

BIOTECH BOOM LEADING GROWTH IN LIFE SCIENCE REAL ESTATE

September 2021

IN A NUTSHELL

- _ Rapid biotech advances and an aging population are creating a positive environment for life science real estate.
- _ In the coming decades, demand for life science is expected to rise as employment and funding in this industry surge to accommodate an accelerated pace of drug and therapeutic development.
- _ Life science tenants are largely concentrated in a cluster of markets that foster collaboration and innovation.
- _ The life science sector is largely recession resistant, although conditions in individual markets can vary depending on supply considerations.
- _ An increased allocation to life science property may improve long-term performance and risk-adjusted returns for real estate portfolios.

1 / Life Science Drivers

The U.S. life science sector has emerged as a popular real estate investment in recent years. Since the COVID-19 pandemic, the sector has seen robust growth and strong investor interest; it is now considered a 'core' product type for many investor groups. Life science buildings include space for the research and development of pharmaceuticals, biotechnology, and medical technology such as specialized diagnostics and devices. They are usually located in clusters near or connected to universities and medical hubs and are generally rich in amenities as tenants try to keep and attract talent. In a world of uncertainty, one of the most attractive aspects of the life science sector is its non-cyclical demand. Not only is the industry inherently recession resistant; the specialized nature of the real estate, equipment and supporting infrastructure makes relocating complicated and expensive, creating a "sticky" tenant base relative to traditional office.

Structural forces make the case for further investment in the sector. Demographic trends, namely the aging of the U.S. and world's population, are creating robust demand for healthcare services and therapeutics. By 2030, the U.S. median age is projected to top 40-year-old for the first time, compared with only 36-years-old in 2005.¹ As the population ages, the potential market for new treatments, drugs and therapies is expected to grow.

¹ U.S. Census. As of 1Q 2021.

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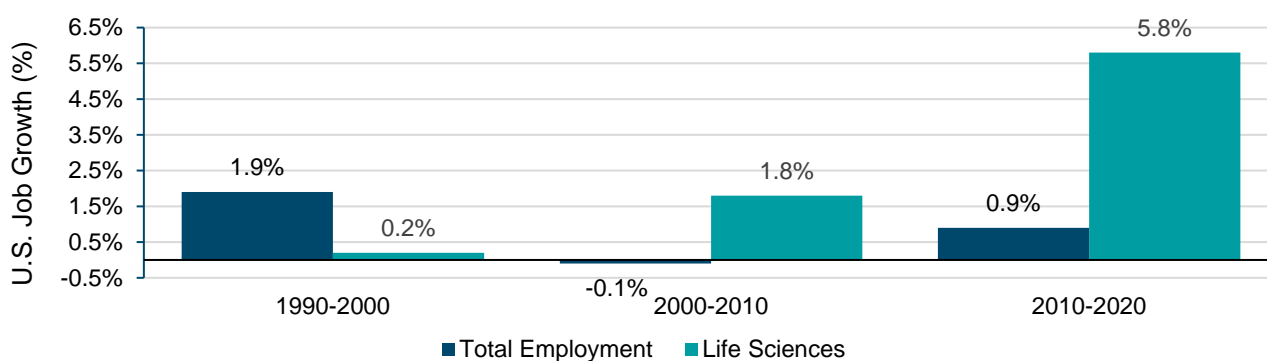
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The explosion in demand for life science has also been driven by technological innovations leading to outsized investments in this sector. The speed at which COVID-19 vaccines have been developed and rolled out is an impressive achievement for the pharmaceutical and biotechnology industries. Being able to leverage mRNA going forward would allow scientists to create new treatments for many currently incurable diseases. Moreover, advances in genetics-related research have spurred the direct-to-consumer ancestry market. Cell and gene therapies are improving patient drug therapy customization and the emerging utilization of artificial intelligence has promising implications in improving diagnostics. These innovations are forecast to maintain their momentum with double digit growth in the next five years.²

Although there are only approximately 245,000 people currently employed in the biotechnology industry, sector employment has been growing rapidly, having risen by 79% since the end of 2013—compared to 42%³ for total employment. Indeed, the life science industry has far outpaced the economy since 2000, accelerating during the last decade thanks to a robust pipeline of drug approvals as well as regulatory efficiencies in the approval process. More recently, even with a brief pause from February to May 2020, industry employment grew by 3.4% in 2020, even as the broader labor market fell by 7.2%.⁴

Importantly, life science employment is highly concentrated in two states, California and Massachusetts, which dominate the industry and account for 46% of all jobs. Other large concentrations are present in Pennsylvania, New Jersey, and North Carolina; these top five states together account for two thirds (66%) of all U.S. life science jobs.⁵

CHART 1. U.S. LIFE SCIENCE EMPLOYMENT GROWTH BY DECADE



Sources: U.S. Bureau of Labor Statistics. As of 1Q 2021.

Life science research and development (“R&D”) require significant capital investment. The National Institutes of Health (NIH), venture capital groups and company directed R&D programs are the primary sources of capital in the major life science markets.

1. The National Institutes of Health (NIH)

Government research grants are the primary source of funding for academics and medical practitioners. The grants are directed to major medical research institutions and universities and typically increase over time. NIH funding grew by 30% between 2015 and 2019, or almost 7% annually, and by another 5% to \$42 billion in 2020. Roughly 50% of all NIH funding goes to established life science markets in the Northeast Corridor, from Boston-Cambridge to Washington, D.C.- Baltimore, and to California (San Francisco Bay Area and San Diego markets).⁶

² Cushman & Wakefield. As of 1Q 2021.

³ Cushman & Wakefield. Data as of 1Q 2021.

⁴ Moody’s Analytics. Data as of 1Q 2021.

⁵ Cushman & Wakefield. As of 1Q 2021.

⁶ U.S. National Institutes of Health. As of 1Q 2021.

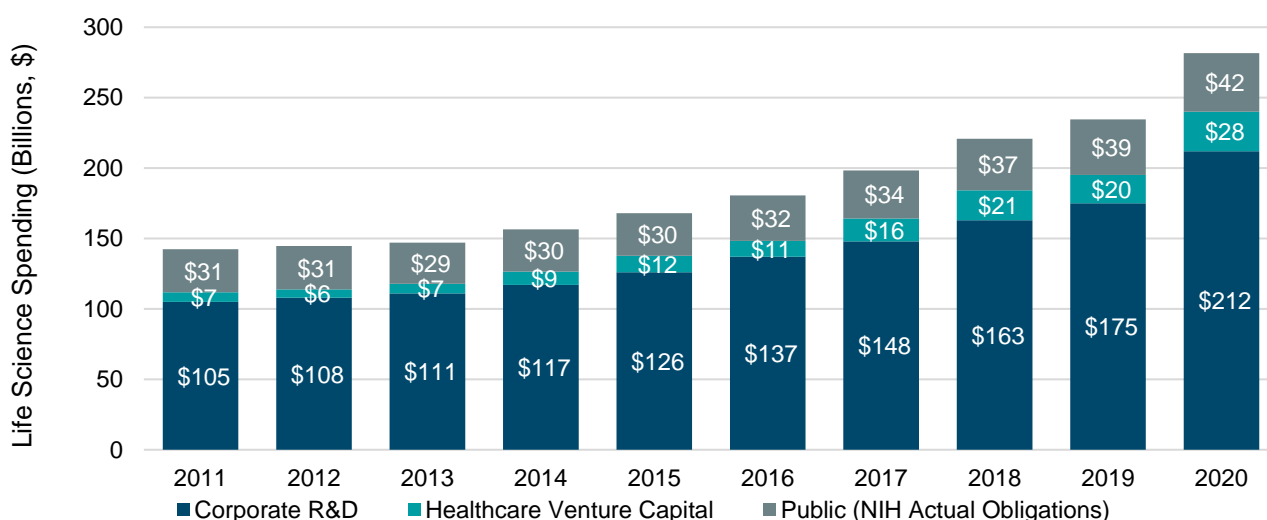
2. Venture Capital (VC) Funding

While the NIH focuses on research, venture capital (VC) focuses on the commercialization of life science products. VC funding in the life science industry has exploded from about \$4 billion in 2008 to an all-time high of \$28 billion in 2020, a 40% increase from 2019 level. With the industry clustered in a few select areas with established histories in biotechnology and pharmaceuticals, the top life science markets are capturing most of the VC funding. The top two markets, the San Francisco Bay Area and Boston-Cambridge, have seen the strongest influx of funding historically, receiving more than half of the total VC funding over the past five years.⁷

3. Corporate Research & Development Spending

Corporate research & development is the biggest source of funding and the most difficult to track. It includes R&D spending by corporations, largely pharma companies. In 2020, R&D spending by corporations was estimated to be \$212 billion, twice the amount recorded in 2011.⁸

CHART 2. U.S. LIFE SCIENCE PUBLIC, PRIVATE AND CORPORATE R&D SPENDING



Note: Corporate R&D spending based on publicly traded pharmaceutical, biotechnology and life science companies with operations in the U.S.
Sources: S&P Capital IQ, CBRE Research, NIH, PwC MoneyTree & DWS. As of 1Q 2021.

Without a doubt, 2020 has been a record year with almost \$300 billion invested in the U.S. life science industry.⁹ Along with strong demographic trends, a likely consequence of the COVID-19 pandemic will be an increased focus on biotechnology solutions.

⁷ PwC MoneyTree & DWS. Data as of 1Q 2021.

⁸ S&P Capital IQ, CBRE Research. As of 1Q 2021.

⁹ S&P Capital IQ, CBRE Research, NIH, PwC MoneyTree & DWS. As of 1Q 2021.

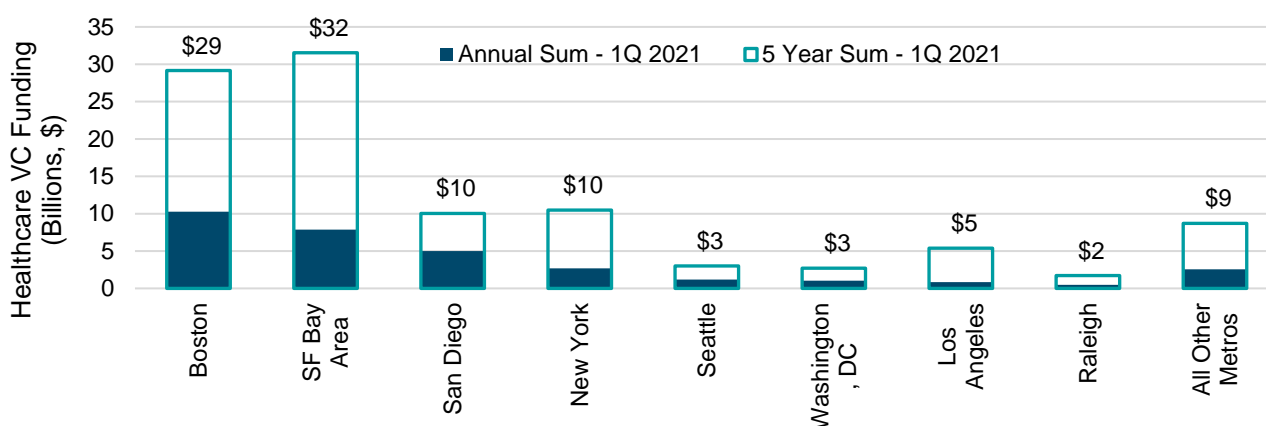
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2 / U.S. Life Science Super Clusters

Relative to the traditional office sector, the life science industry is mostly present in clusters throughout the nation that share a few key elements. First, and probably one of the most important, is access to a strong and reliable talent base. Second is proximity to leading research institutions that are focused on medical and life science research. Third is funding, which comes in the form of venture capital, public funding through NIH or company directed R&D spending. The handful of markets that are fueling the bulk of the growth in the industry offer the nation’s largest and most concentrated life science and R&D labor force, capture most of the funding from the NIH and venture capital, and offer the largest inventories of leasable life science space. Successful clusters are difficult to create and tend to take 15 to 20 years to form.¹⁰ Once established, success breeds success as more companies look to build a presence to benefit from the ecosystem.¹¹

The major clusters have benefited from significant demand over the past few years, fueling strong real estate fundamentals and returns. Boston-Cambridge and the San Francisco Bay Area are the top two U.S. life science markets, followed by San Diego. These three markets have accounted for about 70% of VC allocations since 2016. The next tier includes the Washington, D.C. – Baltimore region, Raleigh-Durham (including Research Triangle Park), New Jersey/New York, and Seattle.

CHART 3. HEALTHCARE VC FUNDING BY MAJOR CLUSTERS



Sources: PwC MoneyTree & DWS. As of 1Q 2021.

Boston continues to dominate life science activity and real estate development, historically attracting approximately a quarter of all venture capital funding.¹² Biotechnology startups tap into the nation’s largest annual graduating pool of people with life science-relevant degrees. Many with those skills are also relocating to the Boston area as its high concentration of life science jobs reduces career risk in case of job turnover. Large biopharma firms are attracted to the entrepreneurial attitude common in the Boston market and continue to grow their footprint.

Boston’s life science real estate market boasts more than 35 million square feet (MSF) of inventory. The metro’s life science vacancies are very tight, less than 2% in the East Cambridge submarket and less than 4% for the entire market.¹³ Consequently, Boston has some of the highest rent levels and growth rates in the nation. Life science rents grew by more than 6% and reached more than \$100 per square foot for high quality life science product in 2021, while traditional offices

¹⁰ ARE. As of 1Q 2021.

¹¹ RBC Capital Markets. As of 1Q 2021.

¹² PwC MoneyTree & DWS. Data as of 1Q 2021.

¹³ CBRE, C&W & DWS. Data as of 1Q 2021.

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remained tested by the COVID-19 pandemic. Large owners of institutional grade assets include top tier life science and medical REITs.¹⁴

The San Francisco Bay Area, like Boston, has a very strong life science presence and solid market fundamentals. The metro's highly educated workforce, coupled with proximity to elite research institutions such as UCSF, Stanford and UC Berkeley have made the San Francisco Bay Area one of the most elite and active life science clusters in the world.

The majority of life science product is located across three major areas: San Francisco proper, the San Francisco Peninsula, and the East Bay. At over 38 MSF of life science inventory, San Francisco continues to experience aggressive industry expansion.¹⁵ Market demand has created a continually landlord-friendly market with developers adding 5.2 MSF of new space over the last six years. The market has 3 MSF currently under construction and more than 16 MSF at various stages of planning.¹⁶ As in Boston, the ownership of institutional grade properties is spread across the top three life science and medical REITs, which hold more than 60% of the region's total life science inventory.¹⁷

San Diego, the third life science market in the nation, continues to evolve at a rapid pace. The core of San Diego's life science industry is anchored in the coastal suburb of Torrey Pines. The metro is home to more than 1,500 life science companies and more than 80 independent and university-affiliated research institutes.¹⁸ Limited supply has encouraged developers to search for opportunities beyond traditional life science submarkets to convert older buildings to lab or build new speculative projects to meet rising demand.

Washington, DC is the top biotechnology, gene and cell therapy hub in the country. It has the nation's largest concentration of life science workers in both government-related as well as venture-capital and publicly funded institutions. The industry is heavily concentrated in Montgomery County, Maryland, where innovation is centered around the National Institutes of Health, the National Institute of Standards and Technology, and the Food and Drug Administration. The metro's limited supply of life science product will likely lead to increasing investment with a focus on conversions of existing underperforming assets as well as ground-up development.

Raleigh/Durham comprises one of the world's largest life science clusters, consisting of over 600 companies employing more than 38,000 skilled workers. The Research Triangle Park is home to many life science giants that are drawn to the market because of its robust talent pool and research universities. In addition, a low cost of living and geographic advantages makes Raleigh/Durham a global leader in life science and biotechnology. The market has traditionally been suburban focused, but limited availability is drawing lab users to downtown locations.

Seattle is also emerging as a national life science hub. The Gates Foundation and Fred Hutchinson Cancer Research lead over 1,000 life science organizations across the state, many in the biotechnology and drug discovery fields. Most companies in the life science sector have gravitated toward the South Lake Union submarket just north of the Seattle central business district. With vacancy extremely low and pricing on the rise in the core submarkets, other suburban submarkets have begun to expand further as well.¹⁹

While New Jersey & Philadelphia remain major biopharma and drug development hubs, New York City is seeing outsized interest. A top life science publicly traded REIT is actively increasing its dominance in the city and building one of the major life science projects in Lower Manhattan, named Alexandria Center for Life Sciences.

Other rapidly evolving life science markets include Los Angeles, Chicago, Orange County, and Denver-Boulder.

¹⁴ ARE, BioMed Realty & Healthpeak. As of 1Q 2021.

¹⁵ Cushman & Wakefield. As of 1Q 2021.

¹⁶ Cushman & Wakefield. As of 1Q 2021.

¹⁷ ARE, BioMed Realty & Healthpeak. As of 1Q 2021.

¹⁸ Cushman & Wakefield. As of 1Q 2021.

¹⁹ CBRE. As of 1Q 2021.

3 / Life Science Investment Outlook

Strong demand and abundant funding have resulted in healthy fundamentals for U.S. life science real estate. Occupancies have stayed relatively stable throughout history, significantly outperforming traditional office, especially during the pandemic, given the acute need for vaccines and therapeutics.²⁰ Moreover, life science and medical workers require specially equipped locations to perform their duties and cannot work remotely as many traditional office workers could during the pandemic. Accordingly, in key research centers like Cambridge, MA, life science real estate vacancy has fallen to near zero.²¹

Low availabilities have spurred construction. Since early 2019, the amount of life science real estate grew by 12% to 95 MSF²², while the inventory of conventional office space grew by roughly 2%.²³ As of mid-2021, another 16 MSF of life science real estate was under construction in core markets. The industry's shift to biologics, which present less environmental risks than chemistry-based solutions, has led to life science space being developed or proposed in unconventional locations such as urban centers in Lower Manhattan and Downtown San Diego, and in multi-story buildings. Substantial expansion of life science inventories, coupled with the significant pipeline of new construction, might raise some concerns about overbuilding. However, current requirements for space far outpace total speculative construction.

There has also been a notable increase in conversions of other property types to life science to accommodate growing demand. However, it is important to understand the limitations of potential conversions. Life science buildings not only need to be in certain locations, but also have unique features that allow scientists to conduct applied/clinical research. Building heights are limited (about 14 stories) as hazardous material can only be used and stored on lower levels given safety and environmental concerns. Floor-to-floor heights need to be higher (14-15 feet) to accommodate stronger duct work and HVAC systems in order to quickly ventilate labs when necessary. Floor plans need to meet certain load, stiffness, and vibration requirements that can hold special equipment needed to conduct experiments. Excess land is also needed adjacent to the property to house cooling towers, generators, hazardous waste storage, lab gasses, and large truck docks.²⁴

While developers are being more aggressive converting buildings to lab use where possible, conversions still represent a fraction of the current construction activity. Planned 2021 conversions in the top five clusters represent less than 2% of existing inventory and only about 10% of total lab construction.²⁵ Converted buildings generally have limitations including less-desirable locations and inferior lab-use capacity and are therefore suitable for a smaller list of prospective tenants. Beyond the physical attributes, what sets life science apart from traditional office and ultimately assures success is the investor's ability to underwrite and manage tenants' needs. Some life science companies are new ventures and may lack financial history or real assets. More established tenants may be dependent on a successful clinical trial or regulatory approval to ensure continued financial viability.

Despite the ongoing COVID crisis, real estate investors continued to report superior performance in their life science portfolios, strong leasing momentum and outsized rental growth relative to traditional office.²⁶ Rent growth was particularly strong in 2020, reaching 3.5% annually, while traditional office rents slumped.²⁷ Favorable supply-and-demand dynamics supported strong NOI performance in almost all leading life science markets. Over the past ten years, life science NOI grew by 5.9% annually, more than double that of the traditional office sector (2.5%). Capital expenses could be significant given the specialized equipment used by life science tenants. Yet to the landlord's advantage, tenants also participate with capital in the build out and maintenance of the space and leases are usually triple net and extend for long periods of time.

²⁰ Costar. As of 1Q 2021.

²¹ Cushman & Wakefield. As of 1Q 2021.

²² CBRE. As of 1Q 2021.

²³ CBRE-EA. As of 1Q 2021.

²⁴ RBC Capital Markets. As of 1Q 2021.

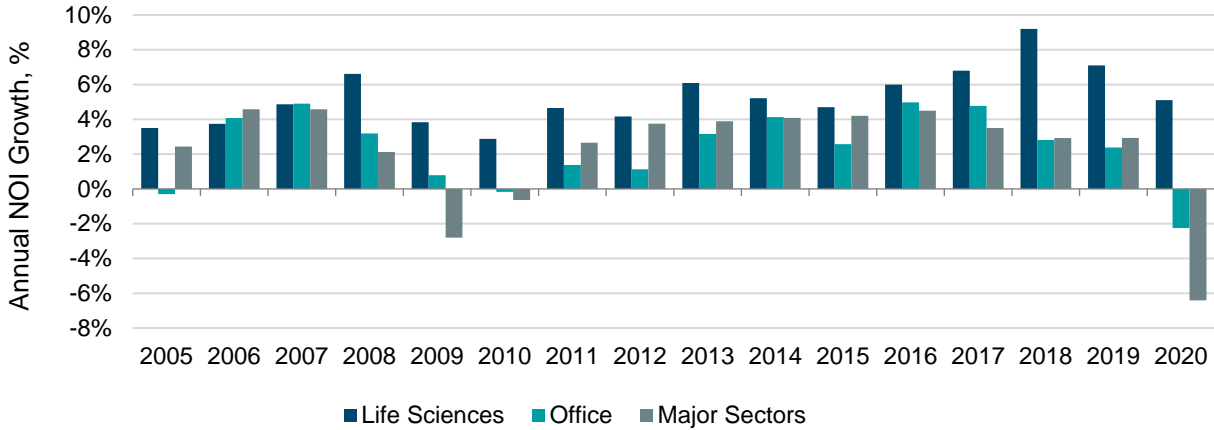
²⁵ RBC Capital Markets. As of 1Q 2021.

²⁶ ARE. As of 1Q 2021.

²⁷ Costar, CBRE-EA. As of 1Q 2021.

The sector has also been resilient during prior recessions, outperforming the traditional office sector and the broader U.S. real estate market. Supported by significant demand and record public and private funding, the life science sector may continue to outperform. According to Green Street, NOI is expected to grow by 3.8% annually over the next five years, outpacing the office sector (2.0%) and a broader composite of major sectors (2.9%).²⁸

CHART 4. U.S. LIFE SCIENCE NOI GROWTH



Note: Major Sectors is the equal-weighted average of Apartment, Industrial, Mall, Office, and Strip Center. Sources: Green Street Advisors (GSA) & DWS. As of 1Q 2021.

Life science cap rates are continuing to compress on the back of increased investor interest. According to Green Street, life science cap rates were 4.8% in July 2021, almost 50 bps lower than those of traditional office.²⁹ Large REITs not historically active in the space as well as private equity funds are sourcing and deploying capital, a trend that is poised to continue.

CHART 5. GSA COMMERCIAL PROPERTY PRICE INDEX

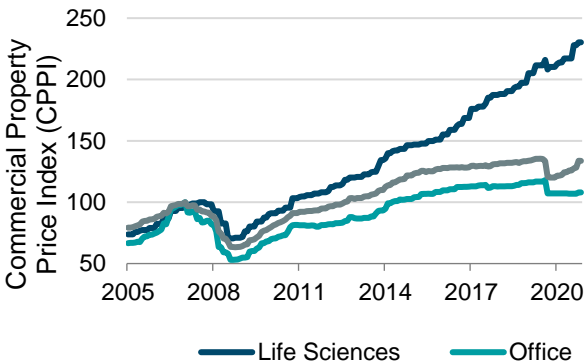
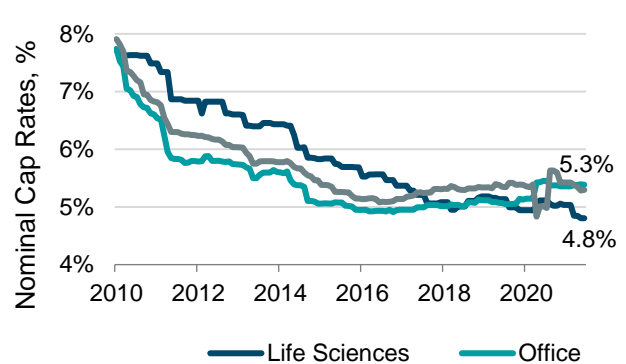


CHART 6. GSA NOMINAL CAP RATES



Note: Major Sectors is the equal-weighted average of Apartment, Industrial, Mall, Office, and Strip Center. Sources: Green Street Advisors (GSA) & DWS. As of 1Q 2021.

High quality assets located in core life science nodes will likely continue to be in high demand, in our view. They tend to attract the highest occupancy and maintain outstanding NOI performance. As life science companies prefer to reside in the top clusters that foster collaboration and innovation, we expect future demand, from both tenants and investors, to continue to favor Boston, San Francisco, and San Diego, pushing vacancy rates lower, rents higher, and creating new development opportunities.

²⁸ Green Street. As of 1Q 2021.

²⁹ Green Street. As of 1Q 2021.

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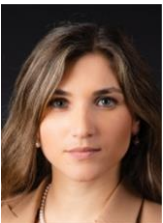
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