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INSTITUTIONAL ADVISORY & SOLUTIONS

CENLAND CORPORATION (II)

The CIO and the Freezing of the DB Plan

December 2020

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It is the afternoon of 15 October 2020 and Dan Woodbridge, 50, CIO of Cenland's in-house management organization for the Defined Benefit (DB) plan, just finished a Zoom call with Denise Liu, Cenland's CFO. During this regular update meeting, Dan and Denise reviewed the recently released Q3 reports. Despite a volatile year, Cenland's well-diversified DB portfolio is again performing well, and better than peers. However, Denise's big news was that given the "lower-for-longer" market environment, the Board decided to accelerate the de-risking of the DB plan by *freezing* the plan at the end of 2020.

In recent years, Cenland's CEO has been zealous about reducing pension cost and enhancing the company's competitiveness. Cenland is a legacy telecommunications company facing intense price pressure from start-up companies that do not sponsor any DB plans. Last year's decision to close the DB plan was the first step to address this issue. In addition, Dan recalled the CEO recently expressed his annoyance about the volatility in funding DB obligations due to fluctuating equity markets and increasingly lower interest rates, which, in turn, affect the company's earnings volatility.

After the decision to close the DB plan, Dan knew Cenland would at some point take further actions to align the company's benefits with current industry standards. But, freezing the plan just a year later came as a bit of a shock as firms typically take a few years after closing to make this next step.

Denise also asked Dan to start putting together an agenda for the yearly asset allocation review which will be a one-day virtual conference in early December. For this year's meeting, given the large allocations to illiquid private assets in the DB portfolio, Denise asked Dan to discuss their DB plan's risk from a cash flow risk perspective (*i.e.*, always having enough cash from pre-defined liquidity sources to meet liquidity demands such as pension benefit payments, GP capital calls, etc.) instead of the traditional volatility risk angle. This is important as a liquid asset and an illiquid asset could have the same volatility, but the cash flow properties of these two assets might be very different.[1] In addition, Denise expects Dan to show the tradeoff between liquidity and performance of the DB portfolio under possible alternative asset allocations that are currently under consideration.

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[1] J. Shen *et al.*, "Building a Better Portfolio: Balancing Performance and Liquidity," PGIM IAS & GIC EIS, April 2020.

After rushing into the living room to help his youngest son log in to his algebra class, Dan sat outside with his laptop and home-made coffee. Surveying his backyard, Dan took a moment to enjoy this precious quiet moment and began to reflect on this past year.

Dan thought turning 50 would be the year's biggest event, but he always knew that life is never with a lack of surprises. Since the pandemic in early March, his team switched to remote working mode. He's been juggling between managing a newly-closed DB plan and helping his three sons keep up with their remote class schedules, especially the little one. Fortunately, his investment team quickly adjusted to the new normal and has been performing as efficiently as before.

Dan sent his investment team a Zoom invite for tomorrow afternoon to break the news about freezing the DB plan and to discuss preparing analyses and recommendations for the yearly asset allocation review meeting. Before meeting with his team, Dan spent some time putting his thoughts together and gathering some plan information to facilitate tomorrow's conversation.

Current State of Cenland Corporation's Defined Benefit Plan

Most of Cenland's employees are covered by a corporate Defined Benefit (DB) plan. Almost a year ago, Cenland decided to follow the industry trend and closed their DB plan.[2] Since then, all new employees who join the firm after December 2019 do not participate in the DB plan. Instead, they are covered by a 401(k) Defined Contribution (DC) plan (with company matching). The closing of the DB plan signaled the beginning of the company's journey of switching over to a DC plan. Along with this change, Dan was also given extended responsibilities to oversee the investment choices in Cenland's DC plan which he describes as "laying out a buffet table." For the DC plan, Dan and his team are mainly responsible for designing the underlying offerings in the DC menu, but participants will be the ones deciding how to invest their 401(k) money.[3]

Following the change in the company's retirement plan offering, as the remaining DB participants age the composition of Cenland's DB participant population changes. As one can imagine, since the beginning of 2020, some of the employees retired and joined the retiree group, but no new employees joined the active participant group. Exhibit 1 shows a year-over-year comparison of the composition of the DB populations between end of Q3 2019 and end of Q3 2020 (*i.e.,* before and after the closing of the DB plan).

Cenland's portfolio has consistently performed better than the average US corporate DB plan. Despite a volatile year, investment returns were still more than enough to pay pension benefits. However, over the past year, the plan's funding ratio decreased to below 90%, primarily due to the lower rate environment and capital markets volatility. After paying out a significant amount in benefits due (*i.e.,* ~$700m, or ~6% of the plan assets), Cenland's Projected Benefit Obligation (PBO) increased, rather than decreased as would be expected for a more mature plan.

[2] Y. Teng *et al.,* "Cenland Corporation: The CIO and the Closing of the DB Plan," PGIM IAS Case Study, December 2019.
[3] J. Cohen, "Five Areas of Focus for Defined Contribution Plans – Many answers, but a few questions still remain," PGIM IRG, April 2018.

At the time the DB plan was closed at the end of 2019, Cenland's PBO was $13.4b based on a weighted average discount rate of 3.25%. Exhibit 2 shows Cenland's estimate of annual benefit payments as of 31 December 2019. During 2020, rates fell further. At the end of Q3, Cenland further adjusted down their weighted average discount rate to 2.65%, consistent with the industry average, and correspondingly, the PBO increased to $14.2b even after paying all benefits due.

In 2018, Cenland made a significant $1b one-time corporate contribution to DB assets to take advantage of the tax reform bill and improve the plan's funded status. At the end of 2018, Cenland's PBO was $12b based on a 4.25% discount rate and the funded status was 95%. However, given the current decrease in the funding ratio, Cenland may need to consider making additional contributions to the DB plan to bridge the funding gap.

This year, facing a newly closed DB plan, Dan adopted his team's recommendations to stop ramping up the portfolio's PE allocation and, instead, added allocations to real estate (RE) to diversify the alternatives portion of the portfolio. Instead of immediately reducing the portfolio's percentage allocation to private equity (*i.e.,* the PE NAV%), which Dan knew would require either selling in the secondary market and suffering a pretty big haircut or making an abrupt change in their PE pacing strategy, Dan wanted to maintain the current PE NAV% and take some time to further evaluate the role of PE investments in the portfolio. In the meantime, Dan became more conscientious about closely tracking the cash flows of the DB portfolio with some quantitative measures.

Despite closing the DB plan, active employees are still accruing benefits. Once the plan goes from closed to frozen, however, these active employees will stop accruing benefits which, in turn, will reduce uncertainty in liability cash flow projections. While this reduced benefit uncertainty may allow the plan to take less risk going forward, there is still a large funding gap to close. Also, while the DB portfolio has been generating enough investment returns to pay benefits (*i.e.,* cash flow positive), once the plan becomes frozen, assets will wind down along with the liabilities. Even though it may take years for the plan to become cash flow negative, it still creates potential concerns about portfolio liquidity and returns.

Dan is also on heightened alert for other actions the corporation may take along with freezing the DB plan. What could they be? What might be the implications for the DB portfolio's asset allocations?

Dan wanted to think about it long and hard before deciding what to present at the annual asset allocation review board meeting in early December.

Cenland's Top-Down Asset Allocation

Led by the CIO, Cenland's in-house asset management organization has been making investment decisions for the DB plan. Under Dan's leadership, the public equity, public fixed income and private equity teams continue to be led, respectively, by JC Lam, 46, Améile Borrion, 47 and Vinita Mody, 49. All three have exhibited excellent manager selection skill and produced industry-leading performance track records. This did not change after the closing of the DB plan as the team continued to share information freely and

execute well. Nevertheless, Dan knew that the news of the freeze will disappoint the team requiring him to think creatively to keep the team motivated and working together.

Cenland's DB assets are invested in both liquid public and illiquid private markets. Exhibit 3 shows the evolution of Cenland's high-level asset allocation and the current allocation as of Q3 2020. A careful reader may notice that, in 2020, in the alternatives space, Cenland introduced some allocations to a new asset class, *i.e.,* real estate, after focusing solely on investing in PE buyouts over the past 10y. Dan decided to add real estate to the alternative portfolio primarily for its income component that helps the overall portfolio's liquidity and potential diversification benefits. In the public space, Cenland further reduced their equity exposure to accommodate the new allocation to real estate and slightly increased the allocation and extended the duration in bonds (Hedging Assets) to better match the duration of liabilities.

Cenland's Bottom-up Private Asset Investing

Managed by Vinita, the private equity portfolio continues to perform well. Since being hired in 2006, Vinita single-handedly built a strong private equity investment team. After a single-minded focus on ramping up Cenland's PE allocations, following the closing of the DB plan and guided by the CIO and the updated IPS, Vinita's team suddenly had to stop increasing the portfolio's PE exposure and shift focus to maintaining the portfolio's PE NAV%.

This came as a shock to Vinita. "PE has been performing very well. How else are we going to close the funding gap?" Although Cenland already had a 25% allocation to PE, significantly more compared with an average US corporate DB portfolio, not to mention a closed plan, Vinita had everything under control. This year also marked Cenland's first successful co-investment which Vinita accomplished by leveraging her relationship with some of the industry's best performing GPs. Co-investment opportunities not only help lower fees paid to outside managers but also reduce the uncertainty in the timing and amount of GP capital calls while rapidly increasing the portfolio's PE NAV%. "Now I have to go full-stop? This is very disruptive. My GPs are going to wonder whether we are a reliable LP. *Heh Bhagavaan!*"

Vinita is also concerned about Dan's decision of adding a new alternative asset class to the overall portfolio. In December 2019, Dan hired Michele "Bruni" Brunelleschi, 34, a Wharton alum with a concentration in real estate and a rising star with 9 years of real estate experience, to build out an investment team. Bruni immediately commenced making commitments to Core Plus RE debt funds, often leveraging on the relationships Vinita had cultivated with her GPs as some of them offer diversified alternative investment funds beyond buyout funds. Starting in January 2020, even though Bruni and his new team had to overcome many difficulties, they have already had a noticeable impact on Cenland's DB portfolio.

Dan started seeing some benefits of this new RE allocation such as a stable income stream. On the other hand, since the pandemic started, he cannot ignore the fact that in the core plus real estate market there have been interest forbearance on some loans, especially in the hotel and retail sectors. Even though it has not happened to Cenland's RE funds, Dan is beginning to have second thoughts on whether Cenland should further increase allocations to RE. In the meantime, Dan is aware of some recent projections about the great

potential in investing in distressed real estate. Would now be a good opportunity to grow and diversify Cenland's newly created real estate portfolio?

Vinita has mixed feelings about Bruni and his new team. Bruni is the youngest among Cenland's investment team heads. He is bright, confident and efficient, but he began his career after the GFC. Since Vinita joined Cenland out of Stanford in 2006, she has been battle-tested. "Better to stick with PE," she thought.

So far, the allocation to alternatives has controlled cash flow volatility, and Vinita and Bruni can make a good argument about maintaining overall alternative allocations in the DB portfolio. However, it does mean a gradually diminishing role for Vinita. This year, they've been maintaining the 25% PE allocation. Would this just be a short transitional period before Cenland decides to start reducing their PE allocations while gradually building up the RE exposure?

Cenland's CIO's Liquidity Demands and Liquidity "Waterfall"

Cenland's top-down asset allocation and bottom-up private asset investing (*e.g.,* commitment pacing and net cash flow) interact to affect cash available to meet various liquidity demands – both internal and external demands. Dan worried about how to understand and keep track of how these two activities interact. As any other corporate DB plan, Cenland strives to pay pension benefits due every month, without fail, to their participants. However, this is not the only liquidity demand on Cenland's portfolio. Exhibit 4 summarizes Cenland's DB portfolio's current liquidity demands, including both internal and external demands. Apart from these explicit liquidity needs, Dan always wants to have a certain level of liquidity in the portfolio for potential strategic corporate moves such as a PRT buyout transaction or a change to a new target allocation which can occur unexpectedly.

Exhibit 5 shows Cenland's current policy portfolio with assets sorted by transactability (according to Dan's subjective views). Within the public portfolio, Cenland invests most of its liquid stock and bonds in active strategies hoping to boost returns and has only a small allocation to passive stocks and bonds as a low cost and least disruptive way to meet regular liquidity needs.

Like any other CIO, Dan has a set of rules to identify which assets will serve as liquidity sources for particular liquidity demands. Dan's liquidity "waterfall" reflects his rules for sourcing liquidity – generally, first sell assets from the least disruptive and least expensive buckets; then if more assets must be sold, sell from increasingly disruptive and costly liquidity buckets. Specifically, each month, Cenland first calculates the total cash ($) available from any illiquid private asset distributions and any over-weighted liquid asset buckets. This $ amount is available for benefit payments and GP capital calls (if there are any that month). Then, if this $ amount is enough for the liquidity demands, Cenland uses any excess $ remaining to try to rebalance under-weighted liquid buckets proportionally back closer to their target allocations. If the $ is insufficient to meet liquidity demands, Cenland would source additional liquidity first from the passive liquid buckets then from the active liquid buckets. Cenland's illiquid assets (*i.e.,* PE buyout and real estate debt funds) are not available to generate cash for immediate liquidity demands.

Every month, Dan closely monitors the percentage usage of the overall liquid assets and receives an alert whenever the DB portfolio crosses any of his pre-defined liquidity "alert triggers". Exhibit 6 shows Dan's current definition of these triggers. However, Dan always worries more about *cumulative* liquidity drawdowns over a consecutive multi-month period (say, over a k-month period) rather than a liquidity drawdown in a single month. Therefore, he recently asked the team to develop cumulative liquidity drawdown metrics to better understand the total drawdown of liquid assets over a sustained liquidity drain, including the frequency of violating a pre-defined threshold over a 10y horizon and magnitude of the maximum drawdown amounts, as illustrated in Exhibit 7.

Cenland Corporation's DB Portfolio's Liquidity & Performance

Over the past year, Cenland's investment team developed an asset allocation framework in partnership with one of their external manager's quantitative portfolio research team that allows Cenland to better understand the interaction of the portfolio's top-down asset allocation and bottom-up private asset investing. The team expects to use this framework as a tool to help the CIO and investment committee evaluate the liquidity and performance tradeoffs of the DB portfolio in a consistent way, especially when thinking about alternative asset allocations and/or any strategic corporate actions.

Dan scrutinized some of the results from the Cenland DB portfolio liquidity study that the team produced using this framework. Exhibit 8a shows the set-up of 3 alternative portfolio scenarios in comparison with the current baseline portfolio. These scenarios included further increasing allocations to hedging assets; allocating more to the RE funds; and a potential PRT buyout transaction in 2y. Exhibit 8b shows a summary of the performance and liquidity measures including the newly developed cumulative liquidity drawdown measure for the three "What-if" scenarios. In all these scenarios, the assumption of long-term PE exposures remains at the current 25% NAV% level.

Dan already has some additional scenarios in mind that he wants the team to analyze for the asset allocation review meeting. Instead of giving the team his ideas of new scenarios to analyze, he decided to let the team brainstorm first to come up with their own "What-if" scenario ideas.

Other Considerations

While thinking about the DB plan's future de-risking journey, Dan recalls that in a recent meeting, Denise mentioned that the head of the PRT distribution team at Sensible, Inc., a major insurance company, is showing her how a PRT buy-in transaction could help Cenland de-risk their DB plan. Dan knows that in a PRT buyout transaction the plan transfers pension liabilities together with assets to an insurance company and "walks away" with no more obligations to the DB participants. In contrast, in a buy-in transaction, the DB plan pays a single premium to an insurance company and the insurer issues a group annuity contract to the plan. Instead of taking over the responsibilities of paying pension benefits to the participants,

the insurer makes a monthly bulk payment to the DB plan to cover their actual benefits payments, while the plan maintains the liability and values the buy-in contract as a plan asset.[4] Even though buy-in transactions are currently not as popular as buyouts in the US, Dan does not want to overlook any possibilities in pension de-risking strategies and wants to better understand a buy-in transaction's implications on the DB plan.

Given current market volatility, Dan also would like to further examine how various public and private assets perform before, during and after equity market volatility events. A recent study shows illiquid private assets provide a portfolio some cushion (in reporting terms) during volatile markets that may partially explain the growth of illiquid private assets in the overall institutional portfolios.[5] Dan wants to hear the team's thoughts on this and how they think volatility events would impact various liquid and illiquid assets in Cenland's DB portfolio.

In addition, Dan is wondering how Vinita and her team maintained a stable PE NAV% in the DB portfolio this year and how they should pace their commitments to ramp down the PE exposure if needed. He recently heard about two types of private equity commitment strategies. One is a cash flow matching strategy that tries to achieve zero total net cash flows (*i.e.,* distributions = contributions) each period. The other one is a Target NAV% strategy that helps achieve and maintain a long-term NAV% in the overall portfolio.[6] Dan wants to hear more from Vinita if they are implementing any of these strategies or following other approaches to manage their commitment pacing.

Finally, Dan could not stop thinking about how the decision to freeze the plan will impact his staff, especially the investment team heads. Dan anticipates that his year-end conversation with Vinita will be even more difficult than last year's, as historically, once a plan is frozen, sooner or later, the plan starts reducing allocations to private equity. How can Cenland keep someone as ambitious as Vinita happy?

Dan is proud of his ability to recruit such a highly capable and ambitious senior investment team, but it took a lot of time and effort. He learned long ago that the team can accomplish almost anything together. Dan already has a few ideas about how to continue to leverage his team's investment acumen in managing both liquid and illiquid assets. There are a lot of unexploited synergies. Dan believes he can unleash the team's potential in new ways to help Cenland's participants achieve their retirement income goals, both within and outside of the DB space. "Maybe collaborate with outside partners such as an asset management firm to develop customized retirement income solutions for Cenland's participants?" he mused.

Dan closed his laptop and went back inside. He is ready for his discussion with the investment team tomorrow.

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[4] "Getting out with a Buy-In: How Shifting Pension Risk, Could be Good for Business," PRT, Prudential Retirement, February 2020.
[5] J. Shen, "Riders in the Storm: How Volatility Events Affect Private Asset Class Performance," PGIM IAS, June 2020.
[6] J. Shen, *et al.* "Building a Better Portfolio: Balancing Performance and Liquidity," PGIM IAS & GIC EIS, April 2020; V. Jeet, "Building and Maintaining a Desired Exposure to Private Markets: Commitment Pacing, Cash Flow Modeling, and Beyond," PGIM IAS, November 2020.

Some Issues for Consideration

1. What's the new objective/challenge Dan is facing going from a closed to a frozen DB plan?

2. What other actions could Cenland take to further de-risk the DB plan? How would that impact the plan's funded status and asset allocation decision?

3. Does Cenland have other liquidity demands not mentioned in the case facts? Do you want to make any adjustment to the rules of sourcing liquidity?

4. Do you see any issue with the current rebalancing rule? How do you want to change it to better execute an LDI strategy?

5. What conclusions can you draw from the initial portfolio liquidity study "What-if" analyses?

6. Would you recommend adding any other liquidity measures in the analyses?

7. What other possible "What-if" analyses do you want to include?

8. From a talent retention perspective, what should Dan plan for next year and beyond?

Exhibit 1
Cenland's DB Population

End of Q3 2019

45%

40%

15%

■ Retired ■ Active ■ Vested Terminated

End of Q3 2020

50%

36%

14%

■ Retired ■ Active ■ Vested Terminated
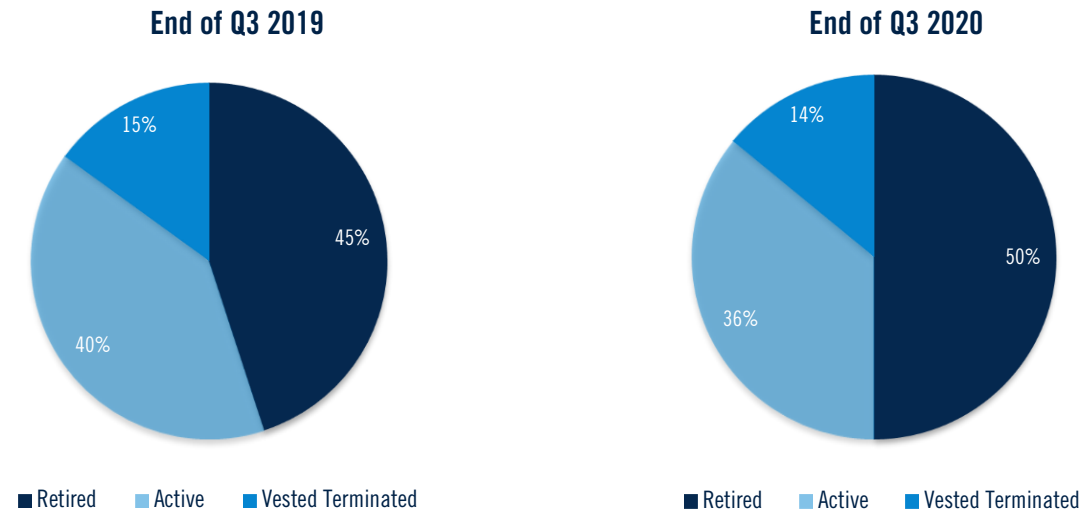
Source: PGIM IAS. Provided for illustrative purposes only.

Exhibit 2
Cenland's Benefit Payment Schedule
(Annual Liability Cash Outflows, As of 12/31/2019)
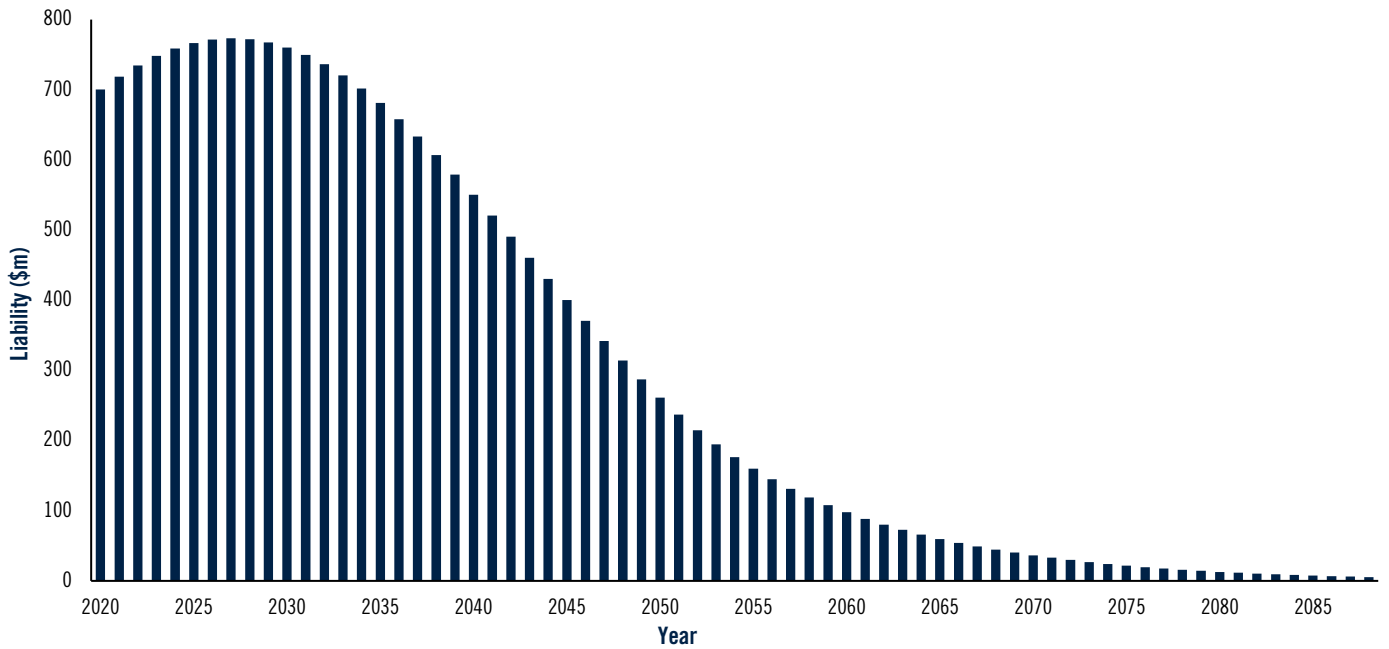
Source: PGIM IAS. Provided for illustrative purposes only.

Exhibit 3
Asset Allocation of Cenland Pension Fund

3a. Cenland's Asset Allocation Over Time
(2005-2019)
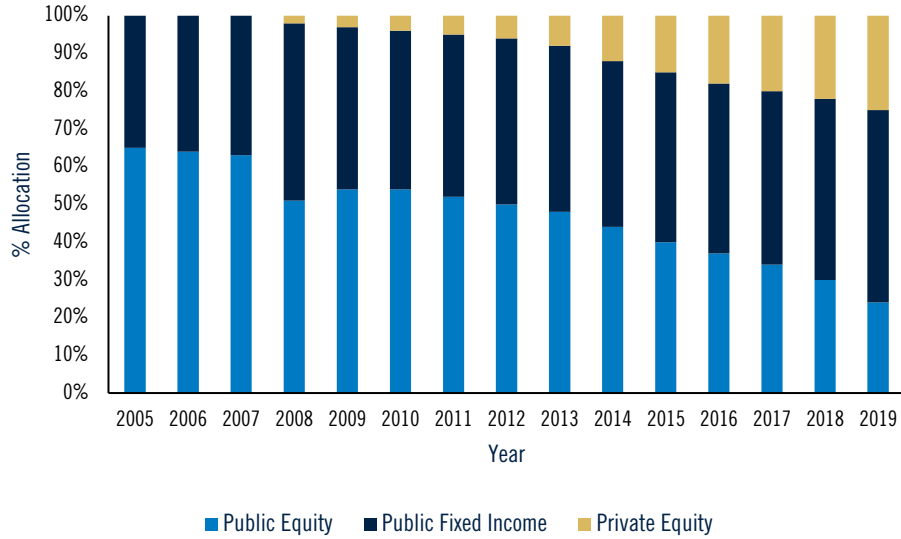
Source: PGIM IAS. Provided for illustrative purposes only.

3b. Cenland's Current Asset Allocation
(Q3 2020)
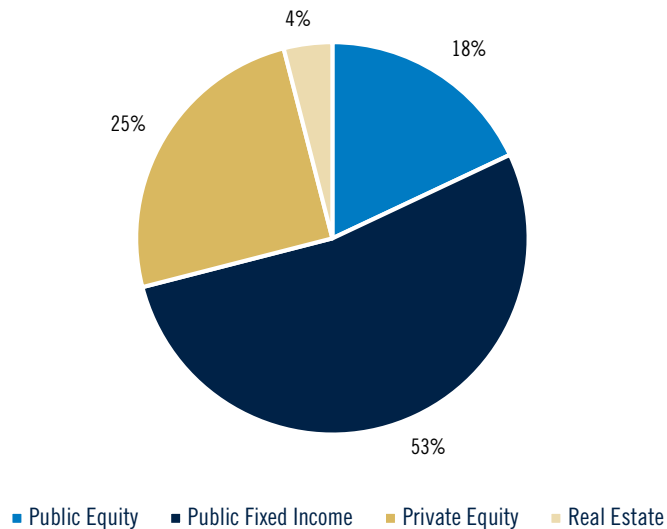
Source: PGIM IAS. Provided for illustrative purposes only.

Exhibit 4
Cenland's DB Plan's Liquidity Demands

Cenland's Liquidity Demands		
External	Benefit Payments	Pay monthly benefits due
Internal	GP Capital Calls	Draw liquidity for GP capital calls (quarterly)
	Rebalancing	Every month, rebalance (4 liquid asset buckets) back to current allocations %, if possible Rebalancing tolerance = current allocation %±50bp, *e.g.*, passive bond 5% (4.5% ~ 5.5%)

Source: PGIM IAS. Provided for illustrative purposes only.

Exhibit 5
Cenland's Current Policy Portfolio
(Approved for Calendar Year 2020)

Asset Type	Liquidity Level	Liquidity Level Description		Target Allocations	
				Stock	Hedging Asset (Bond)
(1) Liquid	1	Available for Liquidity	Passive	2%	5%
			Active	16%	48%
(2) Illiquid	2	RE (Unavailable for Liquidity)		4%	
		PE (LP Investment NAV) (Unavailable for Liquidity)		25%	

Source: PGIM IAS. Provided for illustrative purposes only.

Exhibit 6
The CIO's Liquidity Alert Triggers

DB Trust Liquidity Profile

Early Alert
(2% of all liquid)

Second Alert
(5% of all liquid)

All Liquid Alert
(exhaust all liquid)

7%

64%

4%

25%

PE   RE   Active Liquid   Passive Liquid
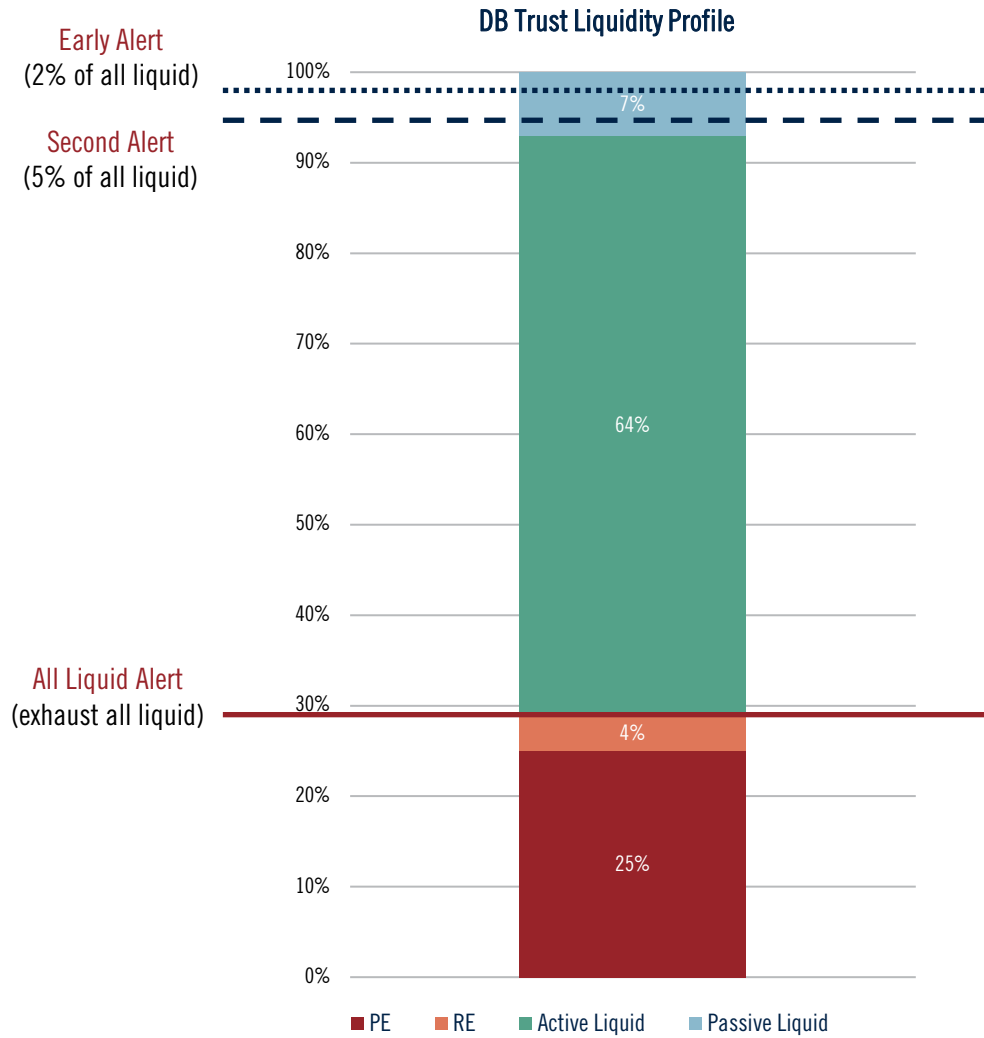
Source: PGIM IAS. Provided for illustrative purposes only.

Exhibit 7
Cumulative Liquidity Drawdown Example
(5,000 runs)

7a. Average Frequency of Liquid Threshold Violation over 10y

On average 16.9% of the chance of more than 5% drawdown of liquid assets over any 12-month period in the 10y horizon
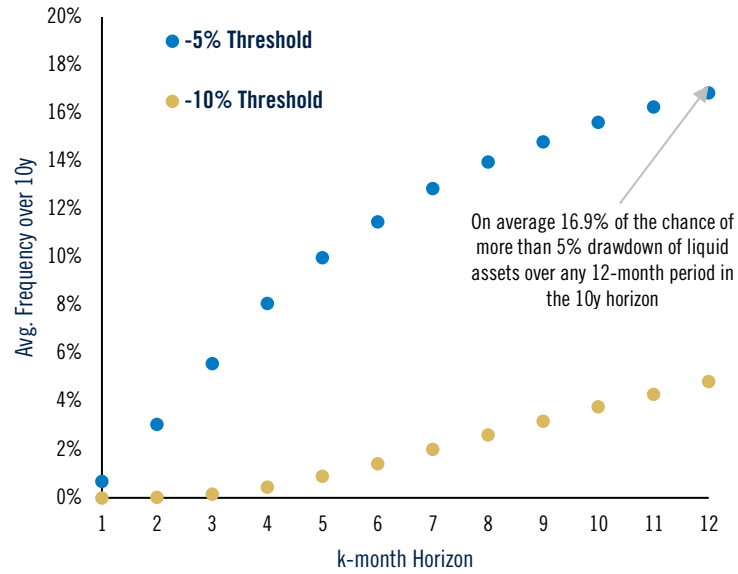
7b. Average Maximum Liquidity Drawdown%

On average maximum -9.9% drawdown of liquid assets over any 12-month period
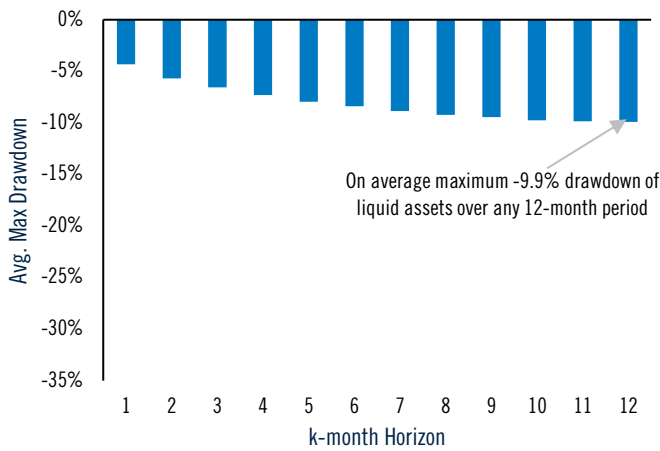
7c. "Global" Worst-Case Liquidity Drawdown %

"Global" maximum -24.6% drawdown of liquid assets over any 12-month period
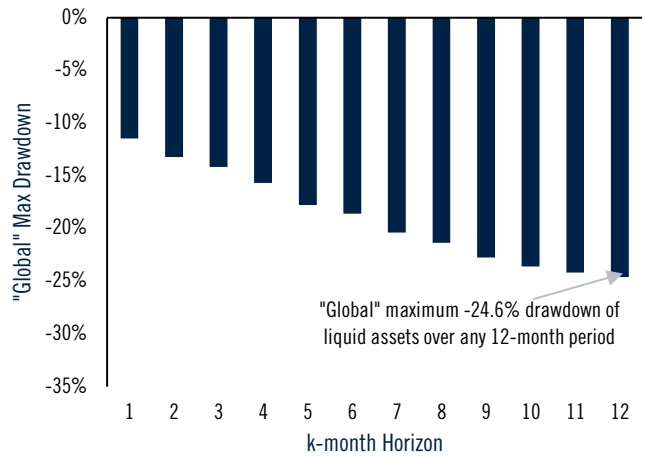
Source: PGIM IAS. Provided for illustrative purposes only.

Exhibit 8
Cenland's DB Portfolio Liquidity & Performance
("What-if" Analyses in 10y Horizon)

8a. "What-if" Scenarios

Asset Type	Liquidity Level Description		Baseline		More Hedging Assets (Scenario 1)		More Real Estate (Scenario 2)		PRT Buyout (Scenario 3)	
			Stock	Hedging Asset (Bond)	Stock	Hedging Asset (Bond)	Stock	Hedging Asset (Bond)	Stock	Hedging Asset (Bond)
(1) Liquid	Available for Liquidity	Passive	2%	5%	2%	5%	2%	5%	2%	5%
		Active	16%	48%	10% (↓↓)	54% (↑↑)	12%(↓↓)	48%	16%	48%
(2) Illiquid	RE		4%		4%		8% (↑↑)		4%	
	PE (LP Investment NAV)		Initial 25% (Tgt 25% Unch. Horizon NAV)		Initial 25% (Tgt 25% Unch. Horizon NAV)		Initial 25% (Tgt 25% Unch. Horizon NAV)		Initial 25% (Tgt 25% Unch. Horizon NAV)	
PRT Buyout			No		No		No		$1b PRT EOY 2	

Source: PGIM IAS. Provided for illustrative purposes only.

8b. Liquidity & Performance Tradeoffs
(5,000 Simulation Runs, 10y Horizon)

Portfolio Liquidity

	Occurrence of the Following Type of Liquidity Event		Baseline	More Hedging Assets (Scenario 1)	More Real Estate (Scenario 2)	PRT Buyout (Scenario 3)
①	Hit Early Alert Trigger (use up 2% of all liquid assets)		1.5%	0.1%	1.9%	4.1%
②	Minimum % of total liquid assets Avg. and Range		69.2% [64.2%, 73.8%]	69.9% [66.8%, 72.4%]	65.5% [62.9%, 68.5%]	67.9% [62.1%, 73.6%]
③	12-month Liquidity Drawdown	Avg. Frequency of Violation over 10y (-5% Threshold)	16.9%	15.3%	18.1%	20.1%
④		Avg. Maximum Drawdown % of Liquid Assets	-9.9%	-8.5%	-10.2%	-11.0%
⑤		"Global" Worst-case Drawdown % of Liquid Assets	-24.6%	-18.2%	-25.5%	-29.7%

Portfolio Performance

			Baseline	(Scenario 1)	(Scenario 2)	(Scenario 3)
⑥		Avg. Horizon "Return" (Net of Benefit Payments)	0.68%	0.53%	0.66%	0.65%
⑦	Funding Ratio	Avg. Funding Ratio (End of Year 5)	93.5%	90.1%	93.1%	91.6%
⑧		95% Confidence Interval Band (End of Year 5)	[69.0%, 119.3%]	[72.1%, 108.6%]	[72.8%, 115.6%]	[66.4%, 117.9%]
⑨		Avg. Variability (Over First 5y)	7.1%	6.5%	6.8%	7.2%

Source: PGIM IAS. Provided for illustrative purposes only.

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