challenges. Value Add and Opportunistic categories are mixed depending on their sector and strategy. On a sector basis, many transportation assets have suffered from reduced human movement, but some commercial and freight activity has provided ballast. Certain midstream assets are challenged, or even distressed under both COVID-19 and the energy market volatility, while other assets have actually benefited (e.g., storage). Utilities and renewables have largely withstood the economic slowdown thus far, although the latter is experiencing

[1] All data in this Market Commentary are from Preqin, unless otherwise cited.

some slowing in project development. The communications sector has been a bright spot with some solid positive returns and potential step-changes in service demand in an already high-growth arena.

The table below[1] provides market statistics for the semi-annual period January 1, 2020 to June 30, 2020, as well as the annual period from July 1, 2019 to June 30, 2020. Short and medium term trends, based on Meketa's judgement, are indicated, along with thumbnail commentary.

Market Metric	Semi-Annual: H1 2020	Annual FY 2020: H2 2019 + H1 2020	Short Term Trend	Medium Term Trend	Comment
Transaction Activity: # Deals	1,081	2,452	↘	↗	Activity especially slow in Q2 2020 with only 422 transactions
Average Deal Value	$516M	$596M	↘	↗	Average deal value down relative to 2018 and 2019
Deals (% of total), #	$158B (100%) 1,081	$258B (100%) 2,452	→	↗	Expect demand for infrastructure to remain high
By Sector: Midstream	$37 (23%) 64	$99 (24%) 181	→	→	Energy market volatility creates winners and losers
Power	$19 (12%) 64	$49 (12%) 223	→	↘	Conventional decreasing in share, but still key to the grid
Renewables	$23B (15%) 585	$68B (16%) 1,273	→	↗	Renewable mandates and lower costs are key drivers
Transportation	$33 (21%) 110	$102 (24%) 64	↘	↘	Any passenger-dependent mode hurting, freight mixed
Telecommunications	$32 (21%) 102	$68 (16%) 194	↗	↗	Sector attractive pre-COVID, growth should accelerate
Social	$5 (3%) 78	$15 (4%) 126	→	↘	Predicted robust opportunity set not yet actionable
Water/Waste	$8 (5%) 45	$16 (4%) 64	→	↗	Seeing more opportunities for private investment

[1] Source: Preqin.

Market Metric	Semi-Annual: H1 2020	Annual FY 2020: H2 2019 + H1 2020	Short Term Trend	Medium Term Trend	Comment
Dry Powder: As of Date	$228M	$231M	→	↗	Dry powder unchanged from year-end 2019, but still close to all-time highs
Dry Powder: % North America and Europe	45% North America 38% Europe	46% North America 39% Europe	→	→	North America and Europe have consistently accounted for 75% to 85% of total dry powder
Fundraising in Period	$51B 39 funds	$111B 105 funds	↘	↗	Fundraising slowed considerably in Q2 2020, but still strong trend upward
# Large Funds Closing, $ Raised	2 large funds $20B and $5B ($25B total)	3 large funds $22B, $6B, and $6B ($34B total)	↘	↗	H1 2020 fundraising Included a diversified global infrastructure fund, and a renewables-focused fund sponsored by large manager

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 Annual Program Reviews 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 86.8% 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 13.8% per year, on average, against the Policy Benchmark of 5.9%, delivering 7.9% in over-performance. Core exposure is currently 86.8% 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.

Conclusion

We believe the Infrastructure Portfolio's performance for trailing periods of longer than one year has been impressive relative to the benchmark. Prior to the pandemic, the Portfolio's performance was already moderating somewhat, a possibility Meketa noted in prior reports should be expected. As stated earlier in this report, for the one year period the Portfolio's performance is essentially flat, compared to its moderately positive Real Assets benchmark, which is 100% real estate (since April 2018). This relative relationship reflects, we believe, the March 31, 2020 valuations for infrastructure incorporating more of the COVID-19 economic effects than have real estate valuations. As infrastructure benefits from downside protection mechanisms, and real estate valuations catch up with the market, we would expect the Infrastructure Portfolio's performance to be more favorable relative to the benchmark.

The Portfolio's development and its current construction remains appropriate and consistent with applicable policies and guidances:

- *Risk*—Exposures are within classification policy ranges, with the observation that the portfolio is intentionally dominated by Core at 86.8% of the NAV;
- *Geography*—Exposures are within the categorical ranges;
- *Partner Relationships, Direct Investments*—NAVs are well below the maximums allowed; and
- *Leverage*—Metrics are comfortably compliant.

We continue to believe as we reported in June that CalPERS can reasonably expect some more moderation in the Portfolio's performance at least across the next several quarters, which will bear the burdens of reduced economic activity from COVID-19. Even so, we also continue believe in its totality the Portfolio is well positioned to weather the downdrafts and take advantage of future opportunities.

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

SPM/EFB/jls