

Climate Risks Lead to New Capital Strategies in Commercial Real Estate



March 2025

Increasing recognition of the impact of severe climate events is driving three multiyear, secular trends in commercial real estate, still in their early stages. Notably, climate risks are expected to materially influence real estate owners' capital allocations. Calvert believes portfolios with real estate exposure that are poorly positioned against climate impacts may require greater investment, potentially lowering investor returns and missing out on compelling incremental revenue-generating opportunities.



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Three emerging trends:

1. Opportunities for monetization.

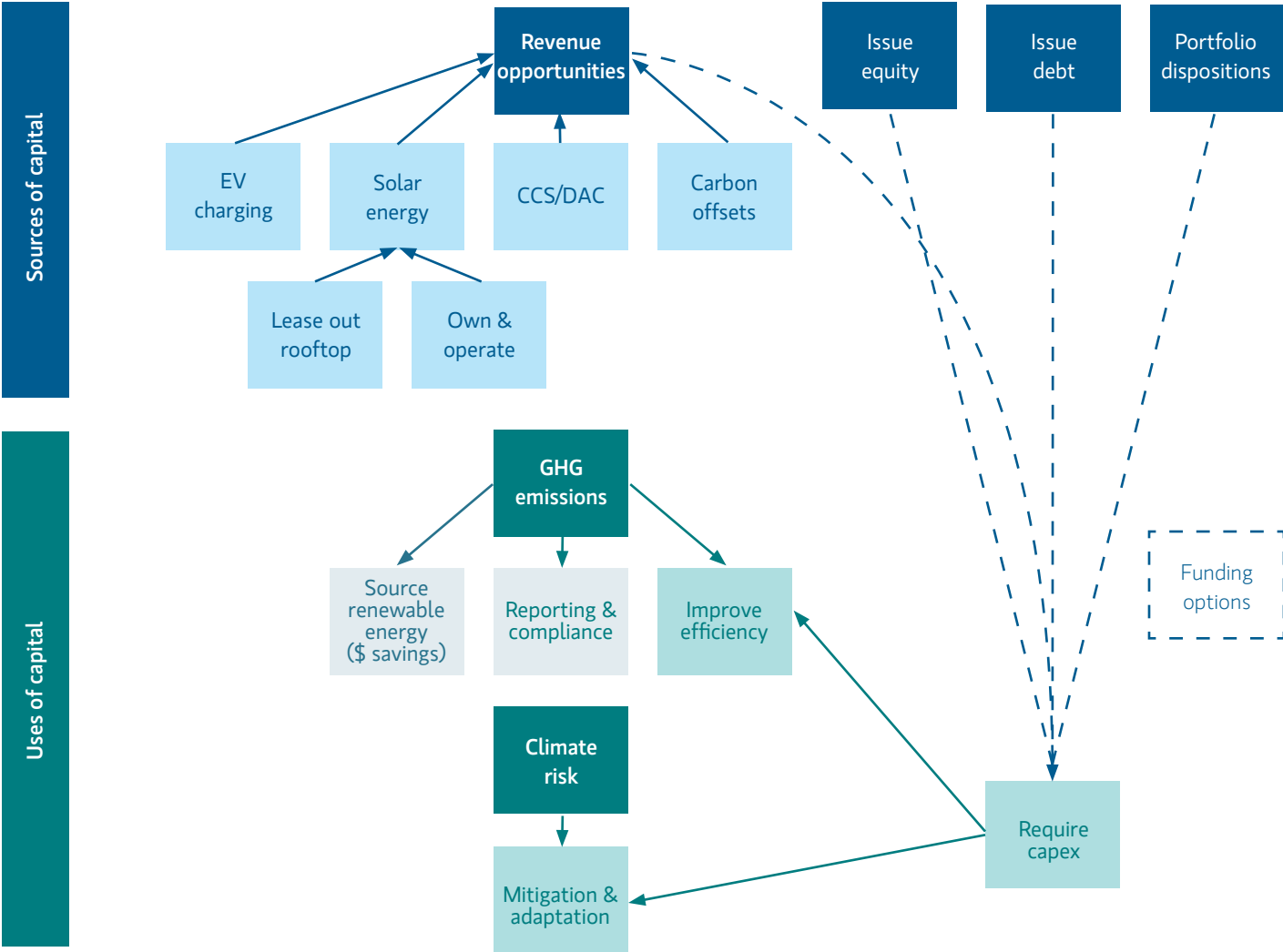
Global efforts to decarbonize offer opportunities to generate real estate revenues beyond traditional sources, such as leasing or sale of the physical property.
2. Greenhouse gas (GHG) emissions are increasing expenses.

Real estate ownership, development and construction companies represent about 10% of the public investable universe,¹ but account for almost 40% of global GHG
- emissions.² These emissions present a negative externality to society that is now being internalized through regulations, tenant preferences and investors' capital.

3. Increasing integration of liabilities from exposure to climate change.

We see this climate risk being factored into investment decisions, such as capital allocation and acquisition/disposition planning.

DISPLAY 1
Climate impacts drive new sources and uses of capital



Source: Calvert Research and Management. For illustrative purposes only.

¹ MSCI ACWI IMI. July 2024.

² 2019 Global Status Report for Buildings and Construction. International Energy Agency. December 2019.

Trend 1: Opportunities for Monetization

Real estate primarily generates revenue from a single source: leasing the space between the four walls of the real property or, in the case of timber REITs, harvesting trees within the property lines. As global decarbonization efforts unfold, real estate owners can potentially tap into new revenue sources that require minimal initial capital and have low maintenance costs or liability exposure.

These areas, with examples cited below, **present investment opportunities at capitalization rates (cap rates) far exceeding the cap rate on the underlying real property, making them a compelling consideration.**

While the revenues from these income streams aren't likely to surpass a property's rental income, they may produce higher incremental returns than investments in leasing commissions or tenant improvements. Examples include:

- **Solar PV generation.** Rooftops, generally considered just part of a building's structure, typically require capital expenditure (capex) for maintenance every 15-20 years. Generally, they have not been rented out. That is changing, as rising energy demand presents an opportunity for large-building owners to affix solar panels and generate energy to sell to tenants or the local utility. The expense of installing and maintaining the solar photovoltaic (PV) equipment need not fall on the asset owner; a cottage industry of solar developers leases rooftops from building owners, paying a fixed rent in exchange for operating their own system on the roof.

This setup allows the real estate owner to lease out previously unused space at minimal cost as well as potentially own and operate the PV system, which, anecdotally, has yielded 9-10 year paybacks. This equates to a cap rate at least double the yield on the real property, according to estimates by commercial real estate firm CBRE Group. The solar PV opportunity is greatest for owners with large rooftops—industrial and self-storage asset owners—though it is feasible for multifamily, office and other complexes as well. For example, self-storage REIT **Extra Space Storage (EXR)** spends \$30M/year (~18% of its capex budget) installing solar PV systems across its facilities to capitalize on this opportunity.

- **Carbon capture and sequestration (CCS) and direct air capture (DAC).** Timber REITs own tremendously large

swaths of land. Holding 12.4M acres and 2.7M acres respectively, U.S. REITs **Weyerhaeuser Co. (WY)** and **Rayonier Inc. (RYN)** each own more land than all but the federal government. Underneath that land sit hydrocarbon and mineral deposits. The REITs lease out extraction rights to third parties, generating excess income while continuing to operate the timber operations aboveground. Crucially, with the global energy transition underway, the value of hydrocarbon deposits will likely lessen, in turn decreasing the value of those leases and the rent. However, the empty basins provide an opportunity for long-term storage of carbon through CCS.

Similar to third-party leases for the extraction of hydrocarbons, landowners can lease out the rights to inject carbon back into the subsurface. The injection points are small, so present little impact to above-timber operations. As with solar PV system leases, CCS and DAC leases represent additional revenue opportunities with minimal associated expense, but currently this is a very nascent area and mainly feasible for large landowners. Timber REIT Rayonier is actively pursuing these options and has forecast carbon capture revenue to grow to be 4-7x its timber revenue per acre, where applicable.³

- **Carbon offsets.** By agreeing to delay their timber harvest, timberland owners can generate carbon offset credits from the additional carbon stored in the trees. Those credits can then be sold to any buyer seeking to reduce their carbon footprint, across any sector. While this delayed harvest impacts core timber business operations, it also creates tangible value through optionality. Having the option to monetize the timber through harvests in good times, and through carbon offsets in slower periods, can help protect the owner's downside. In periods of offsets, the timber continues to grow for future harvests. This can create real value through lower volatility, added downside protection and facilitating more efficient capital planning. Fast-approaching 2025 year end and 2030 corporate decarbonization goals will likely propel carbon offset demand as corporations seek to close the sizable gaps between promised emission reductions and those they have achieved.

³ June 2024 Investor Presentation. Rayonier Inc. June 2024.

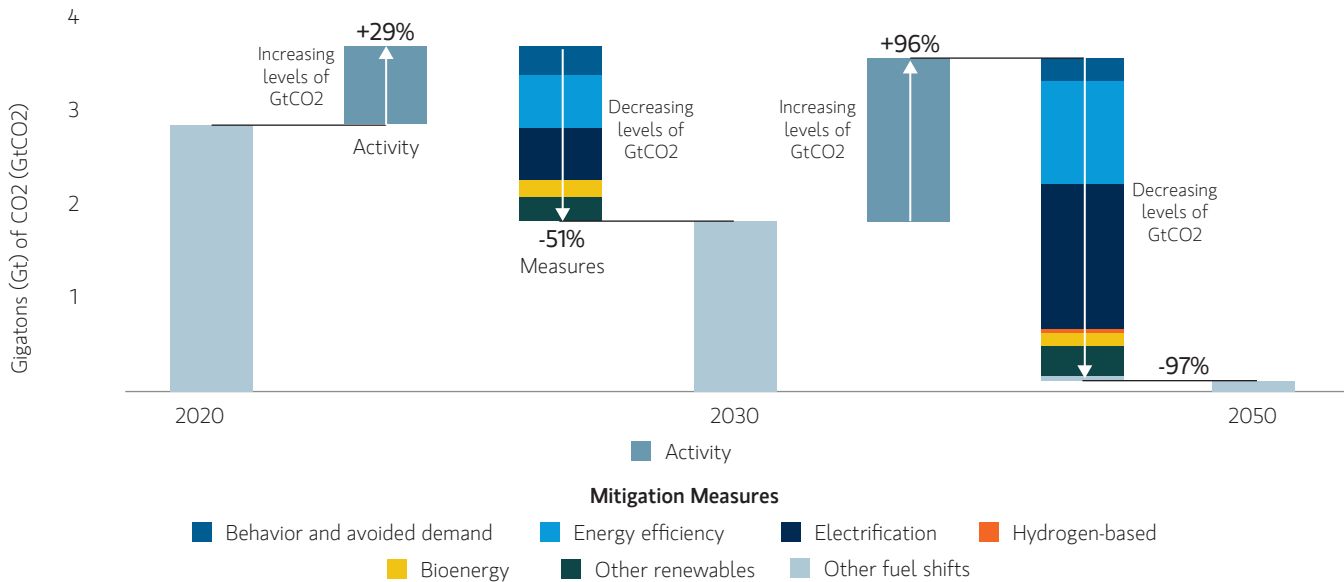
- While the voluntary carbon offset market has been criticized for early-stage missteps, it is coalescing around standards and will likely become more transparent and liquid over time, just as cocoa, grain and other commodity markets have done. The value from this additional optionality is increasingly reflected in timberland valuations with private markets leading public markets in recognition.
- EV charging stations.** REITs like mall owners **Simon Property Group Inc. (SPG)** and **Klépierre SA (LI)** and industrial owner **Prologis Inc. (PLD)** have been adding EV charging stations to their properties to attract tenants and generate revenue. EV stations at malls can attract foot traffic, as customers prefer the convenience of charging their EV vehicle while they shop. In turn, this benefits the mall retailers, which translates into leasing demand. Prologis uses the EV charging stations to facilitate EV truck charging to entice tenants electrifying their fleet or supply chain. Beyond convenience, offering EV charging stations can produce ancillary income through electricity revenue.

Trend 2: Increasing Expense from GHG Emissions

Jurisdictions around the world are drafting and implementing energy and emissions regulations⁴ to internalize the real estate industry’s negative externalities that society has long subsidized. This will require substantial upfront capital from real estate owners to improve efficiency, decarbonize and address ongoing, elevated compliance expenses.

Improving efficiency. According to the International Energy Agency (IEA)’s roadmap to net zero,⁵ **the global real estate sector will need to reduce emissions by 95%**, from 3 gigatons (Gt) in 2020 to 120 metric tons (Mt) in 2050, despite continuing to increase built square footage. The good news is that the tools for this decarbonization are largely already available today, led by electrification and energy efficiency mitigation measures, as shown in *Display 2*. Sustainable building envelopes, heat pumps, energy-efficient appliances and sustainable building materials are examples of the types of mitigation measures that will drive most of the needed change, as shown in the orange and blue columns in *Display 2*.

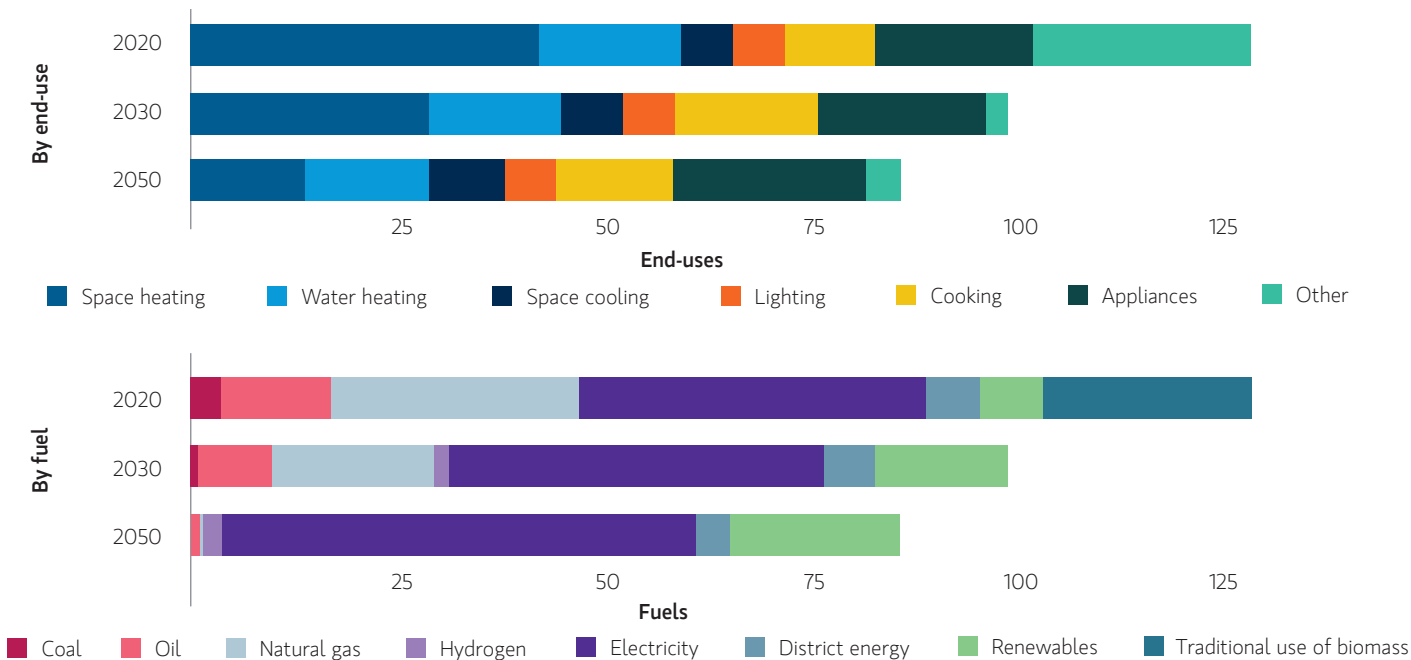
DISPLAY 2
Path for buildings to achieve Net Zero Emissions by 2050 Scenario
 Global decarbonization goals and mitigation measures, by sector



Source: International Energy Agency (IEA). GtCO2 (gigatons of carbon dioxide) is a measurement of carbon emissions being released into the atmosphere. Upward arrows indicate activity, which increases carbon levels. Downward arrows show decrease in GtCO2 being released due to decarbonization mitigation measures, led by electrification.

⁴ For example, New York City’s LL97, Boston’s BERDO, Singapore’s ECA, EU’s EED and the UK’s EPC.
⁵ Net Zero by 2050 A Roadmap for the Global Energy Sector. IEA. October 2023.

DISPLAY 3
Global final energy consumption by fuel and end-use application by buildings in the NZE



Source: IEA. Data as of 10/31/2021, from most recent IEA NZE paper. NZE is the IEA Net-Zero Emissions by 2025 Scenario, used to generate the 2030 and 2050 forecasts.

Display 3 above further highlights efficiency opportunities for energy-intensive appliances like heating, cooling and cooking tools. It also shows how replacing oil and coal (red bars) with renewables (green bars) can help decarbonize the energy used for these appliances.

To achieve the IEA’s net zero pathway, **more than 85% of buildings will need to comply with zero-carbon-ready building energy codes by 2050, increasing retrofit rates from less than 1% per year today to about 2.5% per year by 2030 in advanced economies, equivalent to 10M buildings retrofitted every year.** To maximize the impact of these retrofits while minimizing expense and disruption to tenants, the retrofits should be done early and simultaneously as much as is feasible. Research has indicated that capex spending related to energy efficiency alone must increase significantly to achieve net zero goals.⁶

Compliance expenses. Increased regulation will result in additional monitoring and reporting burdens. For investors,

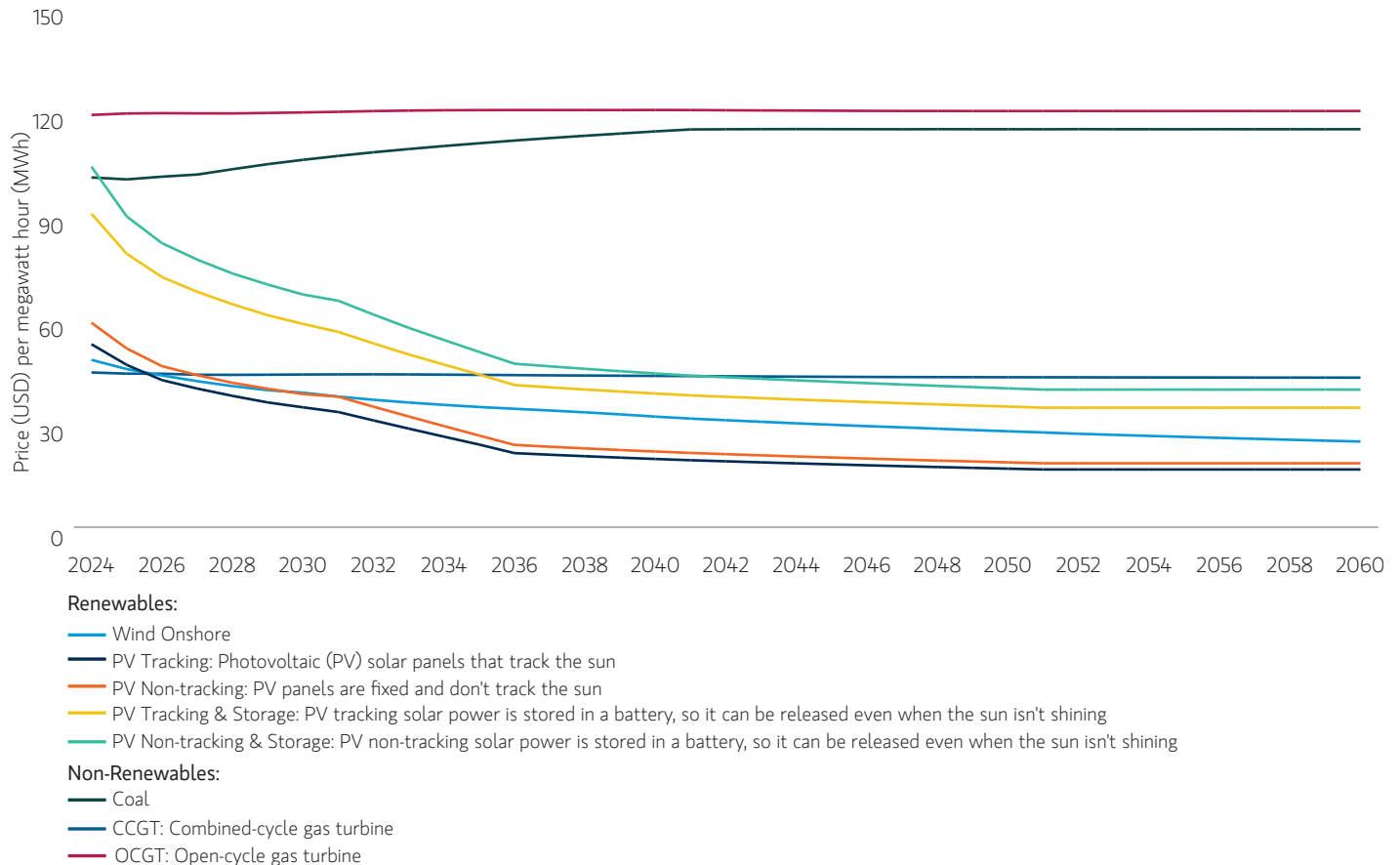
these increased burdens should improve transparency on financially material risks, just as the burden of auditing financial statements is accepted by investors in exchange for reliable insights into a company’s operations. Along with reporting requirements, owners will face material, ongoing fines for noncompliance with the regulations.

Sourcing renewable energy. While traditional, closed cycle gas turbine (CCGT) power is often the cheapest energy option today, alternative energy sourced from solar PV systems and wind is expected to soon become the cheapest option, as demonstrated in Display 4. However, pricing dynamics for renewable energy are complex. Solar energy will soon become cheaper than traditional energy according to the IEA, but only during the day, when the sun is shining. Likewise, it’s projected that wind and other renewable sources will soon be competitively priced. Therefore, the cost increases or savings from sourcing renewable energy will depend heavily on the usage profile for each asset and its access to renewable sources.

⁶ Vejarano, Gino Beteta. The capex costs of reaching the Paris goals. IEA, Energy system/Buildings.

DISPLAY 4

Renewable energy is forecast to become the cheapest source of power within a decade



Source: Bloomberg NEF; Calvert Research and Management. As of 12/31/2024. Megawatt-hour (MWh) is a unit of electrical energy equivalent to 1,000 kilowatts of electricity used continuously for one hour. USD/MWh indicates how many U.S. dollars a MWh of energy costs. The more USD/MWh, the more expensive the energy. Forecasts are based on current market conditions, subject to change, and may not necessarily come to pass.

Trend 3: Increasing Integration of Climate Liabilities

Insurance firms' growing propensity to raise premiums and reduce coverage for weather-related catastrophes is essentially pulling forward the long-term future liabilities of climate change. This growing recognition spans the globe, from the U.S.⁷ to Japan,⁸ Australia,⁹ Europe¹⁰ and other regions. Insurers' actions are the canary in the coal mine, portending significant valuation impacts as climate risk is incorporated in a more robust and quantitative way. **Property owners must factor climate risk into investment decisions, such as capital allocation and**

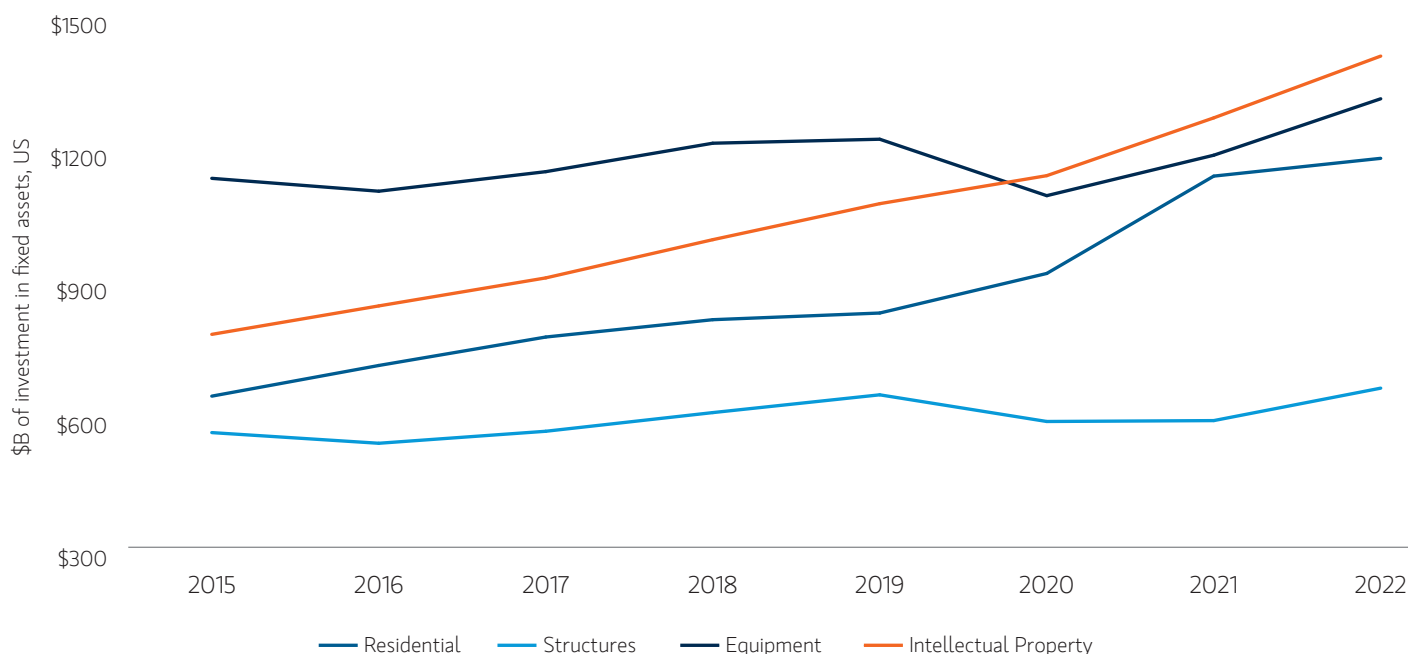
acquisition/disposition planning to avoid increased operating and capital costs and the threat of stranded assets. This will involve significant capital expenditures to shore up the resiliency of the assets themselves and the surrounding infrastructure. The costs include more resilient building materials, redesigning layouts and moving key elements of the asset, like HVAC systems, to accommodate weather impacts. Further, owners must consider the surrounding infrastructure; a reinforced, sturdy multifamily building will still diminish in value if the roads leading to it wash away and unreliable grid infrastructure deters potential renters.

⁷ Cho, Renée. With Climate Impacts Growing, Insurance Companies Face Big Challenges. Columbia Climate School State of the Planet. November 2022.

⁸ Evans, Steve. Japanese property insurance premiums to rise on cats & climate: Moody's. Artemis. September 2022.

⁹ Ellerbeck, Stefan. How climate change is causing an insurance crisis in Australia. World Economic Forum. June 2022.

¹⁰ Jones, Huw. EU regulators set out ideas to plug climate 'insurance gap'. Reuters. April 2023.

DISPLAY 5**Investment in CRE capex has lagged all other fixed assets, at a growing pace**

Source: Bureau of Economic Analysis; Calvert Research and Management. Investment in Private Fixed Assets, Equipment, Structures, and Intellectual Property Products by Type." Table 2.7. U.S. Bureau of Economic Analysis. June 2024.

While decarbonization and climate risks will affect future operating expenses, the greater threat is the potentially vast amounts of capital that may be needed to align properties with the new regime of climate requirements by regulators, tenants and investors.

Historical data, as shown in *Display 5*, indicate that capex in U.S. commercial real estate has lagged investment in other fixed assets, suggesting that the industry may already be undermaintained, exacerbating the need for upcoming capital investment.

Financing capital investment for decarbonization. Real estate owners can finance these capital investments through four avenues: operating cash flow, issuing equity, issuing debt or dispositions.

Operating cash flow. If the capital needs are small and/or if climate investment subsidies are available, tapping into operating cash flow is the simplest financing solution. If the capital needed is a size of any significance, it could threaten

an issuer's dividend, putting management in the precarious position of reducing a dividend, and if shareholders divest as a result, an increase in capital costs. Preparing for unpredictable climate events could also drag on returns as owners keep more cash on hand to cover impacts, rather than reinvesting it. This low return capital allocation reduces overall returns and valuation.

When financing capital investments through operating cash flow, it's highly important to communicate to shareholders the value of reinvesting their capital to protect the portfolio's assets, rather than returning the capital to them. Hotel REIT **Host Hotels & Resorts Inc. (HST)** has articulated their strategy to investors through its sustainability return on investment (ROI) metric, which measures the return it anticipates from sustainability upgrades funded largely through operating cash flow. Investments in GHG reductions, energy efficiency, water efficiency or other projects must meet specified return targets to be undertaken.¹¹

¹¹ Environmental Policy. Host Hotels & Resorts Inc. July 2023.

Issuing equity. This is rarely a popular choice as it dilutes shareholder value and is often only considered if there is already high leverage and a clear return on investment—higher than the equity cost of capital, on the capital investments. This option is further complicated by the still-evolving patchwork of regulations and early-stage climate science.

Issuing debt. This is a likely route for many real estate owners, provided they currently have moderate to no leverage. The appeal of this option has waned in recent years, however, as higher interest rates have significantly raised the cost of debt. We believe an investor should not view the option of taking on additional debt to fund climate-related capital expenditures as increasing the riskiness of the firm. Rather, the capital investments should be viewed reducing intangible costs. For many, this capital could be funded through green financing to capture a small premium in pricing.

Office buildings REIT **Inmobiliaria Colonial (COL.MC)**, a Spanish multinational real estate corporation, has embraced this approach. The issuer has converted all the group's bonds into green bonds for a total aggregate amount of approximately €4.6 billion as of December 2023, with further issuance of EUR 500 million in 2025, totalling to 7 green bonds outstanding.¹²

Portfolio dispositions. Rare is the real estate CEO who enthusiastically pursues shrinking the asset base of their portfolio, even in the face of clear private market premiums to carrying value. Therefore, it is unlikely this will be a popular strategy, though it could be the optimal allocation of capital. By divesting assets heavily exposed to regulation and/or climate impacts, along with their associated liabilities,

the CEO can reduce portfolio risk. In turn, that capital can be redeployed elsewhere in the portfolio to shore up resilience, doubling the impact of the dispositions.

In fact, leading REITs worldwide are addressing climate impact by assessing their current portfolio risks, conducting impairment testing, applying an internal shadow carbon price to new acquisitions, or passing altogether on new deals that would add material climate risk to the portfolio.

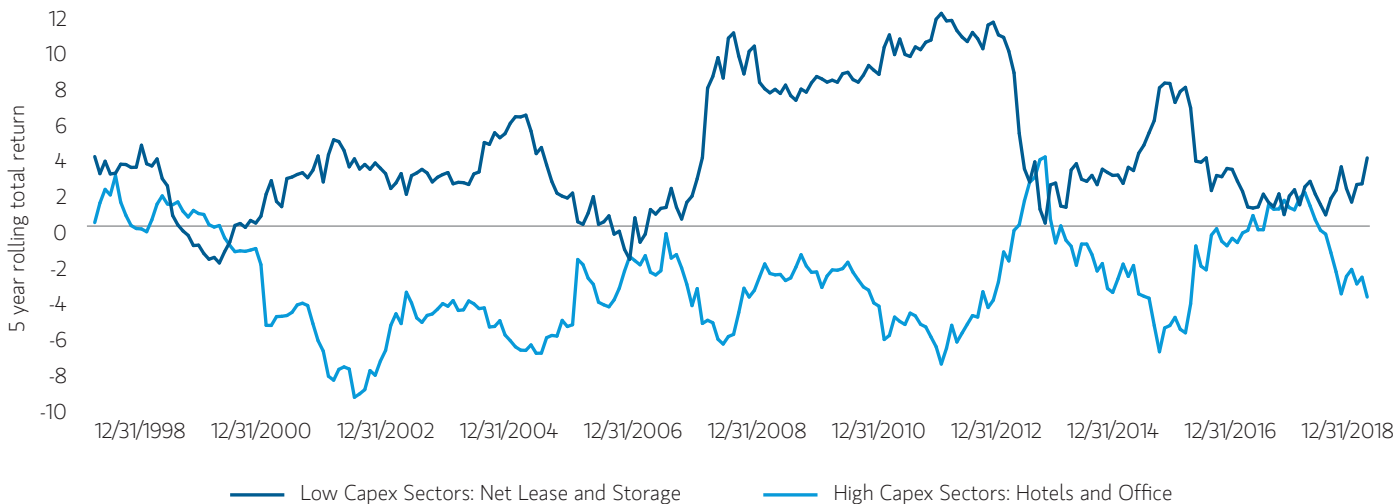
Ultimately, the most popular tactic to finance this impending capital expenditure boom will likely be a combination of operating cash flow and issuing debt. Funding from cash flow or increasing debt service, by issuing debt at high interest rates, will decrease cash flow to investors while improving the risk profile of the real estate firm.

This is important because research¹³ has shown that real estate investors historically and consistently underestimate capital expenditure needs, potentially leading to lower returns for real estate that needs high capital expenditure investment. These insights stem in part from a pivotal Green Street Advisors study on the role of capital expenditure (capex) in evaluating the real estate market. Displays 6 and 7 further illustrate these points. *Display 6* compares the performance of the highest capital expenditure sectors—hotel and office (where capital expenditure reserves range from 25%-30% of net operating income (NOI))—to the performance of the lowest capital expenditure sectors, net lease and self-storage (where capital expenditure reserves range from only 3%-5% of NOI). Over the past 20 years, the low capital expenditure sectors outperformed 93% of the time and by significant margins.

¹² 2024 Green Financing Framework, Colonial (Inmobiliaria Colonial). November 2024.

¹³ Green Street Advisors; Calvert Research and Management.

DISPLAY 6
Low Capex sectors have outperformed High Capex sectors for 20 years
 Past performance is not a guarantee of future results.

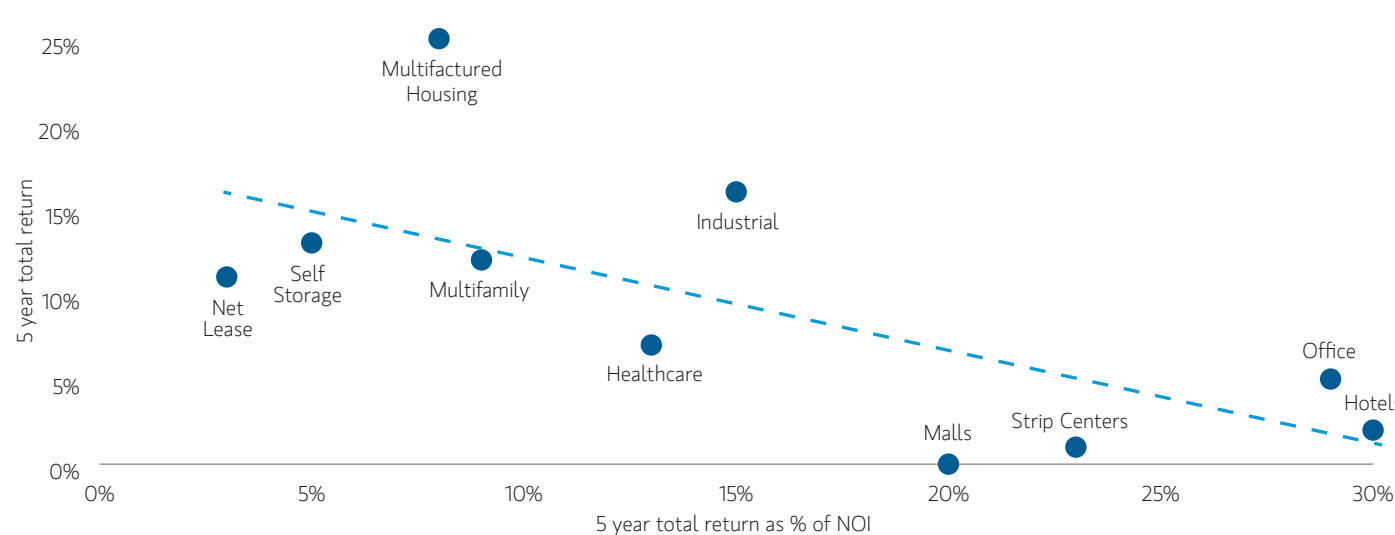


Source: Green Street Advisors; Calvert Research and Management. Green Street Advisors,"Heard on the Beach: The Most Important Thing," June 10, 2019, discusses the importance of capex in evaluating the real estate market.

Breaking returns out by property type, *Display 7* illustrates the negative correlation between capital expenditure and returns. Low capital expenditure sectors like manufactured housing, self-storage and net lease, have generated high

returns. In contrast, moving towards properties with higher capital expenditure, such as offices, hotels and others, correlated with lower returns.

DISPLAY 7
Capex has been negatively correlated with total return



Source: Green Street Advisors; Calvert Research and Management.

Conclusion

The more concentrated a real estate portfolio is, with significant exposure to high GHG emissions and climate risk, the less resilient it will be and the more capital it will require. The research cited here demonstrates that real estate investors generally underestimate this capital need, which can lead to lower returns for portfolios that require the most capital. In addition, they may not be equipped to capitalize on some of the emerging revenue opportunities. **Therefore, we think more environmentally sustainable portfolios should generate superior investor returns over the long term.**

Strategies to potentially benefit from these trends and opportunities may include:

- Overweighting portfolios or assets with strong sustainability characteristics and underweighting those with greater climate exposure.
- Overweighting property types that generally emit fewer GHG emissions and exhibit less climate change exposure, like industrial and self-storage, and underweighting heavy resource emitters and/or sectors with high climate exposure, like hotels and office.
- Overweighting property types and regions that allow asset owners to capitalize on some of the emerging revenue opportunities, like timber REITs and industrial portfolios in favorable solar PV jurisdictions.
- Securing a steep discount for highly exposed assets that will need significant capital to comply with future regulations and/or withstand growing climate threats. We believe the opportunity set for “greening” value-add firms could grow rapidly, and internationally, in coming years.

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Investing involves risk including the risk of loss. The risks associated with ownership of **real estate** and the real estate industry in general include fluctuations in the value of underlying property, defaults by borrowers or tenants, market saturation, decreases in market rents, interest rates, property taxes, increases in operating expenses and political or regulatory occurrences adversely affecting real estate. There is no guarantee that any investment strategy, including those with an **ESG** focus, will work under all market conditions. Investors should evaluate their ability to invest for the long-term, especially during periods of downturn in the market. There is no guarantee that any investment strategy will work under all market conditions, and each investor should evaluate their ability to invest for the long term, especially during periods of downturn in the market.

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Cap rate is a metric used to estimate the potential return on a commercial real estate investment. It's calculated by dividing a property's net operating income by its asset value.

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